# 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E M SYMMES

The concentration of weak nitric acid. G PAYRAS. *Rev gén. mat plastiques* 6, 147–51(1930).—A description is given of the Chem Construction Co 's Fr pat. 656,108 (*C A* 23, 4026) A PAPINEAU COUTURE

Vanadium as a catalyst for sulfuric acid manufacture in America. ENSIO ALHOPURO *Acta Chemica Fennica* 3, 112–4(1930).—The characteristics of V catalysts now used in plant operation are given The best results are obtained by the Selden V mass and the new converter developed by A O Jaeger, which give as high as 98% conversion In present day plant operation V gives a higher av conversion than Pt, because Pt is contaminated with traces of As and Cl The price of Pt is 184–253 times the price of V, but the high return value of Pt catalysts and the high price of licenses for V catalysts make this proportion lower $H_2SO_4$ plants which were operated or built in 1929 and which use the Selden converter system have a total capacity of more than 300,000 tons of $H_2SO_4$ per year The total production of $H_2SO_4$ by the contact process in the U S during the same year was 1,870,000 tons as 100% acid S A KARJALA

Potash. GEO W STOCKING *Chem Markets* 28, 247–52(1931).—The industry in Germany is described. E H

A study of the properties of polyhalite pertaining to the extraction of potash. VI Experiments on the production of potassium chloride by the evaporation of leach liquors from decomposition of uncalcined polyhalite by boiling saturated sodium chloride solutions. H H STORCH AND F FRAAS. Bur Mines, *Rept of Investigations* 3062, 7 pp (1931), cf *C A* 25, 1338.—Evapn of 90% of the $H_2O$, interspersed with 3 crystn steps, will yield 78% of the $K_2O$ as crude KCl, the bulk of the impurities being NaCl This product may be refined readily by recrystn to produce pure KCl. A preliminary estimate indicates about $20 a ton as the cost of production at the plant. A. H. E.

The acids and acid salts which contaminate cream of tartar. FILIPPO PERCIABOSCO *Atti III congresso naz chim pura applicata* 1930, 520–5.—Some cream of tartar contains appreciable quantities of $Ca(C_4H_5O_6)_2$ instead of KCl E. M. S

Quinquennial review of the mineral production of India for the years 1924 to 1928. Phosphates. E H PASCOE *Records Geol Survey India* 64, 413–21(1930).—Apatite is known in many parts of India, some deposits assaying 20–25% $P_2O_5$. Nodular deposits of lime phosphate also occur ALDEN H. EMERY

A brief history of the world's phosphate rock production. A. N. GRAY. *Superphosphate* 4, 25–46(1931).—Historical notes relating to the discovery of phosphate deposits and the early production of phosphate rock in all parts of the world are given. The world's annual production of phosphate rock by countries is given for the years 1847 to 1929 K. D. JACOB

Dehydration of salts of phosphoric acid. S. S. DRAGUNOV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 409–16(1930).—Graphs show the transformations of the salts of Na, K and Ca or phosphoric acid upon drying. From these it is possible to judge the % of pyro- and meta-modifications formed, as well as the speed of the transformations at various temps. With the loss of $H_2O$ of crystn. $CaHPO_4.2H_2O$ becomes less sol in citrate soln. At 100° only 4% of the $H_2O$ of crystn was lost in 1.5 hrs. At 150° 19% was lost in 20 min It is important not to dry phosphate very much above 100° for any period of time (not more than 30–50 min. at 100°). Ca metaphosphate, insol. in acid, can be hydrated in the autoclave at high pressures and brought back to the sol. state J. S. JOFFE

Utilization of the gases obtained in the process of volatilizing phosphorus and the production of soluble phosphates. A. P. DUNAEV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 397–409(1930).—The relation of $H_2O$ and O from the air to the system: P, $PH_3$, CO, H, in which a reaction of selective oxidation of generator gas takes place was investigated A modification of the app. used by Britzke and Pestov (cf. *C. A.* 24, 208) was necessary. A description and drawing of the new app. are given. The exptl. data obtained show that the oxidation of P with $H_2O$ over CaO at a temp. from 550° to 950° is completed to phosphoric acid at fairly rapid velocity of the gas stream. Very little $PH_3$ is found in the gases, and the sum of CO + H is not decreased. The materials used for oxidation contained no phosphates. In the oxidation of the gases with air no excess of O was necessary in the process, except what was needed for the oxidation of P. At the lower limits of temp no O is used up by the CO The generator gases used in this manner can be used again for heating or other purposes. After

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# CHEMICAL ABSTRACTS

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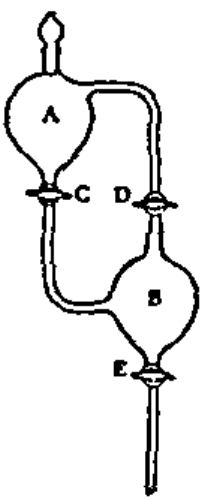
## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A new high-efficiency glass condenser. PAUL R. CRANDALL. *J. Lab. Clin. Med.* 16, 89–91(1930).—A glass condenser is described which may be used in an all glass distg. system. Approx. 2 l. of distd. $H_2O$ per hr. may be produced. E. R. MAIN

A simplified apparatus for the extraction of liquids. R. B. FORSTER. *Chemistry and Industry* 50, 44(1931).—The app. was designed for extg. $H_2O$ solns. with lighter solvents. A tube from the closed bottom of the cylindrical extractor connects with the boiling flask. A by-pass from this tube enters the extractor about half-way up, serving as a passage for the vapor to the condenser on top and as a return for the solvent to the boiling flask. The soln. to be extd. is placed in the lower half of the extractor, the condensate falls into a thistle tube which delivers it at the bottom of the soln., through which it rises and overflows to the boiling flask, its rise being impeded by baffles attached to the stem of the thistle tube. Cf. *C. A.* 20, 3817. J. H. MOORE

A separatory funnel for washing heavy volatile liquids. HAROLD S. KING. *Proc. Trans. Nova Scotian Inst. Sci.* 17, 240–1(1930).—Two separatory funnels are sealed together in such a way (see fig.) that a heavy liquid in the first can be sepd. from a supernatant liquid and delivered to the 2nd funnel without contact with the outside atm. After removal of the supernatant liquid, the heavy liquid can be returned to the first funnel for rewashing. RACHEL BROWN




An improved pipet manipulator. D. C. B. DUFF. *J. Lab. Clin. Med.* 15, 1027–8(1930). E. R. MAIN

Improved slow-combustion pipet for gas analysis. H. R. AMBLER. *J. Sci. Instruments* 8, 18–9(1931).—O is led into the gas through a capillary side tube entering near the bottom of the Hg in the pipet, thus preventing back-diffusion of the gas. Analyses by absorption in liquids may be made by bubbling the gas through the side tube. J. H. MOORE

Automatic gas-analysis apparatus based on the thermal conductivity of gases, and its use in industry. PAUL JARRIER. *Chaleur et ind.* 11, 181–5(1930).—A table of densities, viscosities and thermal conductivities of air, $N_2$, $O_2$, CO, $CO_2$, water vapor, $H_2$, $C_2H_2$, $CH_4$, lighting gas, $NH_3$ and $SO_2$ is given. The Ranarex app. is described, it gives good results. The principle of the Dommer "Unograph" is illustrated and described. The Siemens elec. $CO_2$ indicator is described. The elec. measurement of the thermal conductivities of mixts. of gases and its applications are discussed. S. L. B. ETHERTON

A thermal method for the rapid measurement of carbon monoxide. GERHARD STAMPE. *Messtech.* 6, 267–70(1930).—The Drager app. is described. It depends on measuring the temp. of the gas on entering and leaving a catalyzing chamber in which it is oxidized to $CO_2$. The theory is discussed, with 7 references. Cf. *C. A.* 24, 5897. J. H. MOORE

Determination of humidity. G. ALIVERTI. *Nuovo cimento* 6, cxvii–cxxiii(1929).—A discussion of the use of various types of hygrometer. B. C. A.

A convenient hydrometer for determining the specific gravity of heavy liquids. A. C. TESTER. *Science* 73, 130–1(1931).—The app. was devised for liquids of sp. gr. between 2.0 and 5.0 for use in *the sepn. of minerals*. Only 5 cc. of the liquid is necessary. The sp. gr. of solids may also be detd. J. H. MOORE

An improved portable $p_H$ apparatus. ARAO ITANO. *Ber. Ohara Inst. landw. Forsch.* (Japan) 4, 471–4(1930); cf. *C. A.* 23, 3602.—The app. previously described has been changed to make one instrument serve as both galvanometer and millivoltmeter; it is manipulated by means of a newly constructed double-throw switch. The

wiring diagram and a photograph of the app are shown The instrument measures the e m f of the cell quinhydrone, standard $p_H$ soln | saturated KCl | sample, quinhydrone N. A LANGE

Deposition filter process. ARMIN BLUMENTHAL. *Pharm. Presse wiss prakt Heft* 1930, 165–6 —Several illustrations are given of an improved type of filter for large operations, it has compartments filled with frames carrying wire gauze on which the filter mass (asbestos or other suitable material) is flooded and deposited in thin paper like layers The various operations are carried out under pressure and suction W. O I

The Schacht-Wheel drier. VON BEZOLD *Chem App* 17, 217–8(1930) —The drier contains a series of cylinders vertically arranged, over which the material is passed and drops to the wheel below Hot air is blown upward The drier will not operate with materials which are larger than hazel nut size or which are sticky or liable to cause explosion M C. ROGERS

The sucking off and precipitation of dust and vapors. A VOGT. *Chem App* 17, 209–10(1930) —The app is arranged so that gases contg dust are put in contact with a stream of water and passed into a settling tank The sludge settles and the clear liquor overflows to a launder and is pumped again to the mixing chamber The settled sludge can be pumped off through a discharge opening in the bottom of the settler M C. ROGERS

An instrument to measure soil consolidation. CORNELIUS DAVIES. *J. South-Eastern Agr Coll., Wye, Kent*, No 27, 225–7(1930) —An instrument for measuring the compactness of soils consists of 2 telescopic tubes within which is a supported spring balance so arranged that a push on the handle of the appliance extends the spring, a scale calibrated in 0 5 lb , a max reading indicator; and a set of steel probes of different lengths and diams K. D JACOB

Illumination of the half-shadow polarimeter with a mercury-quartz lamp HANS N. NAUMANN *Biochem Z* 229, 269–70(1930) —The use of the Hg-quartz lamp as a source of illumination increases the accuracy of the polarimeter 2-3 times, this is of great significance in the study of weakly rotating substances S MORGULIS

Theory of optical pyrometers and description of some new improvements. S HELD *Chaleur et ind* 11, 403–10, 473–80(1930) S L. B ETHERTON

Leonard Hill acetone-methylene blue actinometer. T. W. B OSBORN AND A D STAMMERS *Brit J Actinotherapy* 5, 68–9(1930) —Exclusion of air is essential for securing reproducible results B C. A

An air-thermostat for corrosion research. U R. EVANS. *Chemistry and Industry* 50, 66–7(1931) —A uniform temp is maintained by forced circulation of air from the chamber through channels between the double walls and back to the chamber The elec. heating is controlled by an adjustable contact thermometer J H MOORE

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Photoelectric cell has definite place in color measurement (SCOTT) 25. Electrometric measurement of very low pressures by means of ionization currents, the space charge manometer (MOLTHAN) 2. Apparatus for determining the tendency of coal and other materials for spontaneous combustion (KREULEN) 21.

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DUBSKÝ, J V. Selbsttätige Filtrationsapparate. Leipzig Georg Thieme 64 pp M. 3 Reviewed in *Chem News* 142, 110(1931)

RABALD, ERICH. Werkstoffe Physikalische Eigenschaften und Korrosion. Band I. Allgemeiner Teil. Metallische Werkstoffe Band II. Nichtmetallische Werkstoffe. Leipzig Reudnitz Verlag von Otto Spamer Stitched, M. 128, bound, M 135

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Gas filters. RENÉ LAHALLSSOIS Fr 693 035 Mar 29, 1930 *Pilous surfaces are* obtained for gas filters with filaments submitted to a treatment such as the action of an electrostatic field so that they become stuck automatically at one end to an adhesive previously applied to the filtering surfaces

Rotary screen and filter apparatus for reclaiming solid particles from gases. FRANK J McDEVITT U S 1 791,102, Feb 3 Structural features

Centrifugal dust separators. Soc HENRY SIMON, LTD., and GEORGE WATTS Fr 693,823, April 12, 1930

Combined hydrometer, liquid casing and suction bulb. J H COLLIE Brit. 335 698, Aug 29, 1929

Humidistat. EDWARD A PORTER. U S 1,791,375, Feb 3,

Calibrated viscometer. RICHARD VON DALLWITZ-WEGNER Ger. 515,270, Jan. 19, 1926

Hydrometer syringe for indicating specific gravity of liquids. ELLIS H BRIDGE (to Electric Storage Battery Co.) U S 1,790,696, Feb 3 Structural details

Apparatus for the agitation and sedimentation of liquids and solids in suspension. THE DORR CO Fr 692,797, Mar 20, 1930

Apparatus for delivering liquids in measured quantities. WERNER HANDELSGES Ger 515,270, June 4, 1927

Apparatus for evaporating and concentrating liquids by passing them through a heated centrifuge MARTIN J KERMER U S 1,791,317 Feb 3 Structural features

Apparatus for effecting hydrogenations and other catalytic reactions between gases and liquids. RING GES. CHEM UNTERNEHMUNGEN M B H Ger 515,417, Jan 25 1922

Apparatus for treating gases with atomized liquids. STELLAWERK A G VORM WITTSCH & CO Ger 514,413, Apr 3 1930 Addn to 512,128 (*C A* 25, 870)

Apparatus for regulating and indicating the density of mixed gases. SMOOT ENGINEERING CORP Ger 515,257 Jan 29 1928 See U S 1,682,689 (*C A* 22, 3800)

Gas washing apparatus. H A BRASSERT (to H A Brassert & Co., Ltd.) Brit 335,648, July 6, 1929 Various structural details are described of an app comprising alternate rows of oppositely rotating or fixed and rotating bars grouped around an axis and fixed nozzles spraying the bars in an outward direction Cf *C A* 24, 1254

Apparatus with shields for reducing radiation effects in gas temperature determinations. ROBERT F WILSON U S 1,791,020, Feb 3 Structural features

Surface condenser suitable for condensing steam. CHARLES A PARSONS and FREDERICK ARKLESS (Arkless to Parsons) U S 1,790,834, Feb 3

Evaporator calandria, etc. OSCAR H WURSTER. U. S. 1,791,296, Feb 3 Various details are described of an evaporator suitable for evapn of crude glycerol

Shaft drier, with grinding or comminuting means. BERNHARD SÄGEBARTH Ger. 515,443, Oct 21, 1927

Centrifugal apparatus for dewatering linters, wood cellulose, etc. GEBR BELLMER MASCHINENFABRIK. Ger 515,463, Nov 22, 1929 Addn to 496,050 (*C A* 24, 3139).

Röntgen-ray tube. C. H. F. MÜLLER A.-G Brit 335,510, Aug 27, 1929 Structural and elec. features

Cathodes for electron tubes. HERMANN LOOSLI Ger 515,095, Jan 25, 1924. Cathodes, comprising an alk. earth oxide on a core of difficultly fusible metal, are prepd by dipping the core into molten alk earth metal, which is heated *in vacuo* or in an inert atm., and then oxidizing the metal coating on the core Alternatively, the core may be embedded in a powd. mass of alk. earth metal which is heated *in vacuo* or in an inert atm.

Electric discharge tubes. J. E. LILIENFELD. Brit. 335,537, Oct. 3, 1928 Various details of manuf. are given of tubes which may be used for the production of Röntgen rays and which may have a cathode of W or Ta pointed by etching and activated by Cs evapd in an adjacent tube.

Photoelectric cell. N V PHILIPS' GLOEILAMPENFABRIEKEN. Fr 693,043, Mar 29, 1930 A photoelec. cell contains a photoactive substance such as Cs spread on an intermediate layer contg. a chem compd and particles conducting electricity. The Cs is produced in the cell or in a chamber communicating with it by heating a mixt contg a compd. of Cs such as Cs chromate and a reducing agent such as Zr. The mixt. also contains a chem compd. which during the heating is volatilized or reacts with the reducing agent present to form the intermediate layer Cf. *C. A.* 24, 2336.

Muffle furnace for calcining "chemicals," pigments or other pulverulent materials. R KRAUSSE Brit. 335,659, July 11, 1929 A muffle or retort extends through a furnace fired by burners and is suspended by blade springs so that it may be continuously reciprocated to convey the charge gradually from the inlet to the outlet end Various details of construction are described Cf *C A.* 24, 3106

Apparatus for controlling furnace combustion in accord with furnace boiler pressure variations. CHARLES M. TERRY (to A W Cash Co.) U. S 1,790,685, Feb 3

Retort for stoker furnaces. WM. F. RIEGER (to Stoker-Matic Corp.) U S 1,790,840, Feb 3

Smoke inspection apparatus for boiler furnaces. ROBERT H. WAGER. Ger. 515,258, Feb 24, 1929 Corresponds to Brit 327,812

Roofs for industrial furnaces. MAURICE GILBERT. Fr. 693,588, April 9, 1930

Suspended roofs for furnaces. SOC. ANON. DES FOYERS AUTOMATIQUES Fr. 692,542, Mar. 21, 1930

Closures for annealing or melting furnaces. Akt.-Ges. Brown, Boveri & Cie Fr 693,214, April 3, 1930

Feeding device for crude lignite trough-grate furnace. Frankel & Viebahn Ger 515,403, Dec 8, 1928

Tuyère for underfeed stokers. Robert A Foresman and Donald J. Mossbart (to *Westinghouse Elec and Mfg Co*). U S 1,791,269, Feb 3

Step-grate Josef Martin Ger. 515,135 and 515,136, Dec 15, 1926

Device for separating dust from gases from rotary kilns, etc. Eisen- und Stahlwerk Hoesch A G Ger 515,188, June 6, 1929

Tilting plant for rotary drum ovens, etc. Gewerkschaft Eisenhütte Westfalia Ger. 515 041, Jan 10, 1929

Stamping device for use with rotary tube ovens. Gewerkschaft Eisenhütte Westfalia Ger 515,392, Nov 21, 1929

Fan for increasing the draft in annular kilns and for cooling the discharge chamber. Gustav Schröder Ger 514,380, May 4, 1930

Recording analyzer for industrial chemical control, more particularly of the purification of boiler-feed water. M. Reignier. *Belg 370 021, June 30, 1930* A wheel, operated by a drum which is released at regular intervals, carries 4 hinged beakers. *In position 1 the beaker is filled with the sample to be analyzed, in position 2* the titration is carried out and recorded, in position 3 the beaker is emptied, and at 4 it is righted again On the wheel are mounted spurs which open the cocks for the addn of the 3 reagents A photoelec. cell opens the cock of the buret and closes it again when the phenolphthalein is decolorized

Oil-feeding and -regulating device for oil burners. Wm R. Ray (to Ray Burner Co). U S 1,791,012, Feb 3 An automatic device is provided for varying the pressure on the oil in accordance with the temp of the surrounding atm

Gas burner. Alfred J Reedy (to A B Stove Co) U. S 1,791,247, Feb 3

Gas burner. Harry E Kerr (*to Barber Gas Burner Co*) *U. S 1,791,360*, Feb 3

Bunsen burners. Louis Martin Fr. 693,535, April 8, 1930 Constructional details.

Heat-exchange device suitable for heating or cooling liquids. Herbert V. Dalgliesh (to Research & Development Corp) U. S. 1,791,483, Feb 3 Structural features

Heat-exchange apparatus suitable for use as a condenser, etc. Stanley Brown (to Griscom Russell Co) U S 1,790,897, Feb 3 Structural features.

*Die-casting machine.* A C Spark Plug Co Ger 515,140, *April 19, 1929* Corresponds to Brit 332,277

Centrifugal casting machine for making hollow bodies in horizontal molds Aurelio Possenti and Carlo Scorza Ger 515,139, Aug 14, 1929

Suction box for felted-sheet-making machines Ostilio Severini (to Società Invenzioni Brevetti Anonima-Torino) U S 1,791,065, Feb 3 Structural features

Apparatus for continuous preparation of emulsions. Rudolf Auerbach U. S 1,790,967, Feb 3 Structural features.

Apparatus for sterilizing rags, etc, with hot air and steam. Heinrich Heli Ger 515,405, Nov 2, 1927

Acetylene generator. Dayton H Danley U S 1,791,194, Feb 3 Structural features

Acetylene generator, with counter-pressure chamber I G Farbenind A.-G Ger 514,437, Oct 8, 1929

Rubberized conveyor belts R S Carter (to Goodyear Tire & Rubber Co) Brit 335 475, April 16, 1929 The conveying surface is free from rubber so that it has *a low coeff of friction while* the driving surface is rubberized, and the belt may be formed of layers of fabric, some rubberized and some formed without rubber

Photographic *temperature-recording apparatus* (suitable for use in ships' holds). Ocean Steam Ship Co, Ltd, and R H Thornton Brit 335 644, July 6, 1929 Numerous structural details are described

Thermostatic device. E L Fonseca (to Wilcolator Co) Brit 335,819, Nov 27, 1928 Structural and mech details

Thermostatic device suitable for control of electric circuits Harold D. Eaton (to Bastian-Morley Co) U S 1 791,477 Feb 3 Structural features

Thermostatic electric switch. Wm A Rankin (to Robeson-Rochester Corp). U S 1 791,225, Feb 3 Structural features.

# 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

The life work of M. W. Beijerinck. JAN SMITH. *Chem. Weekblad* 28, 94-7 (1931).—A memorial address. G. G.

The scientific career of Henry Louis Le Chatelier. RALPH OESPER. *J. Chem. Education* 8, 442-61(1931). F. H.

Charles Edward Coates. W. L. OWEN. *Ind. Eng. Chem.* 23, 339-40 (1931).—Biography with portrait. G. G.

Reminiscences of Gibbs by a student and colleague. EDWIN B. WILSON. *Sci. Monthly* 1931, 211-27. E. H.

Wilhelm Holmeister. A. H. LARSON. *Plant Physiology* 5, 613-6(1930).—A biographical sketch accompanied by one plate. WALTER THOMAS.

Paul Julius. A. LOTTERINGHAUS. *Z. angew. Chem.* 44, 109-12(1931).—Obituary with portrait. E. H.

Håkan Sandqvist. ANON. *Svensk Farm. Tid.* 34, 633-4.—Obituary with portrait. A. R. R.

C. Willgerodt. O. HINSBERG. *Chem. Ztg.* 55, 85(1931).—Obituary. E. H.

Nobel prizes in chemistry and physics for 1930. H. Fischer and C. V. Raman. ANON. *Svensk Kem. Tid.* 42, 293-300(1930).—The accomplishments of these two scientists and their portraits are given. A. R. R.

Unrecognized and unknown facts about the origin of the combustion theory of Lavoisier. MAX SPETER. *Chem. Weekblad* 28, 79-82(1931); cf. *C. A.* 20, 1922(German).—The influence of Guyton de Morveau and Mitouart on Lavoisier is described. F. SCHOTTE.

Changing attitudes in the history of chemistry. J. N. SWAN. *J. Chem. Education* 8, 510-4(1931). E. H.

An analysis of the college entrance examination board examinations in elementary chemistry for 1921 to 1928. JACOB W. BOORSTEIN. *Science Education* 15, No. 2, 91-100(1931). E. H.

Questionnaire study of chemistry finances in South Dakota. RALPH DUNBAR AND J. ROBLEY LANE. *J. Chem. Education* 8, 565-7(1931). E. H.

An administrative study on the teaching of chemistry in the secondary schools of South Carolina. G. G. NAUDAIN. *J. Chem. Education* 8, 559-64(1931). E. H.

An experiment on the use of journal articles in teaching elementary college chemistry. HOYT C. GRAHAM. *J. Chem. Education* 8, 531-3(1931). E. H.

Dispensing laboratory solutions. CHARLES F. ECKELS. *J. Chem. Education* 8, 543-5(1931). E. H.

Fertilizer from the air. A project for chemistry students at the secondary-schools level. HOWARD R. WILLIAMS. *J. Chem. Education* 8, 462-70(1931). E. H.

An experiment on refracture index for the course in physical chemistry. CRAIG S. HOYT. *J. Chem. Education* 8, 537-8(1931). E. H.

Ashes and the remains of fuel found by the excavation of ruins of a seventeenth-century glass factory near the Keizergracht at Amsterdam. D. J. W. KREULEN. *Chem. Weekblad* 28, 97-102(1931).—The fuel used in this glass factory was a high-volatile coal of English origin. G. G.

Geochemical distribution laws and cosmic frequencies of the elements. V. M. GOLDSCHMIDT. *Naturwissenschaften* 18, 999-1013(1930); cf. *C. A.* 24, 1239.—An elaborate review of the distribution of elements in the different spheres of the earth and in stellar bodies. It is concluded that the manner of distribution of the elements is detd. by properties of their electron shell; the frequency of occurrence of each type of atom, however, is detd. by properties of the nucleus. This frequency of occurrence is apparently the same in all parts of the cosmos. B. J. C. VAN DER HOEVEN.

Changeable mass and the second law. S. MONOROVIĆ. *Arhiv Hem. Farm.* 4, 169-74(174-5 German)(1930).—Mathematical. J. KUČERA.

The calculation of chemical, electrical and gas-mechanical transformations of matter, energy and form by space energetics. RICHARD VON DALLWITZ-WEGNER. *Z. Elektrochem.* 37, 25-33(1931).—On the basis of space energetics the equations derived for cohesion pressure, the processes in the Daniell cell, the mechanism of the galvanic cell, contact and thermal electricity, gas laws, efficiency and entropy are discussed. H. STOERTZ.

Immersion liquids for determining refractivity of solid substances by the embedding method. A. MAYRHOFER. *Mikrochemie* 3, 52-71(1931).—Purpose. To establish a

standard series of immersion mixts. of a few liquids which could replace the numerous embedding fluids that have been proposed in the literature. The mixts.—water glycerol, cineole-paraffin oil paraffin oil-α-bromonaphthalene, α bromonaphthalene-$CH_2I_2$—are considered standard mixts. of the first line The following mixts. have high $n$ and by dilu with mixts. of lower $n$ often serve for direct refractometric testing paraffin oil $CHBr_3$, $CHBr_3$-α-bromonaphthalene, $CHBr_3$ $CH_2I_2$ The percentage compns of the mixts. studied were detd. by careful measurement of the ingredients in microburets *The regularities with respect to the refraction* corresponding to the mixt rule, the effect of keeping the mixts. for some time and the effects of temp were studied W. T. Hall

Electrometric measurement of very low pressures by means of ionization currents the space charge manometer. Wilhelm Molthan *Z tech Physik* 11, 522–9(1930).—By the use of an electrometer method the sensitivity of pressure measurement by ionization can be raised from $10^{-7}$ mm Hg to as low as $10^{-10}$ mm Hg A measuring tube with 4 electrodes is used in a circuit with electrometer and 2 triodes, calibration method and details are given B. J. C. van der Hoeven

The development and present state of our knowledge of the natural system of elements (centenary of Lothar Meyer's birthday). F. Paneth *Naturwissenschaften* 18, 964–76(1930).—A review B. J. C. van der Hoeven

The ozone of the upper atmosphere. Ch. Fabry *Scientia* 49, 11–22(1931).—This is a summary of the evidence relating to the presence and manner of distribution of ozone in the atm The evidence is derived principally from the absorption spectra of the sun and stars. *If the ozone in the atm. were uniformly distributed* its concn. would be 60 mg per 100 kg of air Actually, at the earth's surface, air contains about 3 mg of ozone per 100 kg Most of the ozone is distributed in the upper regions of the atm at altitudes which are variable, and which are estd. to be from 20 to 50 kilometers. *If the atm ozone were segregated it would form a layer about 3 mm. thick* at atm pressure The thickness of this layer, however, varies between extreme limits of 2 and 4 mm due to seasonal and irregular causes The origin of atm ozone is uncertain Speculations are advanced regarding the relation of atm ozone to certain *phenomena of the upper atm It is estd that atm. ozone is responsible for the absorption* of about 4% of the sun's energy that is incident on the upper atm. R. H. L.

Unit of atomic weight. F. W. Aston *Nature* 126, 953(1930).—None of the suggestions so far advanced for a new unit of at. wt is free from objections While extreme accuracy *is not vital for chemists, physicists now need an accuracy of 1 in 10 000* Gregg M. Evans

Magnetic rotary power of hydrocarbons in the gaseous state. R. de Mallemann and P. Gabiano. *Compt rend* 191, 1319–20(1930).—By using $\lambda = 578$ mμ, the Verdet const., *sp and mol rotations for methane, ethane, propane, butane,* isopentane and hexane were detd for the gaseous state and, for the 3 latter, in the liquid state The dispersion ratios for $\lambda = 546$ mμ and $\lambda = 436$ mμ are 1.125 and 1.84 for all the hydrocarbons F. W. Laird

The magnetic rotatory polarization of fused organic substances. Constantin Salceanu *Compt rend.* 191, 1316–8(1930), cf *C. A* 24, 3682.—The variation with temp of the magnetic rotatory power and magnetic double refraction of fused naphthalene and β methylnaphthalene was detd for 3 Hg lines There is a slight convexity toward the temp. axis of the rotation temp curve which is the opposite of that obtained for the magnetic double refraction temp. variation The experimentally detd values for the magnetic rotary dispersion agree fairly well with those calcd from Mallemann's theory F. W. Laird

Magnetic double refraction of phenol, naphthalene and phenanthrene in the molten state. Constantin Salceanu *Compt rend.* 191, 486–8(1930).—By means of the exptl arrangement of Cotton and Dupouy (cf *C. A* 24, 3682) the magnetic double refraction of phenol at 49° was found to be 1.10°, of naphthalene at 106°, 3.45°, and *of phenanthrene at 104°, 7.85°* The *double refraction is given at several other temps.* for each compd., as are the ratios of the double refraction to that for nitrobenzene The Cotton Mouton consts. also are given. E. G. Vanden Bosche

Molecular field and atomic order in ferromagnetic crystals and in hydrogenated iron. L. W. McKeehan *Nature* 126, 952–3(1930).—"The 2 possible ways in which magnetization may change are (1) by reversals, without sensible magnetoresistance changes or magnetostriction, and with small but definite hysteresis losses probably closely conditioned by elec. cond., and (2) by rotations through less than 180°, with magnetoresistance and magnetostriction, with hysteresis losses of important amount

largely controlled by mechanical strains inherent or induced by applied stresses, and possibly subject to catalytic acceleration. GREGG M. LANE

Generalization of the virial of Clausius. S. RAY. *Bull. intern. acad. polonaise* 1929A, 233–9.—Math. The virial of Clausius is applied to the case of a vol. of gas enclosed within impervious walls disposed symmetrically with respect to the co-ordinate axes. B. C. A.

Entropy, elastic strain and the second law of thermodynamics; the principle of least work and of maximum probability. W. S. KIMBALL. *J. Phys. Chem.* 35, 611–23 (1931). cf. *C. A.* 23, 5850. A new mech. aspect of entropy with reference to a simple, fully excited gas is obtained from the geometrical expression for wt. and by taking strains to include unit extensions in velocity and momentum space as well as ordinary space. The second law of thermodynamics and the automatic increases of entropy that it represents are attributed to increased strain under the action of corresponding stresses, rather than to the unsatisfactory ergodic hypothesis as in statistics. H. I. JOHNSTONE

The nature of the effect of the addition of salt upon the surface tension of sodium taurocholate solutions. MASAJI SHIONO. *J. Biochem.* (Japan) 12, 317–39(1930).—Various salts added to a soln. of Na taurocholate lower its surface tension to different degrees. At higher concns. the effect is conditioned upon the hydration of the salts while at much lower concns. the effect depends upon the nature of the cations, those forming less dissociable salts being more effective in depressing the surface tension of the Na taurocholate solns. The surface tension of taurocholic acid or of its salts is due to the accumulation of their mols. at the surface of soln. The min. surface tension of the Na, Ca and Cu salts differ from each other, indicating that the surface activities of the films of these various taurocholates differ. S. MORGULIS

Binary mixtures. L. PIATTI. *Z. physik. Chem.*, Abt. A, 152, 36–46(1931).—The b.-p. compn. and the viscosity-compn. diagrams at various temps. were detd. for mixts. of *m*-cresol and PhOMe with EtOH and $C_6H_6$. At 0° the viscosity curves are nearly straight lines but at higher temps. the deviation is marked. The results are discussed with respect to mol.-compd. formation. V. F. HARRINGTON

Maximum velocity of evaporation of liquids evaporated on heated metallic surfaces. ZOFJA BLASZKOWSKA. *Roczniki Chem.* 10, 691–713(713–4 French)(1930).—The phenomenon of max. velocity of evapn. of liquids was investigated by evapg. 10 liquids ($Et_2O$, $Me_2CO$, $CHCl_3$, MeOH, EtOH, $CCl_4$, $C_6H_6$, $H_2O$, $C_6H_5CH_3$ and $C_6H_5Cl$) over Al, Fe and brass surfaces heated several tenths of a degree above the boiling temp. On heating the metallic surfaces to temps. still higher a rapid diminution of the velocity of evapn. can be observed, this is due to the Leidenfrost phenomenon, which makes the evapn. very difficult. A small elec.-furnace was constructed which served to study and det. with precision the so-called "temp. corresponding to the max. velocity of evapn.," that is, the temp. of the metallic surface at which the velocity of evapn. attains a max. A series of curves is drawn showing the relation between the time of evapn. of 1 drop of the liquid (approx. 0.01 g.) and the temp. of the metallic surface on which the evapn. takes place. The curves are marked by a min. time of evapn. of the liquid (corresponding to the max. velocity of evapn.) in a certain temp. interval lying above the b. p. of the liquid. On the basis of these exptl. results a technical method is elaborated for a very rapid evapn. of liquids by heating the metallic surfaces to the "temp. corresponding to the max. velocity of evapn." 600 l. of $C_6H_6$ or $C_6H_5CH_3$ could be evapd. in one hr. per 1 sq. m. Also in *Bull. intern. acad. polonaise* 1930A, 188–90. J. KUČERA

The rate of shear in capillary tubes. WINSLOW H. HERSCHEL. *J. Rheol.* 1, 505–7(1930).—A brief math. note suggested by Williamson's paper (cf. *C. A.* 24, 5193). EUGENE C. BINGHAM

Rheology index. EUGENE C. BINGHAM. *J. Rheol.* 2, 10–107(1931).—A list of 5000 references to rheological literature arranged alphabetically according to authors. The subjects of papers are included and in many cases the location of abstracts of papers are cited. EUGENE C. BINGHAM

Some fundamental definitions of rheology. EUGENE C. BINGHAM. *J. Rheol.* 1, 507–17(1930).—This is a revised form of definitions drawn up for the comm. on plasticity, consistency, etc., of the Am. Soc. for Testing Materials (cf. *Proc. Am. Soc. Testing Materials* 29, II(1929); *C. A.* 23, 4119, 4861). EUGENE C. BINGHAM

Plasticity and criteria of molecular aggregation. S. E. SHEPPARD. *J. Rheol.* 1, 471–84(1930); cf. *C. A.* 24, 1783.—S. discusses the work of Staudinger and his co-workers, Whitby and his co-workers, Kraemer and Williamson, Fikentscher and Mark and attributes the solvation of colloids to monomol. adsorbed layers formed by dipole

orientation for those conditions under which the colloidal solns. obey Poiseuille's law, *e. g.*, in gelatin above 40°. In gelatin above 40° the fluidity steadily increases with time. If the solvation were increasing there would be a dilation, but it is not observed, hence it is inferred that only the linear dimensions of the macromols. are changed.
LUCYNE C. BINGHAM

Structure of material in the solid state. ADOLFO FERRARI *Scientia* [3], 48, 371-82(1931).—A review is given of the present ideas of crystal structure applied to such cryst. properties as at. radii, amorphism, isomorphism, polymorphism and temp. of fusion.
DON BROUSE

X-ray investigation of the cubic modification of the perchlorates. K. HERRMANN AND W. ILGE. *Z. Krist.* 75, 41-66(1931).—The cu. form of the perchlorates belongs to either space group $T_1^1$ or $T^1$. There are 4 mols. in the unit cell, whose dimensions are as follows: $KClO_4$—7.47 A. U.; $NH_4ClO_4$—7.63 A. U.; $TlClO_4$—7.61 A. U.; $RbClO_4$—7.65 A. U.; $CsClO_4$—7.96 A. U.; $NaClO_4$—7.25 A. U.; $AgClO_4$—6.92 A. U. General at. positions are given. For $NH_4ClO_4$ and $NaClO_4$ it is shown that the $ClO_4$ group forms a close packed tetrahedron, with the Cl atom at the center.
L. S. R.

The influence of $RO_4^{--}$ and related ions on the crystalline form of sodium chlorate. HAROLD F. BUCKLEY. *Z. Krist.* 75, 15-31(1930)(in English).—$NaClO_3$ normally grows as cubes, with rare appearance of 110, 210 and 111. Expts. using a wide range of impurities show this cubic habit to be rather unresponsive to modification. However, ionizable substances of the $RO_4^{--}$ type cause the 111 planes to appear at the expense of 100. There is a certain crit. concn., *C*, at which the 100 faces just disappear. *C* values are as follows: $3SeO_4$ ions, $2ClO_4$, $1Cr_2O_7$, $1CrO_4$ to $1ClO_3$; $1SO_4$ to 7-$ClO_4$, $1S_2O_8$ to $20ClO_4$, $1B_4O_7$ to $60ClO_4$, $1S_2O_6$ to $1000ClO_4$. $MoO_4$, $MnO_4$, $PO_4$, $AsO_4$, $CO_3$ and $SiO_3$ have no effect. The effect is attributed to the ions adhering to the surface by means of their $O_3$ triangles in place of the $ClO_3$ ions, the configuration of the remainder of the ions causing the variations.
L. S. RAMSDELL

*The crystal structure of bixbyite and the C-modification of the sesquioxides.* LINUS PAULING AND M. D. SHAPPELL. *Z. Krist.* 75, 128-42(1930)(in English).—The unit of structure of bixbyite has $a = 9.365$ A. U. and contains 16 $(Mn, Fe)_2O_3$. The space group is $T_h^7$. On the assumption that the (Fe, Mn)—O and O—O distances cannot be less than 1.80 A. U. and 2.40 A. U., resp., a final choice is made between 2 possible arrangements, both of which are compatible with the x ray data. The chosen structure has 8 (Mn, Fe) in 8*f*; 24 (Mn, Fe) in 24*e* with $u = -0.030 \pm 0.005$, 48 O in *x*, *y*, *z*, etc., with $x = 0.385$, $y = 0.145$, $z = 0.380 \pm 0.005$. A detailed description of the structure is given, together with interatomic distances and dimensions for the similar oxides of Mn, Sc, Y, In, Tl, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu. The structure for this series as detd. by Zachariasen (*C. A.* 23, 1790) is shown to be in error.
L. S. RAMSDELL

The crystal structure of columbite. J. H. STURDIVANT. *Z. Krist.* 75, 88-114 (1930)(in English).—A crystal of columbite tantalite (Fe, Mn) (Cb, Ta)$_2O_6$ was found to have an orthorhombic unit with dimensions $a = 5.082$ A. U., $b = 14.238$ A. U., $c = 5.730$ A. U., contg. 4 mols. The space group is $V_h^{14}$. By the use of the coördination theory and the theory of close packing, several structures were derived, one of which best fits the exptl. data. It consists of octahedra of O ions about a metal ion, each octahedron shares 2 edges with adjoining ones to form strings of either Cb octahedra alone or Fe octahedra alone, the strings are united by the sharing of octahedra corners to form
L. S. RAMSDELL

*The structure of enstatite, $MgSiO_3$.* B. E. WARREN AND D. I. MODELL. *Z. Krist.* 75, 1-14 (1930)(in English).—From rotation photographs of a hypersthene crystal the axial lengths were calcd. as $a = 18.20$ A. U., $b = 8.86$ A. U. and $c = 5.20$ A. U. If holohedral symmetry is assumed, the space group is $V_h^{15}$. There are 16 mols. $(Mg, Fe)SiO_3$ in the unit cell. Coördinates of the at. positions and interatomic distances are given. There is a close relation between this structure and that of diopside. With slight alterations the whole diopside cell corresponds to ½ unit of enstatite, with Ca replaced by Mg. The unit cell of the orthorhombic pyroxene corresponds very nearly to 2 cells of monoclinic pyroxene, joined on the (100) plane through a glide plane of reflection. Enstatite has the single type of Si O chain characteristic of the true members of the pyroxene group.
L. S. RAMSDELL

The crystal structure of benzene and its relation to that of thiophene. IL. G. BRUNI AND G. NATTA. *Atti accad. Lincei* 11, 1058-62(1930); cf. *C. A.* 24, 2353.—The crystal structure of $C_6H_6$ was detd. at −170° by the powder method with a Ca anticathode. The axial ratios were $a : b : c = 0.771 : 1 : 0.708$, these values closely

checked those obtained by Cox (*C. A.* 22, 4296) 0.771 : 1 : 0.704. These values are near those of thiophene, 0.757 : 1 : 0.757, while the vols. of the unit cells are 471 and 498 × $10^{-24}$ cc., resp., which would explain the formation of solid solns. of these 2, although there is no true isomorphism. A. W. CONTIERI

**Lattice constants of mixed crystals of copper-nickel.** W. G. BURGERS AND J. C. M. BASART. *Z. Krist.* 75, 155-7(1930).—Precision measurements on a series of mixed crystals of Cu-Ni show a slight deviation from the values as predicted by Vegard's additive law. The max. deviation was 0.008 A. U. L. S. RAMSDELL.

**Anomalous crystallized mixed systems of the type iron ammonium chloride.** A. NEUHAUS. *Chem. Erde* 5, 554-624(1930).—$NH_4Cl$ may take up varying amts. of $FeCl_3·H_2O$ (up to 7.5%) giving distorted cu. crystals showing optical anomalies. Crystals of a similar nature are formed with $CoCl_2·2H_2O$ (up to 19%) and $NiCl_2·2H_2O$ (up to 14%). Conclusion: These are not double salts nor true mixed crystals, but rather represent the inclusion of foreign matter along certain faces in the $NH_4Cl$ crystals. The systems $FeCl_3·H_2O$, $CoCl_2·H_2O$ and $NiCl_2·H_2O$ were also studied in this connection, and data are given for some new cryst. hydrates. B. C. A.

**Artificially colored crystals as examples of the so-called anomalous mixed crystals.** K. SPANGENBERG AND A. NEUHAUS. *Chem. Erde* 5, 417-528(1930).—A detailed review is given of artificially colored mixed crystals (*e. g.*, $FeCl_3$ in $NH_4Cl$, methylene blue in $Pb(NO_3)_2$, etc.) and of the influence of such substances in soln. on the habit of the crystals. It is considered that these are not true mixed crystals but represent an inclusion of foreign material adapted to the structure of the host. In this connection the composite crystals formed by the regular intergrowths of various minerals and salts are considered in detail from a structural viewpoint. B. C. A.

**Distribution of foreign substances in crystals.** J. NORDHART AND H. STEINMETZ. *Chem. Erde* 5, 225-32(1930).—The distribution of color and inclusions in various minerals and in crystals of $Pb(NO_3)_2$ grown from solns. contg. various coloring matters is described. In fluorite the bands of color parallel to the cube faces are built up of minute fibers perpendicular to the cube faces, and there are diagonal areas in the crystal free from inclusions. The observations are discussed in connection with the growth of crystals. B. C. A.

**Anomalous crystallized mixed systems with organic components or of an organic component in an inorganic host.** A. NEUHAUS. *Chem. Erde* 5, 529-53(1930).—Various inorg. salts when crystd. from soln. may take up org. coloring matters; *e. g.*, $Ba(NO_3)_2$, $Pb(NO_3)_2$ and $Sr(NO_3)_2$ readily take up methylene blue, NaCl and KCl take up murexide, and $K_2SO_4$ takes up ponceau red and Bismarck brown. Similar anomalous crystals are also formed by certain pairs of org. compds., *e. g.*, $C_{10}H_8$ and dihydronaphthalene. Crystals of this kind are considered in detail especially from a structural point of view. B. C. A.

**The points on the isotherms of electrical conductivity of metallic mixed crystals.** G. GRUBE AND J. HILLE. *Z. anorg. allgem. Chem.* 194, 179-89(1930).—The relations between the constitution of binary alloys and their elec. cond. are so far explained that this property may be used to obtain constitution diagrams in cases where thermal analyses do not yield clear results. If a non-dissocd. intermetallic compd. seps. from a continuous series of mixed crystals of 2 metallic components which in turn forms mixed crystals with the components, no displacement of the max. of the cond. isotherm occurs with temp. if both components lower the transformation temp. of the compd. If the transformation temp. is increased by both components, 2 rounded max. occur on the isotherm at temps. adjacent to the transformation temp. of the pure compd., which lie at *lower and higher concns. than the compd.* If the transformation temp. is increased by one component and lowered by the second, there may occur a flattening and displacement of the max. to other concns. at adjacent temps. The heterogeneous decompn. regions adjoining the α- and β mixed crystals have the same cond. at the same temp. For the establishment of the phase boundaries, the temp. resistance curve rather than the cond. isotherm is used. A displacement of the max. of the cond. isotherm with the temp. may also occur if both components lower the transformation temp. of the compd., only however if the compd. is partly dissocd. into its components. ALLEN S. SMITH.

**Conditions of growth of crystals of difficultly soluble substances.** I. D. KURBATOV. *Compt. rend. acad. sci. U. R. S. S.* 1930A, 429-35(1930).—Conditions of accelerating or decelerating the process of crystn. of difficultly sol. substances were studied, and a distinction was drawn between the methods employed in the labs. and those natural conditions that give rise to the growth of large crystals. A new lab. method for obtaining large crystals, based on exptl. evidence and theoretical considerations, is pro-

posed Large crystals can be obtained best by using solns of non-equiv. ionic concns. of the substance to be crystd. To feed crystals formed in satd. solns. and to prevent formation of new centers of crystn., non-equiv. solns. should be used They present 2 factors favoring growth of large crystals (1) increase of the soly product, and (2) decrease of the no of mols. that can crystallize out of the soln B N Dantoff

Magnitudes of state of oxygen at low temperatures. Fritz Schmidt. *Z Ver deut Ing* 74, 1710(1930).—The thermodynamic properties of O at temps. between +200° and −200° and at pressures from 1 to 1'0 atms. were detd by interpolating and extrapolating isothermic curves The following values for the most important properties were derived

| | Temp. | Pressure | Sp Gravity (water = 1 kg./dm.³) |
|---|---|---|---|
| M p | −218 4 | 1 mm Hg | 1 305 |
| B p at atm pressure | −182 8 | 760 Hg | 1 141 |
| Crit point | −118 8 | 51 35 atm. | 0 430 |

The sp heats were derived from the *pv* diagrams: sp heat of liquid $c_v = 0.395$ kg-cal/kg °C at −200° and the heat of vaporization $r = 51$ kg-cal/kg at −182 8° and 760 mm Hg M McManon

The compressibility of nitrogen and hydrogen at pressures up to 5000 atmospheres. James Basset and R. Dupinat. *Compt rend* 191, 1305–7(1930).—The vols of $H_2$ and $N_2$ that occupy 1 cc. at 16° and 1000 kg per sq cm are given at pressures ranging from 1000 to 5000 kg per sq cm Similarly the vols. of $H_2$ and $N_2$ that initially occupy 1000 cc at 0° and 76 cm are given for these same high pressures. The values for $H_2$ are in accord with those of Amagat App for subjecting gases to 10 000 kg per sq cm and to 25,000 atm. is under construction F. W Laird

The compressibility isotherms of methane at pressures to 1000 atmospheres and at temperatures from −70° to 200°. Hamline M. Kvalnes and V. L. Gaddy *J. Am Chem Soc* 53, 394-9(1931).—Published data were checked and addnl values obtained to cover 9 temps and 26 pressures at each temp B A Soule

A method for the determination of critical temperatures and the critical temperature of hydrogen fluoride. P. A Bond and Della A Williams. *J Am Chem Soc.* 53, 34–7(1931).—The crit. temp of HF is 230 2°, as detd by a new method in which the pointer of a balance is set in motion upon the appearance of the liquid phase The method, which may be used for substances attacking glass, has been checked (*a*) directly on $SO_2$, (*b*) by substituting in van Laar's equation $T_c/T_b = K$, values from HF and obtaining for K a value (1 72) very close to that for HCl, HBr and HI. Don Browne

The activation energy of adsorption processes. Hugh S. Taylor *J Am. Chem Soc* 53, 578–97(1931), cf *C. A.* 25, 629.—Adsorption is not necessarily rapid. The assumption that adsorption processes possess their own characteristic activation energies leads to a general theory of adsorption that applies equally well to the so-called primary, or irreversible, and to the secondary, or reversible, adsorption Those adsorptions are secondary or reversible that have small heats of adsorption and small activation energies. In general, it is the adsorptions with the higher energies of activation that are important in catalytic change. F L. Browne

Velocity of adsorption processes and the problem of promoter action. Hugh S. Taylor and Arthur T. Williamson *J Am Chem Soc* 53, 813–4(1931), cf preceding abstract.—On an active *MnO* catalyst $H_2$ is adsorbed immeasurably slowly at 0° and 100°, at 180° the initial rate of adsorption is 8 mm per hr and at 305° 78 mm per hr., corresponding to an activation energy of approx 10 000 cal A $MnO$-$Cr_2O_3$ catalyst shows an extremely low rate of absorption at 0° but at 184° it has risen to approx 100 mm per min. or an increase of about 700-fold by reason of the promoter action of the $Cr_2O_3$ In considering the mechanism of promoter action attention must be paid not only to extension of surface but also to the velocities with which the activating adsorptions occur C J West

Surface films. N K Adam *Nature* 126, 955–6(1930).—A comment on a review by Langmuir of A's book "The Physics and Chemistry of Surfaces" (*cf. C. A* 24, 2354) A disclaims as much disagreement with L as is inferred by the latter The liquid expanded state is intermediate between the condensed and the expanded states, and it is to this state only that the statements as to competition between the chains and heads of mols. apply A however, reaffirms his belief in the possibility of definite angles of tilt. Gregg M. Evans

Dialysis, ultrafiltration, osmosis and their applications. A Boutaric. *Chimie & industrie* 24, 1295–303(1930).—A review A Papineau-Couture

Finely divided solids as emulsifiers. J L van der Minne *Chem Weekblad* 27, 651–2(1930).—The conclusions of Carmere (*C. A.* 25, 858) are compared with those of M. (Dissertation Utrecht, 1928). cf. *C. A.* 22, 2312. B J C van der Horven

A method for measuring average particle size of emulsions. Wheeler P Davey *J. Phys. Chem.* 35, 1157(1931).—When a drop of an oil in water emulsion falls into clean neutral water with force enough to break the surface of the water, the drop maintains its identity for some time. A drop of emulsion deposited gently on the water spreads very rapidly. When spreading is complete a layer one colloidal particle deep seems to exist on the surface of the water. If it is assumed that the colloidal particles remain spherical, the surface covered by a known quantity of emulsion gives the information necessary for calcg. the diameter of the particles. The emulsion must be dil. enough to avoid aggregation of particles and concd. enough to furnish sufficient particles to cover the surface. Samples of an emulsion at different dilns. indicate the same particle size. The procedure is the same as that employed by Langmuir with oil films. J. F. Brown

Influence of electrolytes on the dispersion of clays. F Allam *Chem. Erde* 5, 276–318(1930).—The results are given of a no. of expts. on the permeability and flocculation of a clay from Silesia with various salt solns. B. C. A.

Liquid ammonia as a lyophilic dispersion medium. II. Ammono-gels of cellulose acetate. Robert Tapt and Jesse E. Starecк. *J. Phys. Chem.* 35, 578–87(1931).—Sols contg. as much as 60 g. cellulose acetate in 100 cc. of liquid $NH_3$ were prepd. A mixt. of acetates is more readily dispersed than the cellulose triacetate. The sols of higher concn. were prepd. by evapn. of part of the solvent. There seems to be no limit to the possible concn. of sol. Dil. sols are clear, colorless and mobile, concd. sols are viscous, translucent and light brown. On warming, the viscosity decreased at first but after several hours the sols changed irreversibly to white opaque gels. The time required for gelation is a function of concn., temp., $H_2O$ content and age. Gels were formed by cooling sols to about —60°. These gels were reversible on warming to a temp. somewhat above that of their formation. Heat irreversible gels seemed to have changed chemically and to have adsorbed water. F. E. Brown

Determination of the hydrogen-ion concentration in gold sols. T. R. Bolam and J. Crowe *J. Phys. Chem.* 35, 602–10(1931).—By using a specially designed H electrode requiring only a little soln., it was found possible to det. the $p_H$ values but the sol must be either sufficiently acid or suitably buffered in order to obtain steady and reproducible results. Probably there was some foreign material present during the expts. of Adolf and Pauli, and of Tartar and Lorah, who were unable to obtain satisfactory values. W. T. H.

Solution of colloidal particles by dilution of the sol. Adolph J. Rabinovich and V. A. Kargin *Z. physik. Chem.*, Abt. A, 152, 24–35(1931).—The previously discovered property of acidoid sols of dissolving on dilu. is confirmed with $WO_3$ and $V_2O_5$ and the results were checked by electrometric and spectrographic measurements. Because of the formation of H ion by hydration of the inner layers of the particles, these sols behave similarly on dilu. of their buffered solns.: their $p_H$ remains const. until the particles are in soln. The Tyndal effect then disappears. The not purely acidoid sols, $As_2S_3$ and $Fe_2O_3$, do not behave thus. V. F. Harrington

Polyatomic oxy-combinations that form during the synthesis of electronegative hydrosols. V. Oxy acids. A. V. Dumanskii and A. G. Yakovlev. *Bull. soc. chim.* [4], 47, 1211–6(1930); cf. *C. A.* 24, 3939, 4977.—Triangular diagrams for the sols of the systems comprising $FeCl_3$ 0.1 *N* [A], NaOH and $NH_4OH$ 0.1 *N* [B], and the Na salts of acetic glycolic, succinic, malic, tartaric and citric acids 0.1 *N* [C], are worked out. The oxy acids give peptization diagrams with regions of deposition, of cloudy electroneg. sols, of electroneg. sols without pptn., and of electropos. sols with and without pptn. Equil. is reached very slowly in these systems. The peptizing action is of the order: tartaric acid > glycolic acid > malic acid > citric acid. Increasing the OH groups increases the peptization properties as shown by tartaric, malic and succinic acids. Substituting $NH_4OH$ for NaOH increases the peptizing action. Thirteen diagrams are shown. Also in *J. Russ. Phys.-Chem. Soc.* 62, 1665–70(1930). H. W. Walker

The mechanism of formation of colloidal silver. Helen Q. Woodward *J. Phys. Chem.* 35, 425–31(1931).—When Ag sols are formed by the Bredig method, Ag reacts with the anion present to form salts, complexes or AgOH. Expts. are reported for arc-

ing in $H_2O$ and in sols of 14 electrolytes When the Ag salts form, the cations of the stabilizing salt form bases In water AgOH forms. F. E. BROWN

Chromium hydroxide. JULJUSZ LISIECKI. *Poczniki Chem* 10, 736–42(742 German)(1930).—A $Cr_2O_3$ sol with as small amt. of peptizing agent as possible was prepd. in a pure and concd. form without dialysis. The excess of peptizing agent can be removed by satn. with a corresponding amt. of gel, in the form of dispersoid instead of by dialysis The time of prepn. is shortened from several weeks to several hrs and the exptl. conditions are quant. *By this method various metal oxide hydrosols* of any concn. can be prepd. with any ratio of the peptizing gel to peptizing agent. A metal oxide hydrosol differs from the dispersoid although it does belong to the *disperse systems* The *dispersoids* show different cataphoretic properties as compared with hydrosols and are not pptd by electrolytes As Bredig's expts. have clearly proved, stable hydrosols cannot be prepd. without peptizing substances Besides mechanical or elec. dispersion, chem. dispersion or peptization is necessary to prep. a permanently stable hydrosol J. KUČERA

Hydrosol of silicic acid. I. Hydrosol made from ethyl silicate by hydrolysis. KENKYO INABA. *Sci Papers Inst Phys Chem Research* (Tokyo) 15, 1–15(1930).—Unless the ethyl silicate, prepd *from* $SiCl_4$ and *EtOH* and purified *by vacuum distn.*, contains some HCl, the $H_2SiO_3$ hydrosol resulting from hydrolysis is unstable Hydrolysis of pure ethyl silicate in the presence of such peptizing agents as NaOH, KOH, HCl and $H_2SO_4$ (but not $H_2CO_3$ or org acids) gives stable sols. The 2 types of sols studied were prepd. by hydrolysis of ethyl silicate in the presence of (1) HCl and (2) NaOH Each sol was purified by electrodialysis through a parchment membrane The highest concn. of $SiO_2$ that can be stabilized by HCl is 7–8% The HCl cannot be removed completely without causing coagulation, *e. g.*, a sol contg 2.56% $SiO_2$ becomes unstable when the HCl concn. is reduced below 0.0001 *N*. Electrodialysis of NaOH-stabilized sols contg more than 14% $SiO_2$ gives unstable sols, with less $SiO_2$ present *strictly neutral sols of high stability can be produced. Because of the relatively* high elec. cond. and low viscosity of the neutral sols, the particles must be smaller in the neutral than in the acidic type of $H_2SiO_3$ hydrosol. This is confirmed by the fact that the amt. of $SiO_2$ passing through the parchment during electrodialysis is negligible in the acidic but very large (30–50%) in the neutral sols The stability of the acidic sols varies with the HCl and $SiO_2$ concns. Addn. of small amts. of HCl to the neutral sols tends to increase the stability II. Electrical properties of the hydrosol of silicic acid. *Ibid* 16–31.—The 4 sols used differed in method of prepn.: *A* was the acidic and *B* the neutral sol described in the preceding abstr., *C* was made by hydrolysis of $SiCl_4$, *D* was made by dissolving in NaOH soln. some of the $H_2SiO_3$ sol from hydrolysis of $SiCl_4$ and then decompg the sodium silicate with HCl. Each sol was purified by electrodialysis sol *C* resembled *A* in requiring some HCl to stabilize it, although *D* could be obtained in neutral form, not all of the NaCl could be removed. Electrophoresis measurements were made in a U tube of the Burton type (diam. of tube 1.1 cm. and distance between electrodes 23 cm.) The *movement of the boundary* which was practically invisible to the naked eye, *was detd by photography in ultra-violet light*, with an ordinary plate Under a potential gradient of 1 volt/cm at 25° the migration velocities $\times 10^5$ of the boundary (*toward the anode*) *in cm./sec* were 2, 23, 1 and 11 for sols *A*, *B*, *C* and *D*, resp each contg approx. the same amt $SiO_2$ (0.3–0.4%) The corresponding conductivities (units not specified) were $1.97 \times 10^{-4}$, $0.675 \times 10^{-4}$, $1.15 \times 10^{-4}$ and $0.688 \times 10^{-4}$ Variation of the HCl concn. (*c*) revealed a max migration velocity (*x*) at low *c* in sols *A*, *B* and *C* With increasing *c* in sols *B* and *D*, *x* decreased to zero and reversed sign in sols *A* and *C* the max. *x* was followed by an abrupt decrease and then a gradual decrease through zero The effect of KCl, $BaCl_2$, $CeCl_3$ and $ThCl_4$ *on neutral sol B* was studied. The effect of KCl and $ThCl_4$ upon *x* was similar to that of HCl With $BaCl_2$, coagulation took place before an isoelec point was reached At concns of 0.0013–0.0014 *N* $CeCl_3$ the $H_2SiO_3$ moved toward the cathode but outside these limits the sol moved *toward the anode* *The viscosity* of the sol shows a min in the neighborhood of the isoelec point The adsorption of neg ions (Cl or silicate) is as important a stability factor as the charge or hydration and its effect is most marked near the isoelec point OSCAR T. QUIMBY

*The syneresis of silica gel.* J. FERGUSON AND M. P. APPLEBEY. *Trans Faraday Soc* 26, Pt. II 642–5(1930).—The syneresis of $SiO_2$ gel was studied under several conditions The vol. of syneretic liquid expressed exactly equals the decrease in vol. of the gel The vol. *of liquid* when plotted against time gave an S-shaped autocatalytic curve. The velocity of syneresis and the total vol. of liquid expressed were greater the greater the original $SiO_2$ concn of the gel at the time of setting The

velocity of syneresis was approx doubled for each 10° rise in temp The initial velocity of syneresis was greater the more alkaline the gel, but the total vol finally expressed was greater the more acid the gel The hydration of the micelles was one mol of water to one mol of $SnO_2$ in neutral gels The hydration increased with alky., being two mols of water to one of $SnO_2$ at a $p_H$ 10 It is concluded that the progress of syneresis is detd by two factors (1) the tendency of $SnO_2$ micelles to consolidate further by the action of unsatd residual valencies, and (2) the tendency of the structure to resist deformation I. H. Reynson

**Coagulation of ferric oxide hydrosols.** C. Harvey Sorum. *J. Am. Chem. Soc.* 53, 812(1931). Polemical with Dhar (*C. A.* 24, 5572). C. J. West

**Pseudo- "irregular series" observed in colloidal gold solution.** Ichiji Iwase. *Bull. Inst. Phys. Chem. Research* (Tokyo) 9, 911-41(1930). (*Abstracts* 80 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 14, Nos. 275-6). A colloidal Au soln. is prepd. by adding 10 cc. $AuCl_3$ soln. (0.6% $AuCl_3$, HCl, $H_2O$) and reducing agent to 100 cc. distd. water stirred well at room temp. The soln. is heated and when it begins to boil KOH or HCl in various concns. is added to det. the influence of the addn. on the stability of soln. As the reducing agent the following 5 compns. are selected: 3.5 $I^{10}_{0.2KOH}$ (3.5 cc. of soln. prepd. by adding 10 cc. formalin to 90 cc. 0.2 *N* KOH soln.) (I), 3.5 $I^{10}_{0.3KOH}$ (II), 6 $I^{10}_{0.1KOH}$ (III), 8 $I^{10}_{0.1KOH}$ (IV), and 8 $I^{10}_{0.2KOH}$ (V). When (I) is used, the colloidal soln. is stable as long as the concn. of alkali added is less than 1.2 millimol./l. and more than 5.6 millimol./l. The coagulation value of KOH is 2.1 millimol./l. In (I) and (II) systems the second stable region exists, in general, in the sphere of 5.8 millimol./l. and 4.5-6.5 millimol./l. In (IV) systems the soln. has comparatively a good stability when there is 6 millimol./l. of KOH in the ultimate concn. In (V) it shows a mere tendency to become stable. The addn. of HCl shows no special phenomenon. In each colloidal soln. coagulation values by $BaCl_2$ and NaCl and $p_H$ are resp. measured. Though the phenomenon resembles the so-called "irregular series," it differs from it in that (1) colloidal particles in the second stable region seem to have the same neg. charges as those in the first stable region and (2) the phenomenon is observed only when the addn. is carried out in the course of the reaction of prepn. K. Konda

**Distribution of hydrogen and hydroxyl ions in gelatin cubes.** E. J. Bigwood. *Compt. rend. soc. biol.* 102, 600-1(1929); *Physiol. Abstracts* 15, 11.—Gelatin cubes contg. phenol red were placed in solns. of weak NaOH plus phenol red. In 24 hrs. each presented a yellow center and a red peripheral zone, the thickness of which was the same in all blocks of different sizes. The $p_H$ (8 to 10) of the soln. scarcely changed in the course of a week. In the second week the $p_H$ changed and in the blocks the acidity increased from the surface toward the center. The values of $p_H$ in the cubes were comparable only when measured at corresponding distances from the surface. G. G.

**Distribution of hydrogen and hydroxyl ions in gelatin columns.** E. J. Bigwood. *Compt. rend. soc. biol.* 102, 602-4(1929); *Physiol. Abstracts* 15, 11-2.—The phenomena described in the preceding abstract were studied in the case of gelatin placed in tubes. In the case of agar jelly the red color reaches the bottom of the tube in 2 days. Agar does not react chemically with penetrating electrolytes. In the gelatin tubes a colorless portion remains at the bottom 25 days later. G. G.

**Role of structure of jelly in permeability of ions.** E. J. Bigwood. *Compt. rend. soc. biol.* 102, 321-6(1929); *Physiol. Abstracts* 14, 640-7.—The selective permeability of gelatin for cations and anions varies with the $p_H$ of the liquid. The permeability depends on chem. affinities, and not on properties of a membrane of a $p_H$, as suggested by Girard. Protein presents the properties of an active ion. For the setting up of a Donnan equil. it is unimportant whether the particles of protein be grouped in layers or scattered in the gelatinous phase. The eventual role of structure is indirect; it contributes to the semi-solid consistence of the gelatin and to the fixation of the non-diffusible protein ions. G. G.

**Abnormal osmosis at non-swelling membranes.** I. K. Solner. *Z. Elektrochem.* 36, 30-17(1930).—The magnitude of the p. d. between two solns. of electrolytes sepd. by a collodion membrane depends on the previous treatment of the collodion, whereby the size of the pores is affected. Such membranes contain fine pores of widely differing dimensions, thereby causing potentials to be set up which differ from place to place and from pore to pore and in consequence tend to establish closed current circuits within and around the membrane. H. C. A.

**The freezing of gel.** KYOJI KINOSHITA. *Bull Chem Soc Japan* 5, 261–6(1930) — An app is described in which solns of gelatin were frozen Cooling curves were obtained for solns varying in concn from 5 to 60% gelatin Undercooling was pronounced and is attributed to inhibitive action of gelatin on the formation of ice crystals. Alternate ice and gel layers were found in solns of concn up to 15% gelatin. Up to this concn the freezing temp fell less than 3°. In the range of solns between 15 and 30% the freezing temp fell rapidly to −0.74°. It is concluded that there is almost no water in this region that can be sepd by freezing With still greater concn of gelatin, water must be more firmly bound, since the f p is not depressed as rapidly The f p -concn curve is of an inverted S type L H REVERSON

**The vapor pressure of gels.** E H BUCHNER. *Compt. rend.* 191, 1323–4(1930) — Two tubes of gelatin gel were placed with their lower extremities in water. In one case the upper portion of the gel was exposed to satd water vapor and in the other the end of the tube was closed After one month the upper portions of both gels appeared firm and analysis showed that the upper extremity in each case contained more gelatin than the lower Further, the final content of the upper ends was less than the original, *indicating absorption of water in* both cases through ascension E W. LAIRD

**The vapor pressure of gels.** PAUL. BARY *Compt rend* 191, 1325–6(1930); cf *C A* 24, 4202 —A controversy with M Buchner concerning the vapor pressure of a gel and its swelling liquid E W. LAIRD

*The denaturation of albumin.* WILDER D BANCROFT AND J E RUTZLER, JR *J Phys Chem* 35, 141–61(1931) —It has been assumed that proteins are irreversibly coagulated and that this process is really denaturation followed by, or accompanied by, coagulation Denaturation was supposed to be a chem change It is found that there *really is no denaturation* and KI, KCNS $(NH_2)_2CO$, $NH_4CNS$, $NaHCO_3$ $CH_2O$ and cane sugar peptize heat coagulated egg white sols The peptized sols produce the same immuno-biological test as the original egg white, and have the same isoelec. points Further exts from egg white sols a substance that acts like crude lecithin After this substance was extd from egg white sols, immersion in boiling water for 15–20 min failed to produce coagulation or cloudiness in a 10% sol The coagulation and peptization of egg white are reversible colloidal changes An extensive literature review is included E F BROWN

**Scattering of light in protein solutions I Gelatin solutions and gels.** K. KRISHNAMURTI *Proc Roy Soc* (London) A129, 490–508(1930), cf *C A* 24, 1578 — Gelatin sols are considered polydisperse systems in which part of the gelatin is present in the molecularly dispersed condition, and the rest as polymol micelles Cooling below 25° produces supersatn, as a result of which fresh particles are formed These become large as a result of the condensation of the molecularly dispersed gelatin on them During the gel sol transformation the gel micelles are gradually dispersed in the original mol condition The variation of the intensity of the scattered light with the concn of gelatin sols and gels was examd The depolarization of the scattered light first decreases and then increases when gelatin sols are cooled to 10°. The significance of this in revealing the change in the size and shape of micelles is pointed out The turbidity at the isoelec. point is caused by the aggregation of gelatin mols F. U

**The colloidal structure of egg white as indicated by plasticity measurements.** J L ST JOHN AND E L GRIFFIN *J Rheol* 1, 484–505(1930), cf *C A*. 24, 5080 —Egg white consists of a thin portion 32% and a thick portion 68% The plastometer of St John was used to study the apparent fluidity of both portions The values given range from 0.167 to 0.305 for the thick portion and from 14.77 to 20.7 for the thin portion The data were irregular Some of the flow curves were far from linear, others indicated a neg yield value and some had a neg slope Many expts proved that it was impossible to obtain accurate values with the material sepd by simple decantation even where the material was as fresh as possible The effort was made to obtain consistent results by passing the material repeatedly through the pores of a Gooch crucible, but the results were unsatisfactory, since the fluidity obtained depended upon the no of times the material was passed through the crucible EUGENE C BINGHAM

**The temperature dependence of the solubility of inert gases in liquids.** G TAMMANN *Z anorg allgem Chem* 194, 159–61(1930) —Values for the expression $(1/\log l) \cdot (d \log l/dT)$ were obtained for He, Ne and A for temps between 15° and 37°. If $Q$, the heat tone, is negligible in comparison to $A$, the external work, and the gas soly, $l$, is less than 1, *i e*, the concn of gas in the liquid is smaller than that in the gas phase, the gas soly increases with increasing temp If $Q$ is greater than the heat corresponding to the work, $A$, the soly decreases with increasing temp If $Q = 0$, $(1/\log l)\ (d \log l/dT)$

should be equal to $-1/T$. This is found to be only approx. true for single values but for the av. of all the values for the soly. of the gases in the liquids used it is accurate. MeOH, EtOH, acetone, benzene and cyclohexane were used. The soly. of A in water decreases appreciably with increasing temp. The soly. of He is independent of the temp. between 15° and 30° while that of Ne decreases somewhat. ALLEN S. SMITH

**Solubilities in hydrogen fluoride.** P. A. BOND AND V. M. STOWE. *J. Am. Chem. Soc.* 53, 30–4(1931).—The solubilities of different salts in anhyd. HF (prepd. by distn. of dry $KHF_2$) were detd. in a "bomb" of Monel metal. The soly. of LiH, expressed as mols. LiF per mol. HF, varies between 0.33 and 0.40 over the range of 0° to 40°. $ZnF_2$, $MgF_2$ and $CaF_2$ are very insol. KI reacts with liquid HF. $CrF_3$ is sol. to an undetd. extent. The solvent action of HF is similar to that of water. D. B.

**The solubilities of alkali chlorides and sulfates in anhydrous alcohols.** E. R. KIRN AND H. L. DUNLAP. *J. Am. Chem. Soc.* 53, 391–4(1931).—At 20° the solubilities of NaCl, KCl and $Na_2SO_4$ in MeOH, EtOH, PrOH, iso-PrOH, BuOH and iso-BuOH over the temp. range 20–50°, in moles times $10^3$ of salt per mole of alc., are

| | MeOH | EtOH | PrOH | iso-PrOH | BuOH | iso-BuOH |
|---|---|---|---|---|---|---|
| NaCl | 0.778 | 0.115 | 0.004 | 0.006 | 0.007 | 0.003 |
| KCl | 0.833 | 0.127 | 0.007 | 0.123 | 0.008 | 0.003 |
| $Na_2SO_4$ | 0.555 | 0.143 | insol. | 0.089 | insol. | insol. |

B. A. SOULE

**The solubilities of silver salts.** KOSAKU MASAKI. *Bull. Chem. Soc. Japan* 5, 345–8(1930).—The soly. was detd. from the e. m. f. of the cell Ag | 0.01 *N* $AgNO_3$ | $NH_4NO_3$(satd.) | Ag salt in 0.1 *N* K salt (except KCN which was 0.01 *N*) by the equation $e = 0.53 \times 2 \times 0.0581 \ln(ca/x)$, where 0.53 is the transference no., $a$ is 0.03, $c$ is 0.1 or 0.01 and $x$ is the concn. of $Ag^+$ in the K salt soln. The mean e. m. f. and the soly. in mol./l. at 18° are: SCN 0.549 v. and $1.0 \times 10^{-6}$, Br 0.570 v. and $7.0 \times 10^{-7}$, CN 0.571 v. and $2.1 \times 10^{-7}$; and $CO_3$ 0.205 v. and $1.1 \times 10^{-4}$. V. T. HARRINGTON

**Theory of hydrotropy.** CARL NEUBERG AND FRITZ WEINMANN. *Biochem. Z.* 229, 466–79(1930).—The ability of many salts of org. acids to make insol. substances, especially nonelectrolytes, water-sol. is designated as hydrotropy. Expts. with K salts of camphoric acid lead to the conclusion that this phenomenon is explained in the formation of a compd. between the hydrotropic salt and the dissolved substance. S. M.

**Refraction of electric waves ($\lambda$ = 12 cm.) in some electrolytes.** K. ZAKRZEWSKI AND T. NAYDER. *Bull. intern. acad. polonaise* 1930A, 30–41.—Measurements were made of the $n$ of water and of aq. solns. for damped elec. waves of wave length 12 cm. The method employed consists in measuring the deviation produced in a narrow pencil of waves by a hollow glass prism filled with the liquid. The angle of the prism used was very small (3°56'), but large enough to eliminate inaccuracy due to reflections on the interior of the prism. The oscillator and detector were of the types described by Zakrzewski (*C. A.* 22, 2103). Within expt'l. error the $n$ of water for this wave length is the same as that for very long waves. The $n$s of Cu sulfate of up to 3% concn. and of NaCl solns. of up to 1% show no perceptible difference from those of pure water. B. C. A.

**Electrical conductivity and viscosity of aqueous solutions.** M. CHANOZ AND G. CLUZET. *Compt. rend. soc. biol.* 100, 1205–7(1929).—The elec. conductivities of solns. of KCl, NaCl, NaOH, $Na_2SO_4$, HCl, $H_2SO_4$ and $CuCl_2$ are reduced by addn. of sucrose, glycerol, agar or gelatin. B. C. A.

**The thermodynamic properties of molten solutions of lithium bromide in silver bromide.** E. J. SALSTROM AND J. H. HILDEBRAND. *J. Am. Chem. Soc.* 52, 4650–5(1930).—The energy changes of molten AgBr upon dilu. with LiBr were detd. at mole fraction of LiBr varying from 0 to 0.89 between 450° and 600°. The free energy of formation of pure molten AgBr is given by the equation $\Delta F_a = -21{,}510 + 6.7\,t$ between 440° and 575°. Density detns. of 0.5 mole fraction LiBr in AgBr were made between 517° and 555° and may be expressed by the equation $d^t = 4.504 - 0.000877\,t$. The results are discussed on the basis of simple assumptions as to ionization, but without taking into account any changes in interionic forces upon dilu. E. H.

**A discussion of the new view in the theory of solutions.** GIOVANNI B. BONINO. *Atti III congresso naz. chim. pura applicata* 1930, 231–48.—A review of the Debye-Huckel theory. J. B. AUSTIN

**Dissociation theory of solutions.** BERKELEY. *Nature* 126, 313(1930).—Two formulas are given connecting the osmotic pressure, sp. vol., vol. of solute and the no. of g. mols. of solvent of salt solns. The formulas held for aq. solns. of cane sugar, $\alpha$-

methylglucoside and *isodulcitol* at both 0° and 30° within variations of about 5%.
J. W. SHIPLEY

**Proton and electron activity in solvents in general.** GEROLD SCHWARZENBACH *Helv. Chim. Acta* 13, 870–96(1930).—Modern conceptions of acids and bases are reviewed critically with 81 citations. Bronsted's definitions (*C. A.* 24, 2022) are somewhat modified. *Acids* are substances that can yield protons, *bases* are substances that can take up protons. Acids and bases may be either uncharged molecules or ions. An acid can yield a proton only in the presence of a base that can take it up. There are no free protons in solns. The proton is in homopolar combination with the acid and can probably penetrate even into the electron shell. *The normal acidity potential* of an acid, $E_{an}$, is defined by the equation $E = E_{an} + RT/F \ln [acid]/[base]$ in which $E$ is the potential of a $H_2$ electrode and *[acid] and [base] are the molar concns.* multiplied by the activity coeffs. for the acid and base, resp. $E_{an}$ varies with the dielec. const. of the solvent *but is independent of the acidity or basicity of the solvent.* Strong acids have high $E_{an}$, weak acids low $E_{an}$. The difference in behavior between strong *and weak acids is more marked the less basic the solvent.* Thus HOAc behaves much like HCl in liquid $NH_3$, in $H_2O$ the two acids differ materially, and in EtOH they differ still *more markedly.* In non basic solvents E attains enormous and indefinite values because pure acids have no tendency to yield protons. Study of the acidimetry of such solns. is unprofitable. In the absence of solvent, acids have a self buffering action. Study of such systems is very difficult because traces of impurities affect the potential enormously. Proton active substances in the pure state are always both basic and acidic to some extent at least, that is, they are amphoteric. T. L. BROWNE

**The dissociation of strong electrolytes. III. Complete dissociation and optical properties.** MORRIS B. JACOBS AND CECIL V. KING *J. Phys. Chem.* 35, 480–7(1931); cf. *C. A.* 24, 3417, 3696.—Additivity of color or light absorption, of refraction and of *dispersion by the ions in solns. of strong electrolytes was not found in all cases.* The most exact recent work shows discrepancies that must be explained by some means other than the degree of ionization. H. T. JOHNSTONE

**The electrode potentials of the silver halide electrodes against a mixture of different halide solutions.** JUZABURO TANIDA *J. Biochem.* (Japan) 12, 411–8(1930).—The potential of Ag halide electrode immersed in a soln. contg. halogen ions against a calomel electrode, is detd. mainly by the activity of the halogen ions of the largest mol. wt. Other halogen ions of smaller mol. wt. as well as anions other than the halides are indifferent. The potential is the same whether a AgCl, AgBr, AgI or a blank Ag electrode is used. S. MORGULIS

**The reactions between atoms and molecules of nitrogen and hydrogen.** W. STEINER *Z. Elektrochem.* 36, 807–14(1930).—*An app. is described for separately activating N* and H by elec. discharge, allowing the gases to react and finally collecting the products *of reaction.* H atoms show *no* reaction with N mols. The *reaction* between *N* atoms and H atoms gives $NH_3$, while the reaction between N atoms and H mols. furnishes $N_2H_4$ and $NH_3$, the former in much the smaller quantity. It seems probable that the $NH_3$ is formed through a triple collision $N + H + X \longrightarrow NH + X'$, followed by the reaction of NH with mol. H: $NH + H_2 \longrightarrow NH_3$, while the $N_2H_4$ arises thus: $N + H_2 + X \longrightarrow NH_2 + X'$ and $2NH_2 \longrightarrow N_2H_4$. If such be the case, only every hundredth or thousandth triple collision between N and $H_2$ is effective in causing reaction. W. C. FERKLISS

**The action of carbonic acid, under pressure, on salts of the alkaline earth metals. I. Action on calcium phosphate.** ERNST MÜLLER AND JULIUS KNÖFEL *Z. anorg. allgem. Chem.* 194, 258–60(1930).—Under pressure a soln. of $CO_2$ decomposes secondary and tertiary Ca phosphate forming $Ca(HCO_3)_2$. At 60 *atm* the *soly. of* $CaHPO_4$ is 6 times that at ordinary pressure. Soly. decreases with increase in temp. $Ca_3(PO_4)_2$ dissolves to the extent of 0.754 g. of $P_2O_5$ per l. *Bone ash* gives a soln. contg. 0.589 g. and 0.333 g. $P_2O_5$ per l. at 0° and 20°, resp. *Phosphorite* is sol. to the extent of 0.035 g. $P_2O_5$ per l. at 0°. The action on natural *phosphates is less than that on synthetic* samples because of the greater compactness of the former. II. Action on alkaline earth silicates. ERNST MÜLLER AND WALTER LUDBERGER *Ibid.* 261–7.—At 20° *and 50 atm.* 2 *or more hrs.* action forms a soln. of bicarbonate equiv. to 3.49, 3.79 and 5.75 g./l. of $CaSiO_3$, $SrSiO_3$ and $BaSiO_3$, resp. At 0° the action is greatest, the soly. decreasing with increase *in temp.* The *min.* soly. is reached at 100°. $[H^+]$ is greatest at 30 atm. Hydrolysis and adsorption effects obscure the reaction mechanism. The soly. of ignited silicates at 50 atm. is 10 *times that at ordinary* pressure and 1/6 that of non ignited samples. A method for the prepn. of carbonate free silicates is given.
B. A. SOULE

Action of water vapor on sodium chloride at higher temperatures. STANISLAW BRETTSZNAJDER *Roczniki Chem.* 10, 721-35(735 German)(1930).—The equil. of the reaction $NaCl + H_2O = NaOH + HCl$ was detd. The value of $K_p$ ( = $p_{HCl}$ on $p_{H_2O}$) was found approx. $1.6 \times 10^{-7}$ at 750°. J. KUČERA

Hydrolysis equilibria of triphenylchloromethane and triphenylbromomethane. The free energy of some reactions of triphenylchloromethane, triphenylbromomethane and triphenylcarbinol. J. O. HALFORD *J. Am. Chem. Soc.* 53, 105-12(1931).—A $C_6H_6$ soln. of the carbinol or carbinol halide was shaken in contact with an aq. soln. of the halogen acid of such strength that at equil. measurable concns. of carbinol and halide were produced. For the reaction $(C_6H_5)_3CCl$ (in $C_6H_6$) + $H_2O(g)$ = $(C_6H_5)_3COH$ (in $C_6H_6$) + $HCl(g)$, $K_{298} = 0.0518$ and $\Delta F^\circ_{298} = 1755$ cal. For the reaction $(C_6H_5)_3CCl$ (s) + $H_2O$ (g), = $(C_6H_5)_3COH$ (s) + $HCl$ (g), $K_{298} = 0.2195$ and $\Delta F^\circ_{298} = 900$ cal. In obtaining these values $K$ was detd. by analysis of equil. mixts. and $\Delta F^\circ$ was calcd. from the equation $\Delta F^\circ = -RT \ln K$. Similarly 14 other free energy relations of $(C_6H_5)_3COH$, $(C_6H_5)_3CCl$ and $(C_6H_5)_3CBr$ were detd. or calcd. These include solubilities and ionizations in $C_6H_6$ and in $H_2O$ as solvents. F. E. BROWN

Double decomposition in the absence of solvent. I. The reciprocal system: $AgCl + KBr \rightleftharpoons AgBr + KCl$. A. P. PALKIN *Acta Univ. Asiae Mediae, Series VI, Chem.* No. 4, 3-17(1930).—The reciprocal system $AgCl + KBr \rightleftharpoons AgBr + KCl$ was studied. The systems AgBr-AgCl and KBr-KCl form unbroken series of solid solns., and the systems AgBr-KBr and AgCl-KCl form eutectics. In order to det. the space equil. diagram of the quaternary system the following systems were studied and their phase diagrams detd. by means of heating and cooling curves: AgCl-KBr, eutectic (25.1 mol. percent KBr) at 320°. AgBr-KCl, eutectic (23.5% KCl) at 318°. AgBr-(50% KBr + 50% KCl), eutectic (74.8 AgBr, 12.6% KCl, 12.6% KBr) at 302°. KBr-(70% AgBr + 30% AgCl), eutectic (54.1% AgBr, 23.2% AgCl, 22.7% KBr) at 318°. KCl-(35% AgBr + 65% AgCl), eutectic (29.4% AgBr, 49.1% AgCl, 21.5% KCl) at 321°. KBr-(42.5% AgCl + 57.5% AgBr), eutectic at 325°. (50% AgBr + 50% AgCl)-(50% KBr + 50% KCl), eutectic (10.9% KCl, 10.9% KBr, 39.1% AgBr, 39.1% AgCl) at 323°. (62.5% AgCl + 37.5% AgBr)-KBr, eutectic (48.2% AgCl, 28.8% AgBr, 23% KBr) at 323°. The liquidus surface of the entire quaternary system consists in 2 fields of crystn. intersecting along the eutectic line. The lowest point on the eutectic line (285°) corresponds to the eutectic compn. of the system AgBr-KBr. Shifting of equil. toward AgBr was noted, it was indicated on the open-space model by the wave on the liquidus surface, and on the projection of the eutectic line, by the max. located nearer to the AgBr field. This agrees with the lower soly. of AgBr. II. The reciprocal system: $AgBr + KI \rightleftharpoons AgI + KBr$. *Ibid* 18-40.—This system resembles the previously investigated system $AgCl + KBr \rightleftharpoons AgBr + KCl$ in relation to its general character. The binary systems AgBr-AgI and KBr-KI both form continuous series of solid solns. The binary system AgBr-KBr forms a eutectic (68 mol. percent AgBr, 285°), and the system AgI-KI forms an unstable compd. KI·4AgI, and a eutectic at 213°. Several diagonal sections of the "equil. square" of the quaternary system were studied by means of heating and cooling curves and the following results were obtained. The system AgBr-KI, eutectic (80.3 mol. percent AgBr) at 264°. AgI-KBr, eutectic (84 mol. % AgI) at 361°. AgBr-(50% KBr + 50% KI); eutectic (76.4% AgBr, 11.8% KBr and 11.8% KI) at 273°. AgI-(50% KBr + 50% KI); eutectic (61.4% AgI, 9.3% KI, and 9.3% KBr) at 336°. (70% AgI + 30% AgBr)-KI; eutectic (25.2% AgBr, 58.6 AgI, 16.2% KI) at 360°. (50% AgI + 50% AgBr)-KI; eutectic (42.3% AgI, 42.3% AgBr, 15.4% KI) at 334°. (6% AgBr + 94% AgI)-KI; eutectic (24.5% KI, 71% AgI, 4.5% AgBr) at 283°, and a transition point (21.5% KI, 73.8% AgI, 4.7% AgBr) at 285°. (7.5% AgBr + 92.5% AgI)-KI; eutectic (20.4% KI, 73.6% AgI, 6% ABr) at 300°, and the transition point (21.3% KI, 72.4% AgI, 5.9% AgBr) at 298°. (87.5% AgBr + 12.5% AgI)-KI; eutectic (17.8% KI, 71.9% AgBr, 10.3% AgI) at 253°. (74% AgBr + 26% AgI)-KI; eutectic (16.9% KI, 61.5% AgBr, 21.6% AgI) at 253°. The system (9% AgBr + 91% AgBr)-KI· the triple transition point of simultaneous crystn. of the solid soln. AgI, AgBr, the solid soln. KI, KBr and the compd. KI·4AgI, occurs at 317°, and corresponds to the compn. 20.5% KI, 7.1% AgBr and 72.4% AgI. The displacement of equil. manifests itself here even more clearly than in the system $AgCl + KBr \rightleftharpoons AgBr + KCl$; the system gives in the direction of the upper arrows a pos. thermal effect of 8.8 cal. The definite unstable compd. KI·4AgI, decomposable at 267°, is formed in the lateral binary system AgI-KI, and forms its crystn. field on the liquidus surface of the quaternary system. The latter, therefore consists of the 3 fields of crystn.: (*1*) solid solns. of KI and KBr, (*2*) solid solns. of AgBr and AgI, and (*3*) compd. KI·4AgI.

The eutectic lines meet at the triple point (317°, 20.5% KI, 7.1% AgBr, 72.4% AgI) The eutectic point of the system KI–AgI is, however, below the triple point (243° at 69.5% AgI). The projection of the eutectic line on the vertical AgBr–AgI plane rises rapidly to a max (about 15% AgBr) The system described here as well as the system AgCl + KBr ⇌ AgBr + KCl can be regarded as a representative of the type of systems that forms a transition from purely reversible to irreversible systems

*B N* Danilov

**Contribution to the study of the equilibrium, $FeS_2 \rightleftharpoons FeS + S$.** Franz dr Rudder *Bull soc. chim* [4], 47, 1225–1254(1930).—*The reversibility of the reaction*, $FeS_2 \rightleftharpoons FeS + S$, was established by distn of pyrites A new synthesis was demonstrated The *intermediate compds*, $Fe_7S_8$ to $Fe_{16}S_{17}$, postulated by others to be formed by the desulfurization of pyrites, do not exist and are considered as simple crystallographic *forms of mixts* of $FeS_2$, FeS and S During the distn $As_2S_3$, present as an impurity, is given off together with $SO_2$ and $H_2S$ formed from water present in the *pyrites* Dissocn curves for pressures of 0 mm to 768 mm with extreme temps of 600° and 680°, resp., *exhibit a clearly* defined flat portion corresponding to the heat of absorption The heat of reaction absorbed by the liberation of one S atom from $FeS_2$ is 18,513 cals. as calcd from the Nernst equation The roasting of pyrites in industrial furnaces gives FeS as an intermediate product, involving as a first reaction the dissocn of pyrites

*H W* Walker

**The affinity of metals for sulfur. I. The thermal equilibrium between hydrogen and the sulfides of iron, tin, cadmium, bismuth and antimony.** L. V. Britzke and A. F. Kapustinskii *Z. anorg. allgem. Chem.* 194, 323–50(1930).—The flow method of Jellinek (*C. A.* 19, 1513, 23, 5400) was used to study the above equil between 400° and 1000°. By combining their data for the equil const (in the sulfide reduction) with those in the literature on the dissocn. const. of $H_2S$, B and K calcd the partial pressure, $p$, of $S_2$ over the various sulfides Within the range studied log $p$ is a linear function of $T$. At ordinary temp the metals stand in the following order of decreasing affinity for S Cd, Sn, Fe, Sb and Bi The mol heats of formation (in large cal at 0°) from rhombic S and metal are CdS 19.80, SnS 20.51; FeS 17.98, $Sb_2S_3$ 42.50, $Bi_2S_3$ 67.20

*Oscar T Quimby*

**Velocity of solution of aluminum in alkali solutions.** M. Tzentnershiver and W. Wittandt *Bull intern acad polonaise 1930A*, 50–61.—*In agreement with Jabłczyński*, Hermanowicz and Wajchselfisz (*C. A.* 23, 3390), it is found that the rate of soln of Al *in NaOH soln is proportional to the free surface area of the metal and to the sq. root* of the NaOH concn KOH, LiOH, $Ba(OH)_2$ and $Ca(OH)_2$ solns all show the same order of reaction as the NaOH soln $Ca(OH)_2$ shows a lower velocity of reaction than the corresponding concns of the other hydroxides, but this is probably due to the formation of a protective film of the insol Ca aluminate With weak bases such as $NH_3$, ethylamine, diethylamine and triethylamine the reaction velocity is more closely proportional to the fourth root of the base concn, but this is proportional to the sq. root of the OH ion concn for weak bases It is concluded that the velocity of soln of Al depends only on the OH ion concn and this is supported by the fact *that for different bases the rate of soln is approx* proportional to the OH ion concn of the solns This yields a convenient method of detg the hydrolysis consts of $Na_2CO_3$ and $K_2CO_3$, which are both about $1.4 \times 10^{-4}$ *The reaction* velocities have a *temp coeff. of about 2 for 10°* and are independent of the rate of stirring of the soln; hence it is a true reaction velocity which is measured *and not a rate of diffusion*

*B C A*

**Reactions involving hydrogen peroxide, iodine and iodate ion. I. Introduction.** Wm C Bray and Herman A Liebhafsky *J. Am. Chem. Soc.* 53, 38–44(1931).—A crit review and discussion of various reactions of $H_2O_2$ in acid solns contg I and iodate or iodide are based on the following table

| | Reaction of $H_2O_2$ with | | | |
|---|---|---|---|---|
| | $I^-$ | $I_2$ | $I_2 + IO_3^-$ | $IO_3^-$ |
| $10^{-12}$ *M* $H^+$ | (*a*) — | (*d*) $I_2 \longrightarrow I^-$ very rapid | (*g*) $I_2 \longrightarrow I^-$ very rapid | (*j*) — |
| $10^{-8}$ *M* $H^+$ | (*b*) $I^- \longrightarrow I_2$ moderate | (*e*) $I_2 \longrightarrow I^-$ moderate | (*h*) — | (*k*) $IO_3^- \longrightarrow$ I and $I^-$ very slow |
| $10^{-1}$ *M* $H^+$ | (*c*) $I^- \longrightarrow I_2$ faster than *e* | (*f*) — | (*i*) $I_2 \longrightarrow IO_3$ rapid | (*l*) $IO_3^- \longrightarrow I_2$ faster than *k* |

**II. The preparation of iodic acid. Preliminary rate measurements.** Wm C Bray and A L Caulkins. *Ibid* 44–8.—Values of $K$, the first-order rate const, are nearly

const., 0.6 ± 0.1 at concns of $I_2$ from $1 \times 10^{-4}$ to $3 \times 10^{-4}$ *M* but always fall off markedly at lower concns. *K* is independent of the concn. of iodate, acid and peroxide within the ranges investigated. The simplest explanation is that the first-order reaction is the rate of hydrolysis of I and the that rapid decrease of *K* at low I concn. is due to the effect of the reverse reaction as the hydrolysis equil. is approached. The oxidation of $I_2$ by $H_2O_2$ furnishes a direct method of investigating the rate of hydrolysis of I.

Don Brouse

**The velocity of decomposition of the carbonato-tetrammine-cobaltic ion and its dependence on the hydrogen-ion concentration.** Kai Julius Pedersen. *J. Am. Chem. Soc.* 53, 18–30(1931).—In glycolate buffer solns. the reaction $[Co(NH_3)_4CO_3]^+ + 2H^+ + H_2O \rightleftharpoons [Co(NH_3)_4(H_2O)_2]^{+++} + CO_2$ is practically complete; in some acetate buffers it is balanced. "When the $CO_2$ pressure is low and the H ion concn. not too small, the velocity may be expressed as the sum of 2 terms, one being independent of the H-ion concn., the other being proportional to the H ion concn. No general acid catalysis was found." (Cf. Brønsted, *C. A.* 22, 4331.) Don Brouse

**Kinetics of the formation of malonamide from ethyl malonate and ammonia in homogeneous solution. A reaction of the third order.** Kenneth C. Bailey. *Proc. Roy. Irish Acad.* 39B, 567–73(1930).—Although the reaction between $CH_2(CO_2Et)_2$ and $NH_3$ in homogeneous medium might easily proceed stepwise through the formation of the half amide, it proves to be a true termol reaction. The reaction was studied in dil. EtOH at 0°, 25° and 33.8°. The resp. values for $k \times 10^3$ are 31.1, 117 and 177. The temp. coeff. is 1.65–1.70. As the concn. of the EtOH is increased, the reaction velocity decreases, thus under the conditions of these expts. the reaction velocity in 76% EtOH was less than 1/6 its value in 44.5% EtOH. The reaction, however, continued termol. An unexpected increase in *k* was obtained toward the conclusion of the expt. carried out at 33.8° and it is uncertain whether this was due to unrecognized exptl. error or to some accelerating factor developing in the reaction.

C. H. Pitt

**Pressure-temperature diagrams for definite phase numbers.** P. Niggli. *Chem. Erde* 5, 201–24(1931).—Fifty pressure temp. diagrams are given for 1- to 5-phase systems.

B. C. A.

**Theory of arranged mixed phases.** Carl Wagner and Walter Schottky. *Z. physik. Chem.*, Abt. B, 11, 163–210(1930).—Binary systems in which the atoms or mols. are shown by x-ray investigations to be arranged in regular lattice arrangement are designated "arranged" mixed phases, as contrasted with those in which the atoms or mols. are distributed haphazardly. A surplus of one or the other component causes a lattice disturbance. The superfluous atoms may (*1*) occupy an intervening position in the space lattice, (*2*) produce vacancies in the space lattice, or (*3*) occupy a position in the space lattice of the other component. If the component in excess requires less space than the other, position (*1*) is noted, if a larger space, position (*2*) is noted. Where both components require about the same space, as in the case of most intermetallic compds., position (*3*) occurs. The chem. potential and activity, calcd. thermodynamically, det. the relation between the elec. resistance and the compn. The systems U–O, Fe–N, Hg–Zn, Au–Hg and Au–Cu are considered.

Curtis L. Wilson

**Fusion diagram of the systems mercuric bromide–mercuric sulfate and mercuric chloride–mercuric sulfate.** M. Paic. *Compt. rend.* 191, 1337–9(1930).—By use of a method previously described (*C. A.* 24, 4208) diagrams are derived for $HgBr_2$–$HgSO_4$. A eutectic mixt. fusing at 236° contg. less than 1% $HgSO_4$ is indicated. The fusion curve mounts rapidly, 506° being the fusion point for 30% $HgSO_4$. From this point values are extrapolated up to the fusion point of $HgSO_4$. The soly. of $HgSO_4$ in fused $HgCl_2$ is less than in $HgBr_2$, the fusion point of a mixt. contg. 10% $HgSO_4$ is 512°.

M. McMahon

**System chromium–carbon.** A. Westgren and G. Phragmén. *Z. anorg. allgem. Chem.* 187, 401–3(1930).—The results of Kratczek and Sauerwald (*C. A.* 24, 1049) contradict in certain important respects those previously obtained by the authors (*C. A.* 22, 2913). The Cr–Cr carbide eutectic is at 3.4% C and not at 4.5%. A cubic carbide of the formula $Cr_7C_3$ is indicated both by x-ray and micrographic observations in addn. to the carbides $Cr_4C$ and $Cr_3C_2$. There is no series of mixed crystals in the concn. interval around 9% C. These discrepancies are attributed to an error on the part of K. and S. in the prepn. of sections for examn.

B. C. A.

**The vapor pressure and the activity of a volatile component in binary alloys at high temperatures.** Karl Jellinek and Gustav A. Rosner. *Z. physik. Chem.*, Abt. A, 152, 67–94(1931).—The vapor pressure of Cd alloys with Pb, Sn and Cu at concns. of 10 to 60% Cd and temps. from 500° to 700° and the vapor pressure of Cu-Zn of the

concns from 600° to 800° were measured The activities of Cd and Zn were calcd and compared with the electrometric measurements of Taylor The heat of vaporization and mixing were also calcd V. F HARRINGTON

**The electrical conductivity and the thermal expansion of magnesium-cadmium alloys.** G GRUBE AND E SCHMIDT. *Z. anorg allgem. Chem* 194, 190–222(1930) — Investigation of Mg Cd alloys by thermal analysis does not yield max or min points on the solidification curve *An exhaustive systematic investigation* of the constitution diagram of the alloys was undertaken by elec. cond and thermal expansion methods from room temp to near the m p The cond isotherm of the alloys at 50° shows 3 decided points at 25, 50 and 75% Mg This confirms the compd MgCd and proves the previously unknown compds. $Mg_2Cd$ and $MgCd_3$ The 3 compds. are revealed only at lower temps ; $MgCd_3$ results at 80° on cooling the Cd rich α mixed crystals sepd from the melt, $Mg_2Cd$ on cooling the Mg rich β mixed crystals to 150° Cd and $MgCd_3$, as well as $MgCd_3$ and MgCd, form a continuous series of mixed crystals In comparison, MgCd and $Mg_2Cd$ are only limitedly sol in one another At room temp stable Cd rich α′ mixed crystals extend from 0 to 65% Mg Mixed crystals between the concn boundary of the β′ mixed crystals cannot be accurately detd but lie in the neighborhood of 60% Mg The transformation of α′- or β′-mixed crystals into the α or β, stable at high temps , results on heating through heterogeneous decompn regions whose boundary curve is placed between 20 and 83% Mg It was shown that in the region of 40–60% Mg and of 70–80% Mg the elec resistance and the length of the test piece increase with heating, first with a const temp coeff and then in a temp region of 70–80° below the true transformation interval the temp coeff slowly increases In the transformation interval it increases suddenly and then decreases to a small const value The transformation therefore proceeds in 2 steps The first occurs with the temp slowly increasing, disarranging the ordered distribution of the atoms, stable at low temps The second follows the transition of the yet partially ordered into the completely irregular distribution of mixed crystals stable at higher temp ALLEN S SMITH

**Lattice deformation and catalytic activity.** NICOLA PARRAVANO *Atti III congresso naz chim pura applicata* 1930, 45–50 —The behavior of a no of metals and metallic oxides as catalysts is considered It is claimed that in some cases catalysis is due to the crystn of an amorphous powder It may also be due to a disturbance of the force field around the atoms or mols by deformation of the crystal lattice J B AUSTIN

**The catalytic activity of nickel in the form of aerosol and aerogel.** W. E. GIBBS AND H LIANDER *Trans Faraday Soc* 26, Pt II, 656–62(1930) —Ni aerosol was prepd in gas mixts of CO and H (*1*) by forming an elec arc between Ni electrodes and (*2*) by thermal decompn of Ni carbonyl The aerosol prepd by these 2 methods showed almost no catalytic activity in the formation of $CH_4$ from CO and $H_2$ Ni aerogel was formed (*1*) by the condensation of Ni vapor formed when an arc was struck between a graphite cathode and a Ni ingot anode, (*2*) by the decompn of Ni carbonyl These aerogels were used as catalysts in the formation of $CH_4$ from CO and $H_2$ They exhibited almost no activity under the same conditions that a Ni + 15% $Al_2O_3$ catalyst gave about 90% conversion The Ni aerogel from the arc showed greater activity in the hydrogenation of $C_2H_4$ Conclusion Finely divided Ni prepd by these methods did not produce active catalysts in spite of the large surface formed L H REVERSON

**Catalytic experiments with a high-pressure circulation apparatus** E BERL AND R BEMMANN *Z angew Chem* 44, 34–9(1931) —Water gas was subjected to catalytic high pressure synthesis in a circulation app in which the liquid reaction product is sepd from the gas mixt A sketch of the app , and details of the design of the high-pressure bomb, sepg vessel, fittings and device for measuring gas velocity are given The results in general, confirmed data reported in the literature Alkali-free ZnO catalyst forms MeOH chiefly In contrast, higher alcs , acids and aldehydes are formed by the use of an alkali-contg ZnO S has an injurious effect on the catalyst The prepn and reduction of the catalyst are of great importance The gas velocity over the catalyst has considerable influence on the reaction With increasing velocity more unstable intermediate compds are obtained, while at low velocities the stable end products predominate ALLEN S SMITH

**The catalytic oxidation of carbon monoxide** J C W FRAZER *J Phys Chem* 35, 405–11(1931) —Carefully purified, finely divided $MnO_2$, $Co_3O_4$ and $Ni_2O_3$ are extremely active catalysts for the union of CO and $O_2$ at temps as low as 0° Extreme purity, not the presence of promoters, is important for catalytic activity Impurities may be removed by electrolysis of an aq suspension of the oxides None of 17 other

unnamed oxides studied was effective. The 3 active oxides differ from the others in one significant particular, namely their compn. is indefinite. By an adsorption app. it was shown that the $O_2$ pressure in equil. with a sample of one of these oxides depends on the compn. of the oxide. Condensation of water vapor within the pores of these oxides destroys their catalytic activity. Extreme drying does not destroy the activity. These oxides, lopesalite, completely protect a worker when used in a gas mask, but they are not yet adapted to the treatment of the exhaust gases of internal-combustion engines. References are made to several dissertations not indexed in chem. literature.
F. F. Brown

**Colloidal ferric oxide and various factors that influence its ability to catalyze the decomposition of hydrogen peroxide. I. The temperature coefficient, the effect of catalyst concentration and the effect of electrolytes.** Raymond J. Kepfer and James H. Walton. *J. Phys. Chem.* 35, 537–77(1931).—Decompn. of $H_2O_2$ was catalyzed at 50°, in the dark, by chloride free $Fe_2O_3$ prepd. in a special high temp. dialyzer according to Sorum. The reaction seemed to be unimolec. The velocity consts. increased as the reaction progressed. The temp. coeff. of the reaction velocity between 30° and 60° was 2.33 for each 10° rise in temp. This rapid rate indicates that a chem. change, not a diffusion, governed the rate of decompn. The rate of decompn. was multiplied by 2.2 when the concn. of catalyst was doubled between the limits 1.2 and 2.5 g. of Fe per l. When NaCl, $BaCl_2$ and $K_2SO_4$ were added, the rate of decompn. of $H_2O_2$ followed typical flocculation curves which show the effects of adsorption of electrolyte on the colloid, flocculation of the sol and subsequent adsorption on the pptd. $Fe_2O_3$. When $NaH_2PO_4$, $Na_2HPO_4$, HCl, NaOH and $CuSO_4$ were added, similar curves were obtained, but these latter curves were modified by the effect on decompn. of $H_2O_2$ exerted by the added electrolyte. The activity of this colloidal $Fe_2O_3$ was about 1000 times the activity of the $FeCl_3$ that it contains. The major catalytic effect is due to $Fe_2O_3$ and not to $FeCl_3$ as sometimes claimed. It is probable that the formation of higher oxidation products of Fe, such as $FeO_2$, $Fe_3O_4$, $FeO_3$ or $H_2FeO_4$, is one of the steps in the decompn. of $H_2O_2$ in the presence of $Fe_2O_3$.
F. F. Brown

**The heat of dilution of salts of several bivalent metals with univalent anions at high dilution at 25°. I. $MgCl_2$, $CaCl_2$, $SrCl_2$, $BaCl_2$ and $MgBr_2$, $CaBr_2$, $SrBr_2$, $BaBr_2$.** F. Lange and H. Streeck. *Z. physik. Chem.*, Abt. A, 152, 1–23(1931).—The heats of dil. for these salts are measured at concns. from 0.1 to 0.0001 *M*. The interpolated values for $V_m$ and $m$ are, at least below 0.01 *M*, in good agreement. The $V_m$ curve is only approx. proportional to $\sqrt{m}$. The extrapolated initial slope agrees with that called by the Debye-Huckel theory. The deviation of $m$ is discussed with respect to the theory, the activity and the osmotic coeffs. and the radius of the unhydrated ions.
V. F. Harrington

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A comparison of certain suspending agents (Bateson) 17. The reversibility of coupled reactions in biological systems and the second law of thermodynamics (Burk) 11A. The $p_H$ stability regions of the proteins (Svedberg) 11A. The state of water in colloidal and living systems (Gortner) 11A. Packing of atoms in alloys (Westgren, Almin) 9.

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## 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Connection between the quantum mechanics "uncertainty" and the structure of elementary particles and a calculation of the masses of the proton and electron based thereon. R. FÜRTH *Z Physik* 57, 429–46(1929), *Physik Z* 30, 895-8(1929); cf. *C. A.* 23, 5405, 24, 1019 —Theoretical. While the radius of the electron has a definite meaning in the classical electron theory, matters become very complicated on applying quantum mechanics The Heisenberg "uncertainty" relationship is applied first to a light quantum, and then to protons and electrons The change of matter into radiation and inversely is considered, and the masses of the electron, proton and neutron are obtained. Eddington's theory of the elementary quantum, in which it is described in 16-dimensional space, is also considered, and the above calcns are carried out B C A

Is there dualism between corpuscles and waves? E. SEVIN *Ann soc sci Bruxelles* 50, Ser B, 121–5, 129–34(1930) —S rejects the explanation of electron diffraction based on the wave mechanics He assumes (1) that when a beam of electrons of homogeneous velocity v impinges on a crystal the shock produces a "classical" wave, i e, a beam of parallel x rays of wave length $\lambda = h\sqrt{1 - (v^2/c^2)}/\epsilon$ The direction of the x ray beam is the same as if the incident electron stream were replaced by a beam of x rays (2) This "classical" wave immediately entrains the electrons which have just been stopped and only those The mechanism of the entrainment is identified with the Compton effect. Reply. C. MANNEBACK *Ibid* 125–9 J B AUSTIN

Spectroscopic apparatus in industry. CHARLES C NITCHIE *Mech Eng* 53, 123-6(1931) E H

*Canal-ray collisions.* CIR GERTHSEN *Physik Z* 31, 918–53(1930) —The intensity of canal rays can be exactly measured by detg the ionization in a gas chamber sepd from the evacuated app by means of a thin window Primary currents of $10^{-17}$–$10^{-19}$ amp can still be measured The laws of canal ray collisions are a well understood as those of related rays Several briefly reviewed papers show this F U

The action of Geiger counting chambers C. BOSCH AND H. KLUMB *Naturwissenschaften* 18, 1098(1930) —An investigation was made of the influence of the surface properties of sensitive "points as used in Geiger counters on disruptive discharges (counter impulses) Geiger Muller counters used were of the conventional type, cylindrical anode, coaxial filament. The filament could be cleaned by glowing or by ion bombardment. Filaments of Cu Ag Au, Fe and Zn were used in He with admixtures of $H_2$ or $O_2$ Electronegative admixtures favor the counting effect, purest electrodes and He filling of the tube gave no counting effect whatever, although recovery was noticed after some time Immersion in liquid air had the same effect of reducing the counting effect It is concluded that an adsorbed film on the filament has great influence on the counting efficiency, probably a $H_2O$ film B J C v D H

Characteristic velocity of electrons diffused from metallic surfaces. G BERNARDINI *Atti accad Lincei* 11, 1096–9(1930) —There are 3 kinds of secondary electronic emissions reflected which do not lose any appreciable velocity diffused, which lose a little in velocity, secondary electrons, released from the metal reflector and having considerably lower velocity There are no characteristic velocities to distinguish these classes of electrons but it has been found recently that at 300–500 v (Rudberg, *C A* 24, 3431) and also at 150 v (Brown and Whiddington *C A* 21, 2221), have noted discontinuities in spectra from secondary emission suggesting inelastic collisions B working at 34–40 v and using Cu, Al and Zn reflectors has noted discontinuities with Cu and Zn only No explanations have been advanced for the phenomena.
A. W. CONTIERI

Electric conduction in metals. W M. Hicks *Nature* 126, 951–5(1930); cf. Fowler, *C A* 24, 3124.—The fact that free electrons in metals do not affect the sp heat relation as a perfect gas is explainable by their being in the interatomic spaces an insufficient length of time to absorb the energy of the space completely As they fall into atoms the energy is absorbed by the nucleus, the electrons are distributed in their selected orbits and the energy radiated according to the *nhν* formula This equalization of energy by the nucleus may explain the behavior of an atom as a perfect sphere and a perfect machine GREGG M EVANS

Evidence of protons in metals. A Coehn *Z Elektrochem* 35, 676–80(1929), cf *C A* 22, 1904.—Three methods are described to show that electrolytically generated H diffuses through a Pd cathode and thereby imparts to the various points on the electrode the potential which would be assumed by a H electrode In the first expt 0 1 *N* $H_2SO_4$ soln was electrolyzed between a Pt and a bent Pd cathode, and after stopping electrolysis the potential at different points on the latter was compared with that of the calomel electrode At first certain points on the wire showed the O electrode potential as a result of exposure to air, but after 80 hrs the potential became equal to that of the H electrode The 2nd method was to observe the variation in elec resistance of the Pd wire electrode as a result of the diffusion through it of H In the 3rd method advantage was taken of the ready oxidation of H contained in Pd by O to form $H_2O_2$ B C. A

The mechanism of spark discharges. J Slepian *J Franklin Inst* 210, 473–5 (1930).—Reply to Loeb (*C A* 24, 5611) M Farnsworth

Infra-red sensitive cells. Fritz Michelssen *Z tech Physik* 11, 511–5(1930).—The action of photoelec cells sensitive in the infra red was studied Cells of Se-Te were prepd by cathodic evapn on glass, the film of alloy being extremely thin, the electrical resistance was reduced by prepg the glass with 2 sets of dovetailed comb-shaped gratings, rubbed in with colloidal graphite and using these as electrodes The alloy was subsequently deposited on the grating The distance between the electrode grooves was 0 1 mm., their length 10 mm The evapn took place in an A glow discharge The dark space reached from the Se-Te cathode halfway to the glass plate by proper adjustment of the A pressure For proper grain size the plate was heated later to 210° for 2 hrs., then enclosed in an evacuated vessel The light used for the tests on the sensitivity was filtered through proper glass filters which cut off light below 0 745 or 0 675μ Curves on spectral sensitivity distribution were also made The data show an active infra-red interval from 0 75μ to 1 2μ for 7 to 13 0 at % Te in Se The opinion of Gripenberg (*C A* 6, 449, 7, 2007) was confirmed on the sensitivity shift toward short λ of plain Se cells when used in a thin film It is believed that the increased sensitivity of the Se-Te mixt is due to a changed crystal form of the Se. The Case "thallofide" cell was examd (*C A*. 14, 2107) These cells were prepd by thermal evapn in $O_2$ at 0 8 mm The results were quite satisfactory for practical application of the cells to fog telegraphy. B. J C van der Hoeven

A new kind of photoelectric cell. B Lange *Physik Z* 31, 964–9(1930).—The new $Cu_2O$ photoelec cells and their use in photometric measurements are described Sunlight falling on a cell of this type having a surface of 49 sq cm drove a small motor in the Siemens lab Frank Urban

Remark on the experiment of Rupp on a relation between electron scattering maxima and the emission of soft x-radiation. H W B Skinner. *Naturwissenschaften* 18, 1097–8(1930).—Recent work of Rupp (*C A* 25, 870) is explainable in a different manner without relating the emission of soft x rays to crystal structure Whatever angle of incidence causes a max reflection of electrons (*i. e.*, a Bragg interference max.) will also cause a min loss of energy of the electrons to the crystal and thus a min chance for excitation of the x-rays Max x ray intensity will, therefore, automatically coincide with max energy scattering of the electrons. Reply. E Rupp *Ibid* 1098 B J. C. van der Hoeven

Determination of atom distances in gas molecules by x-rays and cathode rays. J. M Bijvoet and H. J. Verweel. *Chem Weekblad* 27, 648–50(1930).—A review. B. J C. v. d H.

Scattering of electrons by crystals and adsorbed gas films. H. J. Verweel and J M Bijvoet. *Chem Weekblad* 27, 626–9(1930).—A review B. J. C. v d. H.

Energy distribution in continuous Röntgen spectra. K. K Aglintzev. *Zhur. Prikladnoi Fiziki* 6, No 2, 38–46(1929) (Published in *Trans State Phys.-Tech. Lab.* (Moscow), No 11(1929)).—A general method for the theoretical detn. of energy distribution is developed analytically (from the current-voltage time relationship) and graphically (from oscillographs), and applied to inductors and transformers It is

shown that the exptl results after the introduction of necessary corrections, are in agreement with Kulenkampff's (*C A* 17, 1752) law of distribution of energy in Röntgen spectra B N. Dantloff

**X-ray investigation of easily deformable crystals.** L. Chrobak. *Bull intern acad polonaise* 1929A, 497–505.—The technic of obtaining undeformed specimens of easily deformed crystals for x ray investigations is given. New app for the work is also described including a simple precision chamber for Laue photographs B C A

**Technic of radiography by γ-rays.** Charles S Barrett, Roy A Gezelius and Robert F. Mehl. *Metals and Alloys* 1, 872–9(1930).—A technic for taking radiographs by means of γ rays is given with charts and tables of exposure times for Ra and for Ra emanation. Factors influencing the quality of radiographs and the rapidity of photographic action with γ rays are discussed A J Monack

**The scattering of hard γ-rays.** L. Landau. *Naturwissenschaften* 18, 1112(1930).—It is claimed that Beck (*C A* 25, 871) is in error and that the possible scattering of hard γ rays by at. nuclei is not more than 0.0001 as great as the Compton effect B J C. van der Hoeven

**Theoretical treatment of atomic destruction.** Guido Beck. *Physik Z* 31, 945–6 (1930). cf *C A* 25, 248.—An interpretation is given of the problem of collisions between α particles and nuclei in terms of the quantum theory of aperiodic phenomena. Frank Urban

**Internal conversion of nuclear energy.** H Casimir. *Nature* 126, 953–4(1930).—When a nucleus passes from an excited state to one of less energy, either a γ-quantum is given off or an extra-nuclear electron is emitted with energy equal to the γ-quantum less the ionization energy. This latter is called internal conversion of nuclear energy. The probability of this conversion will be measured by the no. of γ-quanta times a factor $K$ (a function of the frequency). An expression for $K$ is given, based on Dirac's equation. For hard γ rays such as those from Ra C the electron ejection is mainly nuclear Gregg M Evans

**Can lead be rendered radioactive?** G Guébey. *Ann soc sci Bruxelles* 50, Ser B, 117–21(1930).—An attempt was made to detect radioactivity in a series of Pb disks which had been exposed to sunlight, ultra violet light, x rays and γ rays by comparing them with a series of Al disks similarly treated. No activity was observed. Conclusion: Pb is not radioactive and the activity reported by others is probably due to a deposit from the atm. J B Austin

**The absolute intensities and internal conversion coefficients of the γ-rays of radium B and radium C.** C. D Ellis and G H Aston. *Proc Roy Soc* (London) A129, 180–207(1930).—The relative intensities of the γ rays of Ra B and Ra C and of the photoelec. groups assocd. with them are investigated. In a fraction, α, of the cases the radiation is absorbed in the electronic structure and gives rise to a photoelectron, in the remaining fraction, $1-\alpha$, the γ ray is emitted clear of the atom. The object of this paper is to describe measurements of the various quantities, α, and on the basis of these results to discuss the question of the mode of energy interchange between the nucleus and electronic system. Marie Farnsworth

**The rate of loss of energy by β-particles in passing through matter.** E J Williams. *Proc Roy Soc* (London) A130, 310–27(1931). cf *C A* 24, 5219.—Exptl results for the rate of loss of energy by β particles with velocities from 0.1–0.97 *c* are given. The values for slow electrons are obtained by the cloud method and those for fast electrons in expts with thin metallic foil. The results have been cor. for the effects of scattering and straggling. The observed values for the rate of loss of energy are 50–80% greater than the theoretical values as calcd by Bohr and Gaunt using, resp., the old and new quantum mechanics. G M Murphy

**The loss of energy by β-particles and its distribution between different kinds of collisions.** E J Williams. *Proc Roy Soc* (London) A130, 328–46(1931). cf preceding abstract.—Classical and quantum mechanics indicate approx. the same av. rate of loss of energy by β-particles but the distribution of the energy loss between different kinds of collisions is very different. The results of the quantum theory calcn. agree more closely with expt., particularly in connection with the phenomenon of primary ionization. Quant. agreement is not good for the rate of loss of energy and primary ionization. For collisions in which the energy loss is large and in case of slow electrons, the agreement is within exptl. error. Gaunt's calcns. extended to the case of fast electrons and for non relativistic quantum theory give a much smaller no. of collisions than expt. This indicates the nature of the relativity correction. G. M. M

Speculations concerning the α-, β- and γ-rays of radium B, C, C'. L. A revised

theory of the internal absorption coefficient. R. H Fowler *Proc. Roy Soc.* (London) A129, 1–24(1930) —This paper is a math development of the absorption of γ-rays in a species of photoelec effect by the planetary electrons of the parent atom, which gives rise to the sharp lines of the β ray spectrum Marie Farnsworth

A new method of analysis of groups of α-rays. I. α-Rays from radium C, thorium C and actinium C. Ernest Rutherford, F A B Ward and C E Wynn-Williams. *Proc Roy Soc* (London) A129, 211–31(1930) —The paper describes some of the applications of the "Greinacher" type of counter for α-rays, in which the ionization current due to a particle is amplified linearly by means of thermionic valves, there being no ionization by collision By using a double ionization chamber with this type of counter it is possible, in working with complex beams of α particles, to record only those particles which stop within the chamber itself, and not those which pass right across it, thus giving a measure of the no of particles having ranges between $x$ mm and $x + 2$ mm This differential counter is applied to the study of groups of α particles emitted from various sources The 8 6-cm α particles from Th C', the 7 0-cm particles from Ra C', and the 3 9-cm particles from Po all appear to be homogeneous groups. The 5 5-cm particles from Act C are found to consist of 2 well marked groups, differing in range by 4 2 cm The 4 8-cm particles from Th C form also a complex group, in agreement with the results of Rosenblum, who showed that they consisted of at least 5 groups of particles The missing short range α particles emitted in the dual disintegration of Ra C are found and their consts detd It is found that these α particles are present to an extent of about 1 in 4,000 of the main 7 0-cm particles from Ra C', they appear to consist of 2 groups—the main one of range 4 1 cm and a smaller one of range 3 9 cm Marie Farnsworth

α-Particles of the actinium series. Paolo Misciattelli *Atti III congresso naz. chim pura applicata* 1930, 388–91 —M has studied the range of α-particles emitted by radioactinium and actinium X as a function of the time elapsed since their prepn. The results are interpreted to show the appearance of various decompn products. J B Austin

An assumed transformation of lead. Remarks on the notes of Smits, Boutaric and Lepape. Stephanie Maracineanu. *Bull. sect. sci. acad roumaine* 13, 55–8(1930); cf 24, 294, 2950, 3427, 4454, 4699 —S., B. and L. confirm the radioactivity of ancient Pb coverings, but consider the cause of the radioactivity debatable M presents arguments in favor of solar action H W Walker

Experiments to discover a stable isotope of polonium. G. v. Hevesy and A. Guenther. *Z anorg allgem. Chem* 194, 162–78(1930) —Of the elements of the radioactive decompn. series, only elements 81, 82 and 83 have stable, as well as radioactive, isotopes. In order to discover a possible stable Po isotope, large quantities of the Te minerals, hessite, calaverite, nagyagite, and the Bi minerals, Bi telluride, bismuthinite, and metallic Bi were used with Po as an indicator. The Po was added to the soln of the mineral and at the end of the expt. was again sepd A possible present stable Po isotope would sep with the Po It is pointed out that the Po ppt. weighed only about 0 1 mg and contained less than 1% of the element sought as detd by x ray spectroscopic investigation It is concluded that the minerals investigated did not contain the element sought, or contained less than $10^{-11}$ g per g of mineral Methods were worked out for the chem and electrolytic sepn of Po from large amts. of foreign substances, especially Te and Bi A systematic investigation of the electrolytic sepn of the different metals gave the most favorable results with the use of Mo as the cathode. Allen S Smith

The isotopic constitution and atomic weights of zinc, tin, chromium and molybdenum. F. W. Aston. *Proc. Roy. Soc.* (London) A130, 302–10(1931).—Expts. with Cd and Ge were unsuccessful. The following figures give the mass no. and percentage abundance of the isotopes, the isotopic moment, mean mass no., at. wt. and packing fraction, resp: *Zn:* 64, 48 0, 65, 2 5, 66, 27 9, 67, 5 3, 68, 17.1, 69, 0 85, 70, 0 38, 1 41; 65 452, 65 380 ± 0 02, —9 9 *Sn:* 112, 1 07; 114, 0 74, 115, 0 44; 116, 14 19, 117, 9 81; 118, 21 48, 119, 11 02, 120, 27 04; 121, 2 96, 122, 5 03; 124, 6 19, 1.77; 118.82, 118.72 ± 0 03, —7 3 *Cr:* 50, 4 9, 52, 81.6, 53, 10 4; 54, 3 1; 0 31; 52 068, 52 011 ± 0 006, —10 ± 3 *Mo:* 92, 14 2, 94, 10 0; 95, 15 5, 96, 17 8, 97, 9 6, 98, 23 0; 100, 9 8, 1 87; 96 025, 95 97 ± 0 06, —5 5 These results include correction of the order of abundance for Zn and Sn and the discovery of 3 new isotopes of Cr and 7 of Mo G M. Murphy

The radioactive properties of rocks, soils, crude oil and waters from Southern California. J Lloyd Bohn *J. Franklin Inst.* 210, 461–72(1930), cf. *C. A.* 24, 4699 —This paper contains measurements on waters from Lake Arrowhead, Arrowhead

Hot Springs, Harlem Hot Springs, the Pacific Ocean and from numerous wells and tunnels of the Pasadena and neighboring water supplies. It also contains measurements on rocks, soils and crude oil MARIE FARNSWORTH

Nature and size of the luminescent center. J. EWLES. *Proc Roy Soc.* (London) A129, 509–19(1930).—By reasoning in accord with recent knowledge of luminescent solid solns., and free from the doubtful assumptions used by Merritt, an equation relating brightness of luminescence and concn. of activator has been derived. This expression is similar to that of Brüninghaus. It was found to apply to solid solns. $Sb_2O_3$, $Bi_2O_3$ and PbO each in CaO, to uranin and Rhodamine 6G in water, and to fluorescein in EtOH. FRANK URBAN

The scattering of slow α-particles by helium. P. M. S BLACKETT AND F. C. CHAMPION *Proc. Roy Soc.* (London) A130, 380–8(1931).—The scattering of particles by an inverse-square law is the same in classical and quantum mechanics. Mott (*C. A.* 24, 2040) by means of wave mechanics has shown the scattering to be quite different from the classical when the scattered and scattering particles are of the same kind. The scattering of α-particles by He is a case of collision of particles of the same kind that have no spin and obey the Einstein Bose statistics. Photographs of 50 000 α-rays from Po were made with the Wilson cloud method in He $O_2$ mixt. The results agree with Mott's theory. G. M. MURPHY

Recoil atoms in a gaseous medium. LA. GOLDSTEIN *Compt. rend.* 191, 1450–2 (1930).—It has been shown previously that the degree of activation of a negatively charged electrode immersed in a mixt. of radon and air varies with the pressure of the mixt. At low pressures the degree of activation is very feeble, because the high velocities of the recoil atoms, Ra A and Ra B are not slowed down by the low gas pressure sufficiently for them to be diverted to the charged electrode. As the pressure increases the degree of activation of the electrode increases to a max. because the path of the recoil atoms is shortened by the increased gas pressure. Then, after passing through a max., the degree of activation of the electrode decreases as the pressure of the gas mixt. increases. In the present paper expts. are described in support of the following hypothesis regarding this decrease. As the pressure increases, the ionization of the gas increases in consequence of the better utilization of the paths of the α-rays, and the decrease in degree of activation is due to the recombination of the positively charged recoil atoms with the negatively charged ions of the gas. It is further shown that the degree of activation of an anode increases constantly with the pressure of the gas, under the same conditions that cause the degree of activation of a cathode to pass through a max. and then decrease. Also, that increase of the ionic density does not sensibly decrease the degree of activation of an anode. Expts. designed to explain this behavior of the anode are in progress. R. H. LOMBARD

Space distribution of *H*-particles liberated from aluminum by α-rays of polonium. H. POSE *Physik. Z.* 31, 942–5(1930).—Absorption curves of *H* particles obtained from Al by Po α-rays were detd. for the angles of 48°, 65°, 105° and 135° between primary and secondary rays. Excellent agreement was found with values calcd. by the method of Bothe. FRANK URBAN

Absolute intensity of the aurora line in the night sky and the number of atomic transitions required to maintain it. LORD RAYLEIGH. *Proc. Roy. Soc.* (London) A129, 458–67(1930).—The standard instrument used in measuring the green auroral light of the night sky was calibrated. If the transmitted light is assumed to consist entirely of λ5577, the brightness corresponding to the zero reading of the instrument is found to be $8.65 \times 10^{-6}$ candles/sq. m. Deducting the fraction attributable to the continuous background, the brightness of the line becomes $3.2 \times 10^{-6}$ candles/sq. m. The energy required to maintain it is 6.4 ergs/sec./sq. m. and the no. of at. transitions required to supply the energy is $1.81 \times 10^{4}$ sec./sq. m. FRANK URBAN

Change in electron coupling in the rare gases. C. J. BAKKER. *Nature* 126, 955. *Naturwissenschaften* 18, 1100(1930).—*g* values for *SL* and *JJ* couplings for $^1P_1$ and $^3P_1$ levels are given for Ne I, A I, Kr I and Xe I. The agreement is good except in Xe I where first-order calcns. are probably not sufficiently accurate for large values of spin-orbit reaction. GREGG M. EVANS

Interferometric measurements in the arc spectrum of iron. C. V. JACKSON *Proc. Roy. Soc.* (London) A130, 395–410(1931).—Interferometric measurements were made of 10 Lines in the Fe arc spectrum between 4000 and 4400 A. U., by comparison with the red Cd Line and the secondary Ne standards. Measurements have also been made of 68 Lines between 2700 and 3100 A. U. in the Fe arc and 5 lines in Hg from 2652–3125 A. U. The results are in good agreement with other investigators and with calcd. results obtained from energy levels. G. M. MURPHY

**Apparatus for determining optical and magnetic rotatory dispersion in the ultra-violet.** AUGUST HAGENBACH *Helv Phys Acta* 3, 168-70(1930). EGON BRETSCHER

**The effect of crossed electric and magnetic fields on the Balmer lines of hydrogen.** WALTER STEUBING *Naturwissenschaften* 18, 1098 9(1930).—Preliminary results are given. The effect was not the appearance of new lines but consisted of a shift of the Stark-effect components and intensity changes. Weak magnetic fields do not influence the intensity distribution materially; strong fields suppress all Stark-effect components. B. J. C. VAN DER HOEVEN

**Bergmann series in the argon spectrum.** ERNST RASMUSSEN *Naturwissenschaften* 18, 1112 3(1930). Until now Bergmann series were only known for Xe (Meggers, de Bruin, Humphreys, *C. A.* 24, 1287). Similar series have now been found for A by using a plane grating and neocyanine plates and an A tube at 2 mm. pressure. The results are given in tables, including derived values for the terms $3d_4$ to $3d_1$ and $2s_2$ to $2s_5$ and $3s'$. B. J. C. VAN DER HOEVEN

**The fluorescence of excited mercury atoms.** Z. ZAJAC *Compt. rend.* 191, 1301-6 (1930).—Hg vapor in a sealed tube was simultaneously subjected to an oscillating elec. discharge and to an intense low pressure Hg vapor arc. External electrodes were used. A greenish blue luminous color was observed in the pos. column limited by the contour of the exciting rays. It started at a pressure of 0.0[illegible] mm. and attained its max. intensity at 0.3 mm. and at a temp. of 140°. At 1 mm. a continuous intense spectrum excited by the discharges was observed which masked the fluorescent light so that it was no longer visible at pressures above 1.5 mm. Raising the temp. of the vapor at const. pressure does not noticeably influence the phenomenon. Photographing the spectrum gives the 5461, 4358 and 4047 Hg lines which are intensified by the simultaneous excitation. Each of the 3 lines is capable of causing the fluorescence, but with different degrees of intensity. The yellow lines 5790 and 5769 do not cause it. The intensities of all lines seen during the fluorescence are proportional to the intensity of the exciting light. I. W. LAIRD

**Analysis of the ultra-violet hydrochloric acid bands.** M. KULP *Physik. Z.* 21, 959-60(1930); cf. *C. A.* 24, 5228.—The bands between 3000 A. U. and 4000 A. U. have been rephotographed and analyzed. FRANK URBAN

**New band group in the ultra-violet absorption spectrum of selenium vapor.** (MLLE.) M. MORACZEWSKA. *Bull. intern. acad. polonaise*, 1930A, 17-9.—A new band group has been observed in the absorption spectrum of Se vapor in the spectral region 2100-2300 A. U. Like other Se bands they are degraded toward the red, but unlike the visible band series no rotational fine structure could be detected with the dispersion employed. The frequencies of 12 band heads have been measured and are expressed by the formula $\nu = 43{,}210 + 368n - 0.2n^2$. Since the bands appear in the satd. Se vapor at relatively low temp., 200° ($p = 0.001$ mm.) to 400° ($p = 4$ mm.), and since the mean frequency difference is 363 cm$^{-1}$ as against 200-270 cm$^{-1}$ for the bands in the visible region, it is suggested either that the carrier of this spectrum is not $Se_2'$ but a polyat. Se mol., or, more probably, that this spectrum corresponds with a different electron jump from that corresponding with the bands previously observed. B. C. A.

**Spectroscopic observations of photochemical reactions.** R. MECKE. *Z. wiss. Phot.* (Schaum Festschrift) 29, 72-6(1930).—Photochem. reactions which are in agreement with Einstein's equivalence law can be regarded as single reactions. Those reactions which do not follow the equivalence law may be regarded as being chain reactions. A. P. H. TRIVELLI

**The chemical effects of cathode rays. I. The decomposition of ammonia.** G. R. GEDYE AND T. E. ALLIBONE. *Proc. Roy. Soc.* (London) A130, 316-66(1931).—A beam of electrons from a Lenard tube with 210 kv. and currents up to 4 microamp. was passed through Al foil into $NH_3$. The decompn. products are $N_2H_4$, $N_2$ and $H_2$. From 5.75 to 71.4 cm. initial gas pressure, the rate of formation of permanent gas is approx. proportional to the pressure and independent of the nature of the surface. The relative yield of $N_2H_4$ is greater at low pressures for the same relative amt. of decompn. A calorimeter is described for the measurement of the energy of the electrons entering the reaction vessel. It gives results for the amt. of energy reacting per mol. of the same order of precision as may be obtained with $\alpha$ particles. The results are in good agreement with those obtained in the same reaction with $\alpha$-particles and agree qualitatively with decompn. in the silent discharge and in ultra-violet light. For each ion pair formed, 1.2 mols of $NH_3$ are decomposed. G. M. MURPHY

**Sorption and chemical reactions in atomic rays.** M. LANCUCKI. *Bull. intern. acad. polonaise* 1930A, 20-9.—A study has been made of the close relationship which

exists between the absorption of N in an elec discharge tube, Fe or Al electrodes being used, and the disintegration of these metals. The amts. of N absorbed and of Fe disintegrated are equiatomic and depend on the gas pressure, the cathode fall, the c. d., and the temp. of the cathode. If the cathode is constructed of Fe nitride, the latter is disintegrated without absorption of N. The Fe nitride formed by this process is not ferromagnetic. R. C. A.

**The action of electrical discharge on gaseous hydrocarbons. The effect of high-speed cathode rays on paraffin hydrocarbons.** S. C. Lind, B. M. Marks and G. Glockler. *Trans. Am. Electrochem. Soc.* 59 (preprint) 8 pp. (1931).—It has been found that the hydrocarbons methane, ethane, propane and butane are decomposed by the high speed electrons (125,000 v.) which are emitted through the thin glass window of a Slack-Lenard cathode-ray tube. H is one of the products of decompn. An estimate is made of the no. of mols. reacting per electron crossing the reaction tube and of the no. of ion pairs produced in the reacting gas per electron traversing it. The comparison of these ratios shows that the no. of mols. reacting and the no. of ions pairs formed are of the same order of magnitude. C. G. F.

**Physical methods in the chemical laboratory. XVI. The effect of electrical discharges on gaseous elements and compounds.** H. Greinert. *Z. angew. Chem.* 44, 30–4 (1931).—The formation of active N and H, the synthesis of acetylene, the polymerization of benzene, and the decompn. of thioformic acid and carbonic acid in the elec. discharge are reviewed. Methods and app. are discussed. Chem. reactions of the active substances as reported by numerous investigators are summarized with an extensive bibliography. Allen S. Smith.

**The dielectric constant and the conductivity of ionized gases.** Th. V. Ionescu and C. Mihul. *Compt. rend.* 191, 1478–8 (1930).—The gas was ionized by a current of electrons in a glass tube provided at one end with a W filament, at 4 mm. from this with a grid, at 7 cm. a Cu ring, and at 17 cm. an Al plate. When the ring and plate were at the same potential, $\Delta C$ and $1/\rho$ were proportional to the electron current, $\Delta C$ being the change in capacity due to the change in dielec. const., and $1/\rho$ the cond. of the gas. If $\lambda$ is the wave length supplied by the oscillator and if the results are reduced to a current of 1 milliamp., then $C\lambda^2$ is neg. for wave lengths between 2 and 12 m. and then becomes pos. $C\lambda^2$ is independent of the value of the accelerating potential. The wave length for which $C\lambda^2$ changes sign is independent of the intensity of the current between 0 and 2 ma. The conductance, $1/\rho\lambda^2$ is proportional to the intensity of the ionization. Its variation with $\lambda$ is less simple. For an accelerating potential of 400 v. it has maxima at $\lambda$ = 2.4 m., and 6 m., and a min. at 3.5 m. For greater wave lengths it decreases rapidly and approaches 0 for $\lambda = \infty$. For 1600 v. $1/\rho\lambda^2$ remains const. up to 6 m., and then approaches 0 rapidly as $\lambda$ increases. R. H. Lombard.

**The hypothetical existence of Hertzian frequency resonators in water.** P. Girard and P. Abadie. *Compt. rend.* 191, 1300–2 (1930).—The dielec. consts. of distd. water obtained by using wave lengths ranging from 4.01 m. to 60.30 cm. are recorded together with the dielectric consts. of $1.5 \times 10^{-4}$ N NaOH at 10° for wave lengths ranging from 50.18 m. to 60.25 cm. The dispersion bands noticed by Weichmann and Frankenberger were not obtained in this region. The hypothesis for the existence of Hertzian resonators of a new type is found untenable because of the lack of confirmation of expt'l. data. F. W. Laird.

**Excitation of fluorescence in benzene at −183° by monochromatic light.** J. Starkiewicz. *Bull. intern. acad. pol. sciences* 1929A, 287–94; cf. Pringsheim and Reimann, C. 1930, I, 480; Pringsheim, C. 1930, I, 1050.—The fluorescence spectra excited in $C_6H_6$ at −183° by the almost monochromatic radiation from electrodes of Zn ($\lambda$ = 2302 and 2558 A. U.) and of Cd ($\lambda$ = 2288 and 2313 A. U.) are in all respects similar to each other and to that obtained in similar circumstances by Reimann with a Hg lamp. This independence of fluorescence of wave length is due not as in the case of the vapor to collisions, but, as supposed by Pringsheim, to some intramol. mechanism. R. C. A.

**The influence of the wave length of the exciting rays on the fluorescence spectrum of etioporphyrin.** The structure of this spectrum in the infra-red and ultra-violet. J. Aharoni and Ch. Dufraisse. *Compt. rend.* 190, 1499–1501 (1930); cf. *Compt. rend.* 183, 321 (1926). With the wave length of the exciting rays varying from 365–546 mμ there were no noticeable variations in the no., position or intensity of bands in the fluorescence spectrum of etioporphyrin. T. H. Rider.

**Spectrophotometric study of the cupric-pyridine ion in aqueous solution.** Atmeras and Taminiau. *Compt. rend.* 191, 99–100 (1930).—The absorption curves for various mixts. of $Cu(NO_3)_2$ and pyridine were detd. There is a max. in the curve, corresponding

to 20% $Cu(NO_3)_2$ showing the existence of $[Cu(C_4H_8N)_4](NO_3)_2$. The stability const. for the deep blue complex ion is $3.1 \times 10^{-4}$ at 18°. I. G. VANDEN BOSCHE

The photoelastic dispersion of vitreous silica. I. N. G. FILON AND F. C. HARRIS. *Proc. Roy. Soc.* (London) A130, 410-31(1931). The dispersion of the double refraction produced by stress has been accurately investigated with 2 blocks of vitreous silica. Results have been obtained for 23 standard Fe lines between 4002 and 6495 A. U. Values are given for the stress-optical coeff. at 6 different loads from 10 to 40 kg. The photoelastic dispersion curve shows anomalous dispersion. This may be due to natural periods of Si, as some of the irregularities in the curve correspond to lines in the Si spectrum. G. M. MURPHY

Is the blackening and blanching of exposed lithopone a photographic phenomenon. H. STROBEL. *Z. wiss. Phot.* (Schaum Festschrift) 29, 200-18(1930). —An investigation is made of the light and dark reaction of ZnS and lithopone under different conditions. Phototropism is termed a photochem. reaction in which, by light exposure, a solid acquires a darker color which disappears again in the dark. S. compared the behavior of lithopone in light and dark with well known photographic reactions and found differences which show that lithopone is not a photographic substance. A. P. H. T.

Behavior of dispersed systems in filtered ultra-violet light. KARL BORGMANN. *Süddeut. Apoth.-Ztg.* 71, 702-3(1931). —A general discussion. W. O. E.

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Luminous artificial filaments (U. S. pat. 1,791,199) 23. Geochemical distribution laws and cosmic frequencies of the elements (GOLDSCHMIDT) 2. Absorption spectra and the constitution of the desoxybenzoin series (SZEGÖ, OSTINELLI) 10. New photochemical effect on celloidin paper as a radiation problem (MEWES) 5. Spectrography of the flavone series (HATTORI) 10. Absorption spectra of azoxy derivatives and analogous compounds (SZEGÖ, OSTINELLI) 10. Spectrochemical study of amino acid anhydrides (ASAHINA) 10. The influence of light on the methylene blue reduction (TAMIYA, *et al.*) 10.

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## 4—ELECTROCHEMISTRY

COLIN G. FINK

Recent developments in the design of electric annealing furnaces for metals. W. MECKENHAUSER. *Metal Ind.* (London) 38, 159-62(1931). E. H.

1930 steel plant electrical developments. A. F. KENYON. *Blast Furnace Steel Plant* 19, 245-8, 254(1931). E. H.

Development of chromium plating. J. G. ROBERTS. *Metal Ind.* (London) 38, 167-9, 194(1931). E. H.

Industrial electric heating. J. I. BERNARD. *Elec. Eng. Australia and New Zealand* 7, 365-8(1931). —A review. C. G. F.

The production of high-manganese slag in the electric furnace. T. L. JOSEPH, C. E. WOOD AND E. P. BARRETT. Bur. Mines, *Rept. of Investigations* 3080, 9 pp. (1931). —Elec. furnace tests made with 150 lb. charges of spiegel, contg. about 15% Mn and 0.5% P, indicate that 2 types of high Mn slag may be produced from metal of this type. When $SiO_2$ was used as a thinning agent, the slag had an av. compn. of MnO 68.1,

FeO 5 2, $SiO_2$ 14 3, P 0 11 and $Al_2O_3$ 8 2% With the exception of frothy slags, $Al_2O_3$ worked as well as $SiO_2$ as a thinning agent, the resulting slag being of the following av compn MnO 6 9 6, FeO 6 1, $SiO_2$ 8 7, P 0 10 and $Al_2O_3$ 13 0% The $SiO_2$ and $Al_2O_3$ may be varied over a wide range provided their sum is about 22% of the slag A continuous cycle gave better results than a batch operation From 85 to 90% of the Mn could be recovered in the slag, 3-6% in the metal, and 6-8% was lost More strongly reducing conditions can be established in the elec furnace than in the open hearth, more positive control of P and Fe in the slag being thus permitted and the treatment being reduced to about ½ ALDEN H EMERY

The coreless induction furnace in a new role. A G ROBIETTE *Iron and Steel Ind and British Foundryman* 4, 125-9(1931), cf *C A* 24, 5638 —Expts were made to det the possibilities of refining low grade steel scrap of various compns and pig irons, the extent of the elimination of the elements Si, Mn P, C and S under varying conditions, and the speed of their elimination Si is removed as rapidly as ore is charged P elimination is rapid and complete under suitable slag conditions C removal is rapid in both the slag reaction process and the air blast method S removal is generally erratic, it increases with the $CaF_2$ addn Products of deoxidation are removed in a few sec through rapid circulatory motion of the charge An auxiliary arc above the slag surface to keep it fluid is suggested C H LORIG

Hydrometallurgy of copper at the Bagdad property. CHARLES T. BAROCH *Trans Am Electrochem Soc* 57, 205 29(1930) —The ore minerals are principally chalcopyrite and chalcocite Cu in the ore averages 1 to 1 25% After roasting the ore it was leached with spent sulfate electrolyte, Cu extns as high as 91% resulting The soln builds up in Cu to a concn of 60 g /l and more, the free $H_2SO_4$ dropping to 10 g /l By diverting part of the spent electrolyte into this soln coming from the extn plant, the Cu is brought down to 50 g /l and the acid up to 25 g /l , an electrolyte of good elec cond resulting The c d of the Cu cells is 2 1 amp /sq dm Cell voltage has ranged from 1 97 to 2 12 v C G F

The electrolytic zinc plant of the Evans-Wallower Company at East St. Louis, Ill U C TAINTON AND DANIEL BOSQUI *Trans Am Electrochem Soc* 57, 241-53(1930) — The Joplin district will probably continue for many years to be the chief Zn producing district of the U S Hitherto, all Zn from this field has been produced by the old process of retort smelting The paper describes the first plant to treat these ores electrolytically Flotation concentrates are roasted in Wedge furnaces, the roaster gas being converted to $H_2SO_4$ by the contact process After passing over magnetic separators, the cones are leached in spent electrolyte (28% $H_2SO_4$) The heat of the reaction raises the temp to the b p Residues contg Pb, Ag and Au are shipped to the Pb smelter Leached soln is purified with Zn dust to ppt. Cu Cd Co and Ni The Cd is sepd from the Cu and recovered electrolytically, while the Cu goes to a Cu smelter In the Zn cells, Al cathodes are used at a c d of 10 7 amp /sq dm Anodes are in grid form and are composed of Pb alloy contg 1% Ag During electrolysis, $MnO_2$ is pptd , a high grade product free from Fe Cu, Ni, etc , being the result The electrolytic Zn produced is 99 99% pure The daily capacity of the plant is 50 tons of electrolytic Zn and ½ ton of Cd C G F

*Germanium in relation to electrolytic zinc production.* U C TAINTON AND E T. CLAYTON *Trans Am Electrochem Soc* 57, 279-88(1930) *Metal Ind* (London) 37, 229-30, 326(1930) —Certain impurities in the Zn soln , if not removed, will deposit with the Zn and lower the overvoltage below the critical point In the high acid, high density process Sb Co Ni and As, which are objectionable impurities, are readily removed However, a hitherto unsuspected impurity which gave rise to low current efficiencies was after careful investigation, found to be Ge Concns as low as 1 mg /l are sufficient to cause serious losses in Zn cathode efficiency Ge may be adsorbed and removed from soln by means of $Fe(OH)_3$ pptd by ZnO in the leaching operation C. G F

The cathode precipitate as a function of exterior factors in solution of zinc sulfate A GLAZUNOV AND K RÖSNER *Chem Obzor* 5, 221-3, 253-63(263 English)(1930) — The theoretical conditions of Zn pptn from $ZnSO_4$ soln and the influence of various factors were investigated High c d , low temp , low H ion concn and the presence of clay particles were favorable for the formation of a smooth and thin deposit The concn change from 25 to 110 g /l Zn has practically no influence on the type of the deposit The expts are elucidated by numerous diagrams F KUČERA

*Some experiments on the electrodeposition of gold from alkaline cyanide solutions.* E T DUNSTAN *J Chem Met Mining Soc S Africa* 31, 118-27(1930) —No evidence of regeneration of cyanide by electrolysis of a working cyanide soln was found, in fact,

a further loss occurred. The use of a rotating cathode does not materially increase the current efficiency, which is extremely low, because of the dil. solns. employed. Electrolytic methods cannot economically improve upon Zn ppts. It is doubtful if space and power would be saved, as the soln. required 4 passes through the cell. The rotating cathode has a depolarizing effect, probably because the friction of the soln. keeps the surface free from bubbles of gas, which enables a lower voltage and higher c. d. to be employed. Also in *Metal Ind.* (London) 38, 215–7 (1931). ALDEN H. EMERY

A new abnormality in the properties of aqueous solutions of cadmium salts. FRITZ TESCHE AND PIERRE J. VAN RYSSELBERGHE. *Trans. Electrochem. Soc.* 59 (preprint) 5 pp. (1931).—Electrolysis of aq. solns. of $CdI_2$ yields cathode deposits containing large amt. of adsorbed $CdI_2$. $CdBr_2$ behaves in the same way while $CdCl_2$ yields normal deposits of pure Cd. The phenomenon is ascribed to the adsorption of neutral mols. An explanation for the difference of behavior of the iodide and the bromide on one hand, and of the chloride on the other hand, is suggested. C. G. F.

Cadmium as a rust preventive. BERNHARD PLANNER. *Z. Elektrochem.* 37, 33–40 (1931); cf. *C. A.* 24, 3339.—Cd is successfully deposited from an alk. cyanide bath at 40–60° and at current densities of 3–4 amp. per sq. dm. with or without the addn. of colloids. In acid baths conditions must be carefully controlled. With increasing temp. and c. d., the current efficiency increases but the grain size of the deposit also increases. The best results are obtained at 50° with a c. d. of 100–150 amps. Acid baths are non-poisonous, and in them there is no decomp. of the anion. With increasing mol. wt. of the electrolyte the grain size of the Cd deposit falls. This is greatest in $HClO_4$ solns. and smallest in phenolsulfonic acid solns. Bright deposits can be obtained from fluoborate and phenolsulfonic acid baths with added colloidal material, but such deposits are quite brittle and show poor adherence to the ground metal. H. S.

Addition agents in bismuth electrolytes. EDWARD F. KERN AND THOMAS R. JONES. *Trans. Am. Electrochem. Soc.* 57, 253–72 (1930).—Solns. of fluosilicate, fluoborate, cresol sulfonate, perchlorate, fluoride, sulfate and chlorides were tested for electrolytes of Bi, the result being the selection of $BiCl_3$ solns. contg. NaCl, $CaCl_2$ or $MgCl_2$ as the most suitable electrolytes. The addn. agents tried were glue, gelatin (sulfite residues) gum arabic, tannin, aloin, aloes curacao, hydroquinone, benzoic acid, pyrogallol and resorcinol. Pyrogallol and resorcinol added to the electrolytes produced the brightest and densest deposits of Bi. Hydroquinone was next in order benzoic acid next, and the other addn. agents were not beneficial. C. G. F.

High-speed nickel plating as practiced in England. ERNEST R. CANNING. *Trans. Electrochem. Soc.* 59 (preprint) 4 pp. (1931).—In England current densities of 3.5 amp. sq. dm. and over are used. Continuous filtration of the electrolyte, kept at 32° to 35°, is necessary to eliminate suspended foreign matter and pinholes. Because of considerable loss in throwing power, C. advises against very high current densities. The preferred $p_H$ is 5.6 to 5.8. The cathode efficiency is 95 to 97%. A plate 0.025 mm. thick is obtained in 45 min. with a variation in thickness of not more than 45%. For adequate protection of the steel, a Ni plate of at least 0.025 mm. is necessary. For sub-tropical countries composite deposits of Ni-Cu-Ni are recommended. C. G. F.

Chromium plating. E. J. DOBBS. *J. Soc. Chem. Ind.* 49, 161–5T; *Metal Ind.* (London) 38, 435–6, 461–80 (1931).—A brief history of modern practice. The tendency in the U. S. is to aim solely at cond. and to overcome the disabilities attendant on high cond.-burning on the outstanding points of a recessed article, by the use of auxiliary cathodes or "robbers." In England research has been centered on increased "throwing power" without auxiliary cathodes or the use of specially shaped anodes. In England flat lead anodes are used. For articles subjected to atm. conditions a thick undercoat of Ni is essential. It is well to have the plating vats lined with hard Pb. This obviates any possibility of the continued formation of $Cr_2(CrO_4)_3$ and yet cannot cause any burning of the work from too large an anode surface, because of the screening action of the glass lining fitted to the latest types of vats to protect the Pb from mech. injury. The matters of temp., c. d., and prepn. of the articles for Cr plating and the stripping of faulty deposits are discussed. W. H. BOYNTON

Variations in the electromotive force during the formation of alloys by the wet method. E. PACE. *Gazz. chim. ital.* 60, 811–8 1930.—In connection with studies of Marmocchelli on the formation of binary metal alloys by the wet method, the phenomenon was examd. from the electrochem. point of view. Similar expts. have been carried out by Tammann but under different conditions and with a different object (cf. *C. A.* 14, 671). The present paper deals with variations in the e. m. f. of the voltaic couple: $A|A^+$ soln.$|B$, during the entire transformation in the following systems: Cu-Sn, Cu-Sb, Sb-Sn, Au-Cd, Ag-Cd, Au-Sn and Ag-Sn. A high initial e. m. f

would be expected because of the difference between the 2 potentials A | A$^+$ soln., and B | A$^+$ soln., where the first remains const. throughout and the 2nd is electrochemically indefinite as a result of the nominal absence of B$^+$ ions and theoretically is infinite. Practically, however, the 2nd has a definite value either because of soln. of traces of B (by the action of atm. O or by double decompn. with A$^+$ cations), or, in case the B electrode is completely passive, because of the oxidizing potential which it acquires in contact with the soln. The app. is described in detail. In the *Cu–Sn system*, during the formation of $Cu_3Sn$ (cf. *Ber.* 27, 630(1897)) the e. m. f. at 100° was initially 0.134 and this rose slowly to a max. of 0.214. In the *Sb–Sn system* the e. m. f. at ordinary temp. with open circuit varied from 0.31 to 0.33, while with a closed circuit it diminished gradually to a min. value of 0.80 after several hrs., and this again increased to 0.300 when the circuit was opened. In the *Au–Cd system* the e. m. f. at ordinary temp. was 0.73 and at 100° was 0.77, and this diminished rapidly with the circuit closed until it reached 0.12 after 1 hr. at ordinary temp. and 0.013 after 20 hrs., while at 100° it diminished to 0.96 after only 15 min. In the *Ag–Cd system*, the initial e. m. f. at ordinary temp. was 0.67 and this increased slowly to a max. of 0.73. With the couple in a closed circuit at ordinary temp. the e. m. f. diminished slowly from 0.72 to 0.42 after about 30 min. and reached 0.01 after 2 hrs. In the *Au–Sn system* at ordinary temp., the initial e. m. f. was 0.39 and diminished only to 0.37 after 6 hrs., while with the circuit closed it diminished from 0.37 to 0.05 after 20 min. When the temp. was increased to 100°, a closed circuit for only 3 min. was sufficient to reduce the e. m. f. from 0.36 to 0.06. In the *Ag–Sn system* at ordinary temp., the e. m. f. was approx. 0.35, and with the couple in a closed circuit this diminished to 0.01 after only 2 min. At 100° the behavior was substantially the same, except that the changes were accelerated. C. C. Davis

**Electrodeposition of cobalt-nickel alloys. II.** S. Glasstone and J. C. Speakman. *Trans. Faraday Soc.* 27, 29–35(1931).—The investigations of the compn. of alloys deposited from mixed buffered solns. of Co and Ni sulfates under various conditions reported previously (*C. A.* 25, 459) have been extended to higher temps., approx. 50° and 90°. In the present work it has been found that the variation with increasing c. d. of the compn. of the Co-Ni alloys is very different at high and at low temps. At 15° the compn. of the alloy is almost independent of c. d. until the rate of removal of ions from soln. by electrodeposition exceeds the rate of diffusion of these ions to the electrode, at 50° the proportion of Co increases rapidly with increasing c. d. before a const. compn. is reached (cf. *C. A.* 21, 3025, 22, 3588). The exptl. conditions in the present work were as reported in Part I, and graphs of the atomic % of Co plotted against c. d. in amps. sq. dm. are given. The relative tendency for Co and Ni to deposit is independent of the H ion concn. of the electrolyte. The alloys deposited at very low c. ds. contain decreasing proportions of Co as the temp. is raised; this proportion is, in general, less than that in the soln. for depositions made at 90°. With increasing c. d. the fraction of Co in the alloy increases rapidly until a max. Co content, independent of c. d., is attained; this max. decreases with increased temp. The influence of Co on the deposition of Ni at 50° and 90° is very similar to that of Fe at 15° and 50°, resp. In general, the current efficiency increases, for the reason that the deposition potential decreases more rapidly than the H overvoltage, with increasing temp. The theoretical basis of the results is discussed in terms of the deposition potentials and overvoltages of the metals concerned. Edward B. Sanigar

**Polarographic studies with the dropping-mercury cathode. XV. Positive and negative maxima on current-voltage curves.** J. Heyrovský and M. Dillinger. *Collection Czechoslov. Chem. Comm.* 2, 626–38(1930).—The anomalies observable on electrocapillary curves obtained by the drop wt. method have been shown (*C. A.* 24, 2675) to be indicated on the current voltage curves by prominent max. which are given under conditions of imperfect polarization of the dropping Hg cathode. Theoretical treatment of these anomalies is given in the present paper, and it is shown that the presence in soln. of a highly absorbable substance, *e. g.* an org. dye, prevents this imperfect polarization and therefore, the anomalous shape of the current voltage curve. The max. occurring on current voltage curves when solns. contg. electroreducible substances are electrolyzed with the dropping Hg cathode are termed "positive" or "negative" according as they are given at potentials more pos. or more neg. than the abs. electrocapillary zero (*i. e.*, −0.56 v. from the *N* calomel zero). The shape of the electrocapillary curve, simultaneously derived from the polarized dropping-Hg cathode, indicates the sign of the max. Just as the pos. branch of the electrocapillary curve is affected by the presence of adsorbable anions and the neg. branch by adsorbable cations, the presence of such anions has been shown to affect the pos. max., while neg. max. have been shown to be sensitive to cations. The current voltage

charge. The formation of the oxide, $Ag_2O_2$, on a Ag electrode has thus demonstrated, and similar expts. with accumulator plates have yielded results supporting the theory that Pb subsulfate is formed on the neg. plate at discharge, but no definite evidence of the presence of $Pb_3O_4$ on the charged pos. plate could be obtained (cf. Féry, *C. A.* 13, 1676, Féry and Chéneveau, *C. A.* 20, 1181). In the Edison accumulator, the active material on the charged Ni plate is mainly $Ni_2O_3$ if the alkali concn. exceeds about 6 *N*.
W. H. Boynton

The Volta effect in electrochemistry. Oscar Scarpa. *Atti III congresso naz. chim. pura applicata* 1930, 83–94.—S. has devised an electrometer in which the displacement of a metallized quartz fiber suspended between two metal plates measures the p. d. between the plates. With this instrument he has measured the p. d. between a Zn and a Cu plate when they have been attached to the Zn and Cu electrodes, respectively, of a *Daniell cell*. He has also measured the p. d. between a Zn and a Cu plate connected by a Cu wire and between two Cu plates connected to the electrodes of a Daniell cell. In the first case the e. m. f. was 0.23 v., in the second 0.85 v., and in the third 1.08 v. The first case S. calls the true or surface Volta effect and ascribes it to the e. m. f. of contact between the electrodes and the solns. and between the two solns. The second or internal Volta effect is the contact potential of the two metals. J. B. Austin

Formation of methane during the electrolysis of potassium acetate and the mechanism of Kolbe's electrosynthesis. S. N. Shukla and O. J. Walker. *Trans. Faraday Soc.* 27, 35–40(1931).—Evidence has been obtained that $CH_4$ is formed at the anode during the electrolysis of aq. acetate solns. under certain conditions. It is suggested that the presence of $CH_4$ has been overlooked by previous investigators, because their analyses of the gaseous products of electrolysis have been confined almost entirely to the mixed anode and cathode gases (*i. e.*, to mixts. contg. a large proportion of H) resulting from electrolysis at high c. d. If it is assumed that only $C_2H_4$ and H are present in the combustible residue, after the removal of the other constituents the presence of small amounts of $CH_4$ may remain undetected since $2CH_4 = C_2H_4 + H_2$, *i. e.*, the $CH_4$ simply acts as a mixt. of $C_2H_4$ and H. In the present work the anode gases were analyzed separately from the H given at the cathode. The combustible residue of the anode gas after the removal of the $O_2$ and $CO_2$ in a Bone and Wheeler app. over Hg. was transferred to an evacuated tube and cooled in liquid air to remove the $C_2H_4$, the contraction after cooling being a measure of the $C_2H_4$ present. After some time the uncondensed gas was pumped off by a Töpler pump and exploded. The ratio, contraction on explosion ($C$)/ amount of absorption by potash ($A$) was approx. 2 whereas the $C/A$ ratio for the condensed gas was 1.25 (the theoretical ratio for $C_2H_4$), showing that $CH_4$ was present in the above anode gases. In the electrolysis a Pt wire anode (4.4 cm. long, 0.1 cm. diam.) was used, and the anode gases were collected separately. Solns. of K acetate (contg. an equiv. amount of acetic acid) of different concns. were electrolyzed at various c. ds. at ordinary temp. A table of exptl. results is given. The results show that under certain conditions $CH_4$ is present with $C_2H_4$ in the anode gases produced during the electrolysis of K acetate solns., the conditions favorable to the formation of $CH_4$ being low c. d. and high concn. of electrolyte. The quantity of $CH_4$ was appreciable only when the c. d. was less than about 10 ma./sq. dm. In the most favorable instance, with a 3.5 *N* K acetate soln. plus 3.5 *N* acetic acid, at a current of 1.5–2.0 ma., almost twice as much $CH_4$ as $C_2H_4$ was produced, the total exptl. results for this soln. being $CO_2$, 67.3, $O_2$ 0.4, $CH_4$ 19.8, $C_2H_4$ 10.5 and residue 2.0%. The results also show that $CH_4$ is formed only along with $C_2H_4$, no $CH_4$ is evolved so long as O is the main gaseous product. With ordinary c. ds. such as are used in the electrolytic prepn. of $C_2H_4$, no appreciable amt. of $CH_4$ is produced. The mechanism of Kolbe's electrosynthesis and the recent work of Fichter are discussed. The abnormally high value of 2.54 v. for the discharge potential of the acetate ion (as put forward by Preuner and Ludlam, *C. A.* 2, 12) is not correct. $C_2H_4$ is evolved below this potential.
Edward B. Santigar

Self discharge of dry cells. Saburo Makino. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 521(1930).—To investigate the mechanism of self discharge a positive electrode only was immersed in an electrolyte, and the same electrode was immersed as an anode with the usual neg. electrode. Decrease of e. m. f. and capacity during open circuit occurs first at the anode, then gradually at the cathode, the degree depending upon the amt. of Fe contained as impurity in the $MnO_2$ used. E. M. S.

*High-speed photographs of arcs in liquids.* Chester Lichtenberg. *Elec. World* 97, 321, 322(1931).—Arcs sprung in insulating liquids ordinarily persist 0.01–0.1 sec. A high-speed, successive-image camera for studying these arcs is illustrated. It clearly records 24 individual successive images at a rate of 550 images per sec. The arcs were

started by opening a single phase, 6000-v., 25-cycle a. c. carrying 50 amp. at 0.45 power factor. The same general phenomenon is observed in all the photographs. The arc starts at the contacts, and immediately oil or other liquids in the vicinity of the arc is gasified. A gas globule forms around the contacts. As the contacts continue to sep., the gas globule expands as a sphere till the sides of the containing vessel or a baffle plate alters its shape. Simultaneously the oil level is raised a distance proportionate to the size of the gas globule. Finally the arc punctures the globule, releasing the pressure within. Sometimes the release is violent. Then the oil level is distorted and broken, some oil being thrown upward. The remainder descends, cools the arc and extinguishes it. W. H. Boynton

A study of the physical processes in the so-called electrical purification of gases. II. The action of the electrical wind (Cottrell process). R. Ladenburg and W. Tietze. *Ann. Physik* [5], 6, 581–621(1930). cf. C. A. 24, 3447.—This is an investigation of the effect of the elec. wind (*EW*) on the velocity of dust particles being pptd. from a gas by elec. pptn. Using the corona discharge from a neg. charged wire to a grounded wall, the authors have found that for particles of diam. $\leq 10^{-4}$ cm. the *EW* is the detg. factor on the velocity ($v$) which at $10^{-4}$ amps. and $5 \times 10^{-4}$ amps./glow-discharge point is 0.56 and 1.23 m./sec., resp. $v$ decreases with distance from glow-discharge point, being for $5 \times 10^{-4}$ amps. at 3 mm. 1.20 m./sec. and at 60 mm. 0.80 m./sec. For particles of diam. = $10^{-4}$ – $10^{-5}$ cm. the *EW* is still an important factor. The measurement of $v$ made by comparing the effect of a current of air of known velocity with that of the *EW* on a stream of $CO_2$, tobacco smoke or $P_2O_5$ in a specially constructed cylindrical pptn. chamber was recorded photographically. Description and drawings of the app. and photographs of the effects are given. E. R. Schierz

High-voltage surge testing—the cathode-ray oscillograph. F. D. Fielder. *Elec. J.* 28, 106–7, 119(1931).—The cathode-ray oscillograph accurately measures voltage and time relationships. It depends for its operation on the influence of elec. fields upon an electron beam. The Dufour and Nonnder types are illustrated and their operations outlined. The deflection of the cathode ray by an elec. field is a pos. motion, and oscillograms indicate it with an accuracy of 2%. W. H. Boynton

1930 developments in electrical equipment for steel mills. H. A. Winne. *Iron Steel Eng.* 8, 21–5(1931).—The synchronous motor has very largely superseded the induction motor for const. speed mill drives, except where flywheels are necessary. The year's developments on d. c. main drives, switchgear, motor room ventilation, auxiliaries, *vacuum tubes* and *elec. furnaces* are noted. W. H. Boynton

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Low-temperature carbonization and the production of electricity in Germany (Rosin) 21. Pb (Thompson) 9. The calculation of chemical, electrical and gas mechanical matter-, energy- and form transformation by space energetics (Dallwitz-Wegener) 2. Some properties of protective films on metals (Hedges) 9. Refractory materials for electric furnaces (Searle) 19.

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Handbuch der technischen Elektrochemie. Band I, Hilfte 1. Die technische Elektrolyse wässeriger Lösungen. Edited by Victor Engelhardt. Leipzig. Akad. Verlag. 613 pp. M. 56, bound, M. 58. By subscription, M. 50.40, bound, M. 52.20.

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Dry cell electric battery assembly. Siemens & Halske A.-G. Brit. 335,758, Oct. 19, 1928. Structural features.

Electric dry cell battery assembly. John S. Zook (to Burgess Battery Co.). U. S. 1,790,784, Feb. 3. Structural features.

Storage battery. Solomon L. Van Meter, Jr. U. S. 1,791,152, Feb. 3. Structural features.

Alkaline storage battery. J. J. Drumm and Celia, Ltd. Brit. 335,587, March 27, 1929. Ag or Ag oxide mixed with Ce oxide is employed as active material for the pos. electrode. Various details of prepn. are given.

Storage-battery plate. Albert S. Hubbard (to Gould Storage Battery Corp.). U. S. 1,791,208, Feb. 3. In making a tubular container to form a part of a storage-battery plate and to contain a core surrounded by active material, a sheet of non-porous insulating material such as hard rubber stock is rolled out, laminae of porous material such as cloth, wood or felt are embedded in the sheet, and the latter is cut into a plurality of washer like sections which are then stacked and vulcanized.

Selenium cell. Hans Thirring (to "Selenophon" Licht- und Tonbildges. m. b. H.). U. S. 1,790,850, Feb. 3. Various details of manuf. are described.

**Accumulators.** MAURICE MATROT Fr. 692,917, June 27, 1929 The electrolyte of an accumulator having a Zn neg electrode is composed *e g*, of $H_2SO_4$ (45° Bé) 500 cc, $ZnSO_4$ 350, dimethylglyoxime 4, $Na_2SO_4$ 50 and $MgSO_4$ 20 g

**Tin plating** SIEMENS & HALSKE A.-G Fr 692,813, Mar 27, 1930 In the electrolytic formation of coatings of Sn of any thickness alk electrolytes and sol or insol anodes being used, the content of free alkali is kept between the limits of 1.5 and 8%, so that no spongy formation is produced during the time necessary to obtain the desired thickness of Sn

**Electrolytic production of chemical compounds.** ANTONIO L CLARIANA Fr 693,150, April 2, 1930 In electrolytic processes for the production of chem compds the cathode is made of or coated with a metallic sponge of finely divided metallic particles which are easily oxidized in contact with the air The operation is intermittent, the cathode, when reduced by the H produced, being brought into the air until again oxidized

**Electrolytic apparatus for cleaning the surface of metals.** THE BULLARD CO Fr 693,109, April 2, 1930

**Electrolytic gas generator.** PAUL HAUSMEISTER Ger 514,391, April 20, 1924

**Electrolytic refining of copper.** UNITED STATES METALS REFINING CO Fr 693,678, April 10, 1930 The cathode used in the refining of Cu have parallel corrugations extending in 2 different directions

**Electrolyte for the production of iron or iron alloys.** ORLANDO ORLANDI Fr 693,812, April 12, 1930 See Belg 360,116 (*C A* 24, 793)

**Electrolytic manufacture of tungsten, etc.** HELLMUTH HARTMANN Ger 514,365, Sept 11, 1928 W is manufd by electrolyzing a soln of $WO_3$ in fused alkali phosphate, with or without $H_3PO_4$ or other phosphates An example is given Other heavy metals, *e g*, Mo, Ta, V and Nb, may be extd similarly

**Electrolytic zinc bath.** GIUSEPPE BIANCO U S 1,701,082, Feb 3 A bath suitable for use in coating iron or steel with Zn is formed from a Zn amalgam, alkali metal phosphate, $H_2SO_4$, $Al(OH)_3$ and water

**Light metals** SOC ANON POUR L'IND CHIM A BALE Fr 692,491, Mar 21, 1930 In electrolyzers for the prepn of light metals by electrolysis of their molten halogen salts a cathodic arrangement for gathering the light metal formed is used It is composed of an exteriorly insulated metal piece in the form of a longitudinal channel or provided on its lower face with longitudinal channels, in elec connection with the cathode which is placed below the said piece parallel to the direction of the channels and descends relatively low into the electrolyte

**Magnesium.** THE MAGNESIUM PRODUCTION CO., LTD (Pierre Cames Casse, inventor) Fr 693,387, Apr 4, 1930 In the manuf of Mg by the electrolysis of a soln of $MgCl_2$ and KCl, a part of the electrolyte is removed from the vat, and $MgCl_2$ is added so that the compn of the electrolyte is maintained practically constant and the KCl follows a closed cycle

**Purifying liquids** JEAN BILLITER Fr 693,799 April 12, 1930 Liquids are purified electrolytically, while suppressing electroösmosis as much as possible, by using mean differences of tension of less than 20 v (preferably 8–16)

**Hydrogen from water** ALBIN WERLEN THIÉBAUT KUENEMANN, ÉDOUARD SILBERMANN and CHARLES GOETSCH Fr 693,637, Jan 21, 1930 In the production of H from water an anode composed of a Hg Cu Zn catalyst, a depolarizer composed of an alkali phosphate and an Al cathode are used

**Butyl alcohol** R RILEY S W ROWELL and IMPERIAL CHEMICAL INDUSTRIES, LTD Brit 335,683 Aug 13 1929 BuOH obtained by the catalytic hydrogenation of aldol crotonaldehyde or butylaldehyde is purified by electrolytic reduction in aq electrolyte either acid or alk such as $H_2SO_4$ or $NaHSO_4$ soln The product may sep into 2 layers the upper of which when neutralized and distd forms a distillate also sepg into 2 layers the upper of which contains the purified BuOH substantially free from aldehyde

**Electric furnace for aluminum manufacture.** PEDER ELIASEN FRÖLAND Ger 515,229, Mar 6 1928

**Induction furnace** EMIL F RUSS Ger 514,357, Dec 12, 1929

**Electric induction crucible furnace** C LORENZ A.-G Brit 335,766, Oct 25 1928 Structural and elec features

**Electric-arc furnace suitable for making tungsten carbides.** OSCAR L MILLS (to Mills Alloys Inc) U S reissue 17,054, Feb 3 Reissue of original pat No 1,719,558 (*C A* 23, 3863)

**Heating elements for electric furnaces** EMIL F RUSS Fr 693,413, April 5, 1930

Apparatus for electrical precipitation of suspended particles from gases. HARRY WINTERMUTE (to Research Corp.) U. S. 1,791,228, Feb. 3. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. HARRY V. WELCH (to International Precipitation Co.) U. S. 1,791,961, Feb. 3. Structural features.

Armoured electric deep-sea cables. FELTEN & GUILLEAUME CARLSWERK A.-G. Brit. 325,904, Jan. 23, 1929. Various structural details are described of cables with a pressure protecting covering formed of profile wires and covered by a water tight sheathing of gutta percha, gutter gentsch or washed rubber.

Electric incandescent lamps. N. V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 325,617, June 29, 1929. Various structural details are described of a lamp which is adapted to be mounted within a parabolic reflector and the bulb of which is preferably colored by surrounding it by a template or stencil and spraying with a "Bakelite" lacquer. A yellow layer may be obtained by burning in Ag oxide.

Metal filament for incandescent electric lamps. C. SEVEN. Belg. 370,823, July 31, 1930. The filament is formed of an alloy of W, Th, Ir, Ni and Cr, or of an alloy of W, Th and Zr. It has an elongated cross section, either an ellipse or a double parabola.

Lamp filaments. SOC. D'ÉTUDES SCIENTIFIQUES ET INDUSTRIELLES. Fr. 693,275, June 1, 1929. Filaments for wireless lamps are made of $Ba_3N_2$ or Ba alloys such as Na Ba, Bi Ba or Sn Ba. Cf. *C. A.* 25, 1170.

## 5—PHOTOGRAPHY

E. P. WIGHTMAN

Preparation of fine grain emulsions. E. FUCHS. *Phot. Ind.* 28, 1172–4(1930).—The graininess observed in photographic materials is due to the clumping or aggregation of grains rather than to the individual grains themselves. Other things being equal, graininess is proportional to the size of the individual grains, but the prepn. of fine grain emulsions is largely a matter of colloidal principles aimed at preventing formation of aggregates of grains. In the ammonia process, substitution in part by $Na_2CO_3$ is recommended for the first ripening, followed by a quick second ripening of the well washed material. C. E. MEULENDYKE

Preparation of silver bromide emulsion. MARX REO, T. NISHIMURA, H. HAYASHIHARA, T. ASAI AND S. MURATA. *Repts. Imp. Ind. Research Inst. Osaka, Japan* 11, No. 13(1930).—The methods of prepn. of AgBr emulsion together with its properties are given. F. I. NAKAMURA

Solubility of silver bromide in photographic emulsion. MICHIO MIYATA. *Repts. Imp. Ind. Research Inst. Osaka, Japan* 11, No. 12 (1930).—The use of the pptn. method in detg. the soly. of AgBr in photographic emulsions is given. F. I. NAKAMURA

Toning by addition. S. JASIENSKI. *Atelier Phot.* 37, 113–5(1930).—Processes for toning Ag images fall into two groups: the substitution methods, in which the Ag of the image is changed to another form, as $Ag_2S$, and the addn. methods, in which some substance is added to the Ag, as the U toning process. The final deposit obtained when a $HgCl_2$ bleach is used for sulfide toning is partly sol. in Farmer's reducer. It cannot, therefore, be $Ag_2S$ but is probably a complex Hg S compd. H. PARKER

Alkaline selenosulfates and their use for the toning of silver images. A. SEYEWETZ. *Sci. ind. phot.* [2], 1, 436. *Rev. franç. phot.* 11, 332. *Photographe* 17, 475–6(1930).—Seleno-sulfates can be obtained from $NH_4$, Li, Na and K sulfites. Because of its great soly., the last is the most interesting. On dilg. a concd. soln. of K selenosulfate with water, Se is pptd., but on dilg. with a $K_2SO_3$ soln., the soln. remains colorless. Silver selenosulfate decomposes, readily pptg. $Ag_2Se$, hence, the soln. cannot be used to tone prints. Several prints may be fixed and toned simultaneously with a fresh soln. of hypo contg. in addn. K selenosulfate. After fixing 2 or 3 prints, however, clear whites are no longer obtained because of the decompn. of the Ag selenosulfate. L. A. STAIB, JR.

History of the invention of silver chloride developing-out paper of the Velox type. R. NAMIAS. *Il prog. fot.* 37, 397(1930).—In a discussion of this subject, Eder claimed that AgCl papers were originated by himself and Pizzighelli. Baekeland replied that in his papers the emulsion was not washed, and that the present type of developing out paper therefore originated with the introduction of Velox. Baekeland's claims are supported by N. C. E. K. MEES

Determination of so-called Ur-silver in photographic gelatin. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* 28, 293–7(1930); cf. *C. A.* 25, 42.—The previous

differentiation of the Ag content between atomic Ag and an organic Ag compd does not hold The Ag is not the result of the action of $AgNO_3$ on gelatin, but is due to differences in the diffusion velocities of Ag and halogen ions within the gelatin during washing Ag halide and Ag formed by exposure cannot be sepd with neutral $Na_2S_2O_3$ The best available substance is $Na_2SO_3$ Its use, however, is limited to the investigation of AgCl and AgBr A P H Trivelli

**Origin and the chemical nature of the silver content.** H. H Schmidt and F. Pretschner *Z wiss Phot* 28, 302-11(1930) —The Ag content arises by hydrolysis through differences in the diffusion velocities of halogen and Ag ions and consists of $Ag_2O$ This $Ag_2O$ has a tanning action on gelatin, forming a difficultly sol complex, The total amt of detectable $Ag_2O$ in the gelatin after washing depends upon the relations between the soly of Ag halide and the Ag O gelatin complex With the same soly of the Ag complex, the Ag content increases with increasing soly of the Ag halide The total amt of $Ag_2O$ formed very quickly approaches a limit when as much $Ag_2O$ dissolves as is formed by hydrolysis of Ag halide The Ag content resulting from AgCl is perfectly sol AgBr and AgI were also studied It is possible that the $Ag_2O$ formed by hydrolysis influences ripening In any case, $Ag_2O$ is more easily reducible than Ag halide A P H Trivelli

**Silver content and the fixing process.** H H Schmidt and F. Pretschner. *Z wiss Phot* 28, 297-302(1930), cf *C A* 24, 2069 —The soly of Ag is less in $Na_2SO_3$ than in $Na_2S_2O_3$ soln Therefore, the total removal of Ag from a washed emulsion by $Na_2SO_3$ soln is due to a sol. Ag compd which has been shown to give Ag ions. The very small amts. of Ag left in the emulsion are of the same order as those obtained if pure gelatin is treated with thiosulfate and the sulfite complex compd solns Very probably this Ag is $Ag_2S$. The soly of Ag in thiosulfate solns. is too great for the use of the latter in accurate analytical investigation A P H Trivelli

**Mechanism of the color change of silver images due to selenium.** A Seiberitz *Sci ind phot* [2], 1, 435(1930) —Se dissolved in alkaline sulfites or sulfides can be used to tone Ag images Sodium selenosulfate and sodium selenosulfide react with Ag to give $Ag_2Se$ This reaction has been verified by removing the image from plates and paper and detg analytically the ratio of Ag to Se A slightly larger percentage of Se was found in the selenosulfate toned image Satisfactory agreement with the theoretical ratio was obtained for the selenosulfide image L A Spain Jr

**Orthochromatism, panchromatism and dye filters.** Guillieminot and Boespflug *Photo Revue* 42, 309-11, 325-6(1930) —An estn of the chromatic sensitivity of negative materials may be obtained (1) by photographing a color chart with and without filters, (2) by means of the Eder Hecht sensitometer wedge (3) by means of spectrographic curves Examples of each method are shown H D Russell

**Glycocoll-copper for daylight filter** R Luther *Kinotechnik* 12, 453(1930) —The advantages are (1) it is easy to prepare in c p form and easy to compound, (2) it contains no volatile and easily oxidized material (3) it is neutral and does not attack the glass walls of the cell (4) it is practically stable with time, (5) the absorption is more independent of temp The disadvantages are (1) the soln can develop mold, (2) it is sensitive to alkali and acid its prepn being thus made more troublesome, (3) its soly is low at room temp If necessary, a greater thickness of cell may be chosen The extinction curve is shifted 8 or 10 mμ farther toward the red, and the density is less in the ultra violet than is that of the Davis Gibson filter It appears to give a closer match to the curve of the ideal filter than does a $CuSO_4$ pyridine mannitol cell O E M

**Raising the sensitivity of bichromated colloid films.** K Jacobsohn and E. Wagner *Atelier Phot* 37, 98-100(1930) —*The addn of CeCl₄ to the sensitizing bath* as advised by F J Tritton was not found to increase the sensitivity of bichromated gelatin Bathing in a soln of methylene blue after the usual sensitizing with $K_2Cr_2O_7$ gave increased red sensitivity The loss in the green and yellow balances the gain in the red, so there is no gain in the total sensitivity H Parker

**Oleobrom.** J D Johnston *Camera* (Dublin) 10, 235-6(1930) —*Technic of* bromoil making is simplified by the introduction of a new bromide paper The developed print is bleached and dried in the usual way *The dry print is charged with* ink from a special roller The print is then placed in water and a clean roller run over the print. This rolling removes the ink from the highlights and deposits it on the shadows. After the proper contrast has been obtained, the print is removed from the water and is either dried or the tones altered by hand manipulation R. A Purdy

**New photochemical effect on celloidin paper as a radiation problem.** H. Mewes. *Z wiss Phot* 28, 311-24(1930) —AgCl papers exposed to different substances (ele-

ments of the periodic system) in a nonconducting box of ebony, or metal free, colorless paper maché, and developed in dild rodinal developer (1 :25) at 18° for 15 min., give pictures which show the effect of radiation and not the effect of emanation of $H_2O_2$. This radiation M. calls *L rays*. Different properties of these L rays are discussed.
A. P. H. TRIVELLI.

**Testing wash water for hypo.** *Atelier Phot.* 37, 117-8(1930).—Several methods are described for testing for the presence of $Na_2S_2O_3$. (1) A dil. (light red) soln. of $KMnO_4$ is decolorized in less than a min. after the addn. of water contg. $Na_2S_2O_3$. (2) Two cc. of a 1% soln. of $AgNO_3$ acidified with HAc, mixed with a glass full of the wash water, give a brown color if $Na_2S_2O_3$ is present. (3) A drop of satd. $HgCl_2$ soln. added to a small amt. of the wash water gives a brown color with $Na_2S_2O_3$ present. The method of Crabtree and Ross using a soln. of $HgCl_2$ and KBr is also described.
H. PARKER.

**Ferrous oxalate developer.** SPÖRL. *Atelier Phot.* 37, 100-2(1930).—For overexposures, the $FeC_2O_4$ developer gives better results than dild. or restrained org. developers, and the time of development is normal. Two stock solns. are used. (*A*) 1:3 (33%) $K_2C_2O_4$ and (*B*) 1:3 (33%) $FeSO_4$ with a drop of $H_2SO_4$. Three parts of *A* to one part of *B* gives the strongest developer; increasing the proportion of *A* weakens it, or KBr may be added to correct overexposures still further. One or 2 drops of hypo increases the energy, but an excess causes fog. A good reducer may be made from the used developer. Fifteen g. of oxalic acid is dissolved in a liter of the heated developer. The green crystals of ferric potassium oxalate formed when the developer cools are made up as a 1:20 soln. and hypo is added equal to 5 times the wt. of the green crystals whose action is between that of $K_3Fe(CN)_6$ and persulfate.
H. PARKER.

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Is the blackening and blanching of exposed lithopone a photographic phenomenon? (SVOBODA) 3. The Spierer lens and what it reveals in cellulose and protoplasm (SEIFRIZ) 11A.

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**Photographic coating sensitive to electronic discharge.** AUSTIN G. COOLEY. U. S. 1,791,051, Feb. 3. Finely divided conducting particles such as metal are distributed through a sensitive coating to render it suitable for use in recording app.

**Three-color cinematograph film.** LEON J. B. DIDIER. U. S. 1,790,978, Feb. 3. A blue image is printed on one face of a film coated on one side with a gelatin bromide layer and on the other with a neutral gelatin layer; the film is coated with a soln. of a dichromate, and there are printed simultaneously on the sides of the film a yellow and a red image, resp., the film being then dried and provided with a colored gelatin strip on each side.

**Production of colored photographic and cinematographic positives.** L. J. DASSONVILLE. Belg. 372,003, Aug. 31, 1930. A Ag salt image is first produced in the sensitized emulsion. After resensitization by means of a salt of another metal, a 2nd image is produced. It is obtained colored by pptn. of a colored salt.

**Photographic plates and films.** I. G. FARBENIND. A.-G. Fr. 693,659, April 10, 1930. Anti halo layers for photographic plates and films contain fuchsone dyes with one or more COOH groups in the mol. Examples are given of the use of aurindicarboxylic acid, aurinmonocarboxylic acid and hydroxycarboxyfuchsone.

**Light-sensitive layers.** KALLE & Co. A.-G. Fr. 693,032, Mar. 29, 1930. Light-sensitive layers are prepd. on appropriate supports using diazo compds. of aromatic amino-acylamines of the general formula $NH_2 \cdot R \cdot NH \cdot CO \cdot X$ and $NH_2 \cdot R \cdot NH \cdot CO \cdot NH \cdot R' \cdot NH_2$ in which R and R' are substituted or unsubstituted groups and X is an aliphatic, aromatic or aliphatic aromatic group and the CO may be replaced by CS. Examples are given.

**Protecting surfaces.** VLADIMIR REVOS. Fr. 692,800, Mar. 26, 1930. Fragile surfaces such as photographic negatives or papers, films, pictures, etc., are protected by a thin layer of a transparent soln. of celluloid, etc., in an appropriate solvent such as AcOAm.

*Printing molds.* ERNST BECHERT. Fr. 692,794, Mar. 26, 1930. In the production of printing molds, safranine or like substance is added to the light sensitive layer to neutralize the latteral or undesired illumination.

# 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

**Researches on the role of water in the salts' aquo combinations of ruthenium-IV-ammines.** R. CHAROVNAT. *Compt. rend.* 191, 1453–5(1931).—In partial support of his theory of hydrolysis Werner made use of certain transformations of salts of Ru-IV nitrosohydroxotetrammine which are caused by suitably heating the salts with acid, namely, $X_2[Ru(NO)(OH)(NH_3)_4]$ (I) $\longrightarrow$ $X_2[Ru(NO)(H_2O)(NH_3)_4]$ (II) $\longrightarrow$ $X_3[Ru(NO)(NH_3)_4]$ (III). In his investigation of the role of water in salts of type II, C. prepd. 2 new salts having the compns. $Ru(NO)en_2Cl_2.H_2O$ and $Ru(NO)py_2Cl_2.H_2O$ (en = ethylenediamine and py = pyridine). The properties of these complex aquo salts indicate that they are really hydrochlorides of hydroxides having the following structures $Cl_2[Ru(NO)(NH_3)_4(ClHOH)]$, $I_2[Ru(NO)en_2(ClHOH)]$, and $[Ru(NO)py_2(ClHOH)Cl_2]$. The mol. of HCl is joined to the O of the group (HCl—O—A) by a secondary valence, the O possessing tri-coördinance. R. H. LOMBARD

**A new method for the conversion of alkali sulfate to alkali chloride for use in silicate analysis.** WERNER MYLIUS. *Sprechsaal* 63, 972–5(1930).—A new method for converting the alkali sulfate to the chloride in the quant. detn. of K and Na in silicates to replace the more bothersome $BaCl_2$ method consists in a double evapn. of the finely pulverized neutral sulfate with $N_2H_4.2HCl$. C. H. LORIG

**The reaction between iodic acid (alkali iodates) and hypophosphorous acid, phosphorous acid or their salts. (II).** V. HOVORKA. *Collection Czechoslov. Chem. Comm.* 2, 608–25(1930)(in French), cf. *C. A.* 25, 468.—This part deals with the oxidation of the lower acids of P by $HIO_3$ in the presence of substances capable of removing, by the formation of insol. iodides the I produced by the reaction between the $HIO_3$ and the HI formed during the oxidation of the phosphorous acids. Salts of Pb, Ag, $Hg^{++}$ and Cd were used, but with Pb and Cd salts free I was always formed. Excess of the perchlorates of Ag and $Hg^{++}$ was finally used. The work was carried out with acidified ($H_2SO_4$) alkali phosphite or hypophosphite solns. to which KI and excess metallic perchlorate were added. With Ag and $Hg^{++}$ perchlorates the corresponding iodides were formed, so that very little direct oxidation of the acids by the $HIO_3$ occurred. The oxidation in the presence of $AgClO_4$ was complicated by the pptn. of almost all the I present as $AgIO_3$ when the $AgClO_4$ was added and also by the reduction of the $AgClO_4$ to finely divided Ag. The results show that only half the $H_3PO_2$ was oxidized. After the oxidation the soln. contained principally $H_3PO_2$ and very little $H_3PO_4$. $H_3PO_4$ only began to be formed after about 50% of the $H_3PO_2$ had been oxidized. At ordinary temp. the oxidation of $H_3PO_2$ to $H_3PO_3$ was the main reaction, the oxidation of $H_3PO_3$ alone was always slow. With $Hg(ClO_4)_2$ no $HgI_2$ was pptd. since it dissolved in the perchlorate immediately on formation. As with the Ag salts the $Hg^{++}$ salts were the real oxidizing agents of the phosphorous acids. The $Hg^{++}$ salts oxidized both $H_3PO_2$ and $H_3PO_3$ to $H_3PO_4$, while $AgClO_4$ only oxidized the $H_3PO_2$ to $H_3PO_3$. The oxidation by the $Hg^{++}$ salt occurred at ordinary temp., the rate depending on the quantity of $Hg(ClO_4)_2$ present. According to the quantity of $Hg^{++}$ salt added, either the $Hg^{+}$ salt alone or the $Hg^{+}$ salt and metallic Hg, were formed. Detailed descriptions of the courses of the reactions of solns. obtained and of ppts. formed are given, together with detailed equations representing the various oxidations. EDWARD B. SANIGAR

**The reduction of soda by hydrogen.** P. VILLARD. *Compt. rend.* 190, 1229–31(1930).—A study was made of the action of H at high temp. upon free alkali, soda by preference because of the ease with which one can detect Na vapor. A current of H was passed over fused soda spread on the internal wall of a tube of extremely refractory glass or contained in a tube of Ag tightly closed at both ends to retain the soda and placed in the glass tube. The results were as follows. At 800° in the heated part of the tube containing the soda the current of H was charged with vapors absorbing Na light very strongly. With a spectroscope and white light the absorbing vapor gave the characteristic spectrum of Na. It did not seem to be a question of dissociation, even at the higher temps. utilized (in the neighborhood of 900°) since the phenomena of the absorbing vapor disappeared entirely when H was replaced by N. R. H. CARTER

**The system, thorium nitrate-ether-water between 0° and 20°.** P. MISCIATELLI. *Gazz. chim. ital.* 60, 922–8(1930).—It is necessary to have data on the quaternary system $UO_2(NO_3)_2$–$Th(NO_3)_4$–$H_2O$–$Et_2O$, and therefore in turn of the ternary systems $UO_2(NO_3)_2$–$Et_2O$–$H_2O$ and $Th(NO_3)_4$–$Et_2O$–$H_2O$, to establish the conditions for the sepn.

of Th from U in the presence of water by the aid of $Et_2O$ (cf. M., *C. A.* 23, 1554). Of the systems $Et_2O$–$H_2O$, $Th(NO_3)_4$–$Et_2O$ and $Th(NO_3)_4$–$H_2O$, only the latter is unknown, so this was first studied. The following data give the temp. and the no. of g. of $Th(NO_3)_4$ in 100 cc. of satd. soln.: cryoscopic method: —0.2, 1; —0.5, 2; —1, 5.2; —1.5, 9; —2.1, 13; —2.9, 16; —4, 20; —4.6, 23.5; —5.1, 26.4; —5.6, 27.3; —6, 33; —6.6, 37; —9, 41; —11.2, 43; —12.2, 44.5; —13.5, 46.2; —15, 47.7; —16.6, 49.8; —19.1, 51; —23.3, 53.1; —25, 55.7; —28.6, 58; —31.3, 59.2; —35, 60.6; —40.6, 62; —43.5, 64; synthetic method: —43.5, 64 ($Th(NO_3)_4.6H_2O$); analytic method: —22, 64.2; 0, 65; 10, 65.2; 20, 65.6. Equil. in mixts. of $Th(NO_3)_4$, $Et_2O$ and water was very slow, in some cases 20 days being required. The results of the measurements at 0° and 20° are given in tables and triangular diagrams, which must be consulted for the quant. data. The method used for obtaining these data is described in detail. In the *prepn. of anhyd. $Th(NO_3)_4$*, the ordinary nitrate was freed of traces of Ce by pptn. with $Na_2S_2O_3$ and $H_2O_2$, crystn. as $Th(NO_3)_4$, distn. of $N_2O_5$ over this to remove $4H_2O$, and treatment of the residue with a current of dry air for several days. C. C. Davis

**The system: uranyl nitrate–ether–water between 0° and 20°.** P. Misciatelli *Gazz. chim. ital.* 60, 839–42(1930).—The binary systems $Et_2O$–$H_2O$, $UO_2(NO_3)_2$–$Et_2O$ and $UO_2(NO_3)_2$–$H_2O$ are already known. Equil. in the ternary system was much more rapid than with $Th(NO_3)_4$–$Et_2O$–$H_2O$. *A method of prepn. of anhyd. $UO_2(NO_3)_2$ was developed, viz.*, by distg. its mixt. with $N_2O_5$ and drying the residue in a current of dry air at 110°. Incipient decompn. of the anhyd. salt is obvious from a change in color to orange yellow. No basic salts are formed in this thermal decompn. (cf. Guempel, *C. A.* 24, 2367). *The data for the isotherms at 0° and at 20° are given in tables and* triangular diagrams, which must be consulted for the quant. values. Cf. preceding abstr. C. C. Davis

**The structure of hydrogen phosphide and of hydrogen arsenide.** G. Natta and E. Casazza *Gazz. chim. ital.* 60, 851–9(1930).—In previous expts. on the structure of hydrides of elements of the 5th and 6th groups (cf. N., *Giorn. chim. ind. applicata* 12, 37(1930)), analogies were found in the form and dimensions of the elementary cells of $NH_3$, $PH_3$ and $AsH_3$, but this was limited to a comparison of the lattice consts., and it was not proved whether a perfect isomorphism exists. In the present paper, more refined methods have made it possible to settle this problem. Of the binary compds. of H with elements of the 5th group, only $NH_3$ has been studied by the x ray powder method (cf. Mark and Pohland, *C. A.* 20, 130; de Smedt, *C. A.* 20, 1735), but the arrangement of the atoms in the mol. was not established. A new examn. of $NH_3$ gave x ray photographs of extraordinary clearness, and these will be described in a later paper, with the detn. of the structure. The lattice const. at —170° was 5.08 A. U., a value lower than that of the other experimenters, probably because of the thermal contraction at the lower temp. $SbH_3$ and $BiH_3$ appeared to be isomorphous but *of a different structure from $NH_3$, $PH_3$ and $AsH_3$. However, the weakness and lack* of clarity of the lines leave this problem unsettled. Good results were obtained with $PH_3$ and $AsH_3$. $PH_3$ was prepd. from Ca phosphide and water and purified by drying with $CaCl_2$, freezing out of heavier hydrides and sepn. from H by solidification with liquid air. *It b. —87.4° and m. —132.5°. $AsH_3$ was prepd. from pure Zn and $As_2O_3$* in aq. HCl, drying with $CaCl_2$ and freezing of the $AsH_3$ with liquid air. Examn. of both $PH_3$ and $AsH_3$ was carried out with an app. already used (cf. N., *C. A.* 24, 4973). At approx. 100°(abs.) $PH_3$ and $AsH_3$ are quite stable and do not oxidize in air, even when traces of other H phosphides or arsenides are present. $PH_3$ crystallizes in the cubic system. Its elementary cell contains 4 mols., has a dimension of 6.31 ± 0.01 A. U. at —170° and a vol. of $251 \times 10^{-24}$ cc. Its d. is 0.896. $AsH_3$ is isomorphous with $PH_3$. Its elementary cell contains 4 mols., with a dimension of 6.40 ± 0.02 A. U. at —170° and a vol. of $262 \times 10^{-24}$ cc. Its d. is 1.96. The position of the P and As atoms corresponds to a face-centered structure. The x ray data did not permit the establishment of the position of the H atoms in the lattice. From considerations based on the size of the constituent atoms, it is probable that both $PH_3$ and $AsH_3$ belong to 1 of the 2 spatial groups $Th^1$ and $Oh^4$. The relations between these and the structure of $NH_3$ will be *the subject of a later paper.* C. C. Davis

**Salts of bivalent vanadium.** Julius Meyer and Margot Aulich *Z. anorg. allgem. Chem.* 194, 278–92(1930).—The soly. of specially purified $V_2O_3$ in various concns. of $H_2SO_4$ is tabulated. If 3 g. of $V_2O_3$ is dissolved in 30 g. of 10% $H_2SO_4$, the soln. diluted and *reduced with $SO_2$, blue vanadyl sulfate is produced.* Electrolysis of the $SO_2$-free soln. in an inert atm. with a Pt, Pb or Hg cathode, 8–10 v. and 2–3 amp. causes further reduction. Purple crystals of $VSO_4.7H_2O$ (I) sep. upon evapn. This product

is very unstable The $NH_4$, K and Pb complexes, *e. g.*, $(NH_4)_3V(SO_4)_3 6H_2O$, are more stable. Treatment of I with alkali salts of other acids gives only solns Salts of org acids decompose readily. Soln of metallic V in mineral acids yields green vanadic solns The metal as cathode or anode does not form $V^{++}$. B A Soule

Germanium. XXXVI. Extraction of germanium and gallium from germanite. L W. I. Patnode and R. W. Work. *Ind Eng Chem* 23, 204–7(1931).—About 1200 g. of germanite is chlorinated and the volatile chlorides are distd. The distillate includes the anhyd chlorides of Ge, As, Si, S and Ga. These are subjected to fractional distn. This distillate contains HCl and $GeCl_4$ which are sepd by gravity. The $GeCl_4$ may then be hydrolyzed again to the dioxide The yield is 85–90% of the Ge content of the ore Amy Le Vesconte

The halides of the rare earths. IV. Samarium diiodide and the thermal decomposition of samarium triodide. G Jantsch and N Skalla. *Z. anorg allgem Chem* 193, 391–405(1930).—Pure anhydrous $SmI_3$ is prepd. by treating a mixt. of 1 mol. of ordinary $H_2O$-contg $SmI_3$ and 6 mols. of $NH_4I$ with a current of HI, the temp being gradually raised to 350° and finally to 600–650° to remove $NH_4I$ After cooling the HI is replaced with N To avoid the formation of basic salts the gases must be quite dry and free from O $SmI_3$ so obtained can be reduced to $SmI_2$ by heating in a Au boat in a current of dry H, the temp. being raised slowly in the course of 11 hrs. to 750–760° and held at this temp for 1.5 hrs. After cooling the tube is filled with pure N $SmI_2$ is a deep green, almost black in color, and dissolves in $H_2O$ to give a deep red color. The soln. evolves $H_2$ and is gradually decolorized with sepn. of a basic $Sm^{III}$ salt. $SmI_2$ is more stable than the chloride but is vigorously decomposed by acids, even AcOH, with evolution of $H_2$. The thermal decompn. of $SmI_3$ was carefully studied in a quartz tube under a pressure of 0.01 mm. of Hg The temp rose to 800° in 4 to 5 min At 550–570°, I began to come off, the reaction being very vigorous at 680–720° Above 750° evolution of I was very slight The material was heated at 800° for 45 min., then at 900° for 15 min., and then allowed to cool, an atm. of pure dry N being finally admitted. The product of this decompn. is $SmI_2$. $SmI_3$ at 680° reacts as follows $2SmI_3 \longrightarrow Sm + 2SmI_3$. $SmI_3$ melts with decompn. at 840° and is extremely sensitive to $H_2O$, forming a red basic iodide in a few mins. in air Cond. measurements verify the rapid decompn. of $SmI_3$ in $H_2O$ solns. as follows: $2SmI_3 + 2H_2O \longrightarrow 2Sm(OH)I_2 + H_2$ If $SmI_3$ is dissolved in air free $H_2O$ at 0° and treated with a cold satd. soln of $Na_2SO_4$, $SmSO_4$ is pptd. It is a bright, orange-red cryst. powder, slowly decomposed by $H_2O$ and sol. in acids with decompn. H. Stoertz

Trichloromethyl perchlorate. L. Birckenbach and J Goubeau *Naturwissenschaften* 18, 530(1930).—In presence of a little HCl, $CCl_4$ reacts with $AgClO_4$ at the ordinary temp., yielding trichloromethyl perchlorate $CCl_3ClO_4$ in 60–70% yield By repeated fractionation in a vacuum in absence of moisture this can be obtained as a colorless liquid which solidifies at about —55° to colorless crystals. With water it yields $HClO_4$ and liberates I with iodides With alc. and other org substances, *e. g.*, tap grease, it reacts at the ordinary temp with detonation. When heated it explodes, liberating Cl. B. C. A.

The action of bivalent metals on persulfates of the alkali group. Synthesis of double salts of the type $M_2^{+}M^{++}(SO^{---}_4)_2$. Ossian Aschan *Z anorg allgem Chem* 194, 139–46(1930).—Reduction of K, Na or $NH_4$ persulfates with metallic Cu, Mg, Zn, Cd, Mn, Fe, Ni or Co gives a double salt, *e. g.*, $K_2Zn(SO_4)_2 6H_2O$ The reaction is practically quant. B A Soule

Alkyloxyvanadylsalicylates. P Bratman *Compt rend* 192, 166–7(1931).—MeOH (or EtOH) $(+VOCl_3 + LiOC_6H_4CO_2Me$ gives $MeO(VO)OC_6H_4CO_2Me$ (or the EtO compd.) These are analogous to the Mo (Rosenheim et Bertheim, *Z anorg Chem* 34, 440(1903)) and the Cu and Ni compds. (Doak and Packer, *C A* 23, 829) V F Harrington

Complex thiocyanates of quadrivalent molybdenum. G A. Barbieri. *Atti accad Lincei* 12, 55–61(1930).—The thiocyanates of quadrivalent Mo, previously unknown, have been prepd. by oxidizing the pyridine as well as the hexamethylenetetramine salts $(C_5H_5N)_3H_3Mo(CNS)_8$ and $(C_6H_{12}N_4)_3H_3Mo(CNS)_8$ with $K_4Fe(CN)_6$. Both of the above salts are insol. in water; so the reaction is carried out by grinding each with $K_4Fe(CN)_6$ in a mortar in the presence of water. With the $C_5H_5N$ salt, an intense blue-violet solid results, while with the tetramine, a green violet solid results The analyses indicate that the products are $(C_5H_5N)_3H_3Mo(CNS)_8$ and $(C_6H_{12}N_4)_3H_3Mo(CNS)_8$. To prove that quadrivalent Mo is present, a method was developed by B.; the method depended on the observation that any Mo salt can be oxidized to $Mo^{VI}$ by a cold soln. of ammoniacal $Fe(CN)_6^{III}$, this being in turn reduced to $Fe(CN)_6^{II}$. The equivs. of $Fe(CN)_6^{III}$ reduced are a measure of the oxidation. The Mo was thus found to be

quadrivalent The estn of $Fe^{II}(CN)_6$ and $Fe^{III}(CN)_6$ in solns of CN and SCN as well as halogens has already been worked out by B (*C A* 24, 4721) A W Contieri

**Studies on some complex chromiselenates. I.** P B Sarkar and S N. Bhattacharya *J Indian Chem Soc* 7, 765–0(1930).—The close analogy between the properties of complex chromisulfates and complex chromiselenates is discussed The methods of prepn and analysis of chromoselenic acid, $H[Cr(SeO_4)_2]$, chromoselenomonosulfuric acid, $H_3[Cr_2(SO_4)(SeO_4)_3]$, chromoselenodisulfuric acid, $H_4[Cr_2(SO_4)_2(SeO_4)_3]$, chromoselenotrisulfuric acid, $H_6[Cr_2(SeO_4)_3(SO_4)_3]$, and the corresponding K salts are outlined Na chromoselenic alum is described L L Quill

The system MgO–FeO–$Fe_2O_3$ in air at one atmosphere (Roberts, Merwin) 8.

Wolf, Ludwig **Grundrüge der anorganischen Chemie.** 2nd ed, revised Leipzig F Deuticke 230 pp M 6, bound, M 8

## 7—ANALYTICAL CHEMISTRY

W T Hall

**Differential potentiometric titration. IV. (a) Adaptation of the method to the use of hydrogen electrodes. (b) Test of standards for precise acidimetry.** Duncan A MacInnes and Irving A Cowperthwaite. *J Am Chem Soc* 53, 555–62(1931).—The way in which the differential electrometric method of titration can be adapted to the use of H electrodes is described in detail and 2 cuts show the necessary app Expts with electrometric detn of the end point by the method described, using const.-boiling HCl, K acid phthalate and benzoic acid as standards, gave results agreeing to within 0.01% or better. W T H

**Improved apparatus and method for the analysis of gas mixtures by combustion and absorption.** Martin Shepherd. *Bur. Standards J Research* 6, 121–67(1931).—The app described is of the Orsat type but contains many improvements A buret is provided which prevents parallax errors, a device gives good illumination, a manometer-compensator is provided which is compact and less fragile than the usual type, the pressure balance being obtained by electric contact, a special stopcock insures accuracy; a water jacket is provided which does not require a very large rubber stopper, a distributor, or manifold, eliminates much capillary dead space, the absorption pipet works very rapidly, the combustion pipet eliminates the undesirable features of the common type, a sampling pipet is designed to permit manipulation without danger of contamination sources of leakage are avoided, the complete assembly is unusually convenient; the app is supported entirely by metal, the assembly and replacement of parts is easily accomplished Several procedures are given for making technical and accurate gas analyses The app was designed for the purpose of getting more accurate results and saving time The original paper must be consulted for details W T. H

**Quantitative study of the boric acid-alcohol flame test.** W. Stahl *Acta Univ Latviensis Kim Fakultat. Serija* 1, No 13–17(in German 399–400)(in Lettish 369–99)(1930).—The $H_3BO_3$ esters give the green flame test when the reacting components are at about 100° below the b p of the EtOH or MeOH used. With rise in temp the effect is increased The concd $H_2SO_4$ used in the test serves not only to liberate $H_3BO_3$ and remove $H_2O$ but also has an effect upon the flame The color can be estd with the aid of a colorimetric scale The best flame test is obtained when the temp is not far from the b p of the alc and the best reaction mixt is 5 vol MeOH to 1 vol concd $H_2SO_4$ The dimensions of the app have an effect upon the smallest quantity of $H_3BO_3$ that can be found but with the micro app described in this paper, as little as 0.005 mg $H_3BO_3$ can be detected As much as 3% of water in the MeOH does not have any noticeable effect W T. H.

**Spectrum analysis in assaying.** A A. Fitch. *Mining Mag* 43, 81–5(1930).—Procedure is outlined for the most valuable types of applications· (1) Qualitative test for a particular metal This is recommended for sorting steel scrap (2) Qualitative test for all metals present. This is valuable esp in complete assays of Pt metals and rare-earth concentrates (3) Approx quantitative analysis—done by comparison with standard spectra. (4) More accurate quantitative detn—done by measurement of intensity of lines by spectrophotometry. The accuracy of the method is about 5% It is suitable for rapid analysis of steels where highest accuracy is not required

Numerous other applications are suggested, the greatest advantage being rapidity
A Butts

**Role of silica in the decomposition of fluorides.** P Fuchs. *Chem Erde* 5, 99–105 (1930).—In the Berzelius method for the decompn of insol fluorides, *e g*, fluorspar, by fusion with alkali carbonate mixed with $SiO_2$ the part played by the $SiO_2$ is in the formation of a double NaCa silicate The carbonate and $SiO_2$ may be fused beforehand to avoid frothing in the actual analysis, the addn of NaOH is advantageous.
B C A

**Cobaltic sulfate as an oxidizing agent.** Sherlock Swann, Jr, and Theodore S Xanthakos. *J Am Chem Soc* 53, 400–4(1931).—$Co_2(SO_4)_3$ is best used as an analytical reagent for the quant oxidation of certain org compds to $CO_2$ An electrolytic method is described for prepn of the reagent
B A Soule

**The use of hydrogen sulfide and ammonium sulfide in analytical laboratories.** E Cattelain *J pharm chim* [8], 12, 367–76(1930).—Useful practical notes on the prepn of these reagents and precautions to be taken in pptg, washing and weighing the various metal sulfides are given Their analytical properties are summarized in 5 tables
S. Waldbott

**Organic reagents in qualitative inorganic analysis.** B Tougarinoff. *Ann Soc Sci Bruxelles* 50, Ser B, 145–246(1930).—The paper contains data concerning the use of about 100 different org compds which have been recommended for the qual testing of inorg materials A bibliography is given, also a statement concerning the nature of each reaction, the method of applying the test and the sensibility Numerous tests for the following cations are described Al, Sb Cu, Bi, Ba, Cd, Ca, Cr, Co, Sn Fe, Mg Hg Mn, Ni, Pb, Sr and Zn No less than 24 different tests are given for Cu, 13 for Fe, 10 for Mg, etc. After giving these data, the latter part of the paper states the results obtained in trying out some 15 of these tests—the alizarin test for Al, the rhodamine B, pyrogallol, benzidine and urotropine tests for Sb, the urotropine dimethylglyoxime and rhodamine B tests for Bi, the antipyrine and K xanthogenate tests for Co the alizarin test for Mg, the benzidine test for Pb, the diphenylamine diethylaniline and orange IV tests for Zn The sensitiveness and specificity of each test are discussed critically and the 3 tests for Zn, the alizarin test for Al the rhodamine B test for Sb and the dimethylglyoxime test for Bi are recommended especially
W T H

**Determination of small quantities of hydrogen and oxygen in active charcoal** Alfred Stock, Hermann Lux and John W R Rayner *Z anorg allgem Chem* 195, 158–63(1931).—Degasify the charcoal and then burn it with a known vol of O Condense the resulting water, and from the quantity obtained compute the H content Then, since the vol of $CO_2$ is equiv to that of the $O_2$, the residual gas, corrected for the $O_2$ *in the water, gives the vol of* $O_2$ *from the O in the original coal* *An app is shown* which is suitable for the analysis and the method is described in detail W T H

**Rapid colorimetric estimation of potassium.** Earle R Caley *J Am Chem Soc* 53, 539–45(1931) cf *C* A 24, 2081.—Dissolve in 1 cc of water the dry residue from a soln and add 7.5 cc of a satd soln of picric acid in 95% alc After a ppt. begins to form in the stirred soln allow the mixt. to stand at 20° for 45 min with stirring at 5-min intervals Filter and wash the ppt with ether Dissolve the ppt and compare the color with that obtained similarly from known quantities of K W T. H

**Determination of magnesium in portland cement and similar materials by the use of 8-hydroxyquinoline** J C Redmond and H A Bright *Bur Standards J Research* 6, 113–20(1931).—Digest 0.5 g of cement with 20 ml of 6 *N* HCl, heating gently Dil to 150 ml and add Me red indicator and concd $NH_4OH$ until the soln is distinctly yellow Boil 1–2 min allow the ppt to settle and filter promptly To the filtrate, add 1 ml of concd $NH_4OH$ and 25 ml of 4% $NH_4$ oxalate soln Boil 2–3 min, digest on the water bath for 30–60 min filter and wash 5–6 times with hot water Heat the filtrate (about 350 ml) to 60–70° and add 20 ml of reagent (25 g 8 hydroxyquinoline dissolved in 60 ml of glacial AcOH and dild to 2 l with cold water) and 4 ml of concd $NH_4OH$ per 100 ml of soln Stir mechanically for 10–15 min Filter and wash the Mg ppt with hot 0.37 *N* $NH_4OH$ Dissolve the ppt in 50–75 ml of hot 1.2 *N* HCl, dil to 200 ml, add 15 ml of concd HCl, cool to 25° and det. the hydroxyquinoline content by the KBr–$KBrO_3$ method of Berg *The results obtained with standard* argillaceous limestone were excellent. The experienced analyst can det MgO within 2 hrs by this method
W. T. H

**Determination of magnesium as pyrophosphate** Stanko S Minolic. *Bull Soc Chim Roy Yougoslave* 1, Pt II 16–24(1930).—To avoid the error due to rapid heat

ing of $MgNH_4PO_4$ it is recommended to use Jena filtering crucibles and heat the ppt for 2 hrs at 480° in an elec. oven W T H

**Electrolytic separation of lead and antimony and its application to the determination of lead in tartar emetic.** Ella M Collin and Henry J S Sand *Analyst* 56, 90-3(1931) —A study of the deposition potentials of $Sb^{+++}$, of $Sb^{+++++}$ and of $Pb^{++}$ in tartrate solns showed the possibility of sepg Pb and Sb electrolytically from such solns. The method described depends upon the oxidation of the Sb to the higher state by $I_2$ in the presence of $HCO_3^-$. Tartaric acid is added and the soln made alk with KOH. It is then electrolyzed by a current derived from an external source or from internal electrolysis. Dissolve 5 g of tartar emetic in water, add 3 g of $NaHCO_3$ and oxidize the Sb(3) with KI soln. Then add 4 g KOH and 2-3 g of tartaric acid. Dil to 300-350 cc. and electrolyze cold using a Pt cathode which has been coated with Cu. Rotate the anode. In 15-20 min. quantities of 1.6-3.3 mg. of Pb can be detd. accurately. Directions are given for carrying out the method by internal electrolysis with a Zn anode and a 10% KCN soln. in the anode compartment. W T H

**Analysis of lead peroxide and of red lead.** G Bruhns. *Chem.-Ztg.* 55, 50-1 (1931). Instead of using $FeSO_4$ or oxalic acid to reduce $PbO_2$ or $Pb_3O_4$ in the presence of acid, it is now recommended to use a soln. of $Fe(NO_3)_2$ and $HNO_3$. A suitable soln. can be prepd. by treating $FeSO_4$ soln. with an excess of $Pb(NO_3)_2$ and allowing the ppt. to settle. Add the soln. from a buret until the $PbO_2$ or $Pb_3O_4$ dissolves completely in the added $HNO_3$ and titrate the excess Fe with $KMnO_4$. Excellent results were obtained in the 13 analyses cited. W T H

**Analytical chemistry of rhenium. II. Determination of rhenium as nitron perrhenate after previous precipitation as sulfide.** W Geilmann and F Weibke. *Z. anorg. allgem. Chem.* 195, 293-308(1931) —To ppt. Re as sulfide, the soln. should be 3.6-4.2 *N* in HCl and the current of $H_2S$ should be continued for at least an hr. It is well to start with the soln. hot and pass the gas for 2-2.5 hrs. while the soln. is cooling. Wash the ppt. with 0.3 *N* HCl which has been satd. with $H_2S$. Treat the sulfide with 3-5 cc. of 5% NaOH and with 2-3 cc. of perhydrol which converts the S to $SO_4^{--}$ and the Re to $ReO_4^-$. After removing the excess peroxide by boiling, neutralize with 2 *N* $H_2SO_4$ and ppt. the hot soln. with nitron. The oxidation of the sulfide can also be accomplished by fusion with $Na_2O_2$ which is particularly advantageous with sulfide ppts. that have been dried and aged. Cf. *C. A.* 25, 50. W T H

**Estimation of small quantities of tin.** J E Clennell. *Mining Mag.* 43, 9-13 (1930) —The accuracy of the usual volumetric method of reduction of a stannic salt in HCl soln. with Fe or Ni, followed by titration with I, was tested for detg. 1 to 30 mg. of Sn. Results with the smaller amts. were shown to be unsatisfactory. A colorimetric method that gives better results for 0.1 to 1 mg. of Sn is based on the blue color given by stannous salts with $(NH_4)_2MoO_4$. Several other reducing agents give the same color, so that the Sn must first be isolated. From the HCl soln. As and Sb are pptd. by Cu, which in turn is pptd. by Pb. The Sn is then pptd. on Zn from a slightly acid soln. This is dissolved in HCl and the soln. reduced by boiling with Pb foil. It is then poured into 10 cc. of alk. molybdate soln. (about 1% $(NH_4)_2MoO_4$ with 2% NaOH). A Butts

**The lead reduction method for the determination of tin and the interference with it by copper and antimony.** S G Clarke. *Analyst* 56, 82-89(1931) —The reduction of Sn from the quadrivalent to the bivalent conditions can be accomplished by boiling the soln. (1.2 *N* in HCl) with a strip of Pb foil for 1.5 hrs. in an atm. of $CO_2$. The reduced soln. may be cooled and titrated with $I_2$, the results being accurate if air is kept out by the stream of $CO_2$ during the entire expt. If, however, Cu is present in the soln., the results are low and the error is proportional to the Cu content. When Sb is present, the error is less but distinctly noticeable. The conclusion is drawn that the method should be applied only after the removal of Cu and Sb if accurate results are desired. W T H

**The analysis of crude platinum and palladium.** W P Horne. *Mining Mag.* 43, 278-80(1930) —Detailed procedure is given for analysis of material contg. 98 to 99.85% Pt or Pd, with detn. of the impurities and other precious metals present, as well as the Pt or Pd. A Butts

**Rapid determination of zinc in brass.** G Bruhns. *Chem.-Ztg.* 55, 41(1931). Karl Altmannsberger. *Ibid.* 41-2 —Thews and Harbison (*C. A.* 25, 661) recommended the approx. detn. of Zn by the color of the metal drillings, stating that more accurate results can be obtained by detg. the Cu and estg. the Zn by difference. B. points out that the KCNS-KI method is excellent for the rapid volumetric detn. of the Cu, and A. that the conventional iodide method gives excellent results. W T H

**The analysis of wolframite and scheelite.** C. Stansfield Hitchen *Mining Mag* 43, 208-20(1930) —The effect of W on the sepn of other elements makes a complete ore analysis difficult, and esp so in presence of Ta, Cb, Sn and Ti The occurrence and mineralogy of W are described and analytical methods discussed at length, with recommendations and a diagrammatic scheme for procedure A bibliography is also given A Butts

**Sulfur-print tests.** L. F. Benson *Electrician* 106, 4-5(1931) —The value of the S-print test, its simple operation and its sensitiveness are pointed out The test can be applied to practically all steels of importance except when the Cr content is high, as in stainless steels and some non magnetic steels W. H Boynton

**Rapid determination of carbon dioxide in carbonates.** Theodor Heczko *Z. angew Chem* 44, 85-6(1931) —Place the sample in a boat, cover with $V_2O_5$, heat in a current of $O_2$ to 1200° and collect the resulting gas. After measuring the volume in a gas buret, absorb the $CO_2$ in KOH, the diminution in vol gives the $CO_2$ W T. H

**Improved method for determining carbon dioxide.** C. A Jacobson and John W. Haught *Bull West Va Univ Sci Assoc* 2, No 4, 8-13(1930); cf *C A* 24, 4237 — The carbonate is decompd. with 20 cc. of 15% $HClO_4$, the evolved gas escapes through a condenser into a bubble tube, is dried with "dehydrite" and the $CO_2$ absorbed in ascarite The results obtained in over 40 expts are reported W T H

**Assay of calcium carbide and Czechoslovakian standards.** R. Vondráček *Chem Listy* 24, 193-7(1930) —The provisional Czechoslovakian standards make use of a modified Caro's app for the assay of $CaC_2$, this method is not exact, and an app giving more accurate results is described The yield of $C_2H_2$ should not be given in cc. of moist gas, as the Gay Lussac formula is only applicable to dry gases. The exptl error in the assay of carbide should not exceed 2%. B C A

**Determination of free acidity of chrome alum.** J. R. Guasch. *Afinidad* 10, 157-8(1930) *Chimie & industrie* 24, 1082(1930) —The various alums (K, Fe, Cr) obtained as by products in several mfg processes cannot generally be used directly on account of their free $H_2SO_4$ content, which must be neutralized, and therefore detd., before use Bellucci and Lucchesi's method, which is used in $Al_2(SO_4)_3$ plants, is based on the colorimetric reaction of hydrolyzed salts with methyl orange, and cannot be used for Cr alum on account of the color of the Cr ion A suitable method is based on the insoly of Cr alum in alc A 15% soln of the alum is treated with 3.5 times its vol of 96% alc., allowed to stand 24 hrs., filtered and titrated with 0.2 *N* $K_2CO_3$ in the presence of phenolphthalein A Papineau Couture

**Colorimetric determination of the sulfate ion in water, coal, etc.** P Guarnieri. *Ind ital cons alim* 3, 161(1930), *Chimie & industrie* 24, 814 —The method consists in treating 100 cc of the water at the boiling temp with an HCl soln of $BaCrO_4$, neutralizing with $CaCO_3$, filtering the ppt and comparing the color of the filtrate with that of standards A P C

**Determination of iodide in the presence of other halides.** Hugo Ditz *Z anorg allgem Chem* 194, 147-50(1930) —The statement of Gorbachev and Kasatkina (*C A* 24, 4240) that $IO_3^-$ cannot be used as an oxidizing agent for the detn of $I^-$ in the presence of other halogens is refuted Early expts of Ditz and Margosches (1901) led to the conclusion that it is possible to base a simple and exact process for the detn of $I^-$ with $Br^-$ and $Cl^-$ on the different behavior of the halides toward $IO_3^-$ with definite $H^+$ concns Further investigations (1904) led to a process for the detn of $I^-$ by which a definite excess of $KIO_3$ soln and a definite amt of $H_2SO_4$ are added to the $I^-$ soln The liberated I is sepd and titrated with $Na_2S_2O_3$ soln A S S

**A new microdetermination of the calcium ion and of phosphorus** M. Mousseron and (Mlle) N Buisson *Bull pharm Sud Est, Schweiz Apoth Ztg* 68, 654-8(1930), cf *C A* 24, 4731 —To det. both $Ca^{++}$ and $PO_4^{---}$ in a single sample, ppt the P as $FePO_4$ by adding $FeCl_3$ and carrying out a basic acetate sepn Dissolve the ppt in $HNO_3$ and det P by the molybdate method Take the filtrate and ppt. Ca with Na tungstate S Waldbott

**Determination of small quantities of volatile organic acids in sulfuric acid solutions.** D N Craig *Bur Standards J Research* 6, 169-92(1931) —In the study of the corrosive effect of various org substances on the plates of Pb accumulators, it was found that sometimes small quantities of AcOH in the electrolyte caused corrosion of the + plates In this connection, as well as in the study of the adequacy of treatment of wood separators, it became necessary to det small quantities of AcOH in the presence of 30–40% $H_2SO_4$ It was also desirable to test for formic acid Fifty ml samples of the acid were treated with sufficient 20% NaOH soln to neutralize about 35 ml

of the acid The mixt was carefully evapd to dryness by a bath kept at 65-75° until most of the liquid was evapd and then heated about 10° higher Water was added and the evapn repeated to make certain that all volatile acid was removed The app used for the distn was ingeniously devised so that there was no danger of any spattered acid getting into the distillate The total acidity of the distillate was detd The neutralized soln was then treated with $Na_2CO_3$ and $KMnO_4$ to destroy the formic acid and then another distn with $H_2SO_4$ served to remove AcOH alone The acidity of the distillates was detd by electrometric titration using the differential method of MacInnis and Dole somewhat modified The values obtained were also compared with those obtained by indicator titrations using phenolphthalein The potentiometric method was found excellent for titration solns of low acidity as obtained from electrolytes contg about 0.1% of AcOH or formic acid in 40% $H_2SO_4$ W T H

**Microdetermination of urea by Nicloux and Welter's method** R Guillemet and P Golaz *Compt rend soc biol* 101, 726-8(1929).—The rapidity and precision of the method are increased by pptg the serum with Tanret's reagent, treating the filtrate with 0.2 cc of a 5% soln of xanthydrol in MeOH (or 1% in AcOH), and collecting the ppt on a Jena filter After washing finally with satd alc dixanthylcarbamide, the ppt is dried in a current of air at 125° for 5 min B C A

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A new method for the conversion of alkali sulfate to alkali chloride for use in silicate analysis (Mylius) 6. Calorimetric method for determining silicon (King) IIB. Density of $H_2SO_4$ solutions of $CuSO_4$ (Chapas, *et al*) 18.

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**Analyzing gases by absorption.** I. G Farbenind A.-G Ger 513,192, Feb 10, 1927. Manipulative features and app. are described

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## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T WHERRY AND J F SCHAIRER

**Optical data for some rare minerals.** T Barth and H Berman *Chem Erde* 5, 22-42(1930).—Mention is made of various media of high *n* and of the dispersion method for detg under the microscope the *n*s of immersed mineral particles Optical data are given for some 30 minerals B C A

**Algodonite and whitneyite.** F. Machatschki *Neues Jahrb Mineral Geol*, Abt. A, Beilage Bd. 59, 137-58(1929).—The minerals are crystallographically inhomogeneous The regular crystals, apparently metallic Cu contg As, have *a* 3.647-3.651 A. U. The hexagonal crystals contain less Cu than corresponds with the formula $Cu_4As$ and have *a* 2.599, 2.598, *c* 4.215, 4.213 A. U., with d 8.71, 8.72 B. C. A

**The system MgO-FeO-$Fe_2O_3$ in air at one atmosphere.** H. S Roberts and H. E. Merwin *Am J Sci* [5], 21, 145-57(1931).—The system MgO-FeO-$Fe_2O_3$ has been investigated at temps above 1000° on the isobar 1/5 atm $O_2$ In the binary system MgO-$Fe_2O_3$ the only compd. is MgO $Fe_2O_3$ which dissociates slightly on heating and begins to melt at 1750 ± 25°. Solid soln extends for a short distance toward MgO In the binary system FeO-$Fe_2O_3$ the stable phase at temps below 1386 ± 5° is a hematite solid soln contg less O than $Fe_2O_3$; just above 1386° the stable phase is a magnetite solid soln contg considerably more O than $Fe_2O_3$ The ternary system contains 2 solid soln fields The first begins at MgO below 1000° and extends with increasing temp toward MgO $Fe_2O_3$ and FeO, a liquid phase appears at 1770 ± 25°, where the solid contains Fe oxide equiv. to 73% $Fe_2O_3$ The second solid soln extends with increasing temp. from MgO $Fe_2O_3$ toward the Fe oxide boundary, which it reaches

at 1386 ± 5°, solid solns of about 1% MgO in MgO $Fe_2O_3$ are possible from 1750 to 1000° or below ALDEN H EMERY

The genesis of lodestone. MARK C BANDY. *Econ Geol* 25, 871–5(1930).—B discusses recent articles by Newhouse (*C A* 23, 4049) and Gruner (*C A*, 23, 4167), on the origin of lodestone. The theory proposed by N., that lodestone is due to a brownish oxidized *magnetite*, does not meet all the conditions under which it occurs naturally and is formed artificially. The theory that it is formed by the magnetic *field of* the earth is equally inadequate. Lightning striking outcrops of magnetite ore is suggested as a theory for the origin *of lodestone*. ALICE W. EPPERSON

A contribution to the study of moonstone from Ceylon and other areas and of the stability relations of the alkali feldspars. EDMONDSON SPENCER. *Mineralog Mag* 22, 291–367(1930).—Moonstone feldspar from pegmatite near Ambalagoda was found to possess a microperthitic structure. The lamellas (or ab) have sepd. mainly along the plane Δ (13 0 2) which is also the plane of schiller. A coarser but fainter perthite occurs, which sepd. *at an* earlier stage along the prism planes 110 and 320. Schillerized feldspars from Kandy, Burma and Colorado were found to be similar. The schiller color is dependent on the size and abundance of microperthite lamellas and is mainly due to the reflection and scattering of light at the boundaries of these. The sp. gr., optical axial angle and extinction angles are dependent on the proportions of the 2 feldspars present. The schiller color and microperthitic structure can be destroyed by heat treatment, and there is a reduction in sp. gr., optical axial angle and extinction angle. The changes appear to be due to a re-soln. of the (or, ab) members *into* each other to form the original (Or, Ab) phases. Structures can be developed on cleavage faces where there is little evidence of microperthite by heating with water and $CO_2$ under pressure, causing selective decompn. The phenomena observed on heating indicate that there are 2 solid soln. changes, at (*a*) 900–1000° between a single solid soln. phase and the 2 (Or, Ab) phases, and (*b*) 500–700° for the (or, ab) sepn. either *from the 2 (Or, Ab) phases or from one of them*. Structure in the Ambalangoda microcline-microperthite indicates that the conversion to microcline evidently took place prior to the exsoln. of the microperthite and hence probably above 700°. It undergoes none of the changes in properties found *for moonstone feldspar* and no re-soln. takes place on heating. Microcline appears to be the stable form of K feldspar and to be incapable of holding albite in solid soln. up to temps. near its m. p. A. M. B.

Mineralogy of Western Australia. EDWARD S SIMPSON. *J Roy Soc W Australia* 15, 99–113(1928–29); cf. *C A* 24, 3969.—Descriptions and in most cases chem. analyses are given for apatite, gray and white beryl (contg. $Cs_2O$ 0.72 and 0.92%, resp.), cinnabar, glaucophane, siderite and corundum; manganilmenite and menaccanite, manganocolumbite, $Ta_2O_5$ 16–48, $Cb_2O_5$ 62–34% resp.; microlite, $Ta_2O_5$ 77.00, $Cb_2O_5$ 3.64, spinel, tourmaline, both schorl and dravite, and vesuvianite. W. L. HILL

*Minerals from the Adamello Mountains* (Trentino). C. GOTTFRIED. *Chem Erde* 5, 106–12(1930); cf. *C A* 24, 4243.—The minerals described are from marble (metamorphic limestone) at contact with tonalite. Garnet as reddish brown dodecahedra, with d 3.512 and $n_{Na}$ 1.7585, gave analysis I, corresponding with grossular 80.55, andradite 8.13, almandine 4.48, pyrope 6.85%. Vesuvianite as olive green crystals with $a:c = 1:0.5391$, d 3.336, $\omega$ 1.719, $\epsilon$ 1.715, gave analysis II, agreeing with Tschermak's formula $Si_{10}Al_{18}Ca_{19}Mg_3H_4O_{78}$. X-ray rotation photographs gave a *unit* cell of dimensions $a$ 22.03, $c$ 11.89 A. U., contg. 2.3 such mols., *i. e.*, 168 O atoms. The space group is $D^4_{4h}$.

| | $SiO_2$ | $TiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MnO | MgO | CaO | $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|
| I | 39.66 | 0.46 | 18.77 | 2.52 | 1.92 | 0.07 | 2.06 | 34.79 | 0.07 |
| II | 37.03 | 0.75 | 16.25 | 3.13 | 1.00 | 0.04 | 2.45 | 36.39 | 2.29 |

*II* also ZnO 0.29, $Na_2O$ 0.28, $K_2O$ 0.03, F 0.31, total less O for F 100.15%. B. C. A.

Analytical determination of the isomorphous variation in rock-forming minerals. H. VON PHILIPSBORN. *Chem Erde* 5, 233–53(1930).—The powd. rock, a pyroxene-granulite from Hartmannsdorf, Saxony, was sepd. into different fractions with Clerici's soln. and an electromagnet. Analysis I*a* is of the heavier and darker fraction (d 3.55–3.58, $n[= \frac{1}{2}(\alpha + \gamma)]$ 1.715) of the hypersthene and I*b* of the lighter and paler fraction (d 3.49–3.55, $n$ 1.706). II*a* of the heavier fraction (d 3.40–3.42, $n$ 1.708) and II*b* of the lighter fraction (d 3.37–3.40, $n$ 1.698) of the monoclinic pyroxene. Analysis III is of the heavier fraction (d. 2.69–2.71, $n$ 1.555–1.560) of the plagioclase, correspond

ing with $Ab_{77}An_{23}$, the lightest fraction with $n$ 1.549 corresponds with $Ab_{75}An_{25}$. Analysis IV is of the garnet (d 3.92, $n_{Na}$ 1.766) and V is ilmenite. From optical data on the still lighter and heavier fractions of the pyroxenes their compn. is arrived at by extrapolation. VI is the bulk compn. of the rock (d 3.181) corresponding with hypersthene 28.53, monoclinic pyroxene 29.60, plagioclase, 32.59, orthoclase 0.41, garnet 3.31, ilmenite 4.35, magnetite 0.35, apatite 0.83%.

| | $SiO_2$ | $TiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MnO | MgO | CaO | $Na_2O$ | $K_2O$ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ia* | 49.42 | 0.54 | 2.64 | 3.42 | 23.15 | 0.26 | 18.17 | 0.91 | 1.23 | 0.19 | 99.96 |
| *Ib* | 50.30 | 0.53 | 3.26 | 3.26 | 20.09 | 0.26 | 20.14 | 1.11 | 1.28 | 0.22 | 100.75 |
| *IIa* | 49.50 | 0.69 | 4.39 | 2.81 | 9.90 | 0.21 | 11.87 | 19.31 | 1.47 | 0.16 | 100.37 |
| *IIb* | 50.12 | 0.65 | 4.74 | 2.01 | 8.57 | 0.21 | 12.87 | 19.84 | 1.60 | 0.14 | 100.78 |
| III | 55.41 | — | 29.42 | 0.40 | — | — | — | 11.11 | n.d. | n.d. | 96.34 |
| IV | 38.50 | 0.68 | 21.77 | 1.47 | 19.64 | 0.72 | 8.75 | 8.50 | — | — | 100.23 |
| V | — | 48.3 | — | 10.3 | 38.3 | 0.3 | 1.7 | — | — | — | 100.4 |
| VI | 48.61 | 2.45 | 12.33 | 3.22 | 9.64 | 0.17 | 10.12 | 10.37 | 2.92 | 0.18 | 100.47 |

V, also insol. silicates 1.5. VI, also $P_2O_5$ 0.36, $Cr_2O_3$ 0.10%.

B. C. A.

**Chemical formula of the zirconium pyroxenes and zirconium pectolite.** W. H. Zachariasen. *Norsk. Geol. Tids.* 11, 216–8(1930).—From a study of analytical data obtained from the Zr pyroxenes, låvenite, wöhlerite, and hiortdahlite and the Zr pectolite, rosenbuschite, it was found that the general formula $R_4Si_4X_{14}$ held for all 4 minerals where R represented all cations save Si, and X the anions. This proves that the names "Zr pyroxenes" and "Zr pectolite" have no chem. justification. H. H. Mosher.

**Sapphirin from Alpe Brasciadega, Val Codera, Italy.** H. P. Cornelius and E. Dittler. *Neues Jahrb. Mineral. Geol.*, Abt. A, Beilage Bd. 59, 27–64(1929).—The sapphirin, isolated by means of $H_2SO_4$ and HF, contained $SiO_2$ 15.19, $TiO_2$ 0.25, $Al_2O_3$ 61.69, FeO 4.31, MnO 0.12, CaO 0.49, MgO 16.23, $H_2O+$ 1.60, $H_2O-$ 0.19%, corresponding with the formula $Mg(Fe, Mn, Ca, H_2)_{10}Al_{24}Si_4O_{52}$.

B. C. A.

**Isomorphous series in the tourmaline group and the genetic relationships between tourmaline and the micas.** W. Kunitz. *Chem. Erde* 4, 208–51(1929).—Theoretical.

B. C. A.

**Tourmaline group.** F. Machatschki. *Chem. Erde* 4, 455–7(1930).—A criticism of the formula of tourmaline proposed by Kunitz (preceding abstract).

B. C. A.

**Thuringite from Schmiedefeld, Thuringia.** H. Jung and E. Köhler. *Chem. Erde* 5, 182–200(1930).—Olive-green material consisting of a compact aggregate of fine scales with d 3.187 gave on analysis $SiO_2$ 20.82, $TiO_2$ trace, $Al_2O_3$ 17.04, $Fe_2O_3$ 8.70, FeO 37.96, MgO 4.15, $H_2O+$ 10.31, $H_2O-$ 0.07, total 99.65%. The analysis agrees with the formula $14(Fe,Mg)O\,5(Al,Fe)_2O_3\,12H_2O\,7SiO_2$. Most of the water is expelled at about 420°, and the dehydration curve is very similar to that of kaolin. X-ray powder photographs of thuringite have been compared with those of quartz, magnetite and kaolin, some of the magnetite and kaolin lines correspond, but those of quartz are absent. Magnetite has a unit cube of edge 8.393 A. U. contg. 8 mols.

B. C. A.

**Studies on the zeolites. I. General review.** Max H. Hey. *Mineralog. Mag.* 22, 422–37(1930).—A review of the general characteristics of the zeolites and their relations to other groups of minerals and to certain artificial products, preparatory to a detailed examn. of the various species. A bibliography is given. A. M. Brant.

**Steatite from the Münchberg gneiss area.** F. Deubel. *Chem. Erde* 5, 87–95 (1930).—A new occurrence of steatite has been found near Schwarzenbach a. d. Saale on the southeast border of the Münchberg gneiss area in Bavaria. It is shown to be a replacement of quartzite, no doubt by hydrothermal action. Analysis of the material gave: $SiO_2$ 61.95, $Al_2O_3$ 0.87, FeO 0.57, MgO 32.16, loss on ignition 4.99, total 100.54%.

B. C. A.

**Dehydration and rehydration of kaolin.** P. Schachtschabel. *Chem. Erde* 4, 395–419(1930).—Kaolin after being heated at 400–800° is capable of taking up $H_2O$ again. This is effected very slowly at 110°, but under pressure at 175–205° all is restored after 100 hrs. The rehydrated kaolin differs from the original material by being partly sol. in HCl, in its dehydration curve, $n$ and x-ray pattern, but these differences become less marked after prolonged heating of the material in $H_2O$ at 200°.

B. C. A.

**Halloysite from Elbingerode [Harz].** O. H. Erdmannsdörffer. *Chem. Erde* 5, 90–8(1930).—Nodules of grayish green halloysite (analysis I) coated with white powdery material (analysis II) occur in limonite in the "Grosse Graben," which has been worked for Fe and Mn ores and pyrite. *Both are optically isotropic with* $n$ = 1.515–1.528

II gives the ratios $SiO_2$ $Al_2O_3$ $H_2O$ = 2.20 1 4.90. Between 105° and 400° very little water is lost and the material then behaves like kaolin. An x ray powder photograph shows a few faint lines coinciding with those of kaolin. The ignited material gives no x ray spectrum.

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | $H_2O$ (105°) | $H_2O$ (400°) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 38.27 | 29.53 | 5.31 | 0.10 | 0.02 | 0.23 | 1.60 | 0.64 | 14.19 | 12.70 | 100.59 |
| I | 38.27 | 29.53 | 5.31 | 0.10 | 0.02 | 0.23 | 1.60 | 0.64 | 14.19 | 12.70 | 100.59 |
| II | 39.00 | 30.07 | 2.08 | 0.01 | 0.04 | 0.40 | 1.31 | 1.24 | 12.70 | 15.15 | 101.09 |

Also traces of $P_2O_5$, $TiO_2$, $SO_3$, $CO_2$, MnO. B C A

Nontronite. W. Noll. *Chem. Erde* 5, 373–84(1930).—Wernschenk (*Z. Kryst. Min.*, 28, 135–64(1897)) regarded nontronite as analogous to kaolin; he gave the formula as $H_4Fe_2Si_4O_{13}$, but very few analyses agree with such a formula. Dehydration curves and x ray powder photographs also show no relation to kaolin. The water is "zeolitic." A new analysis of green greasy nontronite from Tachau, Bavaria, gave $SiO_2$ 43.02, $Al_2O_3$ 10.53, $Fe_2O_3$ 29.18, FeO 1.37, $H_2O$ 21.53, total 99.93%, corresponding with the ratios $R_2O_3$ $SiO_2$ $H_2O$ = 1 2.49 4.53. B C A

The chemical composition and crystallographic and optical properties of a Vesuvian lithionite. Guido Carobbi. *Atti III congresso naz. chim. pura applicata* 1930, 336–7.—A blue Vesuvian lithionite of the formula $(Ca, Na_2, K_2)$ $Si_4O_{10}$, m. p. 780°, was sepd. into Cu-poor and Cu-rich fractions by flotation in a heavy liquid. The former contained blue monoclinic crystals with d. 2.48–2.37, $a:b:c$ = 0.4506 : 1 : 0.3997, $\beta$ = 114.3°. The latter had d. 2.74, was optically —, and had the plane of the optic axes perpendicular to the plane of symmetry. The refrs. were 1.545 and 1.574. Chem. analyses of both fractions are given. J. B. Austin

Blomstrandite from Kabuland. Harald Bjørlykke. *Norsk Geol. Tids.* 11, 332–9(1930).—This deposit of possible industrial importance was found in gang chiefly composed of xenotime, orthite, feldspar, quartz and magnetite. Two cryst. forms were noted, the typical blomstrandite and a euxenite-like type. The mineral yielded upon analysis $Ta_2O_5$ 19.11, $TiO_2$ 31.84, $UO_3$ 3.78, $ThO_2$ 1.46, rare earth oxides 35.16, FeO 4.30, CaO 0.86, MgO 0.38, ignition loss 3.70%. By spectro-analyses Y, Th, Hf, Cp, Yb, Tu, Er, Ho, Dy, Tb, Gd, Sm and Nd were detected. H. H. Mosier

Chemical and spectrographic investigations on an apatite in Chinese strata of recent origin. Guido Carobbi. *Atti III congresso naz. chim. pura applicata* 1930, 338–40.—A specimen of apatite from Tsingtao was examd. It was a solid soln. of fluorapatite, chlorapatite, hydroxyapatite and oxyapatite. The crystals, which were badly formed, appeared to be uniaxial, —, with d. 3.23, $\epsilon$ = 1.625, $\omega$ = 1.630. Spectroscopic examn. showed no Ce but the presence of La, Sm, Eu, Er and Yt. A chem. analysis is given. J. B. Austin

Cupriferous melanterite from the Skouriotissa mine, Cyprus. Max H. Hey. *Mineralog. Mag.* 22, 413–8(1930).—A cluster of large greenish blue crystals of melanterite was found in an ancient carved stope in the ore body near Lefka, Nicosia district, Cyprus. The crystal habit is unusual, being tabular on b(010). Partial analysis gave CuO 2.15%. The crystallographic measurements are given. A. M. Brant

A suspected meteoric specimen from northern Arizona. L. F. Brady. *Am. J. Sci.* [5], 21, 179–80(1931).—The specimen analyzed: metallic Fe 37.44, Fe as $FeCl_2$ 0.880, Fe as FeO 0.257, S 0.073, Si 0.432, Mn 0.120, Cl as $FeCl_2$ 1.300, P 1.110, Ni 4.040, Co 0.447, C (graphite) 46.530, combined C 2.202, O as FeO 0.943 and insolubles (mainly FeO and $SiO_2$) 1.706%. The outer surface resembles weathered hematite. In section it appears to be an intergrowth of cryst. Ni-Fe in a ground mass of graphite. Etched surfaces show very fine Neumann Lines. Its sp. gr. is 3.7. A. H. E.

A new iron meteorite from Pojoaque, New Mexico. L. F. Brady. *Am. J. Sci.* [5], 21, 179–80(1931).—The specimen is of Ni-Fe. There are several spherical inclusions of chrysolite which seem to be surrounded by a layer of kamacite. Its sp. gr. is 6.2. Allen H. Emery

New observations on the tectites of Indochina. A. Lacroix. *Compt. rend.* 191, 803–9(1930); cf. C. A. 23, 2395–6.—The tectites in Indochina are widely disseminated. In order to consider the uniformity of their chemical compn., tables of results of analyses of tectites taken from widely sepd. places are given. These show very close agreement. Various theories of origin are discussed, and the only one considered not impossible is that of cosmic origin, as meteorites. Indications defending this hypothesis are cited and discussed. Alice W. Epperson

Synthetic sulfide replacement of ore minerals. James C. Ray. *Econ. Geol.* 25, 433–51(1930).—Geochem. expts. were carried on with the object of detg. the point at

which dispersion of bornite in chalcocite occurs as well as such replacement phenomena as might be induced under lab conditions Tabulated data are given, as are results of microscopic examn of the repolished surfaces of the treated ore fragments The expts show that mixed sulfides in the presence of $H_2O$ only can generate their own conditions to bring about changes in these sulfides without addn of materials to the local system in which the changes are taking place R advances the hypothesis of "deep-seated supergene alteration" for this type of massive deep seated bornite, and believes the principles here advanced have a general application to Cu deposits of hydrothermal origin although the discussion is based specifically on the Butte ores A W I

**The texture and origin of some banded or schistose sulfide ores.** W H Newhouse and G F Flaherty *Econ Geol* 25, 600-20(1930) —Conclusions Criteria of flowage and plastic deformation of an ore mass, based on apparent flow structures as seen in hand specimens, are usually unreliable An ore mass composed in whole or in part of galena, sphalerite and chalcopyrite, which has been strongly deformed, will show in its texture that flowage has taken place unless complete recrystn has occurred Extent of recrystn and size of crystals are a function of strain and compn in the crystal and of time and temp Unless complete recrystn of the entire ore mass takes place 2 generations of each mineral should be found Quartz is an introduced mineral in schist replacement deposits, showing no preferred direction of elongation or orientation Ores are particularly discussed occurring at Blue Hill Me, Milan, N H, *Mandy, Manitoba and Rammelsberg, Goslar, Germany* Alice W Ipperson

**Pseudo-eutectic textures.** G M Schwartz and Charles F Park, Jr. *Econ Geol* 25, 658-63(1930) —S and P discuss Lindgren's paper (C A 25, 265) and describe a specimen of ore contg covellite intergrowths, which furnishes addnl proof that graphic intergrowths may form by replacement It is considered that pseudo eutectic textures develop by replacement, even if supergene, and they may also develop by more or less contemporaneous crystn as in ilmenite and silicates, though ilmenite could not form a eutectic with several minerals in the same rock It is possible for the texture to develop in hard minerals, but it is relatively uncommon and has not been observed except in gabbro and titaniferous magnetites. A W I

**A colloidal origin of some of the Kennecott ore minerals.** S. G Lasky. *Econ Geol* 25, 737-57(1930) —*The sulfides that make up Kennecott ore bodies were transported* in highly dispersed condition and were flocculated on reaching such an ideal flocculating agent as limestone. Alumina along thin gouge seams also served to flocculate sulfides as well as to dam back the solns Chalcocite and S were always present The chalcocite, in addn to the covellite that it was able to dissolve from the surrounding material at high temp, contained in soln also a certain amt. of covellite formed by reaction with excess S, which at this stage was present in relatively small quantity With lowering of the temp, the covellite tended to unmix and did so in part until equil was reached. The equil. pt. lies apparently above 8% CuS A W I

**The incipient oxidation of galena.** Alfred L. Anderson. *Econ Geol* 25, 528-42 (1930) —Study of incipient states of alteration of galena indicates it to be more generally oxidized by air-water processes than by solns of ferric sulfate Much of the limonite represents a later addn from external sources. The first product obtained by oxidation of galena is always anglesite With admixt of pyrite and chalcopyrite, the reactions become more complex Because of formation of electrolytic cells between various sulfides in contact with the oxidizing solns, the attack on galena is greatly aided, while the oxidation of pyrite or chalcopyrite is retarded On this basis galena oxidizes earlier and with more ease than most other sulfides, except sphalerite Galena remains in the oxidized croppings only because the coating of insol alteration products prevents ready access by fresh oxidizing solns Covellite is a common but not abundant mineral formed by replacement of galena Four main types of structures may be recognized (1) regular borders, (2) botryoidal structures, (3) stranded borders and (4) *platy structures* each referring to the relation the covellite bears to the galena Alice W Ipperson

**Limonite types derived from bornite and tetrahedrite.** Roland Blanchard and P. F. Boswell. *Econ Geol.* 25, 557-80(1930).—Neither bornite nor tetrahedrite contains sufficient S to dissolve itself completely. Field evidence has not established definitely the proportions of pyrite needed to effect complete oxidation of bornite and tetrahedrite in nature Hydrolysis of $Fe_2(SO_4)_3$ during oxidation liberates acid and may reduce below the theoretical ratio the pyrite needed for complete oxidation of bornite and tetrahedrite. Field evidence shows that an overwhelming proportion of pyrite is needed to prevent formation of indigenous limonite after bornite, and such proportion is not usual. Five limonite types derived from oxidation of bornite have

been identified and described, a triangular boxwork being most distinctive Leached outcrops derived from bornite generally carry a "relief" limonite—a characteristic product, *orange colored, with soft texture on fresh surfaces* Two limonite types derived from oxidation of tetrahedrite have been identified and described That called contour boxwork is more distinctive Leached outcrops from tetrahedrite usually carry local incrustations of Sb oxides that assist in identification A W I

**A mother lode gold ore.** CARLTON D HULIN *Econ Geol* 25, 348–55(1930) —H describes specimens from the Kennedy Mine, one of the largest of the Au mines operating on the Mother Lode, in Amador County, Cal The relative degree of favorability of the several host minerals for Au as observed in these ores is chalcopyrite, pyrite, galena, apatite, carbonates, pyrite sphalerite, and quartz, the first 5 minerals are about equally favorable, and quartz is the least favorable A W E

**Geology of the Panamint silver district, California.** F MAC MURPHY. *Econ Geol* 25, 305–25(1930) —*The paper includes a history of mining in the district, its location and topography a description of the rocks and their structure, and a discussion of the ore deposits* The occurrence of numerous clean-cut Ag bearing quartz veins is described They outcrop in limestone, schist or slate, but those in limestone are more numerous and persistent The principal and almost exclusive vein filling is milk-white, sometimes glassy, quartz of coarsely cryst massive texture Ag is almost wholly contained chemically bound in tetrahedrite, the principal sulfide mineral Oxidation and supergene enrichment products are not abundant in the ores, but the following minerals have been identified malachite azurite anglesite cerusite, smithsonite, bindheimite cerargyrite, stromeyerite chalcocite and covellite The deposits are classified as those formed at intermediate depths and suggest a genetic relationship *with an intrusion of granite porphyry An unusual vein in the district carries, in order* of deposition, pyrite quartz, pyrrhotite, chalcopyrite, marcasite and siderite, the latter overlapping with marcasite and chalcopyrite ALICE W EPPERSON

**Observations on secondary copper and silver sulfides in the Broken Hill Lode** F L STILLWELL *Proc Australasian Inst Mining and Met No* 67, 187–210(1927), No 77, 71 9(1930) The primary ore (apart from gang) consists essentially of sphalerite and galena with minor amts of arsenopyrite accompanied by a Ni Co-Sb mineral, chalcopyrite pyrrhotite and cubanite, chalcostibite and tetrahedrite meneghinite, dyscrasite pyrargyrite and berthierite The oxidized zone consists of a manganiferous ironstone capping covering large masses of cerussite frequently rich in oxidized Ag and Cu minerals Zn salts from the primary sulfide ore have been largely removed *in soln* The abundance of cerussite *is* partly due to the abundance in the meteoric $H_2O$ of carbonates derived from the primary calcitic ore Only minor amts of anglesite resulted The surface waters contained small quantities of phosphate, derived from apatite which converted small quantities of the sulfate or carbonate into pyromorphite or Pb phosphate *At varying depths the sulfides appear The secondary sulfides* including Ag and Cu occur as coatings resembling soot on the primary The secondary sulfides have been partially oxidized as denudation has progressed A H E

**The Engels copper deposits, California** CLARENCE N FENNER *Econ Geol* 25, 420–5(1930) —The article by Knopf and Anderson (*C A* 25, 265) is discussed The authors statements in favor of gaseous transfer of mineral matter are approved, and their discussion is supplemented ALICE W EPPERSON

**The ores of the northern Rhodesia copper belt.** ALAN M BATEMAN *Econ Geol* 25, 365–415(1930) —This belt will constitute the greatest Cu mining center of the world Production and important mines are named The region is a peneplain 4000 ft high The rocks consist of an old pre mineral basement complex unconformably overlaid by ore-contg Roan series *probably of pre Cambrian age intruded by younger* granites and basic intrusives the granites being the probable source of the Cu The ore deposits consist of beds of the Roan series uniformly metallized with specks of CuS Ores are largely sulfide and oxidation extends hundreds of ft below the water level *Chalcocite is the most important sulfide, followed by bornite and chalcopyrite* Linnaeite *is not uncommon and pyrite is rare Eight types of chalcocite* intergrowths are described and discussed the conclusion being that the chalcocite is in part hypogene and in part supergene Sulfides have been introduced after consolidation and folding of the rocks and have clearly replaced the rock silicates Localization of the ore minerals in the sediments was probably due to the superior permeability of the ore beds This Cu belt constitutes a great metallogenetic province of Cu mineralization It is linked with the adjacent Katanga Cu region by *similar features of geology* and ores and the common occurrence of the rare mineral linnaeite A W. F

**The correlation of the ore-bearing sediments of the Katanga and Rhodesian copper**

belt. ANTON GRAY *Econ Geol* 25, 783-804(1930), *cf preceding abstract*.—The principal Cu deposits of the Katanga and Rhodesia occur in the lower series of the System of the Katanga, known locally by various names. In view of the fact that these rocks were first studied in the Katanga, where the ore-bearing beds were called the Série des Mines *this name has been applied by G.* to the rocks over the entire Cu belt. The sulfide ore bodies of Rhodesia are found near the base of the Série des Mines. They lie stratigraphically below the oxidized ores of the Katanga, which are found in the dolomites of the upper Roan group, and to a lesser extent in the M'Washia. No evidence of unconformity has been found between the Série des Mines and the Kundelungu series and it is considered that these beds should be grouped together under the name of the Katanga system, as proposed by Van Doorninck. A geologic map is included. ALICE W. EPPERSON.

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**The Sherritt-Gordon copper-zinc deposit, northern Manitoba.** E. L. BRUCE. *Econ. Geol.* 25, 868-70(1930). B. discusses the communication by J. F. Wright, (*C. A.* 25, 1186) *regarding B.'s paper* (*C. A.* 23, 4910). *B. explains some apparent disagreements in the 2 papers, gives some addnl. data and states that in the main his statements and those of Wright agree.* ALICE W. EPPERSON.

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**Lead-zinc and pyrites ores of the Deutsch-Bleischarley mine, Upper Silesia.** H. SCHNEIDERHÖHN. *Chem. Erde* 5, 385-95(1930).—These ores are known to contain As, they were examd. by the metallographic method for As minerals. In the Pb-Zn ore, shelly blende surrounds cores of galena and jordanite ($Pb_4As_2S_7$), but in the pyrites ore, consisting of a mixt. of pyrite, marcasite and shelly blende, no As mineral could be detected. Chem. tests showed that much As is present in the pure pyrite (no doubt in isomorphous mixt.) and only traces in the marcasite and blende. B. C. A.

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**Hydrothermal oxidation and leaching experiments; their bearing on the origin of Lake Superior hematite-limonite ores.** I. JOHN W. GRUNER. *Econ. Geol.* 25, 697-719(1930).—G. has previously suggested that hematite ores of the Soudan formation of the Vermillion range had been leached of $SiO_2$ and oxidized by hot ascending waters from a large basic magma, and new expts. support the hydrothermal hypothesis and its extension to other districts of the Lake Superior region. Leaching of $SiO_2$ *from the Fe formation is discussed, and expts. on soln. of* $SiO_2$ in hot $H_2O$ and on oxi-

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dation of minerals contg $Fe^{++}$ are described. The $SiO_2$ was found to be very sol., and tables are given showing the solubilities of different minerals, $SiO_2$ from gabbro being found less sol. than quartz. It was found that the oxidation of ferrous minerals by water at high temp. begins at or below 200°. The expts. and methods used are described in detail. II. *Ibid* 837–67.—Expts. show that $SiO_2$ from $SiO_2$ gel, chalcedony, and greenalite taconite is sol. to an extraordinary extent in water at temps. from 200 to 300°. The soly., except of $SiO_2$ from gabbro is many times as great at 200° as at room temp. Oxidation of $Fe^{++}$ in minerals takes place in hot $H_2O$ or steam in the absence of air at temps. as low as 160° provided the H given off in the decompn. can escape. Siderite is oxidized to magnetite, and magnetite to hematite. Expts. support the hypothesis that Lake Superior hematite limonite ores were oxidized and leached hydrothermally. These ores have similar counterparts in the leached ores of South Africa. Arguments supporting the weathering hypothesis and Gruner's hypothesis are discussed and the latter is upheld. ALICE W. EPPERSON

The iron deposits of the Sierra de Imataca, Venezuela. ERNEST P. BURCHARD *Econ. Geol.* 25, 549–50(1930).—A paper by Zuloaga on Pao Fe ore deposits is discussed in connection with one by B. (*A. I. M. M. E. Tech. Pub.* 295, Jan., 1930). Similarities and dissimilarities in the ores of the 2 regions are pointed out. A. W. E.

Graphic intergrowth of niccolite and chalcopyrite, Worthington Mine, Sudbury. CARL LAUSEN. *Econ. Geol.* 25, 376–84(1930).—The general geology of the region and the ore deposits are described, and the origin of the graphic texture and sequence in the deposition of the ores is discussed. The mineralization is described as taking place in 3 stages: the 1st was a high temp. hydrothermal stage, producing magnetite, pyrrhotite, pentlandite, chalcopyrite, the 2nd and 3rd were moderate temp. hydrothermal stages, producing resp. gersdorffite, maucherite, niccolite-chalcopyrite intergrowths and pyrite, sphalerite and galena. ALICE W. EPPERSON

A qualitative and quantitative determination of the ores of Cobalt, Ont. L. ELLIS THOMSON. *Econ. Geol.* 25, 470–505(1930).—Methods of analysis are given, and development of new etching reagents is described. Geology of the region is discussed, and detailed descriptions are given of specimens from Mining Corporation, Nipissing and O'Brien Mines. The old mineralogical title of smaltite-chloanthite for the hard white mineral associates of the native Ag and niccolite of this region is no longer applicable, these 2 minerals being exceeded in rarity only by the Ni mineral gersdorffite. Cobaltite is much the commonest of these minerals. Common structures are noted for the 9 minerals, listed in order of prevalence as follows: cobaltite, arsenopyrite, safflorite, skutterudite, rammelsbergite, loellingite, smaltite, chloanthite, gersdorffite. II. *Ibid* 627–52.—Eight new microchem. reagents have been developed for differentiation of the 9 hard white As minerals which are common in this district. Crystal habits, modes of occurrence, interrelationships and assocns. with Ag of each of these minerals are discussed. Relative abundance of the common minerals is given, smaltite and chloanthite are placed among the rarer minerals of the group with cobaltite at the top of the list. Relation between quant. proportions of the other common minerals of this district and their proximity to the diabase sill, worked out and compared to a similar relation for native Ag. It appears that larger quantities of associd. arsenopyrite, cobaltite, loellingite, rammelsbergite or skutterudite have been favorable to the deposition of native Ag, while niccolite, tetrahedrite and safflorite in larger quantities are inimical to it. The occurrence of rarer minerals is recorded as observed by other investigators. Details of ore genesis, as outlined by previous observers, are amplified to include the occurrence of such minerals as safflorite and maucherite, which are new for the district, and to fit the commoner occurrence of other minerals which were heretofore considered rare. ALICE W. EPPERSON

A qualitative and quantitative determination of the ores of Cobalt, Ont. M. N. SHORT. *Econ. Geol.* 25, 704–17(1930); cf. preceding abstract.—The work of Thomson is discussed at length, and S. makes suggestions giving his own methods of detn. of the hard arsenides. ALICE W. EPPERSON

Origin of chromite deposits. F. E. KEEP. *Econ. Geol.* 25, 425–8(1930); cf. *C. A.* 25, 899.—The paper of Fiebelkorn (*C. A.* 24, 1219) is discussed. K. agrees with F. as to the possible cause of the chromite in the Great Dyke, but disagrees with the statement that the Great Dyke is younger than the rocks of the Bushveld Complex and gives evidence that the 2 intrusions were more or less contemporaneous. A. W. E.

The chrome deposits of Umvukwes district. F. E. KEEP. *S. African Mining and Eng. J.* 41, Pt. II, 105–6(1930).—The chrome ore occurs in seams in serpentinized enstatite-olivine rock and in websterite. The ore was formed by magmatic segregation.

The seams are expected to extend to some depth without change The uses of chrome ore are discussed ALDEN H EMERY

**Supergene cassiterite in tin veins.** FRIEDRICH AHLFELD *Econ Geol* 25, 540–8 (1930).—The paper by Singewald (*C A* 25, 899) is discussed Results of investigations in Bolivia are given Meteoric waters are not capable of dissolving cassiterite since they (in Bolivia) are always acid Alk surface waters are not present in Bolivia ALICE W EPPERSON

**Supergene cassiterite in tin veins.** J B SCRIVENOR. *Econ Geol* 25, 663–4 (1930), cf preceding abstract.—The citation of bony tissue replaced by cassiterite is thought to refer to certain Cornish stags horns which were said to be impregnated with $SnO_2$, but which were found by the writer to contain no Sn, but to have grains of quartz in cavities of the bone, evidently washed in by water No evidence was found by the writer in Cornwall, or in Malaya, of soln of cassiterite by ground water ALICE W EPPERSON

**Origin of the strontium in the strata of the lower Muschelkalk and Röt formations near Jena.** K DINGER *Chem Erde* 4, 167–77(1929).—The celestite occurring in certain strata of the lower Muschelkalk and Röt formations is not primary, but is due to secondary enrichment The Sr has been transported in soln., probably as $Sr(HCO_3)_2$ and pptd as sulfate by interaction with gypsum since the deposits of celestite occur only where this mineral is or has been, present Spectroscopic and chem examn of the various strata of the above 2 formations showed the presence of traces of Sr in practically all cases, derived initially from sea water through the agency of certain radiolaria which abstract it to form their shells B C A

**Search for phosphate deposits in U. S. S. R.** A D ARKHANGELSKII. *Compt rend acad sci U S S R* 1930A, 97–101.—Possible sources of phosphates in Russia have not been so far thoroughly investigated A thorough study is recommended, especially in Crimea, Caucasus and Turkestan, not only of known types of deposits, but also of general distribution of phosphates in sedimentary rocks Most of the deposits known at present are of low P content and are scattered among other minerals over a large area in thin layers Formation of phosphates from limestones by means of reaction with $NH_4$ phosphate originating from deposits of guano is outlined, and possibility of this phenomenon in Russia given consideration ROBERT SCHLESS

**Asbestos milling in Rhodesia.** F. E. KEEP. *S African Mining and Eng J* 41, Pt II, 89–90(1930), cf *C A* 24, 3198.—Serpentinization and the formation of chrysotile asbestos in the Great Dyke of Rhodesia are probably due to surface waters The zones are localized in zones of weakness Of the rock passing the grizzly at the mill head, 8–12% passes to the cleaning mill as fiber and grit ALDEN H EMERY

**Genesis of the emery deposits near Peekskill, New York.** JOSEPH L. GILLSON AND JOSEPH E. A KANIA *Econ Geol* 25, 506–27(1930).—These deposits, still mined on a small scale, are located 35 mi N. of N Y. City on the east bank of the Hudson, along and on both sides of the contact of the Manhattan schist and Cortlandt intrusives G and K. present data disproving the assimilation theory of the deposits and proving that they are contact metamorphic in origin and were formed by gaseous or liquid emanations from the magma reservoir which passed upward through the already solid border of the igneous mass and into the schist A detailed mineralogical and petrographical description of the rocks and ores is given ALICE W EPPERSON

**The origin of the talc and soapstone deposits of Virginia.** J D BURFOOT, JR *Econ Geol* 25, 805–26(1930).—The geographic distribution of these deposits is discussed, and their characteristics described The presence or absence of talc, soapstone or steatite in this region is thought to depend, in part at least, on the occurrence of the correct segregation product—pyroxenites, peridotites or dunites, on the presence of feeding channels leading to these rocks, and on the invasion of the correct type of solns., that is, solns of the correct chem character with the requisite temp and pressure The condition of differential stress is not necessary for the formation of talc The mineral association and paragenesis seem to indicate that talc is formed under deep or intermediate vein zone conditions ALICE W EPPERSON

**Origin of the white clays of Tuscaloosa age (Upper Cretaceous) in Alabama, Georgia and South Carolina.** GEORGE I. ADAMS *Econ Geol* 25, 621–6(1930).—A believes that the white clays in the district were not the result of marine deposition, as held by Newmann Deposition of clayey material in small shallow fresh-water lakes is more commensurate with the extent of the white clay bodies, but does not explain the massive character of the beds It is suggested that the massive character and purity of the clay are the result of the local alteration of deposits of impure clays No attempt is made to explain the chem processes which are involved A satisfac-

tory explanation must be applicable to all the white clays in the region which are similar in character, whether their sources were the crystallines and metamorphics, or the sedimentary areas, and whether they occur in the Tuscaloosa or other formations
ALICE W EPPERSON

**Clays of the Jackson Purchase region, Kentucky.** JOSEPH K. ROBERTS *Econ. Geol* 25, 832–6(1930).—The geological formations of this region range from the limestone and chert of Mississippian to the Recent surficial deposits Detailed descriptions are given of a number of the clays. Tables of chem analyses are included
ALICE W. EPPERSON

**Geology of Tshasoff-Jar fireclay deposits.** P A ZEMYATCHENSKII. *Trans Ceramic Research Inst* (Moscow) 1929, No 20, 7–29(in German 182–3).—The fireclay occurs in beds in Tertiary Pollawa sands. Intact, horizontal layers are found, frequently curved or folded, sometimes compressed or even torn off the main mass Perpendicular sections are not uniform in sand content, color and $Fe(OH)_3$ inclusions There is also included löwigite and alunite, usually in white and yellow nodules from the size of a pea to 20–30 cm. The clay bed is 4.5–6 m thick, sandy at the top The area worked is about 1200 hectares, by several concerns and at 24 places Without careful sorting, the quality of the clay suffers from the presence of löwigite, which on burning gives $SO_2$ and $SO_3$, causing swelling and blistering $Na_2SO_4$ remaining from the löwigite is a good flux, and if coned at certain points can cause holes to form in the ceramic object. It is proposed to levigate the clay to make it uniform and to purify it. Based on surveys, about 15 million tons of clay are available F M SYMMES

**Composition of clay from the Tshasoff-Jar deposits.** V ISKYUL. *Trans Ceramic Research Inst* (Moscow) 1929, No. 20, 30–87 (in German 184–7). cf preceding abstr.—Examn. by microscope and detn. of its showed the clay to be mainly kaolinite in the form of shredded flakes, muscovite in colorless scales and slightly rounded quartz grains Tourmaline and limonite were present, the former in free, prismatic particles or embedded in quartz grains, the latter as compact clusters or granules distributed throughout the clay Rutile grains were found in only the finest clay fractions, zircon in long grains or whole crystals usually in the coarse fraction Strongly weathered feldspar, löwigite and alunite were found in rounded grains, and biotite in brown plates The clay was sepd. by the Sabanin and Robinson method into fractions > 0.05 mm., 0.05–0.01 mm. and < 0.01 mm Chem analyses showed high alkali content. About 1–2% $TiO_2$ was always found, but not much $Fe_2O_3$, CaO and MgO $SO_3$ was present, derived from löwigite and alunite. The org content corresponded to humus The crude clay reacts very little with $Na_2CO_3$ soln. or with 2 and 10% HCl, but ignited clay reacts easily, $Fe_2O_3$, CaO, MgO and alkali being extd The clay is a kaolinite mica-quartz rock.
E M SYMMES

**Mineralogical composition of Doubrovka kaolin and its fractions by rational analysis.** T KRASENSKAYA. *Trans Ceramic Research Inst* (Moscow) 1929, No 21, 3–25 (in German 26–7).—The change of mineral compn of kaolin on alteration from coarse to fine fractions was detd. and mineral impurities were identified. The kaolin was decompd. by 10% HCl after dehydration at 600° followed by a 2-hr extn. by 5% $Na_2CO_3$ soln. Microscopic examn of kaolin showed the presence of kaolinite, quartz, mica and feldspar Ease of decompn. of mica and feldspar is not given in the literature Their proportions were estd by microscope count. Mica was 95% decompd by the HCl and $Na_2CO_3$, and feldspar about 23% Tables show the mineralogical compn. of unground kaolin and its coarser fractions In the finer fractions kaolinite rises, but mica, feldspar and quartz diminish
E M SYMMES

**Bohemian clay** G LINCK AND E KÖHLER *Chem Erde* 4, 459–60(1930).—A clay from the Tertiary lignite beds was analyzed in bulk and also the portion sol in HCl after ignition at 600° the dehydration curve is plotted. It contains kaolin 47.58 with amorphous material 18.94%, quartz 40% and some mica, pyrite and org matter
B C A.

**A new locality of gaylussite in eastern Mongolia with associated natural soda.** K. NIISOMY *Econ Geol* 25, 758–63(1930).—The topography of the region is described, and the occurrence of Na minerals and of gaylussite is given, with typical analyses. The origin of these minerals is discussed, but no definite theory is formulated.
ALICE W LEPPERSON

**Geological aspects of the formation of coal.** CYRIL S FOX. *Proc. 16th Indian Science Congress, Geology Sect., October 25, 1929; Fuel in Science & Practice* 9, 548–50(1930).—Stratigraphical and petrological data obtained from field investigations and lab studies of Indian coals are presented in a detailed discussion of their occurrence, quality, origin, constitution and formation. From these data and the results of nu

merous other researches—39 references are included—I draws 16 conclusions concerning the formation of coal The main processes in the conversion of peat into primary coal are considered to be of a chem character and involve all the plant components Coalification proceeded under water, under anaerobic conditions, sometimes before deposition of overlying sediments Primary coal became heated because of pressure and was thus changed into bituminous or anthracite coal depending upon the degree of carbonization In some cases where carbonization proceeded far enough locally, as a result of catalytic action in capillary spaces fusain was formed D A R

**Coal as a recorder of incipient rock metamorphism.** MARIUS R CAMPBELL. *Econ Geol* 25, 675–96(1930).—Evidence is given to indicate that 5 stages in the metamorphism of coal can be recognized and explained by the processes that have been active in the earth coincident with the development of plant life on the land, and that at least 6 of these stages have left few if any marks on the compn or phys appearance of the sediments assocd with the coal They may, therefore, be classed as incipient stages of rock metamorphism ALICE W EPPERSON

**Studies in the development of Dakota lignite. V. Extraction and study of the benzene-soluble portion of Dakota lignite.** I L HARRIS, C F BELCHER AND A W GAUGER *Ind Eng Chem* 23, 199–201(1931).—Lignite from the Velva deposit in N D was extd by the Fischer (*C A* 11, 1739) and Bone (*C A* 23, 951) methods and a study made of the $C_6H_6$-sol portion Up to 4.3% of the dry, ashless coal substance was extd by the Bone method That portion of the ext obtained up to 17 atm has a compn closely analogous to *Montan wax* from German brown coal A H E

**Some chemical aspects of the origin of petroleum.** S C LIND *Science* 73, 19–22(1931).—The chem complexity of petroleum is little less miraculous than its abundance This discussion is directed toward the origin of the complexity rather than the initial source of natural hydrocarbons Processes, either thermal or ionic, are now known by which progression both up and down the hydrocarbon series is effected This leads directly to the complexity found in natural petroleums, and also found in synthesized ones Consequently, the starting material, whether of vegetable, animal or mineral source, does not need to be a complex mixt, but may be a single chem species, from which a high degree of complexity is obtained by steps which appear simple when chem and thermodynamic properties of hydrocarbons are considered The simplicity of such a mechanism may lend indirect support to the old idea of inorg origin from one or a few hydrocarbon gases such as might be produced by action of water on metallic carbides in the earth's interior On the other hand, it does not preclude animal or vegetable origin, but strongly suggests that the primary material, whether gaseous, liquid or solid, is later subjected to thermal (or ionic) agents or both, which produce the complexity found in nature ALICE W EPPERSON

**Study of the black shale overlying the cap rock of the Cromwell sand in relation to the origin of the Cromwell oil dome, Oklahoma.** OLIVER R. GRAWE *Econ Geol* 25, 326–47(1930).—An investigation of 54 samples of this shale has shown that its lithologic properties and its compn are as const as can be expected of any rock No variations occur which can be correlated with local metamorphism produced by structure forming forces Slight differences in color are independent of the structure and seem to accompany changes in compn (especially in carbonate content) which may be best explained on the basis of sedimentation Although shales from different stratigraphic horizons show increase in sp gr with depth, sp gr of the shale from a single horizon is constant, regardless of structure Gardner's suggestion that a careful study of properties and compn of the shale in the low domelike structures of the Mid Continent field may prove the presence of slight localized metamorphism has not been substantiated, and it is unlikely that local forces of the type postulated by Gardner could have produced the Cromwell dome. ALICE W. EPPERSON

**Limestone oil reservoirs of the northeastern United States, and of Ontario, Canada.** A N MURRAY. *Econ Geol* 25, 452–69(1930).—On theoretical grounds the most effective, if not the only, way in which sufficient porosity can be developed in limestone to provide a reservoir of commercial importance, is as a result of soln above a water table The porous limestone reservoirs in the northeastern U S. and Ont all have been shown to have been subjected to erosion before the time of deposition of the formation now overlying them, with the possible exception of the limestones of Traverse age in Mich It is therefore suggested that erosion caused the development of porosity in the case of all these limestone reservoirs. ALICE W EPPERSON

**Some properties of limestone as a reservoir rock.** W. V. HOWARD AND W. W. LOVE *Econ Geol* 25, 720–36(1930).—The expts described indicate that oil will migrate through limestone, but that most of the oil is absorbed by the rock, particularly

the lighter fractions of oil In a thick reservoir heavy residues may collect in tighter zones within the reservoir with the result that porous limestone is divided into "pays" separated by an asphaltic limestone, as well as by other impervious beds Such division into zones makes difficult the application of exptl results to field conditions It appears that normal production methods will remove from the area tributary to any well all oil which that well can be expected to produce, regardless of rate of production The low sp gr typical of oils from limestone reservoirs appears to be the result of absorption of lighter fractions by the rock ALICE W. EPPERSON

**Chemical and petrological investigation of bituminous rocks of various ages from northern Germany.** F. HIEBENTHAL. *Chem Erde* 4, 343–68(1929) —Bituminous material from 4 different formations (Alluvial, Diluvial, Tertiary and Cretaceous) has been examd chemically and petrologically The bitumens from these marine sediments show increasing C content with age, but unlike those of terrestrial origin there is no corresponding decrease in the H content Elementary S was found in the specimen from the Alluvium and a stable "metabitumen" was detected in the Tertiary rock B C A

**A tholeiitic phase of the quartz-dolerite magma of central Scotland.** FREDERICK WALKER *Mineralog Mag* 22, 368–76(1930) —The rocks near Dalmeny and Kinkell are described, with chem analyses, and shown to contain chlorophaeite The analyses and ns indicate that the residual glass is of acid compn in both cases A M BRANT

**Granitic rocks of Tsukuba district and their associated injection-rocks.** KEN ICHI SUGI *Japan J Geol* 8, Nos. 1/2, 29–112(1930) —Around the granite rocks of the district hornfelses and injection rocks are extensively developed Biotite granites (granodioritic) constitute the main body of the igneous rocks, being assocd with aplitic granites, aplites and pegmatites which occur as small sheets and are especially abundant near the contact borders of the granites These granitic rocks may have intruded during the Mesozoic era The metamorphic rocks are believed to have been derived from the sedimentary complex of the Chichibu series, the metamorphism being due to the igneous intrusions Of the hornfelses which occupy the eastern part of this area the predominant types are those derived from argillaceous sediments andalusite- or cordierite hornfels, which show gradual transitions to the injection rocks of the western area The latter, derived largely from argillaceous sediments, are grouped in 4 main types, *viz* sillimanite biotite- biotite- with shimmer aggregates cordierite biotite and biotite fels There are also metamorphic rocks derived from Ca Mg bearing sediments, which are almost free from igneous injection but not from its effects A few chem analyses are given. W L HILL

**Geological and petrographical examination of the granites quarried in Silesia.** W BECKER AND F MACHT *Chem Erde* 5, 412–36(1930) —Details are given of the stone from several quarries in the neighborhood of Strehlen, including the jointing of the rock the size of grain of each constituent mineral and the relative proportions of each mineral These are points of importance in the quarrying of the stone and in its suitability for various purposes B C A

**Phonolites and trachytes of the Laacher See district.** W AHRENS *Chem Erde* 5, 1 21(1930) —Trachytoid phonolitic tuffs at Burgbrohl, belonging to the Alluvial period, are of later age than the main mass of trachytes of the Laacher See district The contained blocks of trachytoid phonolite lava are described petrographically with chem analyses The analyses are compared with published analyses of the trachytes and plotted on diagrams showing that at this later period the magma became more acid B C A

**Mineralogy and petrography of the Rhön Mountains.** F HEIDE *Chem Erde* 5, 396–411(1930) —Petrographical descriptions are given of phonolite rocks, with one chem analysis B C A

**Basalt from the Atlantic Ocean** C. W CORRENS *Chem Erde* 5, 76–86(1930) — A description with chem analysis is given of a fragment (62 7 g ) of basalt raised from the floor of the Atlantic at a depth of 2000 m in lat 1°56′ S, long 12°40 7′ W It has a glassy crust which has been acted on by sea water B C A

**Basalt of the Stöffel, Westerwald [Nassau].** E LEHMANN *Chem Erde* 5, 319–72 (1930) —From this hill of Miocene basalt 600 000 tons of stone are quarried annually The basalt is penetrated by dikes of essexite-porphyry, which is a product of differentiation of the basaltic magma Detailed petrographical descriptions with chem analyses are given of these rocks B C A

**Dolomitization of Middle Devonian [limestone] in the Eifel.** P. MÜLLERS. *Chem Erde* 4, 431–54(1930) —Many analyses are given of the dolomite rock in the Gerolstein

basin They show in the majority of cases 80 90% of dolomite ($CaCO_3 MgCO_3$), but in a few streaks only 1 2% The rock is a coral reef formation the dolomitization took place contemporaneously by the action of the sea water The undolomitized streaks represent lagoon deposits B C A

**Rocks of Gomera, Canary Islands** W Meigen *Chem Erde* 4, 369–91(1930) — The Tertiary or post Tertiary volcanic rocks of the island of Gomera are underlaid by a series of extensively weathered rocks which were believed by Gagel (C A 20, 3114) to represent a much older "Grundgebirge" A detailed examn with several analyses of these rocks shows that they are only the weathered equivs of the ordinary types of volcanic rocks which include basalts trachytes and trachytic phonolites Analyses are also given of the portion of the weathered rocks sol in HCl B C A

**Red marls of the Trias formation.** H F Krauss *Chem Erde* 4, 188 207 (1929) A no of marls from the red Trias formation have been subjected to chem and rational analysis, and their mineral compn has been calcd After subtraction of clastic minerals (quartz feldspar and carbonates) and recalen of the results to 100% it is found that the ratio of $Al_2O_3$ $SiO_2$ $H_2O$ in the residual material is practically the same as that in specimens of "terra rossa" It is therefore concluded that both these substances represent similar products of weathering B C A

**"Terra rossa" as residue from solution of marine limestones.** Wilh Graf zu Leiningen *Chem Erde* 4, 178 87(1929) A series of comparative analyses of "terra rossa" from a no of localities and of material left after the soln of various limestones is adduced as addnl evidence in support of L's view that the first named substance is to be regarded as a soln residue of certain marine limestones B C A

**"Terra rossa" as solution residue of marine limestones** J. Blanck. *Chem Erde* 5, 43-7(1930) The analyses by Leiningen (preceding abstr) support the view first expressed by B in 1915 B C A

**Natural weathering and a comparison of chemical and natural weathering of building stones.** E Kaiser. *Chem Erde* 4, 290 342(1929) In a study of the effects of natural weathering in a region, the properties of the underlying strata are important, since the nature of these often greatly influences the effects due to climatic weathering, certain oases furnish instances of this kind The weathering of building stones caused by various gases present in the atm is fully discussed, and the analogy with natural weathering is traced Analysis of a block of sandstone taken from Regensburg Cathedral showed that of the salts formed by weathering, $CaSO_4$ tended to be concd in the outermost layers, while $MgSO_4$ and Mg chlorides had penetrated deeply into the stone. The presence of alumina and silica in the sol salts due to weathering was also noted, but it is uncertain in what form they occur Chem weathering is intensified by light, and building stones exposed to full light are more rapidly corroded than those in a more shaded position B C A

**Bleaching processes [in rocks].** H Harrassowitz *Chem. Erde* 5, 146–64 (1930) —Many different geological processes may give rise to much the same result Exogene bleaching and endogene bleaching are distinguished, the former is due to ordinary weathering at the surface, and the latter to fumarole and hydrothermal actions By the removal of certain constituents the rocks may be altered to kaolin, bauxite, alunite, etc, or even to a pure quartz sand B C A

**Weathering of shell limestone and soil formation near Jena.** W Hoffe. *Chem Erde* 5, 165 81(1930) —Several chem analyses are given of limestones from different strata in the "Muschelkalk," of the weathered rocks and of the overlying soils These show a gradual removal of lime and an accumulation of the residual constituents of the limestone B C A

**The abundance of elements of the vanadium group in eruptive rocks.** G v Hevesy, E Alexander and K Würstlin *Z anorg allgem Chem* 194, 316–22 (1930) —Two hundred and eighty-two samples of eruptive rocks were examined for V, Cb, Ta and protoactinium content The mean Cb and Ta content was $3.2 \times 10^{-4}$ or $2.4 \times 10^{-4}$ g per gram of rock The relation of at abundance of Cb and Ta is 2.6 The V content was $2 \times 10^{-4}$ and the protoactinium content (calcd from the Ra content of $1.2 \times 10^{-12}$) $7 \times 10^{-12}$ per gram A comparison was made of the abundance of these elements of the V-group in the eruptive rocks and in meteorites M M

**The significance of silicate synthesis for geochemistry.** Wilhelm Eitel. *Naturwissenschaften* 18, 1019-26(1930) —A review of recent work in silicate chem B J C van der Hoeven

**The age of the earth.** Otto Hahn *Naturwissenschaften* 18, 1013–9(1930).—A review. B J C. van der Hoeven

A study of the pedogenic processes in an area of lower paleozoic shales (JONES) 15. Geochemical distribution laws and cosmic frequencies of the elements (GOLDSCHMIDT) 2.

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## 9—METALLURGY AND METALLOGRAPHY

D J DEMOREST, R W GILLETT AND RICHARD RIMBACH

Metallurgy and the power industry. J B ROMER. *Metals and Alloys* 1, 868–70 (1930) —A review A J MONACK

Metallurgy in South Africa. S W. SMITH. *Mining Mag* 43, 265–9, 336–41 (1930), 44, 24–31(1931) —A survey of operations at various works, especially those for Au Pb, Cu and Fe, with discussion of papers presented at the Empire Congress. A BUTTS

Lead. G W THOMPSON *Am Metal Market* 38, No 35, 3, 5, 10 (Feb 20, 1931) —The great increase in consumption of Pb has been in the elec industry where it is chiefly used for cable coverings The problem in the future of the Pb and Cu industries will depend largely upon the demand created by the elec. industry *Properties of Pb* and its alloys with Sb or Sn or both are discussed W H BOYNTON

The Roan Antelope copper mine A. G McGREGOR. *Mining Mag* 43, 270–6 (1930) —A description of the mine, mill and smelter with several flow sheets and diagrams. Initial production will be 50,000 tons of Cu yearly. A BUTTS

Milling practice at Fresnillo R. E BYLER. *Mining Mag* 42, 137–47(1930) —A description of practice in cyaniding an oxidized Ag ore and differential flotation of Pb-Ag Zn sulfide ore The cyanide is regenerated by treating the soln with $SO_2$ and absorbing the liberated HCN in alk soln A BUTTS

Amulet flotation mill practice W G HUEBLER. *Can Mining Met Bull* No 226, 295–306(1931) —Operations at the new 300-ton mill treating Cu Zn Fe ore by selective flotation are described, and the use of various reagents is discussed. A BUTTS

The new smelter and concentrator of the International Nickel Company at Copper Cliff, Ontario L M SHERIDAN *Eng J* (Can) 13, 682–7 1930) —After coarse crushing by hand at the mines, the ore is shipped to Copper Cliff where it is crushed to 200-mesh and sent through a wet concn. to remove the rock In the concn. process the sulfides are floated, and the lighter rock material sinks to the bottom By selective flotation a rough sepn. is made of the Cu and Ni Smelting comprises roasting in multiple-hearth roasters, in reverberatory furnaces and blowing in basic-lined Bessemer converters The product is an 80% Cu Ni mat The layout of the smelter and concentrator is shown in a diagram. W H BOYNTON

The Hollinger assay office W R DODGE *Can Mining Met Bull No 225*, 115–22(1931) —The equipment and work of the lab of the Hollinger Consolidated Gold Mines are described A BUTTS

Review of iron and steel literature for 1930 E H McCLELLAND *Blast Furnace Steel Plant* 19, 258–61(1931) E H.

Recent developments and researches in cast iron. J W DONALDSON *Roy. Tech Coll Met Club J* (Glasgow, 1929-30, No 7, 38–40 E H.

Evaluation and testing of the properties of raw materials and key-products in the iron industry A WAGNER. *Stahl u Eisen* 50, 655–68(1930) —The present state of our knowledge of the properties of coal, coke and Fe ore used in the production of Fe and steel and of the pig Fe produced from various types of ore is reviewed, and modern methods of detg the value of these materials for their particular purposes are briefly discussed Lab tests of the coking power of coal and chem. analyses of Fe ore do not give sufficient information as to the value of the coke and ore for metallurgical purposes, as no account is taken of their phys condition, which is of considerable importance in detg their behavior in smelting Similarly, chem analysis of pig Fe affords little information as to its value for subsequent operations, but, in combination with an examn. of its micro- and macro-structure and a detn. of its mech properties after remelting under standard conditions, the analysis gives a fairly accurate idea of the com value of the metal. B C. A

**Calorific value, heat and gas flow, the physical bases of metallurgical processes.** H Bansen *Stahl u Eisen* 50, 668-78(1930) Diagrams have been constructed to show the heat balance in various stages of Fe smelting the blast furnace, gas producer, acid and basic open hearth furnaces converter and sponge Fe producer and the effect of preheating the gas and air is illustrated A knowledge of the calorific value of the fuel and the rate of flow and heat content of the various gases is shown to be of paramount importance in the correct and efficient operation of the various processes The resistance of the column of charge in the blast furnace to the flow of gas through the furnace dets to a large extent the output of the furnace, and any factor which increases this resistance reduces the efficiency of the furnace One of these factors is the deposition of C from the flue gases in the upper part of the blast furnace shaft an app is described and illustrated for the detn of the magnitude of this deposition from blast-furnace gas B C A

**The carbon-oxygen equilibrium in liquid iron.** H C Vacher and E H Hamilton *Am Inst Mining Met Eng., Tech Pub* No 409, 13 pp (1931) The product of the C and O conens in liquid Fe at 1620° was found to be 0.0025 at 1 atm pressure The same const was obtained over a range of 0.01-0.04% C and 0.003-0.19% O Expressed as the product of FeO and C it becomes 0.011 H C Parish

**Improving castings with the double forehearth.** Carl Rein *Giesserei Ztg* 27, 8-11(1930) —Cast Fe melted in a cupola can be improved by a complete deslagging This is accomplished by allowing the melt to stand a while so that the slag particles may rise to the top Where various mixts are melted in the same furnace the double forehearth has the advantage of keeping the individual melts sep It is heated to a white heat with an oil burner before tapping, so as to not cool the charge C L W

**Development of the modern blast furnace.** Geo E Rose *Blast Furnace & Steel Plant* 19, 255-7(1931) E H

**The cupola furnace and its main dimensions.** Leopold Schmid *Giesserei-Ztg* 26, 567-77(1929) —A discussion of the construction and operation of the Fe-foundry cupola, with and without forehearth Curtis L Wilson

**The combustibility of coke in cupola practice.** J Gwosdz *Giesserei-Ztg* 26, 578-82(1929) —A dense, hard, difficultly combustible coke is the most suitable for cupolas, as it does not reduce $CO_2$ back to CO so readily Curtis L Wilson

**The selection of coke for foundry purposes.** Otto Hurrert *Giesserei-Ztg* 27, 35-7(1930) —Low $H_2O$, ash, and S content and high strength are desirable For cupola coke, low activity (velocity of reducing $CO_2$ to CO) is debatable. This activity is attributed to the unsatd amorphous C atoms When activity is desired, the graphitization caused by coking at too high a temp is to be avoided *Cf C A* 24, 221 Curtis L Wilson

**Wrought iron, some pros and cons, and the need for research.** H W. Gillett *Metals & Alloys* 2, 25-30(1931) —A correlated abstract. A J Monack

**Producing hydraulic cylinder castings.** E Longden *Iron and Steel Ind. and Brit Foundryman* 4, 115-8(1931). C H Lorig

**Character of change of hardness of iron ruptured by tension.** M Mikhailov and I. Churbanov *Acta Univ Asiae Mediae*, Series XI, Tech., No 3, 1-5(1929) —Hardness tests (Shore scleroscope and Rockwell) made on samples of iron broken by tension showed that the hardness of the surface and of deeper layers increased in all parts of the specimen except the necked portion On the portions corresponding to the neck the hardness of the surface layers decreased 21%, but the hardness of the inner layers increased 20% B N Daniloff

**The strength of gray cast iron at elevated temperatures.** J W Donaldson *J West Scot Iron Steel Inst.* 38, Pt II, 11-20(1930) —Cast irons comprising 2 plain irons contg 0.65 and 1.48% Si, resp., and alloy irons contg (*a*) 2.43% Mn, 0.40% Cr, 0.75% Ni, 0.12% V, 0.48% W and (*b*) 0.61% Cr, 0.30% Ni, 0.02% V, resp., were investigated to det (1) the temp.-stress curves of a series of plain and alloy irons, (2) the influence of previous heat treatment on the temp.-stress curves, and (3) the effect of low Si and various alloy addns on the strength of cast Fe at elevated temps both as cast and after heat treatment. Downs Schaaf

**Plastic and elastic deformation.** E Kirpt. *Iron Steel Eng* 8, 54-66(1931).—The compression resistance of wrought iron and mild steel increases to unknown values when we compress plastic material The rate is very great when the height is very small as compared with the diam., because of the rapid increase of expansion or horizontal resistance An observed increase in resistance per sq in was from 50,000 to 230,000 lb. The applied force works vertically and is transmitted by deformation or displacement of the molecules into horizontal direction. Expansion work must be considered along

with compression work when deriving a formula in which tensile strength or compression strength of steel is taken as a const during the whole operation The soln of problems relating to plastic and elastic deformation involves application of the law of least resistance or least work Twenty two equations are evolved relative to the plastic flow of hot steel, of cold steel and of elastic flow The strength can be improved, and a considerable amount of material can be saved by proper design of frames, rollstands or similar structures Application of the theory of least work, credited to Castigliano, yields the same result as indicated in the formulas W H Boynton

Wearing tests on iron and steel Arvid Johansson *Jernkontorets Ann* 114, 551–71(1930) —A critical discussion is given of various tests for wearing resistance, including the Robin Brinell, Spendel and Amsler tests. The general conclusions are that wearing resistance increases with increased C content, with increased coarseness of structure and with increased speed of rotation The general status of the results is, however, highly uncertain Problems for further research are the effect of crystal structure as detd by chemical analysis, heat treatment, final working temp., and slag inclusions Seven references are included H C Dews

Investigation of a raw steel from pre-Roman times. H Hanemann *Stahl u. Eisen* 51, 67–8(1931) —A steel bar from the pre-Roman La Tène period was subjected to chem and metallographical analysis. The irregular structure showed dark parts consisting of pearlite and cementite and lighter parts consisting of ferrite and pearlite The chem analysis showed 0.44% C, 0.065% Si, 0.10% Mn, 0.042% P, 0.012% S, traces of Cu and no other metals. The steel of that period could only have been made in the bloomery hearth Forging expts showed that sharp knives could be made from this steel but not without some difficulty due to the formation of cracks This steel bar, over 2000 years old, is a good example of the great stability of cementite J A Szilard

Testing method for the determination of the surface characteristics of [steel] plates. E Gerold *Stahl u. Eisen* 51, 104–6(1931) —The luster of the surface of iron plates is a measure of their smoothness. Several methods to measure the luster of plates are described The polarization luster measuring apparatus built by Schmidt and Haensch (cf K Kieser *Z angew Chem* 32, 357 (1919)) utilizes a polarization photometer to measure the amt of polarized light in rays reflected from the surface to be tested The stray luster measuring device, built according to Kempf Flugge by the same firm photographs the image of a small slit by means of the rays reflected from the surface to be tested The clearer the image of the slit, the better the reflecting power and the smoother the surface of the plate The Askania luster-measuring app is built on the same principle except that instead of exposing a sensitive paper, the observer reads the luster of the surface under test directly by comparing the divergency of the rays from the same point of the surface The app designed by the research lab of the Vereinigte Stahlwerke *Dortmund is similar to the above except that a photocell* cell is used to measure the amt. of light reflected from the surface Because of the comparatively small surface area possible to cover with the above app this method is not suitable as an acceptance test for plates. However, it gives valuable information on the surface characteristics of plates when the adhesion of paints and varnishes is being studied J A Szilard

Influence of high-frequency oscillations on the treatment of metallurgical products. G Mahoux *Compt rend* 191, 1328–30(1930) —All expts were made on rods 15 mm in diam Steel contg 3% Ni 3% Cr and 1% Mo was heated 9 hrs at 500° in a current of $NH_3$ with a blank not electrically treated The Brinell Vickers no was raised from 380 to 1030 the resilience from 9 to 11.8 kg and the nitride penetration was 0.35 mm The only change in the blank was a nitride penetration of 0.01 mm The B V no of steel contg 8% Ni 19.8% Cr and 4% W treated 10 hrs. at 500° in $NH_3$ was raised from 235 to 1035 at the surface, to 570 1 mm beneath the surface and to 472 at the center A soft steel electroplated with Cr and treated 9 hrs at 530° showed a Cr penetration of 0.35 mm the blank showed no penetration Comments on the preceding communication. Leon Guillet *Ibid* 1331–2.—The results have been confirmed by Aubert and Duval for steel and many alloys. A Ni coating on steel is absorbed at 450 The treatment opens a fertile field for research J H M

The formation of cracks in steel castings. K. Singer and H Bennek. *Stahl u. Eisen* 51, 61–9(1931) —The possibilities of the formation of so-called hot cracks during the cooling of steel castings and the filling up of these cracks or fissures by the liquid part of the casting are reviewed with reference to practical examples The cracks are caused by great temp differences in the casting by the manner of heat transfer from one part of the casting to the other and mainly by the size and shape of the coldest

part of the casting, from which during solidification contraction forces are acting on the rest of the casting. There is no direct relationship between piping and cracks, although by working toward a pipe free casting the better temp. conditions prevent the formation of cracks and help in filling up those formed by the liquid part of the casting during the cooling period. The importance of the proper contraction of the casting is emphasized. Were it possible to control the shrinking of the casting the danger of the formation of cracks would be greatly reduced. It is pointed out that in a casting solidifying in a field of a high frequency coil the induction current would counterbalance the radiation losses thereby preventing the formation of cracks. J. A. Szilard

**Aging of steel castings.** A. Pomp. *Stahl u. Eisen* 50, 410–1 (1930).—The impact strength of mild steel castings (notched bars) contg. C 0.1–0.27, Si 0.16–0.46, Mn 0.45–1.37, P 0.05–0.06 and S 0.04% decreases on aging at 250° for 1 hr. after forging to a reduction in area of 7–10% but not nearly to the same extent as it does after completely annealing. The values obtained for the annealed metal at 20° to −20° were consistently below 2 m. kg./sq. cm. whereas those for the aged metal varied from about 6 m. kg./sq. cm. at 20° to about 2.3 m. kg./sq. cm. at −20°. B. C. A.

**Effect of various annealing temperatures on cold-worked low-carbon steel.** H. E. Pitlow. *Metals & Alloys* 2, 18–9 (1931).—The results are expressed by 3 graphs which show (1) the *relation between annealing temps. and Rockwell hardness* of 4 low C steel brake drums (2) the *relation between annealing temps. and ductility* and (3) the relation between annealing temps. and hardness and ductility of cold worked low C steel. A. J. Monack

**Cold-rolled steel.** Georges Delbart. *Aciers spéciaux* 5, 483–98 (1930).—This work covered (1) influence of *cold rolling and successive annealings on the tensile strength and elongation*, (2) *hardness*, (3) *corrosion by $H_2SO_4$*, (4) *attack by fuming $H_2SO_4$*, (5) *influence of cold rolling and successive annealings on the impact strength* and (6) *influence of cold rolling and rapid annealings on the magnetic permeability*. Data and graphs are given in connection with each of the items above. A large number of *photomicrographs* is included. A. J. Monack

**Steels for cold pressing.** G. R. Bolsover. *Iron and Steel Ind. and Brit. Foundryman* 4, 101–2 (1930).—Low C rimming steels used for deep drawing do not work harden readily. The tensile strength varies approx. as one third the % reduction in steel thickness. When steel is stretched more than 5% brittleness is encountered on reheating to 200° to 300°. Age hardening after quenching increases the tensile strength of dead mild steel 67%. For deep drawing purposes stainless steel must be low in C and should be quenched from a high temp. C. H. Lorig

**Tensile strength at high temperatures of steel containing small quantities of nickel and molybdenum.** W. Liesmann and C. Salzmann. *Stahl u. Eisen* 50, 442–6 (1930).—The tensile properties of steel with C 0.2, Mn 0.8, Si 0.25, Ni 0.4–2.2 and Mo 0.2–0.6% have been detd. at 500° after annealing at 900–970°. Ni and Mo both increase the tensile strength and yield point but reduce the ductility, 0.1% Mo increasing the ultimate strength by 1 kg./sq. mm. and the yield point by 2 kg./sq. mm., and 0.5% Ni increasing the former by 2 kg./sq. mm. and the latter by 1.8 kg./sq. mm. With higher proportions of Mo the ratio ultimate strength/yield point is unfavorably affected, but further addn. of Ni improves this ratio. The steel with 2.1% Ni and 0.5% Mo has a yield point of 27.5 kg./sq. mm., a tensile strength of 42 kg./sq. mm., an elongation of 11% and a reduction in area of 20% at 500°. B. C. A.

**Solution of cementite in carbon steel and the influence of heterogeneity.** Erik Walldow. *Engineering* 131, 27–30 (1931).—Transformation of α iron to γ iron starts from the grain boundaries. Com. steels show a transformation interval, the transformation starting at different temps. in different parts of the specimen. A new material, "sorbo troostite," is found when heating at 3.5–5.2° above $Ac_1$ for 1 hr. or less. Its structure is less distinct than that of sorbite and it is not so strongly attacked by $HNO_3$ as troostite. It appears to be residual undissolved ferrite and cementite and never to have been in the γ state. It is found in the peripheral parts of austenite grains. Varying solv. of pearlite grains is not due to alloying elements as contaminators but to their irregular occurrence in the structure. Ann Nicholson Hird

**The development of nitriding plants.** F. Bruhl. *Krupp Monatsh.* 11, 287–90 (1930).—A description is given of the development of nitrided steel together with a discussion of the requirements demanded of nitriding equipment. A number of installations are described. H. Stoertz

**The case-hardening of commercial steels by means of nitrogen.** B. Jones. *Iron and Steel Ind. and Brit. Foundryman* 4, 77–86, 99 (1930).—Five British com. austenitic steels of various compns. were nitrided at 500° for 90 hrs. Except for a 13.20% Mn

steel with 1.25% C, the increase in hardness was inappreciable The austenite in the Mn steel was partially decompd into troosto-martensite Nickeliferous austenite does not harden on treatment The effects of certain elements were ascertained by nitriding 20 com steels of different chem compns for 90 hrs at 500°. Contrary to published information, plain C steels are nitrided Mild steels harden to a greater extent than do high C steels. Nickel steels do not nitride With Cr and V the retarding effect of Ni is not so great The effects of the combination Al, Cr, Mo appear to be more than additive C H Lorig

**Use of zirconium alloys in steel manufacture.** *Pit Gov Aciers spéciaux* 5, 509–21(1930).—The following are discussed (1) action of Zr on the impurities contained in steel (2) phys properties of Zr steels and (3) steels for which the use of Zr is recommended Data and photomicrographs are given A J Monack

**New manganese-silicon alloys for the deoxidation of steel.** C. H Herty, Jr., and G R Fitterer Bur Mines, *Repl of Investigations* 3081, 14 pp (1931).—By using Mn-Si alloys for deoxidation, larger inclusions were formed than by using Si alone The av size of the inclusions formed when using Si was $15 \times 10^{-4}$ cm The size increased with increasing Mn, until at a Mn/Si ratio of 4 18 the largest particles in dead killed steels were 1000 cm $\times 10^{-4}$ These large particles would rise at a much more rapid rate (600–2400 in per min) than the small $SiO_2$ particles (0 15–1 5 in per min) Tests in commercial acid and basic open hearths show the same results on steels of from 0 12 to 0 60% C using alloys with a Mn/Si ratio of 4 5 6 0 Mn efficiencies of 75–85% have been obtained when forging grade steels have been deoxidized with these alloys Alden H Emery

**Some important advances in the properties and treatment of metallic alloys.** Leon Guillet *Rev métal* 27, 449–66(1930), *Rev univ mines* 4, 221–30, 296–303(6).—General review *H C Dudus*

**Examination of the resistance of metal alloys against attack by salt solutions** III. L Maass and W Wiederholt *Korrosion u Metallschutz* 6, 265–77(1930). cf *C A* 25, 1205.—Solns of sylvinite, carnallite, Glauber's salt and bitter salt were used as corrosive media, in which the specimens previously specified were immersed under various conditions The testing period was 4 months in the expts carried out at room temp, and 8 days with those carried out at 90° The losses of wt and the appearance of the corroded surfaces and of the corrosion products are given in detail The greatest losses of wt were observed in the group of the various forms of iron By addn of Cr and Ni the material is considerably improved, and Cr Ni steels give the best results that were observed The second best group is the Cr Ni Fe alloys Ni and the other Ni alloys show a similar behavior, although they are not quite as good Between them and plain iron rank Cu and the Cu alloys No essential difference is observable between Cu bronze and brass The losses of wt of the β brasses are slightly lower The magnitude of the attack generally speaking, is not so great in solns as when the sheets are covered with solid salt The corrosion is mainly restricted to the surface, without penetrating deeper into the metal The penetration amounts to approx 0 02 mm in 4 months Perforation of the sheets by pits was not observed A soln of sylvinite was found to possess the greatest corrosiveness Generally speaking, the effect of Glauber's salt was much smaller and that of carnallite even less although exceptions were observed in the series where $O_2$ was passed through the solns The influence of the experimental conditions was considerable The losses of wt were doubled by using the double quantity of corroding soln per sq cm of area The same holds true if there is a boundary line of liquid and air Introduction of $O_2$ causes losses 5 times as high The corrosion at 90° was found to be greater after 8 days than that at room temp after 4 months Leopold Pessel

**Structure analogies of intermetallic phases** A Westgren and W Ekman *Arkiv Kemi Mineral Geol* 10B, No 11 1–6(1930).—In intermediate phases of the β brass type contg either Cu Ag or Au it has been found that there is a ratio of valency electrons to atoms of 3 2, while in the lattices of the γ brass type the ratio is 21.13 Recently metallic compds have been found not contg Cu, Ag or Au with atomic groupings resembling β or γ brass viz NiAu, MnAl and FeAl, where the atoms of the transition elements behave as if they had a valency of zero To test the validity of this remarkable rule the authors made a series of alloys corresponding to the general formula $A_3B_5$ where A is a transition element (Co, Ni Rh Pd Pt), and B is either Zn or Cd The alloys were made in sealed evacuated quartz tubes by heating for about a week at 900 1000° In all cases where alloying succeeded, a homogeneous material of γ-brass structure resulted, as was evidenced by the powder photograms The homogeneity range extends for Co-Zn alloys from 15 to 22 at. % Co and for Ni-Zn alloys from

15 to 19 at. % Ni. It was noticed that alloying of transition elements with Al, Zn or Cd gives a much more pronounced decrease in vol. than is the case with alloys formed with atoms having complete inner electron shells. The contraction for $Ni_4Cd_3$ amounted to almost 8.7% although Ni occupies only 19 at. % in the alloy. H. S. v. K.

**Packing of atoms in alloys.** A. Westgren and A. Almin. *Z. physik. Chem.*, Abt. B, 5, 14-28(1929).—The variation of the linear lattice dimensions with compn. of the alloy has been investigated in the α phases of the systems Ag-Al, Cu-Al and Ni-Al and in all cases the parameters are less than those calcd. by Vegard's additive law from the parameters of the components. From calcns. of the vol. occupied per atom in the various phases of the above systems, and of the systems Cu-Zn, Ag-Zn, Ag-Cd, Cu-Mg and Fe-W, it is shown that, in general, a contraction in at. vol. accompanies the formation of the intermediate phases. The at. vols. in contiguous phases of any system differ only slightly so that the curves of vols. drawn for a series of phase regions are almost continuous. The vol. contraction is especially marked in Ni-Al alloys, and it is suggested that this depends on the fact that such alloys are formed by the union of an atom which is deficient in a nuclear electron with one of normal type. B. C. A.

**The influence of temperature upon the notch toughness of aluminum alloys.** Torao Kobayashi. *Mem. Research Coll. Eng.* 3, 147-53(1930).—Duralumin, Y-alloy and other com. Al alloys were worked, quenched and aged 20 days, after which test pieces were placed in an impact machine and tested at temp. intervals of 50° up to 550°. The heating arrangement was attached to the testing machine and could be removed simultaneously with the release of the pendulum. The notch toughness was found to resemble plasticity, in that it increased with increasing temp., reaching a max. at 450°. Curtis L. Wilson

**Volume change during solidification of manganese and some alloys.** Kotaro Honda, Yoshiharu Matsuyama and Yatsugi Isomi. *Bull. Inst. Phys. Chem. Research* (Tokyo) 9, 905-10(1930). (*Abstracts* 88 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 14, Nos. 275-6.) Vol. changes during solidification of Mn and some alloys contg. Mn, Ni or Co are measured by using the thermobalance. Values of $V/V'$% ($V$ = vol. of liquid sample at m. p., $V'$ = contraction by sol. dilatation) obtained are: pure Mn (Mn 99.9%, C 0.01%, Al 0.03%, Fe 0.05%, Si trace), −4.50; Mn-C (C 1.10%), −1.60; Ni-C (C 2.23%), +2.05; Co-C (C 2.20%), +2.03. K. Kondô

**Macro-etching of tin-base bearing metals.** Ernest B. Drake. *Metals & Alloys* 2, 20-4(1931).—A method for macro-etching tin base babbitts of various compns. is suggested. The failures in connecting rod bearings which have been run in test engines appear most often in the finely crystalline babbitts near the joint. The macro-etched babbitts indicate fairly well the size and distribution of the micro-constituents which may be expected. Centrifugally cast main- and connecting rod bearings show SnSb cubes, which are generally associated with a smaller no. of CuSn needles than when the SnSb cubes are absent, all imbedded in a groundmass of Sn rich eutectic when the babbitt is of the type: 85% Sn, 7.5% Sb, 7.5% Cu. The die-cast main and connecting rod bearings show no SnSb cubes but do show a larger amt. of CuSn needles imbedded in a groundmass of Sn rich eutectic and delta solid soln. when the babbitt is of the type: 85% Sn, 7.5% Sb, 7.5% Cu. A. J. Monack

**Production of lead-Sn alloys from Sn slag.** Edmund R. Thews. *Metallbörse* 21, 3-4(1931).—Sn slags are smelted with Pb or Sn poor alloys. A purer product is obtained by using type metal. Pb residues can be used with Sn slags to produce an alloy of 8% Sn. For alloys richer in Sn this product is oxidized and used as raw material for the next smelt. Sulfurous ores require a preliminary roasting. The presence of much As is harmful because of the formation of viscous iron arsenides. A coking mixt. contg. 10-25% wood charcoal is best. Ann Nicholson Hird

**Zinc and zinc-alloy use in the automotive industry. II.** Robert M. Curts. *Am. Metal Market* 38, No. 22, 5, 10(1931).—This installment deals with Zn wire, extruded Zn shapes, die-castings, the use of fully automatic machines, the introduction of high grade Zn in die castings, Zn alloys for body hardware, and other equipment. Some data are given on the Zn-Al alloy system. **III.** *Ibid* No. 23, 5.—This instalment deals with heat treatment of Zn base die-casting alloys, water-vapor tests, the disastrous effects of contamination, phys. tests on die-casting alloys, and the use of inserts in these alloys. **IV.** *Ibid* No. 24, 5, 10.—Cleaning, etching and Ni plating are discussed. A series of tests indicates that Cd plate may be applied directly to die-casting with no appreciable harmful effects. Attractive coats of enamels, japans and lacquers may be applied to Zn and its alloys. Metallic Zn is used in the automotive industry

for electro-galvanizing as a constituent of brass, as rolled sheet and strip for a variety of fabricated products and in the production of a great no of die-cast parts The phys properties of the various Zn alloys and the ease of application of attractive and durable plated finishes have resulted in annual increases in Zn consumption for automobile parts Tables show the A S T M specification B 6-18 for Spelter and the phys and elec. properties of Zn die-casting alloy contg 4% Al, 3% Cu, 0 05-1 0% Mg and the balance Zn W H Boynton

**Fatigue strength of unwelded and welded cast and rolled materials.** Walter B. Bartels. *Z Ver. deut Ing* 74, 1423-6, *Giesserei Ztg* 27, 607-16, 637-45, 661-4 (1930) —The type of graphite sepn is of special significance for fatigue strength In fine eutectic form a considerable increase in vibratory strength is obtained, even with welded bars The skin produced on the surface of castings by melting of quartzite is of little significance for increased static or dynamic strength, but the grain structure of the outer zone is important. Annealing in all cases lowers the fatigue resistance of cast I e The effect of welds upon low C steel was studied The dynamic strength of the weld was greatly influenced by the dynamic strength of the materials welded The weld in general has a stiffening effect, and hammered welds increase resistance to fatigue H Stoertz

**Building up metals with electric arc welding** K. Tewes. *Giesserei-Ztg* 27, 585-9(1930) —*In arc welding* it is customary to add materials to the electrodes which will improve the quality of the weld Si and Mn have been widely used to bring about deoxidation of the weld, but Ti appears to be more suitable It combines energetically with O and materially reduces the quantity of oxides in the weld The $TiO_2$ which is formed readily floats to the top and can be removed with the slag Greater homogeneity of the weld results in improved mech properties. Ti also tends to form nitrides, $Ti_4N$, TiN, $TiN_2$ and $Ti_2N_4$, which greatly increase the hardness of the steel. H Stoertz

**Soft steel welds deposited by the electric arc.** D Rosenthal and M Mathieu. *Compt rend* 191, 484-6(1930) —The nature of the weld of soft steel bars produced by the elec arc depends on the manner in which the molten metal is protected from oxidation Metallographic examn. shows that welds protected with a covered electrode have more regularly formed grains than non protected welds X ray diagrams show the existence of strains in non protected welds I G Vanden Bosche

**Non-corroding and acid-resisting alloys.** Bo Kalling *Tek Tidskr* 75, 101-3 (1928) —A review C A Robak

**Some properties of protective films on metals.** Ernest S Hedges. *Chemistry and Industry* 50, 21-5(1931) —A review of film properties is given, with special consideration of the work carried out by Evans and by the author A theory of anodic polarization is offered, according to which OH ions are discharged simultaneously with other anions, such as $SO_4$ ions for instance, if a certain crit c d is reached and more $SO_4$ ions are discharged than can be replaced This has the effect of producing a layer of oxide or basic salt on the surface The presence of $SO_4$ ions renders this film non protective, but it has the effect of raising very greatly the effective c d at those areas of the electrode which are uncovered. The consequence will be that in some spots the discharge will consist of OH ions only which give a perfectly continuous oxide film The discontinuous film first formed will be thrown off the electrode by the subsequent evolution of $O_2$ Leopold Pessel

**The mechanism of the suppression of corrosion velocity by colloids.** W Beck and E v Hessert *Z Elektrochem* 37, 11 20(1931) —The decrease in corrosion velocity of Fe in $H_2O$ or strong acid solns is due to the presence of hydrophilic colloids, and is dependent upon the type as well as the concn of added colloid The authors suggest the possibility of the formation of coagulation layers upon the surface of the metal due to the action of the Fe ions upon the negatively charged particles of the hydrophilic colloid The colloidal materials studied were agar starch, silicic acid and gelatin and the metals Armco' electrolytic, carbonyl" and pure I c H Stoertz

**Protection of large steel structures from rust.** Henry E Weitkamp *Het Gas* 50, 480-4(1930) —A review B J C van der Hoeven

**Initial corrosion rate of steels.** H O Forrest B E Roetheli and R H Brown. *Ind Eng Chem* 22, 1197-9(1930) —Studies of corrosion rates in distd water, of oxide-free, low C 14% Cr steel and of (18-8) Cr Ni steels were made during the initial stages of corrosion After 10 min the rates for the Cr and Cr Ni steels became essentially zero while the rate for C steel decreased but slightly, indicating the formation of invisible, adherent, protective films on the resistant steels A method for obtaining reproducible results is described B E Roetheli

**Rust-free steels, their properties and preparation.** E. Houdremont. *Krupp Monatsh* 11, 270–86(1930).—H discusses the various types of stainless steels as classified under the headings martensitic, ferritic and austenitic steels. The system Fe-Cr-Ni is studied together with the effect of C upon it. A table is given contg the range of C, Si, Mn, Cr, Ni, W, Mo and Cu in typical examples of these steels. The prepn of V2A in a Siemens Martin furnace and the prepn of a Cr steel by reduction of a Cr ore in a basic furnace are described. Heat treatment, hot and cold working and recrystn are considered in relation to their effects upon mech. properties. H. S.

**Behavior of rustless steel toward dilute sulfuric acid.** J. Fritz. *Krupp Monatsh* 11, 267–9(1930).—Conclusions drawn by various investigators that rustless steel is attacked by $H_2SO_4$ are incorrect. If practical requirements are adjusted so that the passivity of the rustless steel can be maintained, it is possible to use it in many solns. contg. free $H_2SO_4$. H. Stortz

**Influence of a small addition of copper on the corrosion resistance of structural steel.** O. Bauer, O. Vogel and C. Holthaus. *Mitt. der deut. Materialprüfungsanstalt* Sonderheft XI, 25 pp.(1930). Extended abstract by V. A. Kendall in *Metals & Alloys* 1, 890–5(1930). The samples covered a range of soft steels, structural steels and 0.25 to 0.35% C steels. The tests were conducted as follows: (*A*) at room temp., (1) in distd. $H_2O$, (2) in Spree River $H_2O$, (3) in North Sea $H_2O$, (4) in humic acid soln., (5) alternating wet and dry in (*a*) 1% NaCl soln. and (*b*) distd. $H_2O$, (6) in the atm., (7) in 1% $H_2SO_4$ and (8) in 1% HCl. (*B*) at temp. of 50°, (1) in distd. $H_2O$, (2) in Spree River $H_2O$, (3) in North Sea $H_2O$, (4) in humic acid soln. and (5) in 1% $H_2SO_4$. Data and graphs are given. A. J. Monack

**Corrosion of metals by phosphoric acid.** Peter R. Kosting and Conrad Hirns, Jr. *Ind. Eng. Chem.* 23, 140–50(1931).—Tables are given of corrosion rates of 22 metals and alloys with pure and crude phosphoric acid of various strengths. Notes on passivity and corrosion inhibitors present in $H_3PO_4$ are added. Ann Nicholson Hird

**Furnace for metallographic examination of specimens at high temperatures.** B. A. Rogers. *Metals & Alloys* 2, 9–12(1931).—The furnace is described. Tests with the furnace have shown that it is possible to observe marked surface changes upon some elements as these pass through certain allotropic transformations. Observations at a magnification of 50 to 75 diams. were conducted on samples heated above 1500° and at higher magnifications when the temp. did not exceed 1000°. Photographs were taken at magnifications of about 150 diams. for temps. up to 1000°. Ten photomicrographs are given. A. J. Monack

**Investigations on wearing in the Amsler machine.** C. J. Gumar Malmberg. *Jernkontorets Ann.* 114, 572–92(1930).—Ring material for trolleys and railway coaches was used. Aside from the quality of the material, the amount of wear is shown to be dependent on (1) the total load, (2) the local strains, (3) the slippage and (4) the wearing distance. Standardization requires fixation of load (*P*), diam. (*D*), r. p. m. (*n*), and the time (*T*). In the actual runs, the test cylinders (40 mm. diam.) were turned out of wrought iron, while the whetting cylinders (60–65 mm. diam.) were punched from rolled rods which were not heat treated after the rolling. The diam. of the rolls was essentially of no influence between 35 and 50 mm., with 10% positive slippage, but the wear was only about 25% as great for 50 mm. as for 35 mm., with 170% negative slippage. Increasing C from 0.6 to 0.8% quadrupled the wear, but the min. wear was with 0.90%. The wear also increases with the slippage. Wear on the test cylinder and the whetting cylinder tends to run parallel. The wear decreases with increased Brinell hardness, and the total wear is a min. when the hardness of the test cylinder exceeds that of the other cylinder. Oil hardened test cylinders wore down the whetting cylinder much more than did water hardened test cylinders. Structure plays a large part in wearing resistance. No great difficulty should be encountered in standardizing dimensions of the test piece, load, slippage, r. p. m. and duration of test. H. C. D.

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The relation between the H overvoltage and composition of brass (Thomson) 4. The electrolytic Zn plant of the Evans-Wallower Company at East St. Louis (Tainton, Bosqui) 4. 1930 steel plant electrical developments (Kenyon) 4. An air-thermostat for corrosion research (Evans) 1. Annual review number [of *Eng. Mining J.*] (Grant, *et al.*) 18. Decorating [metal surfaces] (Brit. pat. 335,788) 19. Recovering dry palm oil from its admixtures with water [formed by washing palm oil from tin plate] (U. S. pat. 1,790,748) 27. Rotary kiln for burning ores (U. S. pat. 1,791,282) 20. Fuel briquets [from ores] (U. S. pat. 1,791,077) 21.

Aluminum in Aircraft. Pittsburgh: Aluminum Co. of America. 150 pp. 50 cents. Reviewed in *Metals & Alloys* 2, Book Review Sect., 53(1931).

Grossman, M. A., and Bain, E. C. High Speed Steel. New York: John Wiley & Sons. 173 pp. Cloth, $3.50. Reviewed in *Metals and Alloys* 2, Book Review Sect., 55; *Ind. Eng. Chem.* 23, 341(1931).

Ingot Contour and Its Relation to Sound Steel. Baltimore: Gathmann Engineering Co. 90 pp. $1. Reviewed in *Metals & Alloys* 2, Book Review Sect., 53(1931).

Iron and Steel Industry Handbook and Directory. *London*: Louis Cassier Co., Ltd. 224 pp. 10s. Reviewed in *Metals & Alloys* 2, Book Review Sect., 54(1931).

Jahresbericht der Abteilung für Metallchemie und Metallhüttenk. Reprint from "Jahresbericht VIII." Berlin: Verlag Chemie. 54 pp. Paper, M. 6.40. Reviewed in *Metals & Alloys* 2, Book Review Sect., 54(1931).

Metal Industry Handbook and Directory. London: Louis Cassier Co., Ltd. 400 pp. Not sold, given to subscribers to *Metal Industry*, London. Reviewed in *Metals & Alloys* 2, Book Review Sect., 54(1931).

Metallurgie Agenda Dunod, 1931. *Paris*: Dunod. 497 pp. Cloth, F. 23.50. Reviewed in *Metals & Alloys* 2, Book Review Sect., 54(1931).

Schut, W. Ferrosilicium. The Hague: Algemeene Landsdrukkerij. 47 pp.

Sterner-Rainer, Ludwig. Die Edelmetall-Legierungen in Industrie und Gewerbe. Leipzig: Dieterer. 154 pp. M. 8.75.

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Vanadium ores. Alphonse Guiterman and Émile Compagne. Fr. 692,654, June 24, 1929. Ores of V, particularly vanadates of Pb or other metals, are submitted in the presence of a suitable flux, to a regulated reducing action to obtain the heavy metals in the metallic state and the V in the form of the oxyd. trioxide.

Treating rare metal silicate ores. Charles V. Irzell (to Westinghouse Lamp Co.). U. S. 1,791,272, Feb. 3. An ore such as zircon is heated with C to a sufficiently high temp. (suitably about 1700–2700°) to convert the Si and rare metal content into carbide compds. which are sepd. by dissolving the Zr carbide with dil. $HNO_3$.

Recovery of precious metals from solutions. H. Wöhlbing. Brit. 325,565, Feb. 2, 1929. Acid solns. contg. precious metals such as chlorides of Pt, Pd, Au or Ag obtained from ores and contg. also base metals such as Cu, Fe or Ni are brought into contact with active C, which adsorbs the precious metal compds. Strongly acid solns. are first dild. or partly neutralized. The adsorbed compds. may be recovered by the action of concd. HCl.

Vacuum and pressure filtration apparatus suitable for metallurgical pulps, etc. John T. Simmons. U. S. 1,791,251, Feb. 3. Structural features.

Preparation of oxide ores for reduction. V. J. J. Depaye. Belg. 370,110, June 30, 1930. A gas rich in CO is passed over the ore, heated to a suitable temp. to produce a deposit of C, which facilitates the subsequent reduction.

Zinc blende treatment. Soc. anon. la nouvelle montagne. Brit. 325,609, March 9, 1929. Zn blende, either raw or roasted, is sintered under forced draught in admixt. with $ZnSO_4$ in the proportion of about 3 mols. sulfate to 2 mols. sulfide in excess of the amt. of sulfide necessary to ensure combustion and a diluent such as gum or dextrin may also be added. Cf. *C. A.* 24, 5012.

Metallurgical furnace suitable for heat-treating metal sheets, bars, packs, etc. Frank A. Fahrenwald. U. S. 1,791,404, Feb. 3. Horizontal shafts pass through the side walls of the furnace and actuate circular disks and eccentric conveyer rolls.

Supporting frame for metallurgical furnaces. Dingler'sche Maschinenfabrik A.-G. Fr. 666,045, Mar. 29, 1930.

Rotary furnace for ore treatments such as roasting or reducing with gases. Carl P. Dorech. U. S. 1,791,403, Feb. 3.

Improvement in the construction and operation of blast furnaces. V. J. J. Depaye. Belg. 370,556, June [illegible]. The air is blown into the furnace at a pressure considerably above atm. The direction of the air blasts is varied, either continuously or intermittently by appropriate mounting of the nozzles.

Blast furnace, etc., operation. Vereinigte Peiner'sche A.-G. Ger. 515,315, Sept. 6, 1927. The introduction of water into the combustion zone of blast furnaces, cupolas and other shaft furnaces is effected with the use of a solid, liquid or gaseous auxiliary substance, other than the blast, as a carrier. Coke is specified.

Gas burner for blast-furnace stoves or furnaces. Wm. R. Paulsen (to American Heat Economy Bureau). U. S. 1,791,911, Feb. 3.

Drying air for furnace blasts. Gebrüder Malyoth. Ger. 515,216, Oct. 5, 1925.

The air is led over $CaC_2$. The mixt. of air and $C_2H_2$ thus obtained may be preheated and supplied as such to the furnace, or the $C_2H_2$ may be burnt, thereby regenerating one half of the moisture initially present in the air. Cf. *C. A.* 24, 5013.

Tuyère for cupola furnaces. Friedrich Schinke. Ger. 515,239, Mar. 21, 1929.

Bessemer process of making steel. Frank W. Davis (to S. G. Allen Trustee to F. W. Davis). Can. 308,761, Feb. 17, 1931. The Bessemer process of making steel with non-Bessemer pig consists in detg. the net blow heat required and then proportioning the amt. of O to the amt. of inert gases in the blast so as to reduce the heat in the waste to a point which will give the blow heat required.

Casting ingots. T. Brinkmann. Brit. 335,538, March 8, 1929. Mech. features.

Two-part ingot mold. Siegfried Junghans. Ger. 514,360, Jan. 8, 1929.

Ingot mold and hot-top construction. H. J. Darlington (to W. M. Charman). Brit. 335,480, Dec. 31, 1928.

Apparatus for melting metal waste. Hirsch, Kupfer- und Messingwerke A.-G. (Otto Götze, inventor). Ger. 514,442, Jan. 20, 1929.

Rare metals. Fansteel Products Co., Inc. Fr. 693,417, April 5, 1930. Difficultly fusible rare metals, particularly Ta, are freed from C which they contain as impurities by mixing the metal with a convenient amt. of an oxide of an element which volatilizes at a temp. lower than the m. p. of the metal, the mixt. being afterward heated under vacuum to a temp. at which the C oxidizes and at which the residue left by the oxide volatilizes. The oxide used may be MgO.

Sheet aluminum. Vereinigte Silberhammerwerke Hetzel & Co. Fr. 693,869, Apr. 14, 1930. Sheet Al which is resistant to corrosion is made by welding into one whole, 2 or more laminated plates of Al and afterward transforming into sheets by rolling.

Tin. Soc. d'Électrochimie, d'Électrométallurgie et des Aciéries Électriques d'Ugine. Fr. 692,640, June 22, 1929. In extg. Sn from its ores, alloys or slags, an auxiliary element contg. a proportion of Si which allows the formation of an Fe silicide unattacked by HCl or by an acid soln. of $SnCl_2$, is added to the initial charge.

Removing lead from metals. Dudzeele Corp. of America. Fr. 692,721, Mar. 25, 1930. Layers of Pb are removed from metal objects by immersing the objects in a warm acid soln. of one or more chlorides, *e. g.*, a soln. of NaCl contg. $H_2SO_4$ or HCl or a soln. contg. $FeCl_3$ and $NaNO_3$.

Lead containing phosphorus in small proportion. American Machine & Foundry Co. Brit. 335,545, March 19, 1929. A soldering, metal-coating or deoxidized lead is prepd. with a content of P (which may be 0.01–0.03%) predetd. in accord with the rate of oxidation and the O content of the metals with which it is to be used in contact.

Magnetic iron and steel. Vereinigte Stahlwerke A.-G. Fr. 693,602, April 9, 1930. Fe or steel free from magnetic aging and to be used as magnetic material is made by lowering the absorption of O and (or) deoxidizing the steel in known manner.

Cementation of steel. H. J. Schiffler. Ger. 514,479, Mar. 19, 1927. Absorption of C in an amt. above the eutectic ratio is hindered by using steel contg. 0.4–4% of Al.

Rustless steel. Georg Müller. Fr. 692,887, Mar. 28, 1930. A rustless steel contains Cr 0.1–1, Cu 0.25–0.5, Ni 0.04–0.25 and W 0.01–0.05% and is free from Si. The added metals are introduced in the form of an alloy with Fe contg. Cr 20–30, W 5–6, Ni 6–10, Cu 10–15 and C (present in the form of carbide) 2.5–3%.

Treating surfaces of metals such as iron in order to prevent rusting. Earl K. Wallace (to Rust Prevention Chemical Co.). U. S. 1,790,960, Feb. 3. The surface is treated with a mixt. formed of pure $H_3PO_4$ 42.5, water 56 and casein 1.5%.

System of magnetic testing to determine properties of railway car wheels, etc. Carl Kinsley (to Magnetic Analysis Corp.). U. S. 1,790,819, Feb. 3.

Alloy. Vereinigte Stahlwerke A.-G. Fr. 692,743, Mar. 25, 1930. Hard alloys of the stellite kind, *i. e.*, having a basis of Co, Cr, W and C with or without Mo, Ni, Fe and Mn, are made by using over 2% of C in the form of graphite.

Alloys. Camille Contal. Fr. 692,634, June 21, 1929. See Ger. 491,815 (*C. A.* 24, 2420).

Refractory alloys. Société anon. des anciens établissements Skoda a Plzen. Fr. 693,775, Apr. 11, 1930. Refractory Cr alloys are made by compensating the high C content by the simultaneous addn. of Al and Ti so that the critical points of the alloy are displaced above the max. temp. of use. Thus, an alloy may contain a max. of 40% of Cr, C 3, Al up to 15 and Ti up to 15%.

Refining alloys. I. G. Farbenind. A.-G. Fr. 693,544, April 8, 1930. Alloys of Mg and Ce are refined by adding dehydrated $CeCl_3$ to the mixt. of salts used in the

refining, whereby any moisture in the salts reacts with the $CeCl_3$ and does not affect the Ce in the alloy

Aluminum and its alloys. Wilhelm Neumann Fr 692,538, Mar 21, 1930 Al or its alloys is obtained by the electrothermal reduction of $Al_2O_3$ clay, kaolin, bauxite, etc., the vapor tension of the Al being lowered by means of substances of high b p during the reduction operation. The Al and the added substances are sepd by a phys. process and a distn. Metals of higher b p than Al or Si may be used.

Iron alloy containing copper, silicon and aluminum. Byramji D Saklatwalla. Fr 693,418, April 5, 1930 See U S 1,781,527 (*C A* 25, 66).

*Iron-chromium-nickel-tungsten alloys.* T. Rosenhain and C H M Jenkins. Brit. 320,598, April 22, 1929 Alloys are described which contain over 40% Cr and Ni together (the ratio of the Cr to Ni being between 2 3 and 1 1), together with 1% of C or Si or both. The total Cr and Ni content may be about 50–50% and the W 4–20% or more

Lead alloy Robert J Shoemaker (to S & T Metal Co.) U S 1,791,148, Feb 3 A tough, slightly hardened, corrosion resistant alloy suitable for covering cables, pipes, etc., comprises Pb together with Ni 0 01–0 03, Ca 0 1–0 3, Sn 0 25–0 5 and Al 0 02–0 1%

Magnesium alloys. I G Farbenind A.-G Fr 693,204, April 2, 1930. The properties of alloys having a high content of Mg are improved by a heat treatment which increases the solv of the materials in the alloy, followed by a cooling strongly retarded by artificial means, particularly in the zone from 270–100°, the duration of the cooling in this zone being at least 3 hrs Cf *C A* 23, 678, 1214

Optical mirrors from metals or their alloys. I G Farbenind A.-G Fr 693,816, April 12, 1930 Metallic mirrors of a high and uniform reflecting power for all wave lengths are formed by one or more layers of different metals or their alloys, which are chosen so that the low reflecting power of one constituent for a certain part of the spectrum is compensated by the high reflecting power of another constituent Ag along with Al, Si or Ni is mentioned as suitable.

Salt baths for annealing metals. W Feit & Co Ger 514,266, Jan. 31, 1930 The baths consist of, or contain, NaCl, $K_2SO_4$ and $Na_2CO_3$ (or $K_2CO_3$) in such amts that the ratio Na K is less than 1 The baths may contain also borax or $Na_3PO_4$ up to 6, alk. earth oxides or carbonates up to 10 and $NaNO_3$ 0 1–0.2%. An example given is NaCl 23, $K_2SO_4$ 41 5 $K_2CO_3$ 21, borax 4.5, $MgCO_3$ 2.5 and $CaCO_3$ 2.5%. The baths are particularly intended for objects of noble metals or their alloys

Method of annealing large metal blocks by electric induction heating. C Lorenz A.-G Wilhelm Fischer, inventor) Ger 515,013, July 3, 1928

## 10—ORGANIC CHEMISTRY

Chas A Kotteller and Clarence J West

Methane synthesis from carbon monoxide and water vapor P Pascal and E Bottoussek *J usines gaz* 54, 477–8(1930) cf *C A* 24, 3252.—CO and $H_2O$ give quant. yields of $CH_4$ and $CO_2$ in the presence of NiO at 270° and practical yields up to 275° At higher temps. equal mixts of $CH_4$ and $H_2$ are formed, until at 750° $H_2$ is quantitatively obtained. K H Engel

*Properties of conjugated compounds.* XI. *Addition of hydrogen bromide to β,γ- and α,δ-dimethylbutadiene* Ernest H Farmer and Frederick C B Marshall *J Chem Soc* 1931, 129–37 cf *C A* 24, 2581.—The mode of addn. of HBr to β,γ-dimethylbutadiene (I) has been studied by Bergmann (*C A* 17, 1420) and by Clausen (*C A* 17, 1619). B states that I yields a main or α-compd. $Me_2CBrCHMe\ CH_2$ (II), with 1 mol HBr while C concludes that, although an unstable II is intermediately formed, the stable product is the α-compd. $Me_2C:CMe\cdot CH_2Br$ (III) The chem. evidence obtained in the study by the degradation of a no. of distd. and undistd. specimens of the addn. product of HBr to I points unmistakably to the fact that the primarily formed product (even when addn is effected at −20°) in the absence of excess of HBr is III, it also appears to be the sole product, although the complete absence of very small proportions of II could not be asserted. The α,δ-isomer gives a mixt. of $Me\cdot CH:CHBrCH\ CHMe$ (IV) and $Me\cdot CH_2CH:CHCHMeBr$ (V), as shown by conversion into the glycols and mono- and dibasic acids The 3rd isomer was absent, showing that α,δ-addn. takes place in only 1 of 2 possible ways The ratio of IV to V in the reaction product, as shown by the ratio of AcOH to $EtCO_2H$ formed, is approx.

90 10, this figure agrees roughly with the highest estimate of the proportion of AcH produced by *ozonolysis of the hydrobromide*. It is clear that the manner in which the alkylbutadienes add HBr varies, as it does for other sym and unsym addenda, with the position of substituent groups in the unsatd chain. At present there is nothing to indicate the order of events in *the 2 fold process of addendum attachment* and addendum partition. C. J. West

**Mercaptan chemistry.** William M. Malisoff, Ernst M. Marks and Fred G. Hess. *Chem. Reviews* 7, 493-547(1930).—A crit presentation and discussion of the SH compds under the following headings: (1) phys. characteristics, (2) chem. characteristics, (3) methods of prepn. and purification, (4) detection and detn., (5) special interest attaching to the substances, (6) research problem. Approx. 600 references are given. G. Toennies

**Nitrosites and nitrosates.** Lydia Monti. *Gazz. chim. ital.* 60, 787-97(1930).—The present paper deals with the prepn. of new nitrosates and nitrosites of octylene (I), diisobutylene (II) and hexadecylene (III), the formation of addn. products between these hydrocarbons and $N_2O_4$ and the decompn. of the nitrosates and nitrosites by heating in an inert gas. The literature describes only the nitrosates and nitrosites of the lowest members of the olefin hydrocarbons up to amylene (cf. Yegorov, *C. A.* 7, 1477; Wallach, *C. A.* 9, 1158). Following the usual method of prepn., the final products from I, II and III are yellow oils with the odor of fatty acids, and in certain cases the acids were identified. This formation of acid is attributed to the direct oxidizing action of $N_2O_4$ or to decompn. with autoxidation which nitrosates and nitrosites (formed at first) undergo spontaneously at room temp. (cf. Schaarschmidt and Hoffmeier, *C. A.* 19, 2034). The expts. prove that addn. products are formed. The gases evolved in the decompn. of the nitrosates and nitrosites contained in all cases N, NO and $CO_2$ and no other gases in any appreciable quantity (cf. Schaarschmidt and Hoffmeier, *loc. cit.*; Sommer, *Ber.* 29, 357(1896)). The formation of N and $CO_2$ indicates autoxidation and destruction of the mol. The quant. results are of special interest, for though the components are always the same, the proportions of the gases vary greatly. One of the chief aims in the investigation is to develop a reliable *method for distinguishing nitrosates from nitrosites*. I was prepd. by refluxing *sec*-octyl iodide (100 g.) with alc. NaOH (25 g. in 500 cc.) for 10–12 hrs., pouring into a large vol. of water, drying the sepd. oil with $CaCl_2$, rectifying and recovering the 121–3° fraction. II was prepd. by the *method of Butlerow* (*Ann.* 189, 44(1877)) and III by the *method* of Bertholet and Péan. In numerous expts. nitrous vapors (from $As_2O_3$ and $HNO_3$ of d. 1.38) were bubbled through solns. of III in $Et_2O$ or AcOH (6–10 parts of solvent). *The liquid became green, but only under certain conditions in AcOH* was a cryst. *compd.*, m. 60–7°, obtained in too small quantity to be analyzed. When the solvents were evapd. at room temp., thick yellow green oils were obtained, and these dissolved in *Et₂O*, washed with 5–6% aq. $Na_2CO_3$, the alk. ext. *acidified with dil.* HCl, extd. with $Et_2O$, the ext. evapd., the residual oil crystd. by cooling, dissolved in 95% EtOH, neutralized with alc. NaOH (phenolphthalein), alc. $AgNO_3$ added, *warmed, filtered, the residue washed with EtOH, dissolved in NH₄OH*, evapd., the ppt. washed and dried *in vacuo*, yields *Ag pentadecylate*. When the crude oil is let stand several months $(CO_2H)_2$ is deposited (Schaarschmidt has obtained $(CO_2H)_2$ by the *slow action of* $N_2O_4$ on satd. aliphatic hydrocarbons, cf. *Z. angew. Chem.* 37, 938(1924), cf. *C. A.* 18, 2138). Similar results were obtained by treating cold liquid $N_2O_4$ by attempting to prep. the addn. product with $AmNO_2$ and $HNO_3$, by treating III in an inert solvent with $NaNO_2$ and $H_2SO_4$, and by absorbing $N_2O_4$ in III under slight pressure at room temp. *I and II also gave similar results. The oil from I contained fatty acids*, but no Ag salt in a pure enough form to be analyzed was obtained. Here, too, $(CO_2H)_2$ was formed on long standing. With II a thick blue liquid was obtained. Thus, dil. $H_2SO_4$ (7 cc. coned. $H_2SO_4$ in 40 cc. water) added to II (8 g.) in ligroin (40 cc.), made ice-cold, aq. $NaNO_2$ (10 g. in 20 cc.) added dropwise, the aq. part removed, the ligroin soln. evapd. *in vacuo* over CaO and paraffin, yields a blue liquid which after 8–10 days becomes a greenish yellow thick oil. Treating this oil in the same way as that from III, a *Ag salt* contg. 59.8% Ag was obtained, probably a mixt. of salts. Similar blue liquids were obtained from I and III. The d. of these products is over 1, they do not react with water and they give the Liebermann reaction. They are also formed by bubbling nitrous vapors (from $As_2O_3$ and $HNO_3$ of d. 1.38) into ice cold I, II or III *without* solvent, stopping the reaction when the liquid has become dark blue, washing the product with water and sepg. by difference in d. The stability of the products varies with the nature of the hydrocarbon. That from II is the most stable, and the color lasts for several days. That from III is much less stable and the color disappears

after a few hrs The mol. wt. of the product from II was 179.2, which agrees fairly well with that for the nitrosite $C_6H_{12}O_2N_2$ *The formation of addn products was also* proved by detn. of the quantity of $N_2O_4$ by II at room temp Quant data on the absorption of $N_2O_4$ by I, II and III at room temp show in all 3 cases absorption which corresponds fairly closely with the addn of 1 mol of hydrocarbon with 1 *mol of* $N_2O_4$ That true addn products are formed is proved by mol.-wt detns. Thus the mol wt of the product from III was 304 (316 calcd for $C_{10}H_{16}N_2O_4$) A study was then made of the decompn of *nitrosites and nitrosates*, for which purpose amylene nitrosate (IV) and the isomers styrene α nitrosite (V) and styrene β nitrosite (VI) were chosen, for these *can be obtained in a very pure form* Further expts will deal with other analogous compds IV was prepd by the method of Wallach (cf *Ann* 241, 292(1887)) and V and VI by the methods of Wieland (cf *Ber* 36, 2559(1903)) The *app* for their decompn., which is described in detail and illustrated, *allows heating of the nitrosate or nitrosite in the dry state in a current of inert gas* ($CO_2$ or N) IV was thus heated at 90–5°, V at 100–25° and VI at 125–35° In all 3 cases, N, NO and $H_2O$ were evolved, and in no case was any appreciable quantity of a higher oxide of N, of O or of a combustible gas detected $CO_2$ was evolved in considerable quantity The following data give the % N (by wt.) evolved, the % NO evolved, the % total N evolved nd the ratio % N evolved/% N in compd., resp., for IV, V and VI: IV, 5 84, 2 50, 7 00, 0 405, V, 3 28, 6 93, 6 51, 0 418, VI, 4 04, 4 85, 6.30, 0 405 These results show that, although the components *in the gaseous decompn products are in all cases the same*, the % compn varies with the starting substance In each case, the % N evolved in gaseous form (N + NO) is around 40% of the total N in IV, V or VI. The remaining 60% of solid decompn. products is composed of $NO_2$ compds., nitriles, etc.

C C Davis

**Attempted preparation of methanetetrasulfonic acid.** Frederic B Kipping *J Chem Soc* 1931, 222–3.—$I_2C(SO_3K)_2$ and $K_2SO_3$ in $H_2O$ heated 4–5 hrs give K methionate AcNH$_2$ and $H_2SO_4$ (65 or 30% $SO_3$) at various temps give $CH(SO_3K)_3$, with 10% $SO_3$ below 170–80° only AcOK could be isolated but at 210° K methionate was obtained in a poor yield

C J West

**Changes in properties of chemical compounds by complex formation. VI. Methylation of alcohols by *diazomethane*.** Hans Meerwein and Gerhard Hinz *Ann* 484, 1–25(1931), cf *C A* 23, 4189.—Aliphatically bound HO groups, as far as is known, do not react with $CH_2N_2$ (I) The following results were obtained with 0 5% EtOH I at 0° (cc. $N_2$ in 1 min.) EtOH, *0.3*, PrOH, 0 1, iso-PrOH, 0 18, BuOH 0 18 Sufficient BuOH does not react with I in 30 hrs to make the method useful for the prepn of the ether Since it would appear that an activation of the HO group might be brought about by complex formation or by the introduction of a polar or easily polarized group in the neighborhood of the HO group a study of the latter possibility was undertaken The following results indicate that this is the case and that the alcs studied were more or less easily methylated by I. In general, the reaction was carried out by passing the I directly into the alc. Ethers retard the methylation in all cases and for this reason the *reaction does not go to completion, the resulting ether preventing* further methylation PhCH$_2$OH gives about 13% of the Me ether $(CH_2OH)_2$ and its mono-Me ether scarcely react with I. HOCH$_2$CH$_2$OAc in EtOH gives a mixt *of AcOEt, HOCH$_2$CH$_2$OMe, MeOCH$_2$CH$_2$OAc* and $(CH_2OH)_2$ Without a solvent the yield of the Me ether was about 12%. AcOMe(?) was also formed, although no explanation of its formation can be given α-Monoacetin gives 25% of the *mono Me ether*, $b_{15}$ *126–9°*, and some di Me ether $b_{15}$ 100–10° $(CH_2)_2O$ (30 g.) and 42 g. $Cl_3CCO_2H$ give 15 g. of *trichloroacetylglycol* (II), $b_{15}$ 130–40° with I 12 g. II gives 5 g. of the *Me ether* $Cl_3CC(OCH_2)_2OMe$, m 77 8°, which is not changed by boiling $H_2O$ or *N* NaOH but splits off $Cl_3CCO_2H$ with 0 25 *N* $HNO_3$ ClCH$_2$CH$_2$OH (15 g.) gives 8 g. of the Me ether m 91° ClCH$_2$CH(OH)CH$_2$OH (30 g.) gives 2 5 g. of the *Me ether*, b 171–2°, $d_0^4$ 1 1832, and 2 3 g. *of the di Me ether, with twice the amt of I* there results 2 and 12 g. resp. $(CH_2Cl)_2CHOH$ (30 g.) gives 26 g. of the Me ether, b 159 5–61 5° HOCH$_2$CH$_2$CN and I react vigorously, giving in addn. to the *Me ether (III) b* 162–4°, basic compds with a $C_5H_5N$ odor MeO detns. indicate a 52% yield of III, although but 25% could be obtained pure There was also isolated a *compd.*, $C_4H_7ON_3$, as the *HCl salt* MeCH(OH)CN gives about 20% of the *Me ether*, b 113–5° $d_4^{20}$ 0 8942, $n_D^{20}$ 1 3825, $Me_2CO$, MeEtCO and $Me_2C(OCH_3)_2$ AcCH$_2$OH gives only a small amt. of the Me ether, the *principal product (50–60%) being* EtCO CH$_2$OH BzCH$_2$OH behaves in a similar manner, giving *phenylacetylcarbinol*, $b_{11}$

140–5° With 20 g $HOCH_2CH_2Cl$ as a catalyst, 20 g PrOH and 8 g I give 5 g PrOMe and 5.6 g $MeOCH_2CH_2Cl$ BuOH (20 g.), 10 g $(ClCH_2)_2CHOH$ and 7 g I give 3.2 g BuOMe and 7 g $(ClCH_2)_2CHOMe$ BuOH (10 g.), 7 g $Cl_3CCH_2OH$ and 5 g I give 2.3 g BuOMe and 4.8 g $Cl_3CCH_2OMe$ Ten g of a 5% BuOH $ZnCl_2$ soln. and 2.2 g I give 2.9 g BuOMe 20 g of a 3.8% soln of $FeCl_3$ in BuOH and 7 g. I give 6.1 g BuOMe 20 g of a soln of $MgCl_2$ in BuOH give 5 g BuOMe A 5% soln of $Al(OEt)_3$ in BuOH and I give 83% of BuOMe, iso-PrOH gives 77% iso-PrOMe. $B(OEt)_3$ in EtOH (15 g of 5% soln.) and I give 13 g EtOMe, 0.69 g $B(OMe)_3$ and 13.8 g PrOH with 6 g I give 4.1 g PrOMe, iso-PrOH and BuOH are not methylated in the presence of B esters $Sb(OBu)_3$ and BuOH give 73% of BuOMe, iso-PrOH scarcely reacts with I in the presence of $(iso\ PrO)_3Sb$ C. J. West

Some aliphatic compounds of arsenic. W. J. Cecil Dyer, Gwyn Davies and Wm. J. Jones *J. Chem. Soc.* 1931, 185–8.—$Pr_3As$ $b_{11}$ 84°, $b_{13}$ 92°, $b_{18}$ 113°, which consts. are related by the equation $10.2378 - \log_{10} p = 3215/(t + 273)$ Exposed to the air, the arsine gradually deposits the oxide also prepd. by shaking the arsine with HgO or the dibromide with $Ag_2O$ *Tributylarsine oxide*, pasty crystals, and the *Am deriv.* were thus prepd. *Tripropyl* and *triisobutylarsine sulfides* crystallize as long needles $Pr_3AsBr_2$ and $Ag_2SO_4$ in EtOH give *tripropylarsine sulfate*, m. 84° *Dichlorides* result from the arsine and Cl in $CCl_4$ *tri Pr deriv.* m. 84° *tri Bu deriv.*, m. 40°, *tri-iso-Bu deriv.*, m. 130°, *tri Am deriv.*, sweet smelling liquid The *dibromides* prepd. similarly, are highly hygroscopic, Br is expelled by Cl, $HNO_3$ or $H_2SO_4$. *tri Pr deriv.*, m. 95°, *tri-Bu deriv.*, m. 55°, *tri iso Bu deriv.*, m. 135° *tri Am deriv.*, liquid The *diiodides* are formed in light petroleum they become brown on exposure to the air, *tri-Pr deriv.*, m. about 130°, *tri Bu deriv.*, m. 121°, *tri iso-Bu deriv.*, m. 117–9° $HgCl_2$ gives compds. of the general formula $R_3As\ HgCl_2$, which may be recrystd. from EtOH; *tri-Pr deriv.*, m. 106°, *tri Bu deriv.*, m. 70°, *tri-iso-Bu deriv.*, m. 158° The arsines and MeI in $Et_2O$ give methiodides, *methyltriethylarsonium iodide*, m. 270°, *tri-Pr deriv.*, m. 204°, *tri-iso-Bu deriv.*, m. 254°, in less pure condition were prepd. the *tri-Bu* and *tri-Am derivs.*, also *ethyltributylarsonium iodide*, m. about 107° *Methyltripropylarsonium chloroplatinate*, m. 219° (decompn.), *tri iso-Bu deriv.*, orange, m. 224° (decompn.), *tri-Am deriv.*, orange, m. 114° The arsine methiodides and $CdI_2$ give the arsonium cadmi-iodides, best crystd. from EtOH, *methyltriethylarsonium cadmi-iodide*, $2MeEt_3AsI\ CdI_2$, m. 283°, *tri Pr deriv.*, m. 279°, *tri-Bu deriv.*, m. 100°, *tri-iso-Bu deriv.*, m. 138° *Methyltripropylarsonium mercurichloride*, $MePr_3AsCl\ HgCl_2$, m. 141°. *Methyltriethylarsonium mercuriiodide*, m. 61°, *tri-Pr deriv.*, m. 90°, *tri-Bu deriv.*, m. 76°, *tri iso Bu deriv.*, m. 117° C. J. West

Parachor and chemical constitution. XVI. Silicon compounds. Samuel Sugden and Henry Wilkins *J. Chem. Soc.* 1931, 126–8, cf. *C. A.* 24, 2651.—$Si(OMe)_4$, $b_{744}$ 121–2° (all b. p. cor.), $d_4^{23}$ 1.032, $\gamma^{18}$ 21.98, parachor (*P*) 330.9, $d_4^t = 1.067 - 0.00155t$ $Si(OEt)_4$, $b_{754}$ 165.3–5.8°, $d_4^{17}$ 0.933, $d_4^t = 0.957 - 0.00135t$, $\gamma^{16.5}$ 22.21, *P* 487.6 $SiEt_4$, for which a method of prepn. is given, $b_{760}$ 153°, $d_4^{13}$ 0.7563, $d_4^t = 0.7818 - 0.000791t$, $\gamma^{13}$ 23.69, *P* 412.1 $SiPr_4$, $b_{761}$ 213.5°, $d_4^{24.5}$ 0.7809, $d_4^t$ 0.7990 − 0.000727*t*, $\gamma^{14}$ 24.65, *P* 565.3 $SiPh_4$, m. 231°, $d_4^{251.5}$ 0.937, $d_4^t$ 0.983 − 0.000883 (*t* − 200), $\gamma^{146}$ 23.70, *P* 787.5 The mean atomic *P* for Si is 27.8 Various values are given for d. and γ for these compds. C. J. West

Preparation of fatty acids. R. Lukeš *Chem. Listy* 24, 197–200(1930).—A general method of synthesis of fatty acids from ales. contg. 4 C atoms less than the desired acid is as follows The ale. is converted into the alkyl bromide, and this is combined with Mg to yield the corresponding Grignard reagent, which reacts with *N*-methylsuccinimide to yield a 1-methyl 5-alkylpyrrol-2 one This on hydrolysis yields a γ-keto acid possessing 4 C atoms more than the original ale., and this on electrolytic reduction yields the corresponding fatty acid Hexoic, heptoic, octoic, nonoic and decoic acids have been prepd. in this way The following hitherto unknown intermediate products are described *1-methyl-5-amylpyrrol 2 one*, $b_{15}$ 143–8°, *1-methyl-5-hexylpyrrol-2-one*, $b_{18}$ 148–50°; *γ-ketononoic acid*, m. 69°, and *γ-ketodecoic acid*, m. 70–1° B. C. A.

The mechanism of the decomposition of alkaline chlorohydrins. Lennart Smith. *Z. physik. Chem.*, Abt. A, 152, 153–6(1931).—Doubt that this reaction is not monomol. seems not to have been well founded, for S., by using pure samples, has obtained good consts. for $(CH_2OH)_2$ and $Me(CH_2OH)_2$. V. F. Harrington

Formins of glycerol. P. A. Dubois *Thesis.* Paris, 1929. *J. pharm. chim.* [8],12, 478–9(1930).—The objective was a rational and practical method of prepg. *allyl ale.* (I) Summary: (1) The mechanism of the formation of I, starting from $HCO_2H$ and glycerol, is different from that when $(CO_2H)_2$ is used (2) The esterification of

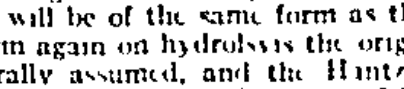
glycerol by $HCO_2H$ leads principally to the formation of diesters (3) $HCO_2H$ seems to act more easily on the secondary alc function of glycerol since the esters which predominate among the isomers of the same degree in the reaction mixt, are 2 mono formin and 1,2-diformin (4) When esterification is pushed to the diformin stage, a yield of 70% I is easily obtained S WALDBOTT

**A new form of the two antipodal rhamnitols** F. VALENTIN *Collection Czechoslov Chem Comm* 2, 689-95(1930).—Hydrated sugar alcs having definite compn and enantiomorphic cryst forms have been prepd for the first time *l* Rhamnitol formed by reduction of ordinary rhamnose with 3% Na Hg and crystd slowly from dil $H_2O$ soln forms the trihydrate (I), m 69°, $[\alpha]_D$ 8.83° The $H_2O$ of crystn was detd by drying at 100° *in vacuo* Crystals of *d* rhamnitol trihydrate (II), m 69°, $[\alpha]_D$ −8.89°, were obtained similarly from *d* rhamnose (see *C A* 25, 84) I is rhombic, *a b c*, 0.9947 1:1.1750 The measured angle between the optic axes for Na light is 82.75° The indices of refraction are $\alpha_{Na}$ (calcd.) 1.44, $\beta_{Na}$ 1.492, $\gamma_{Na}$ 1.505 The axial ratios and optical properties of II are the same JANET E AUSTIN

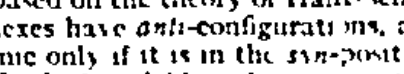
**Dipentaerythritol.** WALTER FRIEDERICH AND WILHELM BRÜN *Ber* 63B, 2681-90 (1930).—According to Ger pat 390,622, pentaerythritol (I) is prepd by adding to AcH and 4 mols HCHO in dil aq soln at 15° 1 equiv alkali or alk earth hydroxide in the course of 1 hr and slowly raising the temp to 45° during the next hr The m p of the crude product obtained by evapg the reaction mixt is raised to about 210° by crystn from $H_2O$ but again falls on further crystn It was concluded that I is accompanied by an impurity which is less sol in $H_2O$ This by-product has now been shown to be the ether, *dipentaerythritol*, $O[CH_2C(CH_2OH)_3]_2$ (II) Since the I and II cannot be sepd by crystn, the crude product was nitrated and the nitrates sepd through their different soly in $Me_2CO$ Treatment of the nitration product with $Me_2CO$ leaves undissolved almost pure I tetranitrate (III), the last traces of which are pptd by cautious addn of $H_2O$ to the $Me_2CO$ soln This produces 2 layers a $H_2O$-$Me_2CO$ mixt contg a little II *hexanitrate* (IV), and a satd soln of almost pure IV in $Me_2CO$ and a little $H_2O$ The latter stirred into 8-10 vols alc yields first a yellowish brown sirup and then white crystals, and the sirup, reppld from $Me_2CO$ with alc, gives a pure white product which is recrystd from alc *in vacuo* The IV cannot be saponf with alc. KOH because of the oxidizing action of the resulting $KNO_3$ on the II, but hydrolysis was effected with Zn and HCl or, better, with cryst $Na_2S$ in boiling $Me_2CO$-EtOH The II (yield, 89%), m 221°, mol wt in boiling $H_2O$ 250 $d_{15}$ 1.366 soly in 100 parts $H_2O$ 0.12 and 11.64 at 15° and 100°, in alc 0.007 and 0.33 at 20° and the b p, resp Perfectly pure I, whose prepn is to be described elsewhere, cannot be obtained by recrystn, a prepn which no longer gives the fuchsin $SO_2$ test for II (see below) m 260° the m.-p curve of mixts with II falls steeply to a min at about 190° with 30% II and shows that an I m 235°, which for practical purposes may be considered pure, contains 10% II Radulescu's statement that the by product m 220° obtained in the prepn of I can be converted into pure I, m 251°, by treatment with alc was not confirmed, the m p of pure II was not changed in the slightest by several crystns from alc IV (95.7% from II slowly added to cold $HNO_3$ (d 1.52) and treated with ½ vol conc'd $H_2SO_4$), m 75°, $d_{15}$ 1.630 (cryst.) 1.617 (fused), mol wt in freezing $C_6H_6$ 522, the f.-p curve of mixts with III (m 141°) is almost a straight line with no min or max *Hexaformate*, from II refluxed in conc'd $HCO_2H$ and fumed down twice with $HCO_2H$ at 120°, yellow m 56° *Hexaacetate*, from II, $Ac_2O$ and NaOAc, heated under a reflux until a violent reaction sets in (yield 54.8%), m 73°, mol wt in $C_6H_6$ 514 *Hexabenzoate*, from II, BzCl and NaOH below 40° (83.5% yield), m 183° *Hexatrityl ether* (97.3% from II and $Ph_3CCl$ in $C_5H_5N$ at 100°), m 173°, decompd by atm moisture and completely hydrolyzed by boiling $H_2O$ Attempts to increase the yield of II by the use of other alk condensing agents (KOH, $Ba(OH)_2$, $Pb(OH)_2$ $Zn(OH)_2$, $Na_2CO_3$) were unsuccessful, boiling for days with NaOH, $Ca(OH)_2$, $HCO_2Na$, $(HCO_2)_2Ca$ did not change the m p of pure I; fusion of I with $K_2CO_3$ yielded a brown resin contg no II or other cryst product No II was formed when I was heated at 300° under a steam jacketed head which permitted the $H_2O$ to distil off and condensed the higher boiling vapors back into the flask, nor when the I was heated at 300° in a sealed tube with 0.25 part $H_2O$ Pentaerythrose, condensed with AcH and HCHO in the most varied proportions, gave only ordinary crude I and in poorer yield than the method described above The mixt of glyceric aldehyde and $CO(CH_2OH)_2$ formed by oxidation of glycerol yielded no cryst products MeCH.CH-CHO with 8 mols HCHO and 1 equiv CaO gave I, m 218-52°, in 64% yield as detd by conversion into III $CH_2$:CHCHO with 3 mols HCHO and 0.5 mol $Ca(OH)_2$ gave 63.4% I. Expts with AcH, 0.5 mol $Ca(OH)_2$ and varying amts (1-8 mols)

NHOH, and why only aq III attacks Ni, Co, Cu and Fe (cf Note VI, *C A*. 17, 2268), or, in other words, why I has a basic function in which an oximic N atom becomes quinquevalent and III an acid function toward metals of the 8th group The method of *prepn of* I *and* III already described (cf Note VI, *C A* 17, 2268) should be modified as follows Aq HONH$_3$Cl (5 3 g ) and aq AcONa (11 8 g in 15 cc ), added to hot alc. IV (10 g in 20 cc.), kept at 60–80° for 12 hrs ($p_H$ is 5 2–5 4), cooled, the ppt (6 2 g of a mixt of 95% I and 5% III) dissolved in anhyd Et$_2$O, made ice-cold, dry HCl passed through the soln , and the ppt treated with dil Na$_2$CO$_3$, yield 6 g of pure I. The mother liquor, concd to the point of crystn , yields on cooling 4 g of a mixt of 75% of III and 25% of I. The mixt dissolved in boiling 50% EtOH, glacial AcOH added, excess hot 20% Ni(OAc)$_2$ added, the ppt washed with EtOH, decompd with HCl and extd with Et$_2$O, yields 2 8 g of III. To isolate the I which remains in the AcOH soln from which the Ni complex of III seps , the soln is made basic with NH$_4$OH, the ppt. is treated with dil H$_2$SO$_4$ and extd with Et$_2$O This yields 1 2 g of slightly colored I. Avogadro (cf Notes XIII and XLII, *C A* 18, 661, 21, 1976) has prepd *α*- and *β p*-tolylglyoximes (V and VI, resp ) Dry HCl passed into V in ice cold anhyd Et$_2$O, does not ppt a HCl salt, but 40% of V isomerizes to VI, and the latter is readily isolated as the Ni complex, Ni(C$_9$H$_9$O$_2$N$_2$)$_2$ Following the same procedure with VI, 60% of VI isomerizes to V. To isolate the V, the product is washed with Na$_2$CO$_3$, the solvent eliminated, the residue dissolved in boiling 50% EtOH, a little glacial AcOH added, excess Ni(OAc)$_2$ then added, the ppt (Ni complex of VI) removed, the filtrate made alk with NH$_4$OH, the ppt. treated with dil H$_2$SO$_4$ and finally extd with Et$_2$O V apparently m 170–1°, but it has no true m p since by the action of heat it isomerizes to VI. LXX. *Ibid* 886–93 —A better method for the *prepn of PhC( NOH)-C( NOH)Cl* (I) than that previously described (Note VI, *C A* 17, 2268, Note XXIV, *C A* 20, 746) is to dissolve *α* or *β* phenylglyoxime (or their mixt. from the oximation of PhCOCH NOH) in a min of 98–9% AcOH, cool, pass into the soln a slight excess of Cl, wash the ppt with AcOH and dry at 70–80° It m 190–200° I and BzCl (calcd quantity), heated 1 hr on a boiling water bath and the product recrystd from CHCl$_3$, yields *2 benzoylphenylchloroglyoxime*, PhC( NOBz)C( NOH)Cl (II), m 177–8° (slight decompn ), does not form an Ac deriv with Ac$_2$O at room temp II and excess BzCl, heated for a long time at 100° or boiled for a few min , hgrom added and the ppt recrystd from EtOH, yield *dibenzoylphenylchloroglyoxime* (III), m 148–9° III, dissolved in warm alc NH$_3$, the solvent eliminated, the residue dissolved in dil HCl, cryst AcONa added and the ppt recrystd from water, yields *β* phenylaminoglyoxime (IV) (cf Note VI, *C A* 17, 2268) II in Et$_2$O, agitated with a slight excess of 6 *N* NH$_4$OH for a short time, and the ppt recrystd from EtOH, yields *2 benzoyl α phenylaminoglyoxime*, PhC( NOBz)C( NOH)NH$_2$ (V), m 171–2° (slight decompn ), insol in cold dil NaOH, in EtOH with FeCl$_3$ it gives a light violet brown color which disappears when dild with water V, heated gently with 20% NaOH and a little EtOH, dild with water and the ppt recrystd from water or very dil EtOH, yields phenylaminofurazan (cf Note X, *C A* 17, 3875) The alk mother liquor, neutralized with CO$_2$, extd with Et$_2$O the ext evapd and the residue recrystd from a mixt. of Et$_2$O and petr ether, yields *α* phenylaminoglyoxime (VI) (cf Note VI, *C A* 17, 2268) Alc II and a slight excess of PhNH$_2$ heated to boiling dild with water, acidified with dil HCl, filtered (the residue is BzNH$_2$) NaOAc added to the filtrate and the ppt recrystd from CHCl$_3$, yield *α* phenylaminophenylglyoxime (cf Note VIII, *C A* 18, 661) In the cold, PhNH$_2$ does not react with II Cold IV, Ac$_2$O and fused AcONa yield, after crystn of the product from EtOH, *2 benzoyl N-acetyl α phenylaminoglyoxime*, PhC( NOBz)C( NOH)NHAc (VII), m 190–1° (slight decompn ) That the Ac group is united with the amino N and not to the oximino O is shown by the fact that when VII is heated gently with 20% NaOH and a little EtOH phenylaminofurazan and its Ac deriv are obtained In conjunction with earlier expts (cf Notes XXXVII, LXIV and LXV *C A* 21, 1099 25, 79 80), the present expts show that when BzCl acts at 100° on chloroglyoximes RC( NOH)C( NOH)Cl, where R is H, Me or Ph, the oximino H farthest from the Cl is first replaced by Bz, giving the RC( NOBz)C( NOH)Cl with which in turn excess BzCl forms RC( NOBz)C( NOBz)Cl The constitution of V corresponds to VI, *i e*, it is a deriv of a form of VI which in the free state is to be regarded as a labile form which is easily isomerized by fusion or by heating in dil AcOH into IV, a stable form Since I is transformed by NH$_3$ into IV, which is not isomerized by NH$_3$ to VI, in the benzoylation at 100° of I a 2 Bz deriv is obtained of a form of I incapable of existing in the free state This bears the same relation to the only known form of I as does VI to IV. HCl can isomerize 1 form of glyoxime to the other form (cf Note LXIX preceding abstract), so it is not impossible that a

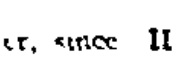
similar reaction takes place in benzoylation with BzCl at 100° Observations in the past on the behavior of acyl derivs obtained from MeC( NOH)C( NOH)OH, PhC-( NOH)C( NOH)OH HC( NOH)C( NOH)Cl and HC( NOH)C( NOH)NH$_2$ have shown, however, that in many cases the acylation of glyoximes proceeds in an abnormal way, even aside from an isomerizing action of HCl Accordingly, when 1 oximino H atom or both atoms in a glyoxime are replaced by 1 or 2 acyl groups, it is never certain that the acyl derivs will be of the same form as that of the original compd, even if these acyl derivs form again on hydrolysis the original form Acylation is much less simple than is generally assumed, and the Hantzsch and Werner theory is wholly inadequate to explain the phenomena (cf Notes LXIV and LXVI C 1 25, 79, 80) On the assumption (based on the theory of Hantzsch and Werner) that glyoximes which form Ni(DH)$_2$ complexes have *anti*-configurations, and that the Cl of the C( NOH)Cl group can become ionic only if it is in the *syn*-position to the oxime OH group, in the benzoylation at 100° of phenylchloroglyoxime with BzCl, the HCl liberated should bring about a spatial transposition and the passage from the *anti* to the *amphi* configuration



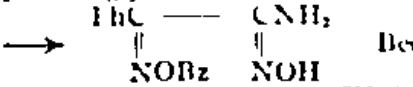
Moreover, since II and NH$_2$ form V, phenylaminoglyoxime and its 2 Bz derivs should be *amphi* compds



Because of the formation of III from II and of IV in turn from III, and since IV forms the Ni(DH)$_2$ complex and is (according to the Hantzsch and Werner theory) an anti form

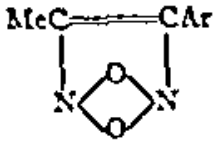


HCl should under the same conditions bring about a spatial transposition



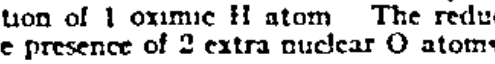
opposite to the preceding transposition (in the 1st case the hydroximino OH group passes from the *syn* to the *anti* position with respect to Ph, and in the 2nd case the same OH returns from the *anti*- to the *syn* position) The simplest explanation is that the NOH group in 1 glyoxime can (whatever the neighboring radical) assume 2 different structures, depending upon the reagent, *i e*, glyoximes react either as if they contained 2 NOH groups or as if they contained only 1 NOH group In this way, it is easy to explain why phenylchloroglyoxime from VI and IV forms a di-Ac and di Bz deriv, whereas VI, II and V cannot be acetylated in the NOH group in 1-position LXXI. G Ponzio and G Longo *Ibid* 893-9 —Expts by earlier investigators on the action of EtMgI on the diphenyl peroxide and methylanisyl peroxide (I) (cf Wieland and Semper, *C A* **2**, 1012), of PhMgBr on the methylpiperyl peroxide (II) (cf Angeli, *C A* **11**, 794) and of MeMgI on II and of PhMgBr on I (cf Bigiavi, *C A* **16**, 1394) showed the varying behavior of these peroxides and, furthermore, did not give any indication of the existence of the isomers of methylaryl peroxides Me(C$_6$N$_2$O$_2$)Ar recently described by P (cf Notes L, LI, LIV, LX, LXI and LXII, *C A*. **23**, 375, 3065, **24**, 363, 1633, 3488, 3774) It was therefore of interest to ascertain whether these new peroxides behave differently toward the Grignard reagent than do their isomers Since the isomeric methylaryl peroxides are readily transformed to the other form by the action of heat, the reaction was in every case carried out at room temp for a very short time instead of prolonged heating in C$_6$H$_6$ The expts in the present paper confirm the indications of the earlier work, that the methylaryl peroxides with the higher m ps are furoxans, MeC$\overset{\frown}{\text{N(O)ONC}}$Ar, and those with the lower m ps are dioxdiazines, MeC$\overset{\frown}{\text{NOONC}}$Ar Because peroxides are relatively inactive, an extremely active reagent, *viz*, MeMgI was used instead of PhMgBr, particularly since the latter also gave rise to secondary products MeMgI was found to be much more active than EtMgI. With furoxans, MeMgI liberated 1 N atom as NH$_3$, leaving the other N atom as an ArCN compd, while with dioxdiazines both N atoms are detached and liberated as NH$_3$ The C atom of the furoxans which is united to Me and to the quinquevalent N atom combines with the Me of MeMgI with formation of AcMe, while with dioxdiazines both C atoms which are united to tervalent N atoms combine with the Me of MeMgI with formation of AcMe and a Me ketone The fact that in furoxans the 2 N atoms behave differently, whereas in dioxdiazines they have an

identical behavior, agrees with the existence in furoxans of both ter- and quinquevalent N and in dioxdiazines of 2 tervalent N atoms, and shows that the $C_2N_2O_2$ group of furoxans has an asym structure and that of dioxdiazines a sym structure Besides confirming the structures of furoxans and dioxdiazines shown above, *i e*, of the isomeric methylaryl peroxides, the expts exclude the possibility that the peroxide with the lower m p can be the furoxan MeC(:N·O·N(:O)):CAr The latter would behave like the other furazan PhC(:N(:O)·N):CAr, and yield with the Grignard reagent MeCN, which in numerous expts could not be obtained, either as such or as its hydrolysis product AcOH, by the use of MeMgI, EtMgI or PhMgBr The reaction between methylaryl peroxides and the Grignard reagent is difficult to interpret. If MeMgI attaches to an ethylenic double bond and thus brings about its rupture, the 2 isomeric peroxides have the same structure



like that proposed by Green and Rowe for *o* quinone dioxime peroxides (cf *C A* 7, 3119, 8, 1412) This structure may, however, be that of the peroxides with the lower m ps which have been regarded as dioxdiazines MeC(:N·O·O·N):CAr With triphenylisoxazoline oxide, MeMgI adds to the —C(:N):O group (cf Green and Rowe, *loc cit*) and then with water forms a compd in which the bond between C and N still exists The same is true of the methylaryl peroxides with the high m ps (furoxans), but is not true of those with the lower m ps The latter do not, therefore, have this structure, *i e*, are not furoxans *Exptl*—Methylphenylfuroxan (5 5 g), added cautiously to MeMgI in $Et_2O$ (from 21 g MeI, 250 g $Et_2O$ (distd over Na) and 3 4 g Mg), let stand after the reaction has subsided, the $Et_2O$ evapd, ice water added, steam-distd and the distillate collected in dil HCl, yields insol PhCN The latter is removed, and the mother liquor, boiled, yields AcMe in the distillate while the dry residue is $NH_4Cl$ Under the same conditions methyl *p*-bromophenylfuroxan yields *p*-$BrC_6H_4CN$, AcMe and $NH_3$, and 4 methyl 5-*p*-bromophenyl 1,2,3 6-dioxdiazine (III) yields *p*-$BrC_6H_4Ac$, AcMe and $NH_3$. Crystd from hot EtOH, III m 92 3° (cf 89–9° of earlier expts, Note L, *C A* 23, 375) Similarly, methyl *p*-methoxyphenylfuroxan (IV) and MeMgI yield *p*-$MeOC_6H_4CN$ (V), AcMe and $NH_3$ With EtMgI IV reacts only with *difficulty, with formation of V, MeCOEt and* $NH_3$ *4 Methyl 5-p methoxyphenyl-*1,2,3 6-dioxdiazine (VI) and MeMgI form *p*-$MeOC_6H_4Ac$, AcMe and $NH_3$. With EtMgI, VI reacts only with difficulty, with formation of *p*-$MeOC_6H_4COEt$, MeCOEt and $NH_3$. Methyl[3,4-dihydroxyphenyl]furoxan methylene ether and MeMgI yield piperonylic nitrile, AcMe and $NH_3$ 4 Methyl 5-[3,4 dihydroxyphenyl] 1,2,3,6-dioxdiazine methylene ether and MeMgI yield 3 4 $CH_2O_2C_6H_3COMe$ (acetopiperone), AcMe and $NH_3$. LXXII. E Durio and M Bissi *Ind* 899–903.—In the oxidation of α benzil dioxime (I) with alk $K_4Fe(CN)_6$, Auwers and Meyer (cf *Ber* 21, 806 (1888)) obtained the diphenyl peroxide $Ph(C_2N_2O_2)Ph$ (II) and a secondary product $C_{14}H_{10}O_2N_2$ (III) III has never been described since, yet its formation may be of importance in explaining the dehydrogenation of glyoximes to the so-called peroxides The present paper shows that III is formed from the α but not from the β-form of I, and describes the conditions which lead to a much higher yield than the extremely small yield by the procedure of Auwers and Meyers Aq 15% $K_4Fe(CN)_6$ (30 g) added dropwise to I (10 g) in 10% KOH (200 cc) keeping ice-cold, the ppt. purified by boiling in EtOH and recrystg the residue from glacial AcOH, yields 25–30% of the *compd* $C_{14}H_{10}O_2N_2$ 2AcOH in air it loses slowly at room temp and rapidly at 100° its AcOH of crystn, leaving III, which was proved to be *dioxotetraphenylpyrazine* O·N(:CPh·CPh·N(:O)):CPh·CPh It is yellow, m 322°, gives an intense red soln in concd $H_2SO_4$ (from which it is repptd by water), is not altered by heating with HCl (d. 1 19) at 160–70° in a sealed tube Traces of III are also formed by the oxidation of I with NaClO (cf Note LXI, *C A* 24, 3188) III (5 g) in glacial AcOH and Zn dust (3 g), heated several min on a boiling water bath, filtered and the filtrate cooled, ppts 3 5 g of tetraphenylpyrazine (IV) After sepn of IV, the mother liquor, made alk

with NaOH and steam distd., yields a small quantity of tetraphenylpiperazine III and $PCl_5$ (equal parts), heated at 140–50°, yield a brown liquid which treated with water solidifies, and crystd from glacial AcOH, yields *chlorotetraphenylpyrazine* (V), m 212° gives an intense red soln in concd $H_2SO_4$. This reaction is similar to that of furoxans under the same conditions (cf. Notes L and LVI, *C. A.* 23, 375, 24, 615), *i. e.*, III is first deoxygenated to IV, which then reacts with Cl with formation of V. The formation simultaneously of II and III from I proves that $K_4Fe(CN)_6$ acts on I in 2 distinct ways: (1) simple dehydrogenation which forms II, and (2) a more complex reaction which involves the elimination as $HNO_2$ of 2 H atoms and 2 NOH groups from 2 mols of I, thus $2I + 2O \longrightarrow III + 2HNO_2 + H_2O$. Since under the same conditions β and α benzil dioxime (VI and VII) form exclusively II, both NOH groups of VI and VII are dehydrogenated by oxidizing agents, whereas in I, 1 NOH group is dehydrogenated and the other is oxidized, *i. e.*, toward oxidizing agents the NOH groups of VI and VII behave the same and those of I differently. This behavior is analogous to that with $Ni^{++}$ ions where of the 3 benzil dioximes only I forms the complex $Ni(C_{14}H_{11}O_2N_2)_2$ by substitution of 1 oximic H atom. The reduction of III by nascent H or $PCl_3$ to IV shows the presence of 2 extra nuclear O atoms, confirms the formula



given and excludes the formula O O N CPh CPh N CPh CPh. The reactions described in the present paper as well as those already known of glyoximes show that it is impossible to generalize, *e. g.*, α *p*-tolil dioxime and anisil dioxime which have many properties in common with I, yield on oxidation with $K_4Fe(CN)_6$ no trace of III.

C. C. Davis

**Ammomalonic ester. Action of alkyl iodides and bromides on diethylsodioaminomalonate.** R. Locquin and V. Cerchez *Bull. soc. chim.* [4], 47, 1377–80 (1930).—This is an introductory paper stating that $NH_2CNa(CO_2Et)_2$ reacts with alkyl iodides and bromides to give $RC(NH_2)(CO_2Et)_2$ in 50% yield. These substances are basic; they form cryst. compds. with KOCN and PhNCO. Previous work on $NH_2CH(CO_2Et)_2$ is reviewed.

I. M. Levine

**Some alkylaminomalonic esters and their immediate derivatives.** V. Cerchez *Bull. soc. chim.* [4], 47, 1381–5(1930).—By the action of 1 mol. of iso-$C_4H_9I$ on 1 mol. of $NH_2CNa(CO_2Et)_2$ either in alc. or in iso-$C_5H_{11}OMe$ there was obtained 50% of *di-Et α-aminoisobutylmalonate* (I), $C_4H_9C(CO_2Et)_2NH_2$, $b_{14}$ 136°, $n_D^{15}$ 1.4371, $d_4^{15}$ 1.0109, M. R. 59.93 (calcd. 59.75). Treated with KCNO in AcOH I gave the corresponding *urea*, $C_4H_9C(CO_2Et)_2NHCONH_2$, m. 194°, and with PhCNO in $Et_2O$ the *phenylurea*, $C_4H_9C(CO_2Et)_2NHCONHPh$, m. 128°, in 70% yield. On mixing 2 g. of I with 8 g. of water satd. with $NH_3$ at 0°, together with a few drops of EtOH and shaking vigorously, the *diamide*, $C_4H_9C(CONH_2)_2NH_2$, m. 153°, was formed on 24 hrs. standing. *Di-Et aminoallylmalonate* (II), $CH_2:CHCH_2C(CO_2Et)_2NH_2$, was prepd. from $CH_2:CHCH_2Br$ and $NH_2CNa(CO_2Et)_2$. II, $b_{17}$ 134–5°, $n_D^{23}$ 1.4442, $d_4^{23}$ 1.039, M. R. 55.00 (calcd. 54.67); *urea*, m. 173–4°; *phenylurea*, m. 113°. Attempts to make *di-Et aminobenzylmalonate*, $PhCH_2C(CO_2Et)_2NH_2$, resulted in noncryst. oils, decompg. on heating, which gave with KCNO the *urea*, m. 234°, and with $NH_4OH$ the *diamide*, m. 156°.

C. R. Addinall

**Preparation of α-amino acids by hydrolysis of alkylaminomalonic esters.** R. Locquin and V. Cerchez *Bull. soc. chim.* [4], 47, 1386–9(1930).—Alkylaminomalonic esters are hydrolyzed either by means of superheated steam at 150° in an autoclave or by refluxing with 10% HCl, to yield α amino acids, $CO_2$ and ROH. The use of steam is preferable unless the resulting acid is insol. in $H_2O$. $NH_2CH_2CO_2H$ (I) (9.5 g. from 25 g. of $NH_2CH(CO_2Et)_2$), leucine, $PhCH_2CH(NH_2)CO_2H$ and $CH_3CHCH_2CH(NH_2)CO_2H$ were obtained in this way. In the prepn. of I, the compd. *I.HCl*, m. 185°, was isolated.

I. M. Levine

**The structure of some organic molecules.** O. Hassel and E. Naeshagen *Tids. Kemi Bergvesen* 10, 126–7(1930); cf. *C. A.* 24, 2346.—A preliminary notice concerning work on dipole moments, and discussing in this connection *meso-* and *dl* forms. Racemic and active dichlorosuccinic acids gave almost identical values for the dipole moment ($2.93 \times 10^{-18}$), the *meso*-form gave lower values ($2.47 \times 10^{-18}$). β-Hexachlorocyclohexane (*trans*) has a center of symmetry, and dipole moment 0, while α hexachlorocyclohexane (*cis*) has dipole moment $2.20 \times 10^{-18}$ e.s.u.

G. R. Yohe

**Preparation of bromoacetyl sugars and of acetoglucals.** P. A. Levene and Albert L. Raymond *J. Biol. Chem.* 90, 247–50(1931).—The prepn. of $BrCH_2CO$ derivs. of sugars can be greatly simplified by dissolving the reaction product resulting from the

action of HBr and $Ac_2O$ on the sugar or of HBr in AcOH on the pentaacetate in $C_7H_8$, concg the soln at 40–50° under reduced pressure and renewing the $C_7H_8$ until all the excess reagents are removed. The $BrCH_2CO$ deriv generally crystallizes directly in the distg flask. The procedure in the prepn of acetoglucals is also much simplified by the use of $C_7H_8$, it forms an azeotropic mixt. with the AcOH used as a solvent when treating the bromoacetylsugar with Zn dust. A P Lothrop

Crystalline α- and β-methyl *d*-gulosides. Horace S. Isbell. *Proc Nat Acad Sci* 16, 699–703(1930). cf. *C. A* 25, 1223.—Although a sirup of Me gulosides prepd by condensation of the pure sugar with MeOH in the presence of 1% HCl could not be crystd directly, the isomeric gulosides were sepd. by means of their cryst. addn compds with $CaCl_2$. By removal of $CaCl_2$ with $(CO_2Ag)_2$ the pure cryst. Me gulosides were prepd and their parent $CaCl_2$ compds reprepd. as a check on their original purity. The new compds described are *α-Me d gulonide* $CaCl_2.2H_2O$, $[\alpha]_D^{22}$ 67°, [M] 22,900, (*α-Me d-gulonide*)$_2$.$CaCl_2$ $3H_2O$, $[\alpha]_D^{22}$ 83°, [M] 23,000, *α-Me d-gulonide* $H_2O$, decomps 77°, $[\alpha]_D^{22}$ 109°, [M] 23,100, *β-Me d gulonide* $CaCl_2.2H_2O$, m. 155°, moderately sol. in abs. alc., $[\alpha]_D^{22}$ —46°, [M] —15,640, (*β-Me d-gulonide*)$_2$ $CaCl_2$, very slightly sol. in abs. alc., $[\alpha]_D^{22}$ —65°, [M] —16,200, *β-Me d gulonide*, m. 176° (uncor.) $[\alpha]_D^{22}$ —83°, [M] —16,100. The mol. rotations of all the α forms are in good agreement with one another as are those of the three β-forms. The difference between the mol. rotations of the α- and the β-gulosides is 39,200 which compares favorably with the normal value 37,000. P C. Hockett

β-Lactose. John Gorton. *Svensk Farm Tidk* 34, 665–7(1930).—Lactose (100 g.) dissolved in 60 cc. $H_2O$ over a free flame and set aside at 105° to crystallize gave 90% of β-lactose with $[\alpha]_D$ 39°, changing to 53.6° in 3 hrs. The $[\alpha]_D$ of the original lactose was 83.7°. The β-soln. when made alk. with $NH_3$ gave $[\alpha]_D$ 55.2° and the α 52.7°. A R. Rose

Recent syntheses in the sugar group. Amé Pictet. *Atti III congresso naz. chim. pura applicata* 1930, 36–41.—A brief review is given of the efforts to synthesize sugar with special emphasis on the methods involving condensation of the anhydrosugars and on the synthesis of sucrose. By heating starch with glycerol, 2 series of anhydrides (hexa-, tri- and diglucosans) are obtained which may be considered as polymers of glucosan. The 1st series of compds. is unaffected by I and the last member is an anhydride of maltose. The members of the other series are colored by I and the simplest is an anhydride of isomaltose. The members of the 1st series polymerize readily under the influence of light, giving substances colored by I. The triglucosan of the 2nd series in concd. aq. soln. protected from light, in time deposits a colloidal substance colored violet by I which is strikingly analogous to starch itself. Its acetate shows by f. p. methods that it must be a dodecaglucosan, $(C_6H_{10}O_5)_{12}$. R. C. H.

Inulin. X. H. Pringsheim, J. Reilly, W. G. Hensel, W. Burmeister, P. P. Donovan and Miss N. Hayes. *Ber* 63B, 2636–42 1930); cf. *C. A* 24, 3996.—Berner (*C. A* 24, 5730) has criticized the observation that inulin dissolves in liquid $NH_3$, fused $AcNH_2$ and (as its acetate) in AcOH with a mol. wt. corresponding to a difructose anhydride, and that by heat disaggregation and boiling of its acetate with $PhSO_3H$, as well as by soln. in $AcNH_2$, it is converted into an inulan of the same mol. wt. B. ascribes the depressions observed to impurities such as $H_2O$ or alc. in the inulin and $AcNH_2$ in the inulan. The authors have shown by the $C^1H_3$ reaction that the inulin they used was alc. free and that the 1.9% of $H_2O$ in the air-dried product is generally given off in 0.5 hr. at 78° *in vacuo* over $P_2O_5$. The inulan on distn. from alk. soln. gave no more color with Nessler reagent than did distd. $H_2O$. The mol. wt. detns. were repeated independently at Berlin and Cork with due regard to these sources of error and the results confirmed by measurements in purified $HCONH_2$. Observing the precautions specified by Freudenberg (*C. A* 24, 1846) values corresponding to 2 × $C_6H_{10}O_5$ were in most cases obtained for inulin in both $HCONH_2$ and $AcNH_2$, although double this value was obtained in 2 cases, whether this was due to previous treatment in the prepn. and purification or to the fact that natural inulin, as believed by Schlubach, is not a homogeneous substance remains to be tested. The inulan in $H_2O$ soln., when sufficiently dil. again gave values corresponding to the 2 × $C_6$-stage. Drying has some influence on its original $H_2O$-solv. but even after especially vigorous drying at 110° it showed, after soln. in hot $H_2O$, a mol. wt. (387) not very much higher than 2 × 162. Schlubach and Elsner and Jackson and Goergen have observed that a small amt. of glucose is formed along with the fructose in the acid hydrolysis of inulin. The present authors also observed, by differential titration according to Bertrand on the one hand and Willstatter Schudel on the other, an aldose content higher than could be accounted

for by exptl error (Cu I, 100 7 0 9 4) Expts on pure fructose under the conditions of the Willstatter titration showed that it is attacked to the extent of about 2 8%, the aldose content in the acid hydrolyzate of inulin thus being reduced to about 5% Taking this titration error into account, no glucose could be found in the inulinase hydrolyzate, thus confirming Bourquelot and Bridel This, however, does not prove that inulin contains no glucose, for the max of hexose obtained by the ferment hydrolysis, as detd with Fehling soln, was only 60% even after weeks and months C A R

**Methylated tri- and tetra-saccharides from cellulose and starch.** Karl Freudenberg and Karl Friedrich *Naturwissenschaften* 18, 1114(1930) —Recently cryst decamethyl β methylcellotrioside, $b_{0.05}$ 210–20° was prepd by acetolysis and methylation of cellulose (*C A* 25, 85) The cellobiose deriv, b 60° lower is also obtained by the same distn The methyltetrose $b_{0.1}$ 255–75° and is also obtained in crystals with all the properties of a tridecamethyl β methylcellotetroside Both compds crystallize easily in water or petr ether even when the MeO content is 1 2% too low Repeated methylation of the cryst prepn gives an analytically correct and uniform product with the expected mol wt in camphor The methylated trisaccharide, m 118°, has $\alpha_{578}^{18}$ —17° in water the methylated tetrasaccharide, m 139°, $\alpha_{578}^{18}$ 14 6° From the products of acetylated starch corresponding, but noncrystallizable, fractions were obtained after methylation a methylated trisaccharide, $\alpha_{578}^{18}$ 133° (water), mol wt. 613 (calcd 678), and a methylated tetrasaccharide, $\alpha_{578}^{18}$ 140° (water), mol wt 812 (calcd 862) These products of starch are the α glucosidic analogs of the methylated oligosaccharides from cellulose, the former having MeO in α as well as β positions From demolition kinetics it was deduced (cf preceding abstr) that starch as well as cellulose has a chain structure The present data are addl evidence The same structure is required for inulin contrary to the opinions of Pringsheim (following abstr), Schlubach (*C. A.* 25, 215) and Staudinger (*C A* 25, 290) B J C v d H.

**Chemistry of starch. XXIV. New polyamyloses.** I. Hans Pringsheim, Alfred Wiener and Alexander Weidinger. *Ber* 63B, 2628–36(1930), cf *C A* 24, 3996 —When $AcNH_2$, which, it had been found, can be used as a f p solvent for complex saccharides such as inulin and glycogen, was tried with α tetraamylose (I), it gave values for the mol wt corresponding, not to a tetra- or diamylose, but to a hexose anhydride (162) In view of the possible effect of the high temp of molten $AcNH_2$ (above 80°) on the labile polyamylose, the mol.-wt detns were repeated in $HCONH_2$ but with the same results At first higher values (never below and often above 2 × 162) were obtained, but this was traced to impurities in the $HCONH_2$ (Schering Kahlbaum, m —5° to —7°, with about 1% $HCO_2H$) When this had been purified until it was acid free and m. 1.8–2°, it always gave for I a mol wt corresponding to a glucose anhydride Pptn of the $HCONH_2$ soln with alc. gave 80% of a cryst substance (II) sepg from hot aq alc with 1 mol $H_2O$ in column-shaped prisms having, when dried, the compn and mol wt. (in $H_2O$) of a glucose anhydride and giving with I-KI the long green needles with metallic luster characteristic of α amyloses II is therefore designated as *α-amylosan* The mother liquor from the II, freed of alc. and $HCONH_2$ *in vacuo* and pptd with EtOH-$Et_2O$, gave an amorphous product (III), sepg from dil alc in rhombic tables with 1 mol $H_2O$, which could best be differentiated from II by means of I-KI which gave brown red prismatic columns like β polyamyloses III, which is called *β-amylosan*, also has the compn $C_6H_{10}O_5$ but gives a mol wt of 2 × 162 in both $H_2O$ and $HCONH_2$ β-Hexaamylose (IV) showed a mol wt of 2 × 162 in both $AcNH_2$ and $HCONH_2$ and when pptd from $HCONH_2$ with EtOH-$Et_2O$ yielded 90% of III. Like the polyamyloses II and III form with org solvents difficultly $H_2O$ sol addn products by means of which they can readily be isolated from aq solns The II and III were further characterized by means of their acetates In AcOH the acetate of III was dispersed nearly to the $C_6$ stage in 24 hrs On heating, the rotations of aq solns of II and III change to a final const. value (II, from 150° to 128°; III, from 179° to 150°) and recrystn of the resulting products from dil alc. gives well-crystd substances, α- (V) and *β-isoamylosan* (VI) Neither V and VI nor their I and Br addn products differ visibly in cryst form from II and III and their corresponding derivs In $HCONH_2$ V and VI give the expected mol. wts and after pptn their rotations are found unchanged. In $H_2O$, however, they show a pronounced tendency to aggregate, gradually passing after several days at room temp into a colloid-dispersed state II, heated 6 hrs on the $H_2O$ bath in $HCONH_2$, changed to a substance (VII) sepg from aq alc. in 6-sided tables and yielding an especially characteristic I addn product in black green prisms I, II, III and IV in aq $C_5H_5N$ (7.3) all showed

the same specific rotation (133°) II, $[\alpha]_D^{20}$ 144.8–9° ($H_2O$) III, $[\alpha]_D^{20}$ 173–81° ($H_2O$) *a Triacetylamylosan*, $[\alpha]_D^{20}$ 120–4° ($CHCl_3$), mol. wt. 256–307 (AcOH) *β-Triacetylamylosan*, $[\alpha]_D^{20}$ 129–32.5° ($CHCl_3$), mol. wt. 332 (AcOH) V, $[\alpha]_D^{20}$ 127–33° ($H_2O$) VI, $[\alpha]_D^{20}$ 150–2° ($H_2O$), 145.5° (*$H_2O$-EtOH, 1:1*) C. A. R.

**Lignin and cellulose. XIV. The hydrolysis of polysaccharides.** Karl Freudenberg, Werner Kuhn, Walter Dürr, Fritz Bolz and Gustav Steinbrunn *Ber* 63B, 1510–30 (1930); cf *C. A.* 24, 1846.—In the series of researches relating to the kinetics of the degradation of polysaccharides, the measurements on disaccharides and other sugar derivs. formed a communication preliminary to those on cellulose and starch (*C. A.* 23, 176). Starch is now investigated under the conditions used with cellobiose and maltose. For cellulose 50% $H_2SO_4$ was used, soln. and hydrolysis followed just as with starch and cellodextrin (the biosan of Hess). The detn. of the aldehyde groups freed was made with 0.1 *N* I. The Cu method does not work because cellobiose reduces more Cu than 0.5 glucose, the 2nd glucose group is attacked after destruction of the 1st. The velocity const. for the hydrolysis of cellobiose by 50% $H_2SO_4$ at 18° was found to be $1.07 \times 10^{-4}$ (*t* in min.) by means of well-agreeing I titrations and polarimetric observations. With cellulose the degree of hydrolysis as detd. polarimetrically is in advance of the degree as detd. by titration with I. The object was to find which of the possible courses of reaction (see last reference, hypotheses II, III and V) best suits the data as obtained by the latter method. Of the consts. assumed, $k_2$ is known *from* the velocity of hydrolysis of cellobiose. $k_1$ is the initial velocity const. of the reaction in all 3 cases. It is found either by extrapolation to an infinitely short time from the mean velocity const. $P_a$, or is detd. from $k_2$ and any one value of $P$ ($P_{0.5}$ was chosen, *i. e.*, $P$ for $a = 0.50$) with the aid of the tables calcd. from one of the 3 fundamental formulas expressing the relation between $k_2$, $k_1$ and $k_2 P_{0.5}$. The degree of agreement between the entire courses of the empirical and theoretical curves shows the applicability of the fundamental relation on which the formula used is based. *Hypothesis II* ($k_2$ *only for* cellobiose different from $k_1$) is eliminated while hypothesis III ($k_2$ for disaccharide and trisaccharide) gives good and hypothesis V (biosan conception) fairly good agreement. Formula III is the better expression, especially for the final stage of the reaction. The fission of cellulose at 30° gives entirely analogous results. *Hydrolysis of biosan acetate* (Hess and Friese, *C. A.* 21, 174). Biosan acetate was crystd. from $CHCl_3$-MeOH, extd. with the latter and the Ac groups removed according to Fischer and Zemplén; the $H_2O$-insol. portions of the free dextrin were used. $[\alpha]_D$ in 2 *N* NaOH —9.95°. *Fission at 18° and 30°. $k_1$ is as large as in the case of* cellulose and here also hypothesis III is better suited than V to explain the kinetics. *Hydrolysis of starch*.—$k_2$ (maltose) at 18° $1.60 \times 10^{-4}$. Kahlbaum's sol. starch, $[\alpha]_D$ in formamide (0.5%) 195°. $k_1$ by extrapolation = $1.07 \times 10^{-4}$, by hypothesis III, found $1.19 \times 10^{-4}$. The curve constructed according to this agrees well with that found empirically. Hypothesis II is *eliminated here but not the biosan assumption* (V). *Similar* facts hold good for the hydrolysis at 30°. *Hydrolysis consts. of disaccharides*.—Solns. were 0.1 *N* in 2 *N* $H_2SO_4$ at 70° (*t* in min.). gentiobiose 3.06, levoglucosan 6.0, trimethyl levoglucosan 1.0, Me mannoside ($[\alpha]_{578}$ 79° in $H_2O$) $1.8 \times 10^{-4}$ in good agreement with similar measurements of Moelwyn Hughes (*C. A.* 22, 1888, 23, 5089, 5393, 24, 2154). The consts. given by von Meyer, Hopff and Mark (*C. A.* 23, 4451) for the inversion of maltose are not in agreement. *Optical Rotations*.—In connection with the polarimetric detn. of the degree of degradation, it is to be borne in mind that the rotatory power unlike the I value does not lie around the half point between glucose and cellulose (see above). *An effort is made to reach a better approximation by assuming* the rotations of the tri- and tetrasaccharides to correspond to their position between the disaccharide and polysaccharide. The values calcd. from assumption III are in better accord with the actual detns. than those from V, but a close agreement between the values so calcd. and the α-values found titrimetrically is not obtainable. The former III remain somewhat behind the detd. values which indicates that the rotations of the tri- and tetrasaccharides are somewhat higher than those indicated by the new assumption. Thus *the deviations may be explained without difficulty. In* contrast the biosan theory requires exact applicability of the derived formulas. Large and const. deviations indicate more than mere expti. errors. From the dependence of the velocity consts. of hydrolysis upon temp. the heats of activation are derived for the fission of the compds. and the thermal proportionality factors. The heats of activation of starch and maltose are not significantly different from one another while those of cellulose and cellobiose are well distinguished, the former being smaller. That, nevertheless, the velocity const. for cellulose *is smaller is to be ascribed to the much*

smaller thermal proportionality factor. Similar, but less pronounced, are the relations with starch and maltose. The kinetic considerations exclude a 2nd type of linking along with the cellobiose linking. Since fully methylated cellulose decomps. only into 2,3,6-trimethylglucose, the only alternative lies between the α- and β-linkings on C atom 4. A disaccharide more difficultly hydrolyzed than cellobiose or one equally easily split, along with cellobiose, would be comprehensible but one more easily hydrolyzed like maltose would make itself noticeable through a more rapid course of reaction. With cellodextrin the extrapolated initial I consumption indicates a chain length of 30 to 40 glucose residues (mol. wt. around 5000 to 7000). The authors explain the deviation from the lower value of Bergmann and Machemer (*C. A.* 24, 2877) by the fact that in the free dextrin used, the lower water sol. parts were removed and these must have been present in the biosan acetate used by Bergmann. With cellulose, a parallel situation is found, giving a chain length of 50 glucoses. Cellodextrin is close to cellulose also as indicated by its lower rotation. The chain of cellulose is assumed to be actually longer since small admixts. of lower carbohydrates can raise the I value. The very different properties of cellodextrin from those of cellulose (solv., viscosity) are to be attributed to the proportionate length of chain, the former having been partially shortened, the entirely undegraded fragments especially being absent. From the I requirement, starch indicates a chain length of 25–30 glucose residues. The sol. starch used was perhaps partly degraded already. A strict literal application of assumption III forces us to make a fundamental distinction between the di- and trisaccharides and the tetrasaccharides. If the middle linking within a long chain always reacts according to $k_1$, the outer linking according to $k_2$, then *formula III would be a 1st* but only a poor approximation. Necessary modifications would have to be made if higher fission consts. of intermediate values between $k_2$ and $k_1$ were to be ascribed to the outer bindings. It would be conceivable that the glucoses should be split off more rapidly at 1 or both ends (perhaps according to $k_2$) while the rest hydrolyzed more or less according to $k_1$. The detn. thus far of the max. yield of cellobiose depended upon the assumption of similar stability of the linkings throughout the chain. If this proves incorrect, then the cellobiose resulting during all stages of degradation would have to remain under 67%, which agrees with a series of new results (50–60%). With starch, it is more difficult to decide regarding the small difference between the initial and final velocities, but the complete analogy between the degradation and the optical changes makes a chain structure seem likely here also. The high yields of acetobromomaltose which Karrer (*C. A.* 16, 63) obtained by the AcBr degradation of starch are explained by the fact that that substance is attacked more slowly by AcBr than the chain compds. *The diastatic degradation is explained by a similar linking of all the glucose residues of* the starch chain, but with a series of accessory assumptions confirmed by kinetic observations. A chain formula is also required for maltase. The newly detd. facts are reconcilable with the chain formulas and a uniform interpretation is possible only with this conception.

R. C. Hockett

Lignin and cellulose. XV. Lignin and nitrogen peroxide. Karl Freudenberg and Walter Dürr. *Ber.* 63B, 2713–20 (1930), cf. preceding abstr.; Schaarschmidt, *Z. angew. Chem.* 42, 618 (1929).—After it had been found that the reaction of Br on lignin consists in substitution and not addn., it remained to be detd. whether lignin behaves toward nitrating agents also as an aromatic substance. The action of $HNO_3$ on lignin is not clear cut, the reaction does not stop at a definite stage but comes to a standstill only when products of deep-seated degradation, which are no longer characteristic, have been formed. Better results were to be expected of $NO_2$, which with aromatic compds. gives substitution derivs., preceded by addn. of 2 mols. $NO_2$ at the double bond, with subsequent elimination of $HNO_2$. In preliminary expts. in a N-filled app. in ice, connected with a manometer to record changes in pressure, the pressure, within a few min. after bringing the $NO_2$ (mixt. of $NO_2$ and $N_2O_4$) and lignin together, fell far lower than in blank expts. with $NO_2$ alone and remained const. for a while, but after about 0.5 hr. it rose slowly for 3 days, owing to the evolution of NO. Attempts to follow the reaction quantitatively failed because of the extraordinary adsorbing power of the lignin and the complex equil. between NO, $NO_2$, $N_2O_4$, $HNO_2$, $HNO_3$ and $H_2O$. There is no doubt that the gradual increase in pressure is due to a secondary reaction, evidently an oxidation process, and that only the first rapid phase (decrease in pressure) marks the course of the reaction sought. This is even more evident when methyllignin is used instead of lignin. Etherification seems to block the point of attack for the oxidation reaction; with methyllignin the pressure falls to a min. within a few min. and then remains unchanged for days. The expts. were then conducted under conditions which permitted of converting the nitrous gases in the reaction vessel after

the nitration into a mixt. of nitrite and nitrate which was then analyzed by the method of Meisenheimer and Heim. The gas remaining after absorption of the nitrous gases in aq. $NaHCO_3$ was pure NO, no org. oxidation products (especially no $(CO_2H)_2$) were found in the $NaHCO_3$ soln. and no $CO_2$ was formed in the nitration. The only cleavage product found was MeOH. The amounts of $NO_2$ used, of NO, $HNO_2$ and $HNO_3$ formed and of N in the nitrated lignin or methyllignin correspond best to a nitration process —O $C_6H_3(OMe)$ C C C— + $2NO_2$ = —O $C_6H_2(OMe)(NO_2)$ - C C C— (I) + $HNO_2$. Definite proof that double bonds do not come into play at all or only to a small extent is afforded by the fact that the nitrolignin and nitromethyllignin can still be brominated (nitrolignin takes up about 0.7 atom Br per atom of N) and that bromomethyllignin can be nitrated. The cleavage of MeOH (20–33% of that originally present in the lignin) had already been observed in the bromination, as it occurs to the same extent whether lignin or methyllignin is used, there is no doubt that it is the original MeO group in lignin that is split off. This cleavage of MeOH is explained on the basis of Wieland's theory that the substitution of $NO_2$ is preceded by an addn. Assuming, arbitrarily, that the $NO_2$ group enters the *p*-position to the MeO group it would be expected that the first product would be a di $NO_2$ compd. —O C(CH——CH$(NO_2)$)(C(OMe)$(NO_2)$ CH) C C C C— which for the most part would change normally, by loss of $HNO_2$, into I, but, to a small extent, the MeO group, reacting with the adjacent $NO_2$ group as if it were —O NO, would split off as MeONO and the resulting quinol deriv. would change into the nitrophenol —O $C_6H_2(OH)(NO_2)$ C C C—. Dimethyldehydrovanillin, {5,2,3 $OHC(MeO)_2C_6H_2$}$_2$, in solid amorphous form, treated with $NO_2$ like lignin, is similarly nitrated, with elimination of 2.5 mols. MeOH. Veratrumic acid, both in solid form and in $PhNO_2$, is nitrated but splits off only traces of MeOH. Veratroylcellulose (18.6% MeO) takes up 12.5% $NO_2$ but almost without loss of MeOH. F. and D. feel that the results of bromination and nitration show that lignin is predominantly an aromatic substance and confirm the the formula —O $C_6H_3(OMe)$ C C C(—O $C_6H_2(OMe)$ C C C—)$_x$ —O $C_6H_3(OMe)$ C C C— previously suggested. These new results show again that all the reacting groups are free since the lignin reacts with the completeness of a permutoid. A further example (the mercuration of lignin) is to be described shortly. Lignin differs from a directed permutoid like siloxene in that the structural elements apparently extend in 3 dimensions entirely without any order, resulting in an extraordinary development of surface, as indicated by the strong adsorbing power. A further peculiarity is that the structural elements are apparently not all entirely identical, although derived from a basic form closely related to coniferyl alc. or guaiacylglycerol, presumably there are differences in the aliphatic chains, and furthermore a small part of the aromatic nuclei are present in the form of the piperonyl residue. The size of the particles formed by condensation also seems to vary widely in one and the same prepn. As a result, the reactions of lignin are by far not nearly so homogeneous as those of permutoids of regular structure.

C. A. R.

Constitution of cellulose xanthate. III. Th. Lieser. *Ann.* 483, 132–43(1930), cf. *C. A.* 23, 3672.—Treatment of methylcellulose with a mixt. of AcOH and $Ac_2O$ contg. $H_2SO_4$ at 25–30° for 7–20 days gives about 50% of cellobiose octaacetate, indicating that some of the glucose anhydride units in the original product are not methylated. No methylcellobiose acetate could be detected, it is probably decompd. during acetolysis.

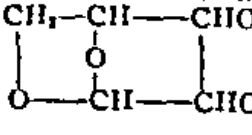
C. J. West

Action of mercury salts on acetohalogenosugars. IV. Direct preparation of alkyl biosides of the α-series. Géza Zemplén and Árpád Gerecs. *Ber.* 63B, 2720–9 (1930), cf. *C. A.* 24, 5730.—It had been found that heptaacetyl α alkylcellobiosides can be obtained in faultlessly pure condition by the action of $Hg(OAc)_2$ on acetobromocellobiose (I) in the presence of the appropriate alc., but the results were not always reproducible, especially with the Et compd., and the quality of the product varied

widely with the amt of the alc used Systematic expts were therefore carried out in which only the quantity of abs alc used was varied the mixt of I (10 g ), $Hg(OAc)_2$ (2 g ) and EtOH was boiled 2 hrs in 40 cc $C_6H_6$, the cooled reaction mixt washed 4 times with $H_2O$, the $C_6H_6$ soln dried with $CaCl_2$, evapd *in vacuo*, then twice with EtOH and the residue dissolved in 50 cc hot alc and allowed to stand 6 hrs at room temp The product, recrystd once more from alc , was then tested for reducing power, rotation in $CHCl_3$ and m p The results showed that whether the product isolated shall be the $\alpha$ or the $\beta$ form can be controlled by the proper choice of the quantity of alc used The $\alpha$ Et deriv can be obtained with certainty with an excess in the neighborhood of 100% of EtOH, even with a 200% excess the product is still a quite pure $\alpha$ deriv but the yield is no longer satisfactory (with a 100% excess the purity and the yield are as good as in the isomerization of the $\beta$ compd with $TiCl_4$ and the procedure is materially simpler) When the excess of alc exceeds 300%, however, the reducing power of the product again increases and between a 300 and 400% excess of alc there is a sharp transition in favor of the $\beta$ form With 10 g I, a difference of 0 74 g in the quantity of EtOH used sufficed to change the rotation of the product from 50 86° to —18 20° With iso-PrOH the $\alpha$ deriv can be obtained more easily than with EtOH, a 40 200% excess of the iso PrOH giving an optically very pure product in good yields, the transition in favor of the $\beta$ form with a further increase in the quantity of alc, however, is even more marked than with EtOH With Pr, Bu, iso Bu, *sec* Bu, *sec* Am, hexyl and $PhCH_2CH_2$ alcs , a 100% excess of the alc often gave the $\alpha$ deriv of highest rotation To obtain the $\beta$ forms, a large excess of the alc must be used With the lower alcs , it is advantageous to use the alc itself as the reaction medium The $\beta$ derivs can often also be obtained readily with $Hg(CN)_2$ instead of $Hg(OAc)_2$ but attempts to prep the $\alpha$ compds in this way met with but little success The highest $[\alpha]_D$ in $CHCl_3$ observed for the $\alpha$ and $\beta$ forms, resp , of the *heptaacetylalkylcellobiosides* were *Me* ——, —25 0°, *Et* 57 23°, ——, *Pr* 58 79°, ——; *iso-Pr* 59 29°, —22 7°, *Bu* (m 172°) 52 40°, —21 60°, *iso Bu* (m 171°) 45 51°, —23 04°; *sec-Bu* (m 193°) 55 76°, —23 20°, *sec Am* (m 193°) 52 23, ——, *hexyl* (m 182°) 53 42°, —21 37°, *β-phenylethyl* (m 207°) 54 16°, —25 28° C A R

**New substances formed by molds.** NADINE WIJKMAN *Ann* 485, 61–73(1931) — The action of *Penicillium glaucum* on sucrose in new glass vessels gives a mixt of *glauconic acids 1* (I) and *2* (II), sepd by crystn from EtOH I, $C_{11}H_{12}O_7$, m 202°, is optically inactive, contains no MeO group, gives no color with $FeCl_3$ and from its behavior on titration appears to contain 1 or more lactone groups I is not esterified with MeOH-HCl, with $CH_2N_2$ N is evolved, giving a product boiling at 210° in high vacuum, it could not be crystd *Ac deriv* , m 175°, *Bz deriv* , m 170°, *$NO_2$ deriv* , m 159°. Reduction of I with Zn and AcOH gives the *compd* $C_{11}H_{18}O_7$, m 237°. Distn of I in N at 215° gives the unsatd *ketone* (III), $C_7H_{10}O_2$, $b_{14}$ 120°, which absorbs 2 Br and 2 H (*dinitrophenylhydrazone*, red, m 173°, *semicarbazone*, m 183°) and the *compd* , $C_{11}H_{14}O_4$, m 171°. Oxidation of III gives the *compd* $C_7H_6O_3$, analyzed as the *Ag salt*. II, $C_{11}H_{12}O_8$, m 186°, distd undecompd in a high vacuum and titrates as a 4 basic acid I is probably a HO deriv of II. C J WEST

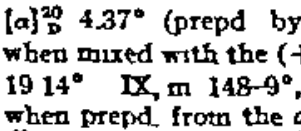
**Xylan.** J REILLY, P. P DONOVAN AND MISS K BURNS. *Proc Roy Irish Acad.* 39B, 505–14(1930), cf *C. A.* 23, 337; 24, 831, 3990 —The work on the effect of soln of polysaccharides in $AcNH_2$ (I) and $HCONH_2$ (II) was extended to the pentosans Abs EtOH pptd from a 0 5% soln of xylan (III) in I a substance which was sol in cold $H_2O$ while moist but which on drying became horny and insol in cold $H_2O$ but sol on short heating to 50°. This ppt (called *xylanan*) (IV) possessed the same rotatory power as the original III, ($[\alpha]_D^{20}$ —111 1° to —113°), and analysis showed its empirical formula to be $(C_5H_8O_4)_n$. F -p detns of the mol wt on III in I at 0 451% concn gave the values 146 and 147; at 0 95%, 195 and at 1 1%, 231 These values point definitely to depolymerization with formation of the mols $C_5H_8O_4$ and $(C_5H_8O_4)_2$ Mol -wt detns in $H_2O$ on dried IV from I gave the values 340, 388 and 485 at 0 73% concn and 353, 412 and 480 at 0 93% concn Similar detns on IV from II gave 344, 383 and 453 at 0 926% concn, and 369, 415 and 513 at 1 049% concn The values indicate the formula $(C_5H_8O_4)_2$ for IV with increasing assocn on standing I and II may act as amino acids to produce depolymerization or it may be that the fundamental units of III are assocd through their residual valences and that these valences are altered when the III is dissolved in I or II. If the units of III are linked through auxiliary valences, the structure of the unit should be:



C H. PEET

Resolution of some ester acids of the γ-truxillic acids into the optical components FRIEDRICH SCHENCK. *Ber.* 63B, *2706–12(1930)*.—*It has thus far not been possible to* resolve the mono esters of α truxillic and β truxinic acids into their optical components *Stoermer and Fretwurst showed, however, that the* γ-truxillamidic acids are readily resolved with morphine The present work was undertaken to det whether the mono-esters *of* γ-truxillic acid are also resolvable To obtain the active monoesters, the following active amidic acids, some of which had already been described by Fretwurst were prepd · *d*-Me (+)γ truxill *l* amidate (I), *l Me* (−)*d-amidate* (II), *l Et* (−)*d amidate* (III), *l Pr* (−)*d-amidate* (IV), *d Bu* (+)*l-amidate* (V) These were converted with $N_2O_3$ in AcOH into the following truxillic monoesters *Me* (+)*d γ-truxillate* (VI), *Me* (−)*l truxillate* (VII), *Et* (−)*l truxillate* (VIII), *Pr* (−)*l-truxillate* (IX) *Bu* (+)*d truxillate* (X) As standards of reference were taken Fretwurst's active amidic acids The *l* form corresponds *to the negative, the d form to the positive* rotation When such an acid (*e g*, the *d* amidic acid) is esterified it becomes, as regards the ester group, *the l form, i e*, the *d* amidic *l*-ester, for if the amide group should be sapond and the remaining ester group replaced by $NH_2$, the *l* amidic acid *should result.* Attempts to effect such a replacement have hitherto failed As with the amidic acids, the *d* forms of the monoesters have a pos , the *l*-forms a neg rotation The direction of the rotation of VII and VIII, which was not detd directly, was deduced from the m. ps with the active compds obtained by resolution (see below) The inversion of the rotation on esterification of the amidic acids noted by Fretwurst was again observed, as was also the increase in the magnitude of the rotation. To obtain the *dl* monoesters, γ truxillic anhydride was boiled with an excess of alc. and about 0 5 mol $Na_2CO_3$, and the resolution was effected by bringing together hot satd alc. solns. of 1 mol each of the monoester and morphine, the salts of the (−)*l Me*, (−)*l-Et*, (−)*l Bu and* (+)*d Pr esters crystg out* while the antipodes remained in soln and sepd. only on cautious evapn With brucine, the antipodes formed the difficultly sol salts (the Bu ester could not be resolved with this alkaloid) The magnitude of the rotation increases with increasing mol wt. of the alc., and the m ps of the *dl* esters decrease while those of the active esters increase with increasing mol wt , with the exception of the Me ester *dl-Monoesters·* *Me*, m 183 5–4°, *Et*, m 173–4 5°, *Pr*, m 170–1°, does not depress the m p of the Et ester, *Bu*, m 142 3°, seps from $H_2O$ as a *hydrate*, m. 62–3° II, m. 153–4° III, m 153–4 *IV*, m 159–60°, $[\alpha]_D^{20}$ −17 70° (all rotations measured in $Me_2CO$) V, m 141 5–3°, $[\alpha]_D^{22}$ 18.33° *Di Bu* γ *truxillate*, from the acid with BuOH $H_2SO_4$, m 85–6° VII, from II with $N_2O_3$ or from the *dl* ester with morphine, m 145 5–7°, a mixt with VI m 178–83° VI, from I and $N_2O_3$ or from the *dl*-ester with brucine, m. 145 5–7°, $[\alpha]_D^{18}$ 6 48° (prepd by 1st method), $[\alpha]_D^{20}$ 4.37° (prepd by 2nd method) VIII, m 142 5–3°, $[\alpha]_D^{19}$ −16 48°, m 173° when mixed with the (+)*d-ester* (from the *dl*-ester with morphine), m 142 5–3°, $[\alpha]_D^{19.5}$ 19 14° IX, m 148–9°, $[\alpha]_D^{21}$ −21.35° when prepd from IV with $N_2O_3$, $[\alpha]_D^{19.6}$ −22 45° when prepd. from the *dl*-ester with brucine, m. 168–70° with the (+)*d-ester* (from the *dl*-ester with morphine), m 148–9°, *Bu* (−)*l* γ *truxillate* from the *dl*-ester with mor phine, m 151–2°, $[\alpha]_D^{18.5}$ −25 70° X, m 151 2° $[\alpha]_D^{21}$ 26 14° C. A R

The structure of the cyclohexane molecule O HASSEL AND H KRINGSTAD *Tids Kemi Bergvesen 10, 128–30(1930)*.—*Since satd hydro-*carbons have practically 0 dipole moment, a distinction between the possibilities I and II *for cyclohexane by dipole measurement* is not possible X ray investigation, with a Debye camera, $C_6H_{12}$ frozen with solid $CO_2$-acetone mixt., and Fe radiation gave the following data Lattice cubic $a = 8.41 \pm 0.02$ A U , 4 mols. per unit cell, d 0 933 The space group is probably $T_h^2$ or $O_h^5$ These results indicate the form of the cyclohexane mol to be I. G R Y



I II

Two syntheses of heptamethylenimine ADOLF MÜLLER AND PAUL BLEIER. *Mon atsh* 56, *391–406 (1930)*.—Reduction of suberone isoxime (a ketoheptamethylenimine) with Na and EtOH gives 1 5% slightly impure heptamethylenimine (I), b 162–4°, $d_4^{17}$ 0.869 $n_D^{17}$ 1 5262 (*chloroaurate* sinters 173°, m. 188°, *picrate*, m 147–8°, *N*-Bz deriv b$_{11}$ 196–7°) Oxidation of the *N* Bz deriv with $KMnO_4$ at 65° gives 41 3% of *ζ* benzamidoheptoic *acid dimorphous*, m 86° and 90°, this also results by benzoylat-ing the amino acid obtained by heating suberone isoxime with 20% HCl at 150° Hydrolysis of the reaction *product of* α,η-*dibromoheptane and* ρ-$MeC_6H_4SO_2NH_2$ with EtOH KOH by HCl at 160° yields 0 8% of slightly impure I and α,η-diamino-

heptane. Improved methods are given for the prepn of suberic acid, suberone and its isoxime C J WEST

Migration of amino groups from one to three in arylamine derivatives of diarylarylethinylcarbinols. Constitution of resulting products. JOSEPH RODIX *Compt rend* 191, 790–2(1930), cf *C A* 24, 78.—$PhNH_2$ with *diphenylphenylethinylcarbinyl chloride* ($Ph_2CClC\ CPh$) (I) gives a yellow product, $Ph_2C\ CHCPh\ NPh$ (II), m 199–200°. A colorless intermediate product, $C_{32}H_{23}N$ (III), m 87–8°, has been isolated. III isomerizes easily into II by the action of heat in the presence of $PhNH_2$ HCl, but not in the presence of $PhNH_2$. II has not been converted into III. III is more basic than II, forming an isolable *HCl salt*. With MeOH in dil $H_2SO_4$, II gives *β phenylbenzalacetophenone*, while III gives *diphenylethinylcarbinyl Me ether*. III is probably $Ph_2C(NHPh)C\ CPh$. These relationships hold in a variety of similar cases where an arylamine with a diarylarylethinylcarbinyl chloride gives 2 isomers, the unstable product (*a*) of the type of formula II being white, and the stable product (*b*) of the type of formula III being yellow. I with *o-toluidine* gives (*a*), m 139–40°, and (*b*), m 192–3°, with *m-toluidine* (*a*), m 117–8° (*b*), m 139–40°, with *p-toluidine* (*a*), m 115–6° (*b*), m 174–5°, with *o-anisidine* (*a*), m 140–1° (*b*) not crystd., with *p-anisidine* (*a*) not crystd., (*b*) m 148–9°. *Diphenyl p-tolylethinylcarbinyl chloride* with $PhNH_2$ gave (*a*), m 118–9°, (*b*), m 162–3°. *Diphenyl β naphthylethinylcarbinyl chloride* with $PhNH_2$ gave (*a*), m 140–7°, (*b*), m 149–50°. *Diphenyl p-bromophenylethinylcarbinyl chloride* with $PhNH_2$ gave (*a*), m 151–2°, (*b*) m 138–9° T H RIDER

The action of hexahalogenated benzenes on Grignards. J F DURAND AND LAI WAI HSUN *Compt rend* 191, 1460–3(1930).—$C_6Cl_6$ reacts with neither MeMgI nor PhMgBr. $C_6Br_6$ or $C_6I_6$ with MeMgI gives $C_6Me_6$, m 157–8° and with PhMgBr $C_6Ph_6$, m 206°, b 418–20° V F HARRINGTON

Chlorination of *o-* and *p*-nitrotoluene. 3,4,6-Trichloro-2-nitrotoluene and 2,6-dichloro-4-nitrotoluene. LEOPOLD F LEVY AND HENRY STEPHEN *J Chem Soc* 1931, 76–9.—*o*-$O_2NC_6H_4Me$ (27.4 g.) and 5 g. $SbCl_5$ satd. with Cl, give 5 g. of the *3,4,6-Cl deriv.*, pale yellow, m 93–4°, further nitration gives the 2,5-di-$NO_2$ deriv., m 229.5° (cor.). Reduction with $SnCl_2$ and HCl gives *3,4,6-trichloro-o toluidine*, m 89°. *Ac deriv.*, m 199°; *Bz deriv.*, m 230°. *p*-$O_2NC_6H_4Me$, chlorinated as above, gives the *2,6 $Cl_2$ deriv.*, m 63–4°; $HNO_3$ and $H_2SO_4$ give the *3,6-di $NO_2$ deriv.*, m 130°. *2,6-Dichloro-p-toluidine*, m 55°; *Ac deriv.*, m 215°; *Bz deriv.*, m 179°. Both of the new Cl derivs. resist oxidation after heating with $KMnO_4$ for 6 days on the water bath. C J WEST

A new color reaction of aromatic amines. I DE PAOLINI *Gazz chim ital.* 60, 859–62(1930).—$Bz_2O_2$ (I) is an extremely sensitive reagent for detecting aromatic amines, for it will give a brown red or violet color reaction with the smallest trace of the amine. This color results from the oxidation of the amine to a quinone, and the reaction has the great advantage over previous color reactions (cf. *Ann* 27, 376(1853), *Compt rend* 111, 975(1890), *Ber* 27, 3264(1894)) that the oxidation takes place in neutral alc. soln. The reaction of I with aliphatic amines has been studied by Gambarjan (cf *C A* 20, 372), who found the reaction to be: $I + R_1R_2NH \longrightarrow BzOH + R_1R_2NOBz$. P. has, however, found that with primary amines another aminolysis takes place, thus: $I + RNH_2 \longrightarrow Bz_2O_3H$ (II) + $RNHBz$. II oxidizes in turn a 2nd mol of $RNH_2$. *E. g.*, $PhCH_2NH_2$ (III) and I yield $PhCH_2NHBz$ (IV), BzH (from the subsequent oxidation of III by II) and $BzONH_2CH_2Ph$ (from combination of III and $Bz_2O_2H$, the latter the reduction product of II). Practically, I is added to alc. III until no more is dissolved, and the soln. is dild. with water, which causes pptn. first of BzOH and then of IV. I reacts with other $RNH_2$ compds., *e. g.*, with alc. $NH_2OH$ or $H_2NNH_2.H_2O$ it forms $BzNHOH$ and $(BzNH)_2$, resp. Gas is evolved in these reactions, because II (which is formed in each case) oxidizes the excess $NH_2OH$ and $H_2NNH_2.H_2O$ to the extent that the mols. are destroyed. In the presence of water and of oxidizable substances, II is formed by the action not only of primary amines, but also of secondary and tertiary amines, as a result of a hydrolysis similar to that with alk. hydroxides, *i. e.*, $I + NaOH \longrightarrow Bz_2O_2Na + II$, as was shown in the present work by using dil. alc. solns. contg. indigo. The great ease of oxidation of aromatic amines to quinones by I probably results from the intermediate formation of II, which in the nascent state is extremely active; in fact the reaction is only feeble in anhyd. solvents, *e. g.*, $Et_2O$ or AcMe. The color reaction was obtained with $PhNH_2$, *o-*, *m-* and *p*-$MeC_6H_4NH_2$, asym. *o*-xylidine, *p*-xylidine, *p*-anisidine, *o-* and *p*-$H_2NC_6H_4OEt$, *o-*, *m-* and *p*-$C_6H_4(NH_2)_2$, benzidine, $PhNHCH_2Ph$, $PhNHEt$, $PhNHMe$, $PhNMe_2$, $PhNEt_2$, *o-* and *p*-$MeC_6H_4NMe_2$, $PhNEtCH_2Ph$, $MeNPh_2$, *p*-$HOC_6H_4NH_2$, *α-* and *β*-$C_{10}H_7NH_2$, *β* $C_{10}H_7NHPh$, $Ph_2C(NMe_2)_2$, *o-*, *m-* and *p*-$H_2NC_6H_4CO_2H$, 4,3-Me-

$(H_2N)C_6H_3CO_2H$, 3-bromo-6-aminocuminic acid, 3-aminocuminic acid, 2,4,5-BrMe-$(H_2N)C_6H_3CO_2H$, *o*-, *m*- and *p*-$ClC_6H_4NH_2$, 2,4 $Cl_2C_6H_3NH_2$, *o*-, *m*- and *p*-$BrC_6H_4NH_2$, and *p*-$IC_6H_4NH_2$. In all cases it is best to add the amine to a suspension of I in LiOH, under which conditions a brown red or violet color appears even when cold, but more rapidly when hot. The reaction is being studied further. C. C. Davis

Asymmetric nitrogen atom. LVIII. Decomposition of active and inactive quaternary ammonium nitrates under the influence of amines; also a contribution to the knowledge of solvate formation by ammonium salts. E. Wedekind and F. Feistel. *Ber* 63B, 2743–53(1930); cf. C. A. 23, 5171.—It had been shown that the decompn. of $MePh(PhCH_2)(PhMeNCH\text{-}CH_2)NNO_3$ (I) in $CHCl_3$ is greatly accelerated by amines, secondary bases having a greater influence than primary bases and tertiary bases having little or no effect, whether the I is dissolved directly in the amines or treated in $CHCl_3$ with small quantities of the bases. The reaction was explained as consisting in a primary formation of a solvate (indicated by an increase of the sp. rotation, among other things) which, because of its relative instability, brings about a decompn. of the nitrate into a ditertiary base and $PhCH_2NO_3$ and the latter finally combines with the excess of amine to form a new salt in which an amine H atom is replaced by $PhCH_2$. The renewed salt formation as the result of solvolysis is indicated by a renewed increase in elec. cond. which during the preceding phases decreases along with the rotation. As these expts. were made with a salt (I) which was not completely stable, optically, in $CHCl_3$, they have been repeated with simple active $NH_4$ nitrates (especially $MePh(PhCH_2)(CH_2\ CHCH_2)NNO_3$ (II)) and a perchlorate, $MeEtPhNClO_4$ (III) (the nitrate is not cryst.), as also with a no. of other amines. To obtain an idea of the qual. decompn. tendency of the halides and nitrates of these $NH_4$ compds., they were tested for a change in cond. with time. The results in $CHCl_3$ and on addn. of $PhNH_2$, resp., were as follows (+ indicates decompn., − no decompn., n.t. not tested): $MePh(PhCH_2)(CH_2\ CHCH_2)NI$ +, n.t., nitrate (II) −, +. $MePh(PhCH_2)(iso\text{-}Bu)NI$ +, n.t., nitrate −, +. $MeEtPh(PhCH_2)NI$ +, n.t., nitrate −, +. $MePrPh(PhCH_2)NI$ +, n.t., nitrate −, +. $p\text{-}CH_2[C_6H_4NMeEt(CH\text{-}CH\ CH_2)]_2Br_2$ (IV) −, −, dinitrate − −. $MeEtPhNI$ (V) −, −, perchlorate (III) −, −. The halides which do not decomp. in $CHCl_3$ (IV, V) also do not react on addn. of $PhNH_2$, and the same is true for the corresponding nitrate and perchlorate. Only those halides decomp. which contain certain groups (Ph and $PhCH_2$ or $CH_2\ CHCH_2$). Since the nitrates which decomp. on addn. of $PhNH_2$ react essentially alike, kinetic measurements were made first on $MePh(CH_2\ CHCH_2)NHNO_3$ (VI) and various amines by the method used before (measurement of the decrease in rotation and cond. with time). With 0.1 g. VI and 50 mols. amine in 10 cc. $CHCl_3$ the following half time values (min.) and av. velocity consts., resp., were obtained. Primary amines: iso-Am 25, 0.182; iso-Bu 45, 0.0072; Pr 47, 0.0065; Bu SS, 0.0064, $PhCH_2$ 90, 0.0037; Ph 250, 0.0032. Secondary amines: Et$_2$ 25, 0.0259, Et($PhCH_2$) 42, 0.0176, ($PhCH_2$)$_2$ 80, 0.0097; MePh 90, 0.0077, EtPh 150, 0.0055, Ph($PhCH_2$) 195, 0.0034, $Ph_2$ ∞, ——. The tertiary $PhNMe_2$ produced no measurable change in 18 hrs. The relationships between basicity and reaction velocity thus brought out will be discussed elsewhere in connection with further exptl. data. As regards the mechanism of the reaction and especially the differing behavior of primary and secondary amines on the 1 hand and tertiary amines on the other, it is to be remembered that, according to the hypothesis suggested in connection with the observations on I, the presence of at least one H on the N of the added amine is necessary for the reaction to take place, for it is assumed that a H atom combines with the $NO_3$ ion to form $HNO_3$ and is replaced by one of the hydrocarbon residues, leaving a tertiary base. $NR^1R^2R^3NO_3 + H\ NR'R'' = NR\ R^1R^2 + R^3NHR' + HNO_3$. The $HNO_3$ may be bound to 1 or both of the bases. It was found that when VI is dissolved in fused *p*-toluidine the cooled solidified mass yields $MeC_6H_4NH_2\ HNO_3$, decomps. 197°. The work on I had also led to the conclusion that solvates are formed primarily in the action of amines on the nitrates. The simple method then used for showing their formation (placing the nitrate alone, the amine alone and a mixt. of nitrate and amine in weighed boats and heating them in a high vacuum at gradually increasing temps. up to 111°) was employed in the present work. With those nitrates which decomp. on addn. of the amine, the pure nitrate remained unchanged while the mixt. of nitrate and amine lost wt. until the residue weighed less than the original nitrate, although the presence of amine ($PhNH_2$) could still be detected by the isonitrile reaction. With III and the nitrate corresponding to IV, the wt. of the residue never fell as low as that of the original nitrate or III in the mixt., there is nothing to prove, however, that these compds. do not also form solvates which are relatively stable as compared with those of the other

nitrates. With tertiary bases ($PhNMe_2$, $PhNMeEt$) there is no further loss in wt. after the residue has reached the wt of the original nitrate No solvate formation between VI and $CHCl_3$ could be detected by this method The $[\alpha]_D$ of VI in various solvents ($Me_2CO$ 56°, abs. alc 67°, PhNHMe 73°, $PhNH_2$ 75°, $CHCl_3$ 80°) is smallest in those solvents which are indifferent as regards their influence on the decompn ($Me_2CO$, alc.) and highest in those which are known to effect the decompn In $CHCl_3$, which according to the heating method forms no solvate, the rotation, although higher than in PhNHMe and $PhNH_2$, is independent of the concn., whereas in PhNHMe and $PhNH_2$ it increases with increasing concn That no solvation occurs in $CHCl_3$ in the absence of an added base was confirmed by f. p. measurements on II in $CHBr_3$, the mol wts found (674 to 583, at concns. of 2·75, 18·9) indicated the usual assocn of $NH_4$ salts in $CHBr_3$ but gave no evidence whatever of simultaneous solvation In *p*-toluidine, which causes the decompn of II in $CHCl_3$, the mol wt of II decreases with the length of time it is kept in the molten toluidine until a const value of 73·40 (calcd 300·3) is reached, while III, which is not decompd by the toluidine in $CHCl_3$, gives mol wts greater than the calcd but *decreasing* with increasing concn., indicating the presence of solvates. C. A. R.

Diphenylamine derivatives. K. Dzierżkowski and M. Russocki *Bull. intern. acad. Polonaise* 1929A, 307–27.—The conclusions of Merz and Weith (*Ber.* 5, 283) concerning the proportion of mono- and di-$SO_3H$ acids formed by the action of concd $H_2SO_4$ on $Ph_2NH$ are confirmed With $ClSO_3H$ in $PhNO_2$ below 90°, however, the initial product is the unstable, cryst., $ClSO_3H \cdot NHPh_2$, which at higher temps. readily decomposes, giving nuclear substitution products in accordance with the scheme $Ph_2NH \cdot SO_3Cl \longrightarrow Ph_2NSO_3H \longrightarrow PhHNC_6H_4SO_3H$, the proportion of mono- and di-$SO_3H$ acids produced depending on the mol proportion of $ClSO_3H$ used Thus with 0·5, 1·0, 1·5 and 2·0 mols of $ClSO_3H$ for each mol of $Ph_2NH$ the proportions of mono- and di-$SO_3H$ acids and of unchanged $Ph_2NH$ are, resp., 25, 5, 70, 38, 22, 40, 34, 50, 16, and 0, 90–100, 0 mols %. Hence with 0·5 mol of the reagent, diphenylamine-4-sulfonic acid (*aniline salt*, m. 200·5°) is readily sepd. from the reaction mixt. as its Mg salt. Nitration of 4-$PhNHC_6H_4SO_3Na$ with 1 mol of $HNO_3$ (d. 1·48) in AcOH gives the *4-nitro-deriv.* (*Mg salt*) converted by hydrolysis with concd HCl in a sealed tube at 190° into 4-$PhHNC_6H_4NO_2$ (Goldberg, Ger. pat. 185,603(1907)), and further nitrated to *Na 2,4-dinitrodiphenylamine-4′-sulfonate* Excess of $HNO_3$ converts 4-$PhNHC_6H_4SO_3Na$ into the 2,4,6-trinitro deriv. identical with a specimen obtained by the condensation of 2,4,6-$Cl_3C_6H_2NO_2$ and sulfanilic acid (Turpin, *J. Chem. Soc.* 59, 717(1891)) and hydrolyzed by concd HCl at 180–200° to 2,4,6-$(O_2N)_3C_6H_2NHPh$ The action of Br (2 mols.) on a suspension of 4-$PhNHC_6H_4SO_3Na$ in $CCl_4$ at 45–50° converts it into its *4-Br deriv.*, while with 6 mols. of Br at 60–70° the product is *Na 2,4,2′-tribromodiphenylamine-4-sulfonate* (*Mg salt*), converted by excess of HBr at 60° into $(2,4\text{-}Br_2C_6H_3)_2NH$ and by dil. HCl at 190° into *2,4,2′-tribromodiphenylamine*, m. 94°, while the action of $HNO_3$ (d. 1·48) in AcOH at 165–90° yields *2,4,2′-tribromo-6′-nitrodiphenylamine*, m. 215°, together with the corresponding *4′,6′-dinitro deriv.*, m. 179°, and *Na 2,4,2′-tribromo-6′-nitrodiphenylamine-4-sulfonate* Diphenylamine-4,4′-disulfonic acid (*Mg salt* + $2.5H_2O$, and *aniline salt*, m. 230°) is best obtained by the action of an excess of $ClSO_3H$ on $Ph_2NH$ in $PhNO_2$ at 110–15°. By reactions similar to those described in the case of the mono-$SO_3H$ acid, its Na salt is converted into the *2-nitro-* and *2,2′-dinitrodiphenylamine-disulfonic acids* (converted into $(2\text{-}O_2NC_6H_4)_2NH$, *2,4,2′-trinitrodiphenylaminesulfonic acid*), and $[2,4\text{-}(O_2N)_2C_6H_3]_2NH$, small quantities of the 2,4,6,2′,4′-pentanitro- and 2,4,6,2′,4′,6′-hexanitro derivs. being formed as by-products of the nitrations. Similarly, bromination of 4,4′-$NH(C_6H_4SO_3)_2$-Ba converts it into the *2,2′-di-Br deriv.*, $+0.5H_2O$, together with some *2-Br derivs.*, and, ultimately, into $(2,4\text{-}Br_2C_6H_3)_2NH$. B. C. A.

An improved method of preparation of substituted amides and hydrazides. Sohrab M. Mistry and Prafhulla C. Guha. *J. Indian Chem. Soc.* 7, 793–7(1930).—The condensation between divers types of amines, diamines, hydrazines, thiosemicarbazides, etc., on the one hand and amides such as $CO(NH_2)_2$, $CS(NH_2)_2$, $PhCONH_2$, $C_6H_4(CO)_2NH$ on the other, can be brought about, with excellent yields, by refluxing a mixt. of 1 mol. of the amide and 2 mols. of the amine with sufficient AmOH until the evolution of $NH_3$ is negligible. With $NH_2NH_2 \cdot H_2O$ and $(NH_2)_2CO$ (*I*), $NH_2NHCONH_2$ is obtained to the exclusion of the expected $(NH_2NH)_2CO$ From I and the requisite amine the following known compds. were prepd.: $(PhNH)_2CO$, $(m\text{-}MeC_6H_4NH)_2CO$, $(p\text{-}MeC_6H_4NH)_2CO$, $(m\text{-}NO_2C_6H_4NH)_2CO$, $(p\text{-}NO_2C_6H_4NH)_2CO$, $(\beta\text{-}C_{10}H_7NH)_2CO$, $(\alpha\text{-}C_{10}H_7NH)_2CO$, $(p\text{-}NHAcC_6H_4NH)_2CO$, $(PhCH_2NH)_2CO$, *o-* and *p*-phenylenediurea

NH $C_6H_4$ $C_6H_4$ NH CO (from benzidine) $(PhNHNH)_2CO$ With I, *m* $NH_2C_6H_4OH$ gave $(m\text{-}HOC_6H_4NH)_2CO$, m 215°, and *p*-$NH_2C_6H_4OH$ similarly yielded *di p-hydroxyphenyl urea*, m 288°. The condensation with I converted *o*-$NH_2C_6H_4COOH$ into *2 4-dihydroxy tetrahydro-1,2,3,4-quinazoline*, $C_6H_4CH(OH)$ NH CH(OH) NH, m 353° (decompn.) *Di-p-nitrophenylcarbohydrazide*, $(p\text{-}NO_2C_6H_4NHNH)_2CO$, m 361° and *di-p-bromophenyl carbohydrazide* were made from *p*-$NO_2C_6H_4NHNH_2$ and *p*-$BrC_6H_4NHNH_2$, resp. The treatment of $NH_2NHCSNHPh$ with I by this method gave 3 compds.: *1-phenyl 2 phenyl amino-5 thiol-1,3,4 triazole*, PhN C(NHPh) N N CSH, m 210°, *2,5-endoxy-1,3,4-triazole*, NH C·N N C O, m 250°, and *2 keto-5-phenylamino-2,3-dihydro-1,3,4-thiodiazole*, S CO NH N CNHPh, m 246°. *p*-$AcNHC_6H_4NH_2$ (II) formed $AcNHC_6H_4NHCONHPh$ with $NH_2CONHPh$ and $(AcNHC_6H_4NH)_2CS$ with $(NH_2)_2CS$ (III). III gave $(PhNH)_2CS$ with $PhNH_2$ (IV) but formed $NH_2NHCSNHPh$ with $PhNHNH_2$ (V). $(NH_2CO)_2$ condensed with II, IV and V to yield (*p-AcNHC*$_6$*H*$_4$*NHCO*)$_2$, m above 370°, (*PhNHCO*)$_2$ and (*PhNHNHCO*)$_2$. II, IV and V gave (*p* $AcNHC_6H_4$ $NHCO)_2CH_2$, m 235°; $CH_2(CONHPh)_2$ and $CH_2(CONHNHPh)_2$ with $CH_2(CONH_2)_2$ and when condensed with $(CH_2CONH_2)_2$ yielded (*p-AcNHC*$_6$*H*$_4$*NHCOCH*$_2$)$_2$, m 347° (decompn.), $(PhNHCOCH_2)_2$ and $(PhNHNHCOCH_2)_2$. AcNHPh was obtained in 80% yield from $AcNH_2$ and IV, on complete removal of AmOH and crystn. of the residue from hot $H_2O$. C. R. ADDINALL

**Chlorination of iodophenols. III. Chlorination of o-iodophenol.** SAMUEL BUCHAN AND HAMILTON MCCOMBIE *J. Chem. Soc.* 1931, 137–44; cf. *C. A.* 7, 1706.—*o* $IC_6H_4OH$ (I) in $CCl_4$ gives on chlorination a sequence of unstable iododichlorides and decompn. products very similar to those obtained from the *p* isomer. I *acetate*, oil, dichloride, m. 92–3° (decompn.), unstable. I *benzyl ether*, oil; the dichloride is unstable. I *benzoate*, m. 34°, *dichloride*, m. 98–101° (decompn.), stable. I *phenylcarbamate* m. 121–2°, Cl in $CHCl_3$ gives the *dichloride*, m. 125° (decompn.) of *2 iodophenyl 2 4-dichlorophenylcarbamate*, m. 145°, its constitution was proved by its synthesis from the 2 components. A 10% soln. of I in $CCl_4$, satd. with dry Cl at 0°, gives *4-chloro-2-iodophenol* (II), m. 78°, its constitution was established by synthesis from 4,2-$Cl(O_2N)C_6H_3OH$ whose *benzyl deriv.*, m. 84–5°. II *acetate* oil; the dichloride decomps. rapidly. II *benzyl ether*, m. 60°, dichloride, decomps. 95–7°, decomps. slowly over 4–5 days. II *benzoate*, m. 88°, *dichloride*, stable, m. 103–4° (decompn.). II *phenylcarbamate*, m. 128°, Cl in $CHCl_3$ gives the *compd.* $C_{13}H_7O_2NCl_4I$, m. 146°. Further chlorination of II in $CCl_4$ gives *4,6-dichloro 2-iodophenol* (III), m. 62°, this is more easily obtained by rapid chlorination of I. III *acetate*, m. 59°, the dichloride decomps. in 5–6 days. III *benzyl ether*, m. 62°, the dichloride decomps. over several days. III *benzoate*, m. 89°; chlorination does not give the dichloride. III *phenylcarbamate*, m. 181°, no dichloride pptd. with Cl but HCl was evolved. Further chlorination of III gives a small amt. of the *tri Cl deriv.*, m. 52–4°. *2 Iododiphenyl ether*, m. 55–6°, results from the $NO_2$ deriv. by reduction and the Sandmeyer reaction, the *dichloride*, m. 81.2° (decompn.), is unstable and decomps. in 2 days. *ω 2' Iodophenoxyacetophenone* m. 123° from I and $BzCH_2Cl$; dichloride, m. 98° (decompn.), moderately stable. I and $COCl_2$ in pyridine give *di-2-iodophenyl carbonate*, m. 88°, *dichloride* m. 108° (decompn.), stable. I *p toluenesulfonate*, m. 80°, *dichloride*, m. 95–7° (decompn.), stable. I *allyl ether*, oil, Cl gives the *compd.* $C_9H_9OCl_4I$, m. 84° (decompn.); slowly decomps. in the air. I *dibromopropyl ether*, oil, the *dichloride*, m. 118° (decompn.) decomps. slowly in 4 weeks, giving *4-chloro-2-iodophenyl dibromopropyl ether* m. 52°. I *Et carbonate*, oil, a dichloride could not be prepd. Chlorination of I in $CCl_4$ at 60–70° gives chloranil and *hexachlorocyclohexadienone*. *p* $ClC_6H_4OH$ and ICl give *4 chloro-2,6-diiodophenol*, m. 106–7°, the dichloride is unstable. Chlorination of a 10% soln. of $PhNHCO_2Ph$ in $CHCl_3$ at 0° gives *4 chlorophenyl 2,4-dichlorophenylcarbamate*, m. 157°, its structure was established by condensing *p*-$ClC_6H_4OH$ with *2 4-dichlorophenylcarbimide*, m. 61°. C. J. WEST

**Chlorination and nitration in methanol as a medium.** E. PLAZEK *Roczniki Chem.* 10, 761–76 (776 German) (1930).—In order to investigate the possibility of introducing MeOH as a solvent and diluent in the chlorination and bromination of various compds., PhOH, *m*-cresol, PhOMe, 2- and 3-$HOC_6H_4CO_2H$, *benzoic acid*, 4-$NO_2$-$C_6H_4OH$, 1,2-acetylphenylenediamine, 4 sulfophenol, 4-$NO_2C_6H_4NH_2$, 2 $NO_2C_6H_4NH_2$,

2 and 4-$H_2NC_6H_4CO_2H$ were chlorinated and PhOH, *m*-cresol, 4-$ClC_6H_4OH$, 2 $ClC_6H_4OH$, veratrole and *p*-$C_6H_4(OMe)_2$ nitrated in MeOH as a medium MeOH was found to be a good solvent in chlorinations, equal in value to AcOH; it possesses the advantage of greater volatility and can be more easily regenerated In some cases the influence of temp and dilu on the course of chlorination was investigated and found to be insignificant Analogous expts with EtOH showed that this solvent is much inferior to MeOH in chlorination and quite unsuitable in nitration Nitration in MeOH could be performed with success only in the case of PhOH and its derivs, especially 2 and 4 $ClC_6H_4OH$, veratrole and *p*-$C_6H_4(OMe)_2$ J KUČERA

New method of reducing aromatic nitro compounds. THEODORA E DE KIEWIET AND HENRY STEPHEN *J Chem Soc* 1931, 82–4.—Cryst $SnCl_2$ is dehydrated with $Ac_2O$ and the nitro compd added and heated until soln results, in this way, *e g*, $PhNO_2$ gives nearly quant *p*-$ClC_6H_4NHAc$. Difficulty was experienced in the isolation of the anilides resulting from the reduction of *m* substituted $NO_2$ compds and it was found necessary to isolate the free bases by steam distn in alk soln A 30% yield of the anilides may be obtained if the residue after removal of the AcOH is extd with hot $C_6H_6$. *3 Chloro-4-acetamidophenol*, m 180°, and *3-chloro 4-acetamidophenyl acetate*, m 127°, result by the reduction of 3,6 and 3,4-$Cl(O_2N)C_6H_3OH$ In *p*-substituted $NO_2$ compds no chlorination takes place except in the case of *p*-$ClC_6H_4NO_2$ which, only if HCl is present during the reduction, gives 2,4 $Cl_2C_6H_3NHAc$ The reduction of *o* $O_2NC_6H_4OH$ and certain of its derivs yielded in each case a *N* Ac deriv, although sufficient $Ac_2O$ was present to acetylate the HO group α Methylbenzoxazoles may be intermediate products in their reduction The reduction products isolated from a no of compds are listed C J WEST

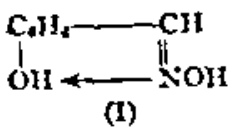
The production of *p*-aminophenol. JULIUS ALTPETER *Metallbörse* 20, 2803–4 (1930); 21, 27–8(1931).—A review is given of the various methods devised for the production of *p*-$NH_2C_6H_4OH$ (I), and of the reactions in which I is a product Short descriptions are given of the reduction of *p*-$NO_2C_6H_4OH$ by means of metal and acid combinations, by P, I and HCl, by the use of $Na_2S$, and by catalytic hydrogenation, and of the employment of metal acid combinations and of $Na_2S$ in the reduction of *p*-$NOC_6H_4OH$ Prepns depending on the cleavage of azo compds include the reduction of *p-dihydroxyazobenzene* by $SnCl_2$ in acid soln, Zn and NaOH and alk $Na_2S$ *Benzeneazophenol* (II) in $Na_2CO_3$, treated with $H_2S$, gives a mixt of $PhNH_2$ and I. Other methods for the cleavage of II include treatment with alc $NH_3$ satd with $H_2S$, reduction with metal-acid combinations and fusion with $NH_2NHPh$ By the reduction of 4,4'-$HOC_6H_4$-$N{:}NC_6H_4SO_3Na$ with Fe and $H_2SO_4$ 80% of I and 95% of $NH_2C_6H_4SO_3H$ are obtained The reduction can also be carried out with Fe and NaCl The *disazo dye* formed by coupling 2 mols of PhOH with tetraazodiphenyl can be cleaved by catalytic hydrogenation into $(C_6H_4NH_2)_2$ and I. Under the heading of various methods of prepn and formation of I are listed the change of *p*-$ClC_6H_4OH$ into I by $NH_4OH$ and $CuSO_4$; the conversion of $PhN_2$ by the action of $H_2SO_4$ in the presence of AcOH; the oxidation of PhNH by $K_2Cr_2O_7$ and of $HO_3SC_6H_4NH_2$ by $MnO_2$ and $H_2SO_4$; the transformation of Ph NHOH on heating with acid, and a similar transformation following the soln of $PhNO_2$ in a soln of S in 35–40% oleum at 20°, the reaction of NOCl with $C_6H_6$ in the presence of $AlCl_3$; the action of $H_2O_2$ on PhNHMgBr in $Et_2O$, the hydrolyses of *N*-phenyl α-indole oxime and phenolphthalein oxime by 25% $H_2SO_4$; the cleavage of nitrones and the distn of 5,2 $H_2N(HO)C_6H_3CO_2H$ The original method of Gattermann for the prepn of I by the electrolysis of a soln of $NO_2Ph$ in $H_2SO_4$ has been modified in many ways The various changes involving cell construction, electrodes, solns, temp, agitation, c d, time, by-products of the reaction, etc, are summarized C R A

Reaction of *p*-anisidine and ethyl methylacetoacetate. WM O KERMACK AND JAMES F SMITH *J. Chem Soc* 1931, 221–2.—*p*-$MeOC_6H_4NH_2$ (I) and $AcCHMeCO_2Et$ (II) appear to give a *compd*, $C_{11}H_{13}O_4N_3$, formed from 2 mols I and 1 mol. II, m 51°; this is confirmed by analysis, its gradual decompn in a stoppered bottle, its behavior with $Ac_2O$ and mol -wt detn C. J. WEST

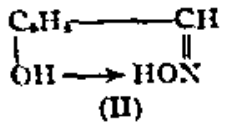
Preparation of an *o*-aminothiophenolsulfonic acid. JAKOB POLLAK AND KARL DEUTSCHER *Monatsh* 56, 365–80(1930).—$(2\text{-}H_2NC_6H_4)_2S_2$ is decompd by $ClSO_3H$ at —20° and by fuming $H_2SO_4$ under various conditions Phenylenediazosulfide is unaffected by fuming $H_2SO_4$ (25–70% $SO_3$) at 160–70°. *o*-$H_2NC_6H_4SH$ could not be sulfonated 4,3 $Cl(O_2N)C_6H_3SO_3K$ and $Na_2S_2$ in 96% EtOH give *K 2,2'-dinitrodiphenyl disulfide-4,4'-disulfonate;* in $H_2O$ reduction occurs with either $Na_2S$ or $Na_2S_2$ The Ba salt of 4,3-$Cl(O_2N)C_6H_3SO_3H$ and K xanthate in $H_2O$ give EtOH, Et xanthate, $CS_2$ and the *Ba salt* (I) of 2,2'-dinitrodiphenyl sulfide-4,4'-disulfonic acid (II), crystg with 5 mols $H_2O$, with $AcONH_4$ only a small amount of the sulfide is produced II

and $PCl_5$ give the *dichloride* of II, orange-yellow, m 195°, crystg with 0.5 mol $C_6H_6$; oxidation of the chloride with fuming $HNO_3$ gives *2,2'-dinitrodiphenyl sulfone-4,4'-disulfonic acid*, whose *Pb salt* crystallizes with 3 mols $H_2O$ and whose *Ba salt* also crystallizes with 3 mols $H_2O$, this also results by the oxidation of I. Reduction of I with Sn and HCl gives *2,2'-diaminodiphenyl sulfide-4,4'-disulfonic acid*, crystallizes with 3 mols $H_2O$ and readily oxidizes in the air. The diazo compd gives a red disazo dye with β $C_{10}H_7OH$. Treatment of the reaction product from 4,3 $Cl(O_2N)C_6H_3SO_3Na$ and $Na_2S_2O_3$ with $PCl_5$ also gives the chloride; when the K sulfonate is treated similarly *Na 2,2'-dinitrodiphenyl sulfide-4,4'-disulfonate* is obtained. 4,3 $Cl(O_2N)C_6H_3SO_3K$ and KHS, heated in $H_2O$, the soln evapd to dryness and the residue reduced with Sn and HCl, give 75% of *2-aminothiophenyl-4-sulfonic acid*. $NaNO_2$ gives a diazo compd which does not couple with β $C_{10}H_7OH$. With the K *sulfonate* there results *K 5-nitrophenothiazine 3,8-disulfonate*, crystg with 2 mols. $H_2O$. Numerous attempts to prep the acid with other S-contg salts were *unsuccessful*. C. J. West

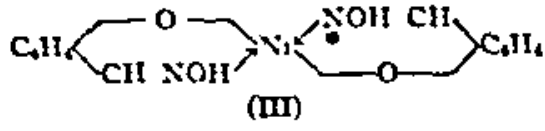
Coördination compounds of oximes. II. Nickel and cobalt compounds of *o*-hydroxybenzaldoxime. Oscar L. Brady *J. Chem. Soc.* 1931, 105-7; *cf. C. A.* 24, 5296.—*o*-$HOC_6H_4CH$ NOH (I) has all the properties of a coördination compd and probably should be *formulated as I, rather than II*, because it yields a NOAc deriv.



(I)



(II)



(III)

with $Ac_2O$ at room temp. The *Ni salt*, dark green needles, and the *Co salt*, dark brown powder, are of the the type III. No evidence of the β isomers could be obtained. Under the conditions specified by Ephraim (*C. A.* 24, 5065) for the detn of Cu by I, Ni salts give some ppt., the presence of salts of weak acids in any quantity would also invalidate the method. C. J. West

Action of mustard oils on oximes. An Obregia and C. V. Gheorghiu *J. prakt. Chem.* 128, 239–319(1930).—*α PhCH NOH (I) and PhNCS (II) at room temp in a* sealed tube give COS, PhCN and $(PhNH)_2CS$, in boiling $C_6H_6$ the reaction products are the *same while if the 2 compds are heated without a solvent to 80° COS is evolved* and S and $(PhNH)_2CO$ are isolated, in EtOH KOH, $(PhNH)_2CO$, $(PhNH)_2CS$ and $PhNHCO_2N$ CHPh *are the products*. The *β*-oxime and II, heated to 120°, evolve COS and give $(PhNH)_2CO$. In a sealed tube at room temp there results COS and $(PhNH)_2CS$. In alk. medium, the products are S, PhCN and $(PhNH)_2CS$. I and *o*-$MeC_6H_4NCS$ in $C_6H_6$ at room temp give (*o* $MeC_6H_4NH)_2CS$ (III) m. 158°. In a sealed tube COS, III and PhCN were obtained, while in alk. reaction the products are *carbo-o-toluido-α-benzaldoxime*, m. 124°, and (*o* $MeC_6H_4NH)_2CO$, m. 158°. I and *p*-$MeC_6H_4NCS$ behave similarly. MeCH NOH and II give COS and $(PhNH)_2CS$ in a sealed tube or in an open vessel, in EtOH or $C_6H_6$, autoxidation and decompn. take place. *o*-$MeC_6H_4NCS$ give S and III. In *o*-$HOC_6H_4CH$ NOH only the oxime group reacts with II, in alk. soln. the products are the nitrile and $(PhNH)_2CS$, the possible reactions involved in the formation of the nitrile are discussed. *p*-$MeOC_6H_4$-CH NOH and II in EtOH at room temp. give the nitrile and $(PhNH)_2CS$, the *β*-isomer behaves in the same manner. Furfur *syn* aldoxime and II in EtOH-KOH give $(PhNH)_2CS$, $(PhNH)_2CO$, S and the nitrile; the *anti*-oxime behaves similarly in EtOH, while with alkali there results the carbanilino deriv., m. 139°, identical with that obtained by the use of PhNCO. *o*-$MeC_6H_4NCS$ gives only (*o*-$MeC_6H_4NH)_2CO$. $Me_2$-C NOH and II in EtOH at room temp. give $Me_2C$ NOCONHPh, m. 108°, and S. *o*-$MeC_6H_4NCS$ gives *carbo-o-toluidoacetoxime*, *m. 81–2°*, *the p-deriv.* m. *105–6°*. MeEtC NOH and II, without a solvent, give the *carbanilino deriv.*, MeEtC NOCONHPh, m. 135°, this also results in $Me_2CO$ soln., *in alk. soln there is also formed* $H_2S_2O_3$ or its decompn. products $H_2SO_3$ and S. If the reacting compds are heated, there results the carbanilino deriv. and $(PhNH)_2CS$. *o*-$MeC_6H_4NCS$ *gives carbo-o-toluidomethyl Et ketoxime* m. 80° *the p-isomer* m. 146–7°. *Carbanilinodiethyl ketoxime*, m. 96–8° (25% yield) *methylpropyl deriv.*, m. 146° (13% yield). Me iso-Bu ketoxime b. 175° $d_4^{17}$ 0.8935 $n_D^{14}$ 1.456, *carbanilino deriv.*, m. 117° (20% yield); *carbo-o-toluido deriv.*, m. 184°. MePhC NOH gives a carbanilino deriv., m. 131.5°, *carbo-o-toluido deriv.*, m. 109° *p-isomer*, m. 126°. *Carbanilinoresacetophenoxime* pale yellow, m. 118–20°. *o*-$MeC_6H_4NCS$ did not react. $Ph_2C$ NOH gives $Ph_2C$ NOCONHPh, m. 176°. $(Me_2NC_6H_4)_2C$ NOH did not react with II or the *o*-Me deriv. *Carbanilinomethyl p-tolyl ketoxime*, m. 112°. Monoximes of diketones do not react with II; *α*-

isonitroso acids, such as AcC( NOH)CH$_2$CO$_2$H or PhC( NOH)OH, also do not react with II. C J West

**The constitution of certain compounds formed by the action of alcoholic hydrochloric acid on unsaturated ketones.** Brian Correy and Hugh Ryan. *Proc Roy Irish Acad* B39, 431 9(1930). cf *C A* 23, 3213, 24, 5203. The dimer formed by the action of alc HCl on PhCH CHCOEt (I) yields a monoxime (II), m 212.3°. II is reconverted into I by treatment with concd $H_2SO_4$ or by boiling with alc HCl and is unchanged by further treatment with $NH_2OH$ HCl (III), hence it is assumed that I is CHPh CHPh CH(COEt) CHCOEt instead of the sym EtCOCH CHPh CH(COEt) CHPh. The compd formed by treating II with $P_2O_5$ appears to be EtCO·CH CHPh CH Et CHCONHEt (IV). IV does not absorb $Br_2$ nor react with III. Heated with dil $H_2SO_4$, extd with Et$_2$O, PhH and CHCl$_3$, neutralized with KOH, distd and the distillate tested with $I_2$ in NaOH, IV gave the CHI$_3$ test but none of the exts left any residue. C H Pitt

**2-Hydroxy-4-methoxy- and 4-hydroxy-2-methoxybenzaldehyde.** Theodora Elizabeth de Kiewiet and Henry Stephen. *J Chem Soc* 1931, 81–5.—*m* MeOC$_6$H$_4$OH (20 g.) in 70 cc. abs. Et$_2$O and 20 g. HCN satd. with dry HCl and kept in a refrigerator for not more than 24 hrs. and the ppted. aldimine HCl dissolved in 2 l. cold $H_2O$ and heated to boiling, gave 0.5 g. 2,4 HO(MeO)C$_6$H$_3$CHO (I), removed in a current of steam, and 10 g. of 1,2 HO(MeO)C$_6$H$_3$CHO (II). II *phenylhydrazone*, yellow, m. 158°, *p nitrophenylhydrazone*, dark red, m. 255° (decompn.), *semioxamazone*, m. 242°. I *p nitrophenylhydrazone*, bright red, m. 226.5°, *semioxamazone*, lemon yellow, m. 247°, *semicarbazone*, m. 230°. C J West

**Condensation of aldehydes with hydrazones. II. Condensation of anisaldehyde and of salicylaldehyde with their respective phenylhydrazones.** Antonino Giacalone. *Gazz chim ital.* 60, 818–21(1930).—The expts. are in continuation of the previous ones (cf. *C. A.* 24, 837) and employ the same method. Each aldehyde can condense with its own phenylhydrazone or with the phenylhydrazone of another aldehyde, so that from BzH, *p*-MeOC$_6$H$_4$CHO (I), *o* HOC$_6$H$_4$CHO (II) and phenylhydrazine, 9 condensation products can be obtained. The earlier paper and present paper describe 3 of these, the remainder will be described in later papers. I (3 mols.), mixed with PhHNNH$_2$ (III) (2 mols.), when the reaction is completed ZnCl$_2$ (10 g.) added, heated on a water bath until the mixt. becomes thoroughly hard, finely ground, washed with steam (to remove I), dried in the air, extd. with boiling C$_6$H$_6$ and the residue recrystd. from boiling PhMe, yields *p p'-dimethoxydibenzal-p,p'-dihydrazino-p''-methoxytriphenylmethane*, MeOC$_6$H$_4$CH(C$_6$H$_4$NHN:CHC$_6$H$_4$OMe)$_2$, pale violet, m. 215–6°. Following the same procedure except that the hardened mass is washed with boiling EtOH instead of C$_6$H$_6$ before recrystn. from boiling PhMe, II (3 mols.) and III (2 mols.) yield *o,o'-dihydroxydibenzal-p,p'-dihydrazino-o hydroxytriphenylmethane*, HOC$_6$H$_4$CH(C$_6$H$_4$NHN:CHC$_6$H$_4$OH)$_2$, yellow, blackens 235°, m. 240°, sol. in dil. aq. NaOH from which solns. it is reppted. by acids. III. **Condensation of salicylaldehyde, of anisaldehyde and of *p*-nitrobenzaldehyde with benzalphenylhydrazine.** *Ibid* 821–4.—*o*-HOC$_6$H$_4$CHO (5 g.) and PhCH.NNHPh (I) (10 g.) treated with ZnCl$_2$ (5 g.) and a little PhMe to make a uniform paste, heated on a water bath, with agitation until the fused reaction mixt. becomes green and solidifies, a little water added, heated further, finely ground, washed with steam, dried in the air, dissolved in hot C$_6$H$_6$, filtered and cooled, ppts. *p,p' dibenzaldihydrazino-o hydroxytriphenylmethane*, HOC$_6$H$_4$CH(C$_6$H$_4$NHN:CHPh)$_2$ (II), m. 185°, insol. in dil. aq. NaOH (suggesting that the OH has taken part in the reaction, but this is disproved by the formation of an Ac deriv.). II, Ac$_2$O and fused AcONa refluxed 3 hrs., poured into water, let stand until solidified, dried, pulverized, dissolved in AcOH, poured into water and dried in air and then over $H_2SO_4$ in a desiccator, yield the *Ac deriv.*, AcOC$_6$H$_4$CH(C$_6$H$_4$NAcN.CHPh)$_2$, m. 109–10°. Similarly anisaldehyde (5 g.), phenylhydrazine (11.5 g.) and ZnCl$_2$ (5 g.), heated until hard, steam distd., the residue washed with EtOH, dissolved in C$_6$H$_6$ and poured into ligroin, ppts. *p,p'-dibenzaldihydrazino-p''-methoxytriphenylmethane*, MeOC$_6$H$_4$CHC$_6$H$_4$NHN.CHPh)$_2$, yellow, amorphous, m. around 125°, could not be crystd. from any solvent. *p* O$_2$NC$_6$H$_4$CHO (2 g.), I (5.2 g.) and ZnCl$_2$ (2 g.), heated as before until hard, pulverized, boiled with water and then with EtOH, the residue purified by soln. in hot PhMe, yield *p,p'-dibenzaldihydrazino p''-nitrotriphenylmethane*, O$_2$NC$_6$H$_4$CH(C$_6$H$_4$NHN:CHPh)$_2$, orange yellow, m. 213–4°. C C. Davis

**A simple method for the preparation of phenylglyoxal.** Carl Neuberg and Eduard Hofmann. *Biochem. Z.* 229, 413–5(1930).—The following reaction is utilized

for the prepn of phenylglyoxal $PhCOCH.NOH + ONO\,SO_3H = PhCOCHO + N_2O + H_2SO_4$. Ten g of PhCOCH NOH is dissolved in 35 cc. dioxane, dild with 10 cc $H_2O$ and cooled to 0°. With const. shaking 8.5 g of $NO_2$ $SO_3H$ crystals is added while the temp is kept below 5°. Then the mixt is warmed up to 40°, whereupon a vigorous reaction and evolution of gas occur. The flask must be kept in cold water to prevent the temp from rising above 60°. This is now transferred with about 100 cc $H_2O$ to a Claisen flask and evapd to 70 cc. *in vacuo*. The oily residue is extd 3 times with 50 cc. ether, and the combined ether exts are washed several times with small quantities of $H_2O$. After removing the ether the PhCOCHO is extd from the oil by boiling twice with 40-cc. quantities of $H_2O$. The hot soln is filtered and evapd *in vacuo* to 30 cc., and on cooling with ice massive crystallization occurs. S. Morgulis

Dimethylallylbenzylacetic acid and isopropylbenzylvalerolactone. G. Darzens and A. Lévy. *Compt. rend.* 191, 1455–7(1930); cf. *C. A.* 21, 581.—$Me_2C:CHCH_2OH$ with HBr gas gives $Me_2C:CHCH_2Br$, b. 120°, which with $PhCH_2CNa(CO_2Et)_2$ gives $Me_2C:CHCH_2C(CH_2Ph)(CO_2Et)_2$, $b_4$ 184–7°. This ester on sapon. and heating *in vacuo* to 160° gives 80% $Me_2C:CHCH_2C(CH_2Ph)CO_2H$, $b_7$ 157–60°, m. 49.5°, and 20% lactone, m. 25° and $b_4$ 148–50°. This does not condense to give a hydronaphthalene deriv. V. F. Harrington

Spectrochemical study of ammo acid anhydrides. IV. Light absorption of derivatives of azlactones, diketopiperazine, hydantoin and thiohydantoin. Tie-ichi Asahina. *Bull. Chem. Soc. Japan* 5, 354–65(1930); cf. *C. A.* 24, 298.—The ultraviolet absorption of azlactones of substituted hippuric acids, RCH(N:C(Ph)CO)O where R is *o*- (I), *m*- (II), or *p*-$AcOC_6H_4$ (III), *o*- (IV), *m*- (V), or *p*-$MeOC_6H_4$ (VI); of $RCH:C(CO_2H)NHCOPh$, where R is furyl (VII), Ph (VIII), *o*-, *m*- or *p*-$HOC_6H_4$ (XV), *o*-, *m*- or *p*-$MeOC_6H_4$ (XVI); dibenzal- (IX), and difuraldiketopiperazine (X), 4-benzal (XI), and 4-furalhydantoin (XII), 2-thiohydantoin and its following derivs. 3-acetyl, 3-benzoyl, 3-acetyl-4-benzyl, 4-benzyl, 4-(*p*-hydroxybenzyl), 4-benzal (XIII) and 4-fural (XIV). VII, X, XII and XIV are more bathochromic and hyperchromic than VIII, IX, XI and XIII. I, II and III have an absorption max. near 3580 A. U. IV and VI have the same max. while V is less bathochromic. The azlactones are far more bathochromic than their hydrolysis products, XV and XVI. Absorption curves and methods of prepn. are given. V. F. Harrington

Esterification of 3,5-diammo- and iodobenzoic acids with alcoholic hydrogen chloride. Anton Kailan and Adolf Irresberger. *Monatsh.* 56, 407–27(1930).—The unimol. velocity coeffs. of esterification of 3,5-$(H_2N)_2C_6H_3CO_2H$ (I) and *o*-, *m*- and *p*-$IC_6H_4CO_2H$ with EtOH-HCl in the presence and absence of $H_2O$ have been detd. at 25°. With EtOH contg. little $H_2O$ the coeffs. for all the acids are proportional to the concn. of the HCl, in moist EtOH the coeffs. increase much more rapidly. The values for I show that the introduction of a 2nd *m*-$NH_2$ group into BzOH has a much smaller effect than the first. The retarding action of the halogen atom is most marked with the *o*-I acid and least with the *m*-isomer. For the *o*-halogenobenzoic acids, the coeff. decreases with increasing at. wt. of the halogen atom. All the *m*-halogeno acids have approx. the same coeff., which is less than that for BzOH. C. J. West

Behavior of some condensation products of *p*-dimethylaminobenzaldehyde toward bromine and nitrous acid. K. H. Bauer and Marie Seyfarth. *Ber.* 63B, 2691–5(1930).—It had been shown that the condensation products of BzH with $PhCH_2CN$, $NCCH_2CO_2Et$ and other compds. do not add Br normally but are unreactive toward it. To det. whether this behavior is influenced by introduction of a $Me_2N$ group into the Ph nucleus, the condensation products of *p*-$Me_2NC_6H_4CHO$ with $PhCH_2CN$, $NCCH_2CO_2Et$, $CH_2(CN)_2$, MeCOPh and $Me_2CO$ were treated with Br and $HNO_2$. With *p*-$Me_2NC_6H_4CH:CPhCN$ (I), *p*-$Me_2NC_6H_4CH:C(CN)CO_2Et$ (II), *p*-$Me_2NC_6H_4CH:C(CN)_2$ (III) and *p*-$Me_2NC_6H_4CH:CHCOPh$ (IV), for the most part no Br or $N_2O_3$ is added at the double bond but Br is substituted in the $Me_2NC_6H_4$ nucleus in the *o*-position to the $Me_2N$ group, as was shown by synthesis of the products, and $N_2O_3$ gives the corresponding $NO_2$ derivs. The yields in all cases were 60–75%. When, however the PhCO group in IV is replaced by MeCO, *i. e.*, with *p*-$Me_2NC_6H_4CH:CHCOMe$, there is formed, by primary addn. of Br at the double bond and subsequent elimination of HBr, *α-p-dimethylaminophenyl-β-bromo-β-acetylethylene* (V), whose *phenylhydrazone* (VI) rearranges in AcOH on the $H_2O$ bath into *N phenyl-3-methyl-5-p-dimethylaminophenylpyrazole* (VII), with loss of $H_2O$. *α-Phenyl-p-dimethyl-m-bromocinnamonitrile*, from 3,4-$Br(Me_2N)C_6H_3CHO$ and $PhCH_2CN$ with a few drops KOH in alc. or from I with Br in $CHCl_3$, green-yellow, m. 102°. *m-Nitro analog*, similarly prepd. from 3,4-$O_2N(Me_2N)C_6H_3CHO$ and $PhCH_2CN$ or from I with $NaNO_2$ in AcOH,

deguelin. Derric acid thus constitutes one-half of the mol of rotenone, deguelin and tephrosin LAWRENCE P MILLER

Rotenone, the effective constituent of derris root. VIII. The chemical constitution of derric acid and risic acid. SANKICHI TAKEI, SHIKIRO MIYAJIMA AND MINORU ŌNO *Bull Inst Phys Chem Research* (Tokyo) 9, 1016–22(1930), *Abstracts* 95–9(in German) published with *Sci Papers Inst Phys Chem Research* (Tokyo) 15, Nos. 278–81); cf *C. A* 24, 4037.—Rotenone (20 g) and 50 g anhyd AcONa in 500 cc. EtOH, treated with 16 g $I_2$ in 130 cc. EtOH in 1.5 hrs., followed by boiling for an hr. and filtering off the AcONa, give 14 g. of *dehydrorotenone* (I), m. 216°. 4.3 g. more is obtained from the EtOH filtrate. No Ac deriv of rotenolone occurs. I (20 g.) in 300 cc. EtOH and 7 g. KOH in 7 cc. $H_2O$ give 16 g. of *derrisic acid*, $C_{21}H_{18}O_6(OMe)_2$ (II), m. 153°, which with $NH_2OH$·HCl and AcONa gives 80% of *derrisic acid oxime*, $C_{23}H_{23}O_7N$OH, m. 142°. It gives with $FeCl_3$ the purple color, proving the presence of a phenolic OH radical. Ten g. II in 200 cc. KOH (1%) with 7.5 g. $KMnO_4$ in 700 cc. $H_2O$ gives 2.6 g. of *risic acid*, 2,5-(*MeO*)$_2$C$_6$H$_2$*C*(*OH*)(CO$_2$H)$_2$ (III), m. 225°, which is not changed by $H_2O_2$ oxidation in alk. soln., but entirely decompd. by prolonged heating with $KMnO_4$. III, methylated with $CH_2N_2$, gives quant. its *di Me ester*, $C_8H_4O_2(OMe)_4$, colorless, m. 80°, insol. in $NaHCO_3$ but sol. in NaOH; with alkali it is converted into III. Three g. III, heated for 7 mins. at 255–60°, gives 1.3 g. of *decarboxyrisic acid*, $C_7H_4O_2(OMe)_2$ (IV), m. 116°, crystals from $H_2O$, m. 68–98° but m. 116° when the water of crystn. is lost. The oxidation of III and IV with *N* $HNO_3$ results in *dimethoxybenzoic acid* (V), yellow, m. 209°, which with $CH_2N_2$ is converted quant. into the *Me ester*, $C_{11}H_{13}O_4N$, faint yellow, m. 146°, being hydrolyzed by heating for 30 mins. with dil. $NH_3$-KOH to the original acid. The mixt. of 5 g. III and 20 g. KOH, moistened with a small portion of $H_2O$, heated for 3 hrs. at 270–300°, gives 0.01 g. of $C_8H_8O_2$, m. 167–8°, whose mixt. with hydroquinone m. 168–9°. It reduces vigorously Fehling soln. and the $NH_3$-$AgNO_3$. One g. III with 5 g. $KMnO_4$ gives 0.1 g. of *derric acid*, 2,5-(MeO)$_2$-C$_6$H$_2$C(OH)(CO·H)CH$_2$CO$_2$H (VI), colorless, m. 171°, which, on fusion, does not liberate $CO_2$ and is oxidized to III. Regarding the optical isomers of VI and III, another paper will follow. K KONDA

Condensation products from aryldithioglycolic acids. ERICH GEBAUER FÜLNEGG AND HELENE JARSCH *Monatsh* 56, 317–21(1930).—Brief details are given of dyes obtained by heating the following compds. with $ClSO_3H$ at 50–60° for 2 hrs.: benzene-1,2-, 1,3- (I) and 1,4-*dithioglycolic acids*, the 4-Cl and 2,5-$Cl_2$ derivs. of I and 1,4-benzoquinone-2,3- and 2,5(2,6?)-dithioglycolic acids. The dyes are probably bisthionaphtheneindigo-*x*,*x*′-dithioglycolic acids. They are violet compds. which dye wool from acid baths blue-green tones. C J WEST

*Synthesis of phenol ketones according to Hoesch. IV.* W BORSCHE AND K. DIACONT *Ber* 63B, 2740–3(1930), cf *C A* 24, 95.—It was shown in Papers I and II that arylglyoxylic nitriles with multivalent phenols under the conditions of the Hoesch synthesis do not give hydroxylated benzils but lactone imines or ketones of polyhydroxytriphenylacetic acids, thus, PhCOCN and *m* C$_6$H$_4$(OH)$_2$ (I) give the lactone, HOC$_6$H$_3$ CPh[C$_6$H$_3$(OH)$_2$] CO O (II). This reaction seems, however, to be limited to the arylglyoxylic nitriles and to depend on the linking of an aromatic acid radical with CN or CO, for on the one hand II has also been obtained (WITH NIEMANN) from PhCOCO$_2$H and I in Et$_2$O with $ZnCl_2$-HCl and on the other hand the alkylglyoxylic nitriles thus far tested (MeCOCN and EtCOCN) give with I under the conditions of the Hoesch synthesis only the monoketimines of the diketones 2,4-(HO)$_2$C$_6$H$_3$CO-COR. Phloroglucinol unexpectedly reacts much less readily and the products have such unpromising properties that nothing definite can as yet be said as to their compn. and structure. *1 (2,4-Dihydroxyphenyl)propane 1,2-dione*, yellowish, m. 150°, *disemicarbazone* yellowish, m. 243–5° *bis(2,4-dinitrophenylhydrazone)*, red, m. 249–50°. *2 (2,4-Dihydroxyphenyl)butane 1,2-dione*, yellowish, m. 150° (the intermediate *monoketimine HCl* forms brownish crystals), *disemicarbazone*, m. 205°, *bis(2,4-dinitrophenylhydrazone)*, red, m. 245°. C. A. R.

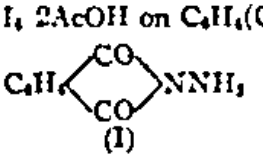
The condensation of catechol tannin. MAX BERGMANN AND GEORGI POJARLIEFF *Naturwissenschaften* 18, 1114(1930).—The condensation tendency of catechol is due to its structure of hydroxydihydropyran and by the simultaneous presence of a 2,3-double bond in the pyran ring with a hydroxyl in position 5. Tetramethylcatechol, with all phenol groups methylated, *still is easily condensable (unpublished result)*. The benzene rings are not essential for the condensation, since glucal (Bergmann and Freudenberg, *C A* 24, 1352–3) is condensed in a similar manner by acids, dihydroglucal (a tetrahydropyran) is, however, acid resistant (Fischer, *C. A* 8, 1121). Not all HO groups

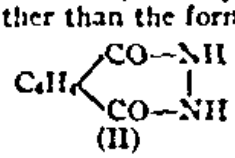
can be removed from catechol without destroying the condensability; anhydroacetobutyl ale does not condense B J C VAN DER HOEVEN

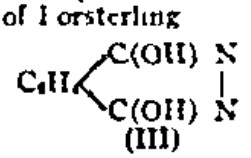
The chemistry of quinic acid. KARL JOSEFSSON *Svensk Farm Tidn* 34, 649-54(1930).—A critical review on the constitution of $C_6H_7(OH)_4CO_2H$ A R R

Preparation of 4-nitrophthalimide and derivatives. LEONARD F LEVY AND HENRY STEPHEN *J Chem Soc* 1931, 79-82.—Nitration of 20 g $C_6H_4(CO)_2NH$, by adding it gradually to 24 cc $HNO_3$ (d 1.44) and 200 cc $H_2SO_4$ (10% $SO_3$) and holding the mixt at 80° for 30 min., then cooling and pouring into 400 g ice, keeping the temp below 20°, gives 78% of the 4 $NO_2$ deriv., m 198°; use of ordinary concd $H_2SO_4$ reduces the yield to 40%. Reduction of 20 g of the $NO_2$ deriv with 84 g $SnCl_2$ and 450 cc. HCl and 450 cc $H_2O$ gives 15.3 g of the 4 $NH_2$ deriv., m 294°. *Ac deriv.*, pale straw, m 331° (cor., decompn.), *Bz deriv.*, cream colored, m 322° (cor., decompn.) $C_6H_4(CO)_2O$ at 180° for 1 hr. gives *4 phthalimidophthalimide*, yellow, m 319° (cor., decompn.) The diazo compd couples with PhOH and α and β $C_{10}H_7OH$, giving orange, maroon and light brown dyes, resp., and with $PhNH_2$ and α and β $C_{10}H_7NH_2$ in acid soln., giving deep red, red and yellow dyes, resp. With CuCl in HCl the diazo compd gives the 4 Cl deriv., m 210°, heating the diazo compd gives the 4 HO deriv., m 280° C J WEST

The action of hydrazine acetate on 3-nitrophthalic anhydride. M MIHAILESCU AND L PROTOPOPESCU *Bul soc chim Romînia* 12, 95-102(1930).—M and H reply to the objections of Radulescu and Georgescu (cf *C* 1 20, 184) to the formula (I) which Mihailescu and Florescu (cf *C A* 18, 3183) propose for the product of reaction of $N_2H_4$ 2AcOH on $C_6H_4(CO)_2O$ rather than the formula (II) of Forsterling


(I)


(II)


(III)

M and H cite the following properties of this compd which are not consistent with formula II and its enol (III) but are consistent with formula I and its hydrolysis product $HO_2CC_6H_4CONHNH_2$ (IV) (*1*) The substance is difficultly sol in water but is hydrolyzed by water to give an acid reaction to litmus (*2*) It dissolves completely in alkali hydroxides with red color and is pptd unchanged by acids (*3*) It dissolves in carbonates and bicarbonates with effervescence but it is not pptd by an excess of $CO_2$ as R. and G erroneously state (*4*) Only monometallic salts are formed (*5*) Three properties indicate that the substance possesses an $NH_2$ group (*a*) It is decompd by $HNO_2$ and NaBrO, (*b*) it reacts with aromatic aldehydes to give condensation products; (*c*) its Ac and Me derivs have properties more like those of *N*- than of *C* derivs. Ten g of 3 nitrophthalic anhydride in 150 cc boiling glacial AcOH reacts with 15 g $N_2H_4H_2SO_4$ and 18 g cryst AcONa in $H_2O$ to form $NO_2C_6H_4(CO)_2NNH_2$ (V) V does not m. 300°; NaBrO decomps it, only mono-Ac derivs are formed by $Ac_2O$ and AcCl, alkali hydroxides, carbonates and bicarbonates dissolve it, producing a red coloration and needle-shaped, golden yellow crystals of only monometallic derivs which do not m 300° but above this temp decomp with explosion $Ac_2O$ reacts with V to form the mono-Ac deriv as needles resembling cotton wool which m 230° V reacts with BzCl in hot pyridine to form a mono-Bz deriv as a sandy powder m 260°. V in hot $NH_4OH$ reacts with $AgNO_3$ to form a deep yellow Ag salt which is a monometallic salt as indicated from N detns Ag could not be detd as explosions resulted in the attempts. The Ba salt of V was prepd by decompn of the K salt of V with $BaCl_2$ as yellow needles which analysis showed to be a monometallic salt V reacts with $Me_2SO_4$ at 120° to form plates of a mono-Me deriv m 265° Heating V with anisaldehyde and fused AcONa gives needles of $NO_2C_6H_4(CO)_2NN$ $CHC_6H_4OMe$ (VI) which m. 280° and react with KOH soln to form $MeOC_6H_4CHO$ and the K salt of V. These properties of V together with the arguments in regard to the structure of I (an analogous compd.) justify the structure assigned to V. ODEN E SHEPPARD

Menthone series. IX. New optical resolution of *dl*-menthol and of *dl*-camphor-10-sulfonic acid. JOHN READ AND WM. J. GRUBB *J. Chem. Soc* 1931, 188-95, cf *C. A* 25, 1233.—Although the naturally occurring form, *l* menthol (I), was fairly readily obtained by the optical resolution of the *dl* form (II) by Pickard and Littlebury (*C A*. 6, 1284), the method does not appear to lend itself to the prepn of *d* menthol (III) in quantity. I and *d* camphor-10-sulfonyl chloride (IV) in quinoline or pyridin give 85% of *l menthyl d-camphor-10-sulfonate* (V), m 125.5°, crystallizes from light petroleum in slender needles, 5-6 cm long, from AcOEt in doubly-terminated prisms; the system is tetragonal, *c a* = 1.3788:1, *a*(100), *m*(110), *p*(111); $[\alpha]_D^{18}$ —20.9° ($CHCl_3$,

c 1.0988). At 153°, V decomps. to *d*-camphor 10-sulfonic acid (VI) and partly racemized *d* Δ¹ menthene (VII). When steam-distd., V undergoes extremely slow decompn., giving I, VI and VII. V is very stable toward hot EtOH KOH. Na in hot EtOH gives I and VII. Prolonged boiling with 20% HCl or $H_2SO_4$ causes a gradual decompn. of the ester, the most satisfactory hydrolyzing agent is hot 50% $(CO_2H)_2$, the products being I, VI and VII. *l-Menthyl l-camphor 10-sulfonate* (VIII), m. 47°, $[\alpha]_D^{15}$ −77.6° ($CHCl_3$, c 1.0930), at 153° it decomps. into *l*-camphor 10-sulfonic acid and VII. It is somewhat less resistant to hydrolysis than is V. II and IV in quinoline give an ester with $[\alpha]_D^{15}$ 2.0° (c 1.0), 2 crystns. from light petroleum and 2 from AcOEt give 45% of V; decomps. with 50% $(CO_2H)_2$ gives only 10% of pure I. II and *l*-camphor 10-sulfonyl chloride give 42% of *d* menthyl *l*-camphor 10-sulfonate (IX), m. 125.5°, $[\alpha]_D^{15}$ 29.8° ($CHCl_3$, c 2.0740), decomps. with 50% $(CO_2H)_2$ gives 10% pure III. An equimol. mixt. of VIII and IX melted indefinitely over a wide range of temp., and gave no indication of the formation of a partial racemate. Similar behavior was shown by a mixt. of IV and VIII. In both cases, the observed rotatory power in $CHCl_3$ was practically equal to the mean value of the 2 components. An equimol. mixt. of IV and IX appears to give mixed crystals when allowed to sep. slowly from AcOEt. Details are given of the resolution of *dl*-camphor 10-sulfonic acid with I.

C. J. West

Action of Beckmann's mixture on some monocyclic terpenes. II. Terpinolene and "origanene." Thomas A. Henry and Humphrey Paget. *J. Chem. Soc.* 1931, 25–32; cf. *C. A.* 22, 1346.—Terpinolene (I) was prepd. by shaking *dl*-α-pinene with half its vol. of EtOH $H_2SO_4$ (50% by wt.) and also from terpineol by boiling gently with 40% aq. $(CO_2H)_2$ for 30 min. or by keeping it at room temp. for 2–3 days with EtOH $H_2SO_4$. I was purified through the tetrabromide, which crystallizes in 2 forms, from 2 vols. EtOH, $Me_2CO$ or AcOEt, m. 122°, monoclinic, $a : b : c = 0.7804 : 1 : 0.9468$, $\beta$ 114° 15′ (cf. Hintze, *Z. Kryst.* 10, 258(1885)), from 10 vols. $Me_2CO$ monoclinic, rectangular plates, m. 119°, $a : b : c = 2.5095 : 1 : 2.0333$, $\beta$ 118° 8.5′, a(100), m(110), c(001), p(101). The regenerated I $b_{30}$ 121°, $b_{760}$ 186°, $d_4^{15}$ 0.8552, $n_D^{15}$ 1.4886; the same product is obtained from the 2 tetrabromides and on bromination yields 80–85% of the first tetrabromide. I is not very readily attacked by Beckmann's mixt. The principal products of oxidation are levulic acid and AcOH. A small amt. of an unstable keto-lactone is obtained, which is regarded as *β-hydroxy-keto-lactone* (*ε-keto-β-hydroxypropyl Δ²-keto-reduction*) (II), $C_9H_{14}O_3$, m. 48–50°, *semicarbazone*, m. 222–3° (cor., decompn.), reduction of II gives homoterpenyl Me ketone. Hydrolyzes with warm alkali gives the *acid* AcCH·CH·C(CMe:CH₂)·CHCO₂H, m. 130°, which absorbs 4 H, giving *dl* ε-keto-β-isopropylheptoic acid. II is not readily attacked by Beckmann's mixt., but at 60° after 2 days there results terebilic acid in quant. yield. "Origanene" (Pickles, *C. A.* 2, 2248, 2673) is generally regarded as α-terpinene; this suggestion ignores the fact that origanene yields a nitrosyl chloride, m. 91–4°, a nitrolpiperidide, m. 186°, and a nitrolbenzylamine, m. 104–5°, which have not been obtained from α-terpinene. Reexamn. of residues from the prepn. of carvacrol from *Cymbopogon origanum* oil shows that α-terpinene is present, but there is also about 1.4% of a terpene giving the above cryst. derivs. and for which the name origanene is again proposed until the constitution can be established.

C. J. West

Pinene and nopinene. Georges Bruy. *Bull. Inst. pin* 1929, 271–6, 293–300; 1930, 7–16, 33–8, 63–8, 87–96, 109–12, 131–6, 151–4, 175–8, 199–205, 223–8, 244–7, 270–4; cf. *C. A.* 17, 3179; 19, 487; 20, 50; 22, 1347, 3157; 23, 829.—After reviewing the origin and phys. and chem. properties of *d*- and *l*-pinene and *d*- and *l*-nopinene, a more detailed account is given of the previously published investigations.

A. P.-C.

Production of camphor. Willibald Rehnert. *Riechst. Ind.* 5, 105–8(1930).—The present and past methods for the distn. of camphor producing material are described.

W. O. E.

Photopolymerization of *p*-pentone. W. Treibs. *Ber.* 63B, 2738–40(1930).—Piperitone (I) in aq. AcOH or alc. exposed to the light of a quartz Hg lamp begins after several hrs. (depending on the diam. of the containing quartz vessels) to deposit needles which are repeatedly filtered off until no more are formed, they are followed by the sepn. of a yellow oil. This oil, when dissolved in hot alc., gives more of the needles on cooling. The yield of cryst. product is the same whether the soln. is illuminated in an air or H atm. and small quantities of uranyl acetate have but a slight influence if the deposits formed on the walls of the vessel are removed, larger quantities, through their screening action, slow up the reaction. The needles seemed to be quite homogeneous, b. about 365° almost without decompn. and m. 112°, but by re-

peate I crystn from MeOH they were sepd into 3 fractions having the compn and mol wt (Rast) of a *dimeric peperitone*. (1) needles, m. 162°, form no semicarbazone, (2) silky needles, m. 142–4°, yielding a *semicarbazone*, $C_{21}H_{31}O_2N_3$, m. 228–35° (decompn.) depending on the rate of heating, that sepd. in 2 forms (needles and cubes) which did not depress each other's m. p. (3) rhombic leaflets, m. 157–9°. (1) and (3) greatly depressed the m. p. of each other. The semicarbazone of (2) regenerates (2) with hot cond. aq. $(CO_2H)_2$. The dimerization in this case evidently has occurred through the double bond in I, probably with formation of a 4-membered ring, but the non-formation of a semicarbazone by (1) and (3) does not necessarily prove that the C:O group is involved in the formation of these dimers, for steric influences may prevent the formation of a semicarbazone even though the C:O group is still intact. In sunlight instead of the light of the Hg lamp I yields only the dimer (1). Preliminary expts. indicate that carvone which, according to Ciamician and Silber, yields only 1 dimer in sunlight, also forms 2 dimers when exposed to the light of a Hg lamp.

C. A. R.

Correction [autoxidation of cedrene]. A. Baumann. *Ber.* 63B, 2080(1930); cf. *C. A.* 24, 97.—The unsatd. terpene $C_{15}H_{24}$ (obtained by dehydration of the alc. resulting from the oxidation of cedrene with O and a Co siccative) was described as having $[\alpha]_D$ −125° when, as a matter of fact, it is d-rotatory. The prepn. used at the time was insufficiently purified and final values on the consts. of the compd. will be published shortly.

C. A. R.

Fokienol, a new monocyclic sesquiterpene alcohol. L. S. Glichitch. *Compt. rend.* 191, 1457–60(1930). Distn. of steams of *Fokienia hodginsii* gives an oil which is mostly a tertiary monocyclic alc., $C_{15}H_{26}O$, $b_{15}$ 125.4°, $d_{18}$ 0.9236, $n_D^{18.5}$ 1.4975, $\alpha_D$ 18°35', mol. refraction 70.18, indicating 2 double bonds. Distn. causes ring closing and the compd. must be isolated through its formate. Acids cause dehydration to a bicyclic diene, $C_{15}H_{24}$, isofokienene. $HIO_3$ gives the monocyclic fokienene, $b_{15}$ 112–4°, $d_{18}$ 0.8802, $\alpha_{D(100)}$ +16°50', $n_D^{19}$ 1.49394. All 3 on dehydrogenation with S give 1,6,4-$C_6H_3Me_2CHMe_2$.

V. F. Harrington

Heteropolar carbon compounds. XII. New dyestuffs of the aniline blue series and perchlorates of several important triphenylmethane dyes. W. Dilthey and R. Dinklage. *J. prakt. Chem.* 129, 21–30(1931); cf. *C. A.* 24, 1855.—Parafuchsin base and *p*-$H_2NC_6H_4Ph$, heated with BzOH 6 hrs. at 175–80°, give *tri(4-phenylamino)aniline blue*, $(PhC_6H_4NHC_6H_4)_3CCl$, golden glistening crystals with a violet blue base color, decomp. about 225°; drying at 110° causes no noticeable decompn. Fuchsin base and *p*-$H_2NC_6H_4OPh$ in the same way give *tri(4-phenoxylaniline blue*, $(PhOC_6H_4NHC_6H_4)_3CCl$, violet, decomps. about 230°. *p*-$H_2NC_6H_4SPh$ and parafuchsin base give *tri(4-phenylthiolaniline blue*, $(PhSC_6H_4HNC_6H_4)_3CCl$, blue or violet, decomps. 220–30°. Colors are given for the EtOH, $H_2O$ and $H_2SO_4$ solns. Little difference is observed in the color of the 3 new dyes. The m. ps. for the following perchlorates are approx.: *Benzaldehyde green*, blue-green, 210°; *brilliant green*, blue-green, 183°; *rhodamin 3B*, red, 167°; *crystal violet*, violet, 230–40°; *methylene blue*, dark blue, 231–2°; *Victoria blue*, blue, in a bath at 320°, decomps. violently; *pararosaniline*, dark red, 317° (block).

C. J. West

Conjugated double bonds. XIV. Addition of maleic acid anhydride to polyenes. Richard Kuhn and Theodor Wagner-Jauregg. *Ber.* 63B, 2062–70(1930); cf. *C. A.* 25, 683.—The addn. of maleic anhydride (I) to dienes has often been used in the study of the structure of natural products such as cholesterol and muscarufin, and it seemed of theoretical and practical importance to det. whether the reaction could be extended to compds. with a large no. of conjugated double bonds such as the dyes of the bixin and carotene series. Preliminary expts. showed that all the polyene dyes tested are decolorized by I and an addn. product of Me bixin was isolated as a well-crystd. Na salt. Because of the no. of isomers possible, however, the structure of this product could not for the time being be established and it was to shed light on this question that the present study of the behavior of a series of synthetic diphenylpolyenes toward I was undertaken. Stilbene, although it has only 1 double bond, reacts very readily with I in hot xylene, forming an amorphous, approx. 1:1 addn. product of high mol. wt.; it is presumably cyclic and is to be described in detail elsewhere. $(PhCH:CH)_2$ takes up 1 mol. I, as has also since been found by Diels and Adler (*C. A.* 24, 96) but the addn. products vary with the conditions of prepn. In xylene are obtained rhombs m. 198° to 203° from prepn. to prepn., which can be sepd., without change in the compn., $C_{12}H_{10}O_3$, into fractions differing in m. p. by at most 4° and which are probably mixts. of isomers. D. and A. carried out the addn. in a molten mixt. of the components and

obtained a compd m 207° (apparently uncor) An isomer m 212.5–4.5° (cor) was obtained by rearrangement of the above mixt with $Cl_3CHCO_2H$ in $CHCl_3$, but its m p fell to 196–8° (cor) on crystn from $C_6H_6$. That the I has added at the 1,4 positions in every case is shown by the conversion of the addn products into terphenyl by hydrolysis and oxidation with $K_3Fe(CN)_6$. The isomers probably differ in the position of the double bond. The isomer m 198° with hot aq NaOH gives a *3,6-diphenyltetrahydrophthalic acid* (II), rhombs with 1 $H_2O$ from alc., which when heated loses $H_2O$ and shows the high m p of D and A's anhydride. An oily isomer (III) of II is obtained through the *dichloride*, m 143–4° (cor), from (PhCH CH)$_2$ and fumaryl chloride. With HCl in $Et_2O$ III changes into crystals, m 230–1° (cor). From its method of prepn, III contains the $CO_2H$ groups in the *trans position*. Assuming that the double bond occupies the same position in II and III, *cis trans* isomerism can be explained only if the double bond is in the 3,4- or 4,5-position. The low melting anhydride of II decomps to a large extent, when distd under 12–5 mm, into (PhCH CH)$_2$ and I. (PhCH CHCH)$_2$ with I yields an addn product $C_{28}H_{20}O_3$ (IV), m 199.5–200° (cor), confirming the observation of D and A. That addn takes place at the 1,6-positions is shown by simultaneous decarboxylation and dehydrogenation by distn with anhyd $Ba(OH)_2$ and Se, which yields *1-phenyl 2 biphenylylethylene* (V), m 221–2° (cor), identical with the product obtained by distn of *p* $PhC_6H_4COCH_2Ph$ with Zn dust in H. (PhCH CHCH CH)$_2$ likewise adds 1 mol I in boiling xylene but the product (VI) is not identical with the *3 phenyl-6 styryltetrahydrophthalic anhydride*, (IV) above. It m 192–3° (cor) and is also obtained by distn of IV *in vacuo*; it is probably also a *3-phenyl 6 styryltetrahydrophthalic anhydride*, for with $O_3$ it yields BzOH in abundance, and hydrolysis gives an acid which, when dehydrogenated with $K_3Fe(CN)_6$ and decarboxylated or when distd directly with soda lime, changes into V. The isomerism of IV and VI is probably due to a difference in the position of the double bond in the cyclohexene ring. On hydrolysis VI gives an *acid* m 190–1° (cor) with regeneration of VI. (PhCH CHCH CH)$_2$ adds 2 mols I when the mixt of the components is cautiously fused, forming *6,6'-bis(3-phenylcyclohexene-1,2-dicarboxylic anhydride)* (VII), m 275° (cor, decompn), and in boiling xylene is obtained an *isomer* (VIII), m 264° (decompn), along with VII. Crystn from $(Cl_3CHCO)_2O$ raises the m p of VIII to 292° (decompn) which again falls to 264° on crystn from $Ac_2O$ or *o*-$C_6H_4Cl_2$. On hydrolysis, dehydrogenation with $K_3Fe(CN)_6$ and distn with soda lime, VIII gives (*p*-$PhC_6H_4)_2$, m 313–4° (cor), attempts to effect the degradation by direct distn with soda lime gave a hydrocarbon, $C_{14}H_{10}$, m 281–2° whose structure has not been established. Hydrolysis of VIII with coned NaOH gives an amorphous *dicarboxylic acid*, easily sol in cold $HCO_2H$ and soon sepg in crystals probably as the result of isomerization, the same change was observed when the amorphous acid was warmed in $Et_2O$ with a few drops of $HCO_2H$. The isomer seps from dil alc with 2 mols $H_2O$ and when heated to 140° in $Cl_3CHCO_2H$ and pptd with $Et_2O$ it gives the anhydride m 290° (see above). Attempts to condense (PhCH CHCH CH)$_2$ with only 1 mol I gave always VII and the unchanged hydrocarbon. Toward fumaryl chloride the tetraene behaves as with I; the resulting *tetracarboxylyl chloride* m 231.5–2.5° (cor) (PhCH CHCH CHCH)$_2$ in boiling xylene adds chiefly 2 mols I; there are obtained 2 *isomers*, $C_{52}H_{44}O_6$, sepd by fractional crystn from $Ac_2O$ into the more sol chief product, m 235.5°, and a less sol isomer, m 255.5° (both cor, decompn). There is also formed an amorphous substance (apparently a 1.3 product), decomps 276.5° (cor). The 235.5° compd is apparently formed by 1,4 and 7,10-addn, dehydrogenation and decarboxylation gives a compd m 302–3°, apparently identical with a product obtained by dehydrogenation of (*p*-$PhC_6H_4CH_2)_2$ and assumed to be *di p-biphenylylethylene*. (PhCH CHCH CHCH CH)$_2$ reacts readily with I in boiling tetralin, forming a product difficultly sol even in boiling $Ac_2O$, dioxane, $PhNO_2$ and BzOEt. Apparently 3 mols I are in the main added. Simultaneous dehydrogenation and decarboxylation gives a hydrocarbon, begins to m 320°, having the compn of a *quinquiphenyl*. (PhCH CHCH CHCH CHCH)$_2$ behaves like the hexaene, yielding a difficultly sol product which has not yet been obtained in homogeneous form. These results show that when a large no of conjugated double bonds are present they each add 1 mol I with formation of 6 membered rings. The reactive diene groups in the diphenylpolyenes are at the ends of the chains and the behavior of these compds toward I is to be ascribed to the same cause as their behavior toward H in the formation of *dibenzylpolyenes*, *viz*, the greater reactivity of the end methine groups adjacent to the Ph residues. C A R

2-Methylnaphthalenes. III. K. Dziewoński and A. Wulffsohn. *Bull intern acad polonaise* 1929A, 143–8.—Sulfonation of 2-$C_{10}H_7Me$ with an equimol quantity

of $ClSO_3H$ in $PhNO_2$ at 30–40° gave *2-methylnaphthalene-8-sulfonic acid* (*Na salt; chloride*, m 94–6°, *amide*, m 172–4°, *anilide*, m 162–4°) Its constitution was established by conversion into 7-methyl-α-naphthol, m 109–11° (*acetate*, m 39–41°, *azo deriv* with *p*-nitroaniline, m 250° (decompn )), by fusion of the Na salt with KOH. B C. A.

**1,4-Dibenzylnaphthalene and its corresponding keto derivatives.** K Dziewoński, J Moszew, S Leftankewicz and L Sucheri *Bull intern acad polonaise* 1929A, 650–7 —The dibenzylnaphthalene, m 88° obtained as one of the products of the action of $PhCH_2Cl$ on $C_{10}H_8$ in presence of $AlCl_3$ or fused $ZnCl_2$ ( β-dibenzylnaphthalene" of Dziewonski and Moszew, *C A* 23, 3220, 3923) is now shown to be *1,4-dibenzylnaphthalene* (picrate, m 107°), also prepd by the reduction of *4-benzoyl-1-benzylnaphthalene*, m 113° (*phenylhydrazone*, m 155–6°, *oxime*, m 202–3°) The latter is obtained by the interaction of 1 $C_{10}H_7CH_2Ph$ and BzCl in presence of fused $ZnCl_2$ The orientation of both compds is established by their oxidation with $HNO_3$ to the known 1,4 $C_6H_4Bz_2$, m 100° (Scholl and Neumann, *C A* 16, 2143) (*dioxime*, m 261°). Treatment of 1,4 $C_{10}H_6(CH_2Ph)_2$ with $ClSO_3H$ at the ordinary temp affords *1,4-dibenzylnaphthalenesulfonic acid* isolated as the Na salt Nitration of 4,1 $C_{10}H_6BzCH_2Ph$ yields a *mononitro deriv*, m 172–3° *A by product of the reduction of the* same compd is *1,4-dibenzyltetrahydronaphthalene* m 92–3° B C A.

*peri*-Benzoyl and -benzyl derivatives of naphthalene K Dziewoński, J Auerbach and J Moszew *Bull intern acad polonaise* 1929A, 658–63 —*1-Benzoyl-8-benzylnaphthalene*, m 142° (*oxime*, m 220–2°), is prepd by the action of $PhCH_2Cl$ on 1-$C_{10}H_7Bz$ in the presence of $AlCl_3$ at 160–70° Oxidation of this with $HNO_3$ yields *1,8-*$C_{10}H_6Bz_2$ (*bisphenylhydrazone*, m 270–1°, *dioxime*, m 270°) (cf *C A* 23, 3220, 3923). B C. A

**Synthesis of acetyl derivatives of 1-benzylnaphthalene. I. 4-Acetyl-1-benzylnaphthalene.** K. Dziewoński and J Moszew *Bull intern acad polonaise* 1930A, 66–71 —1-$C_{10}H_7CH_2Ph$ reacts with AcCl in the presence of $AlCl_3$ in $CS_2$ at the ordinary temp to give *4-acetyl-1-benzylnaphthalene*, $b_{12}$ 240–5°, m 75° (*picrate*, m 113°) (60%), together with a *di Ac deriv*, $b_{12}$ 265–70°, m 135° (10%), as a by product The *oxime*, m 240–1°, of 1,4-$C_{10}H_6(CH_2Ph)Ac$ undergoes a Beckmann rearrangement when its soln. in AcOH and $Ac_2O$ satd with anhyd HCl is heated at 100°, to give *4-acetamido-1-benzylnaphthalene*, m. 208–9°, hydrolyzed by boiling 6% HCl to 4,1-$C_{10}H_6(CH_2Ph)NH_2$ identical with a specimen obtained by the action of $NH_3$ on 4,1 $C_{10}H_6(CH_2Ph)OH$. (*C. A* 22, 2164) $HNO_3$ (d. 1.52) in AcOH at 10–15° converts 1,4 $C_{10}H_6(CH_2Ph)Ac$ into its *5-nitro-deriv*, m 153°, while boiling *10% $HNO_3$* oxidizes it to *4-benzoyl-α-naphthoic acid*, m 180–1°. B. C. A.

**Bromination of 4-nitro-1-methylnaphthalene.** John S H. Davies and Albert E. Oxford *J. Chem Soc.* 1931, 220–1.—4,1-$O_2NC_{10}H_6Me$ and Br in a quartz flask in ultra-violet light give a *mono-Br deriv*, yellow, m 137.5–8.5°, and a very small quantity of a *tetra-Br deriv*, m 189–90° (decompn ), the same mixt was obtained in a sealed tube at 100–20° for 2 hrs α $C_{10}H_7CH_2Cl$, $b_{14-15}$ 146–58°, seps. from EtOH at —15° as silvery flakes, m 29.5–30.5°, this was previously described as a liquid. 2,4 $(O_2N)_2C_6H_3CH_2Cl$ and NaBr in MeOH, boiled 6 hrs , give the *bromide*, m 46–7°. C. J. West

**Naphthalene series. II Diaryl- and triarylmethane derivatives of dimethyl-α-naphthylamine.** Basker Gokhle and Frederick A. Mason *J. Chem Soc.* 1931, 118–26, cf. *C A.* 24, 5296 —$(Me_2NC_{10}H_6)_2CH_2$, m 181–2.5°, was obtained from α-$C_{10}H_7NMe_2$ and HCHO in AcOH-HCl and methylal in AcOH-HCl or $H_2SO_4$, the base was surprisingly resistant to oxidizing agents; chloranil in glacial AcOH at 110° gives 2% of *4,4'-tetramethyldiamino-1,1'-dinaphthylcarbinol*, m 184–6°; cold AcOH gives a faintly green soln , becoming blue-violet on warming; concd. HCl or $H_2SO_4$ gives a deep yellow soln *4-Dimethylamino-1-naphthoyl chloride* and *anilide* were prepd from the acid. *Attempts to prep* the ketone $(Me_2NC_{10}H_6)_2CO$ from this chloride and α-$C_{10}H_7NMe_2$ in $C_2H_2Cl_4$ gave only tarry products *4,4',4"-Hexamethyltriaminotrinaphthylmethane*, m 266–7.5°, is formed from α $C_{10}H_7NMe_2$ and $HC(OEt)_3$ with $AlCl_3$ at 70°. $Me_2NC_{10}H_6COCl$ and $PhNMe_2$ with $AlCl_3$ in $C_2H_2Cl_4$ give *4,4'-tetramethyldiaminophenyl 1-naphthyl ketone*, m. 128.5–9°, $Et_2O$, EtOH and dil. mineral acids give light greenish yellow solns With $POCl_3$ the ketone condenses with $PhNMe_2$, yielding a deep blue dye, probably identical with "Naphthoblau " Reduction with Na-Hg in EtOH gives the corresponding *carbinol*, pale yellow, m. 62–3°; the AcOH soln is a brilliant blue 4 $H_2NC_{10}H_6NMe_2$; obtained by reduction of the 4-NO deriv , yields an *Ac deriv*, m 185°. Attempts to prep. the analog of methylene-blue B failed. Ab-

sorption curves of the carbinols in AcOH are given, values calcd according to Moir's theory agree with the observed maxima C. J. WEST

Naphthalene-1,5-disulfonic acid as a by-product in the monosulfonation of naphthalene. CYRIC B RADCLIFFE AND WALLACE P SHORT *J. Chem Soc* 1931, 220 — In the prepn of 1 $C_{10}H_7CN$ from $C_{10}H_7SO_3Na$ and KCN, there *is obtained* 1 4 g 1,5-$C_{10}H_6(CN)_2$ from 100 g $C_{10}H_8$ employed in the sulfonation, because of the sparing soly of $C_{10}H_6(SO_3H)_2$ as the Ba salt and the incomplete conversion into the dicyanide, this est of the degree of disulfonation is a conservative one C J WEST

Theory of halogen substitution II. PAUL PFEIFFER AND PAUL SCHNEIDER *J prakt Chem* 129, 129–44(1931), cf *C A.* 24, 1858 —Previous work showed that certain ethylenes give colored bromides In order to study the constitution of these the following work was carried out $Ph_2C:CH_2$ and $(p\text{-}MeC_6H_4)_2C:CH_2$ gave absolutely no color with Br $\alpha$ $C_{10}H_7MgBr$ and AcOEt give *α,α-dinaphthylmethylcarbinol*, m 146°, giving an intense malachite green color with concd $H_2SO_4$ and a brick red color with Br With concd HCl there results *α,α-dinaphthylethylene*, m 107°, concd $H_2SO_4$ gives the same color as with the carbinol, the ethylene does not show a characteristic behavior with Br, in $CCl_4$ Br gives a *mono-Br deriv*, m 148°, excess of Br gives a *tetra Br deriv*, m 69–70°, sol in 30% oleum with a grass-green color Attempts to prep $(C_{10}H_7)_2C:CHPh$ by the action of $PhCH_2CO_2Et$ upon $\alpha$ $C_{10}H_7MgBr$ gave only $PhCH_2COCHPhCO_2Et$ *Biphenylphenylethylene*, $PhC_6H_4CPh:CH_2$, m 94–5°, concd $H_2SO_4$ gives a brick red color, Br vapor colors the compd greenish gray, *Br deriv*, m 162°, warming with concd $H_2SO_4$ gives an intense red-violet color, Br vapor colors the compd black-violet and the color is very stable, the *di Br deriv* m 155°, Br vapor does not color the crystals $(PhC_6H_4)_2C:CH_2$, m 211°, gives a *Br deriv*, m 187–8°, colored by Br vapor a red brown, which color quickly disappears, *di-Br deriv*, m 194–5° *asym Dibiphenylmethylethylene*, $(PhC_6H_4)_2C:CHPh$, light yellow, m 165–6°, sol in concd $H_2SO_4$ with a deep red violet color, Br vapor gives a deep green color stable for only 1 2 secs *Br deriv*, m 150–2°, Br vapor gives a dirty grayish black color, stable for about 1 hr *asym Dibiphenylphenylethylene*, m 192–3°, difficultly sol in cold concd $H_2SO_4$, and giving a deep bluish red color on warming, Br vapor gives a grass-green color, stable for only 1 sec., *Br deriv*, m 201–2°; Br vapor gives no characteristic color C J WEST

Organic arsenic compounds. I J KLIPPEL *Roczniki Chem* 10, 777–83 (783 English)(1930) —*Methylphenyl α naphthylarsine*, $C_{17}H_{15}As$, m 60 0–0 5° was obtained by the action of PhMgBr on $Ph(C_{10}H_7)AsCl$ On addn of Cl or CNBr to this compd, and after decompn of the addn products by heating *phenyl α naphthylchloroarsine*, $C_{23}H_{19}AsCl$ m 46 0–6 5°, and *phenyl α naphthylcyanoarsine*, $C_{18}H_{12}AsCN$, m 95 5–100°, resp were formed The chloride and cyanide were converted by hydrolysis into *phenyl-α naphthylarsine oxide*, m 116 5–7 5° which on oxidation by $H_2O_2$ gave the *arsonic acid*, m 189 0–9 5° The chloride and oxide described by Blicke and Smith (*C A* 24, 83) as thick non-crystg oils are cryst when in a pure condition J KLČERA

The action of bromine on naphthylamine- and aminonaphtholsulfonic acids GUSTAV HELLER, HERBERT ARNOLD AND JOHANNES SCHMIDT *Z angew Chem* 43, 1132–7(1930), cf *C A* 22, 3653 —1,4, 1,5- (I) and 1,8-$NH_2C_{10}H_6SO_3H$ react with an excess of $Br_2$, yielding the corresponding *2,4-di-Br derivs*, while the 2 5-, 2 6- and 2 7-compds give the *1 Br derivs* The products from the 2 8- and 2,1-compds were not characterized since the reaction in these cases was not under control 2,3 6 (II) and 2,6 8-$NH_2C_{10}H_5(SO_3H)_2$ (III) yield *dibromonaphthalenesulfonic acids* of unknown structure In each case 1 $SO_3H$ group has been substituted for a Br atom In the product from II, a Br atom occupies position 1 Unknown *mono Br derivs* of I and III were also prepd $SO_3H$ derivs of 1,2- 1 8-, 2 5- and 2 8-$NH_2C_{10}H_6OH$ yield bromonaphthoquinones upon reaction with $Br_2$, the halogen replaces the $SO_2H$ group when an excess is used 2 5,7-(IV) and 2,8 6-$NH_2(OH)C_{10}H_5SO_3H$ and 2 8 3 6-$NH_2(OH)C_{10}H_4(SO_3H)_2$ all yield *1,3 6 7-tetrabromo 2-amino 5 8 naphthoquinone* (V), m 241°, *Ac deriv* m 255° *di Ac deriv* m 160–1° V reacts with $PhNH_2$ yielding the *anilinotribromo deriv*, $C_{16}H_9O_2N_2Br_3$ m 215–6° Upon reduction of V with $SnCl_2$ 1 of the Br atoms is lost the product $C_{10}H_4O_2NBr_3$ m > 300° IV also reacts with 2 mols of $Br_2$, the probable product being *1 3 dibromo 2 5 7 aminonaphtholsulfonic acid* 1,8 4 $NH_2(OH)C_{10}H_4SO_3H$ and 1 8 4,6-$NH_2(OH)C_{10}H_4(SO_3H)_2$ (VI) both give *2,4,7 tribromo-1-amino 5,8 naphthoquinone*, while *2 4 6 7 tetrabromo 1-amino-5 8 naphthoquinone*, m 255° (*Ac deriv* m 184°) is derived from both 1 8,5 $NH_2(OH)C_{10}H_5SO_3H$ and VI. VI *also yields 2,4,x tribromo 1,8 6-aminonaphtholsulfonic acid* and the K salt of *1,2,4 tribromo 5 8-naphthoquinone 6 sulfonic acid* This last product indicates that the $NH_2$ group has been replaced by Br It was isolated with 2 5 mols of $H_2O$, 1 5 *mols of which was*

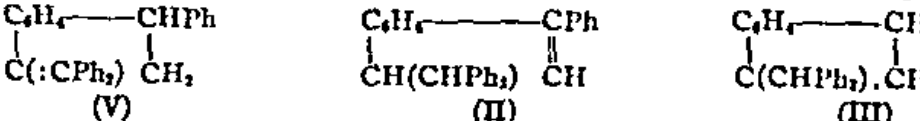
driven off by heating at 150° The bromination of 1,8,3,6 $NH_2(OH)C_{10}H_4(SO_3Na)_2$ in KCl soln gives the K salt of *2, 4(?)-dibromo-1-amino-7,8 naphthoquinhydrone-3,6-disulfonic acid*, the reduction of which compd leads to the formation of the *hydroquinone compd*. $C_{10}H_7O_8NS_2Br_2$ By heating 0 5 g of 1,2,4-$NH_2(OH)C_{10}H_4SO_3H$ (VII) with 1 cc of 50% $Br_2$ in HOAc at 100°, 0 4 g of 3,4,1,2-$Br_2C_{10}H_4(=O)_2$ was isolated When a free flame was used in heating VII with $Br_2$, 3,2,1,4-$Br(HO)C_{10}H_4(=O)_2$ was obtained 1,2,4,6-$NH_2(OH)C_{10}H_4(SO_3H)_2$ yields the K salt of *4 bromo 1,2 naphthoquinone-6-sulfonic acid*

I. M. LEVINE

Reactivity of substituents in the $C_5$-nucleus. VINCENT JACOBI *J prakt Chem* 129, 55–96(1931) —Because cyclopentadiene is not only difficult to prep but polymerizes quickly at room temp, indene (I) has been used in this study Much of the chemistry of I is reviewed Details are given of the reduction of I and the prepn of its di Br deriv Distn of dibromohydrindene at ordinary temp gives *5*-bromoindene $b_{16}$ 120°, m 36°, a trace of concd $H_2SO_4$ gives an intense bluish red color, oxidation gives 4 $BrC_6H_3(CO_2H)_2$ Diketohydrindene (II) and *p*-$C_6H_4(CHO)_2$, heated at 110–20°, give *p-aldehydobenzalindandione*, $C_6H_4(CO)_2C{:}CHC_6H_4CHO$, pale yellow, m 173°, concd $H_2SO_4$ gives an intense orange color, $PhNHNH_2$ gives *p*-$C_6H_4(CH{:}NNHPh)_2$ With twice the amt of II, there results *terephthalidenebisdiketohydrindene*, m 293°, a by product, yellow m over 300° II and 1 mol MeMgI give unchanged II indicating the structure $C_6H_4{<}\overset{CO}{\underset{C(OH)\,CH}{}}{>}CO$, even 2 mols MeMgI give unchanged II; 5 mols MeMgI give *1,3-dihydroxy 3 methylindene* $b_{14}$ 120°, repeated vacuum distn or distn at atm pressure splits off 1 mol $H_2O$, giving *α-methylindone* The 5-Br deriv. of I and Mg in $Et_2O$ give the Grignard reagent after heating several days; with $H_2O$ it gives I. *1,2,5-Tribromohydrindene (5-bromoindene dibromide)*, oil which decomps very easily, cooking with 10% EtOH gives *5 bromoindene hydroxybromide*, m 80 5 1 5°. I dibromide, $b_{14}$ 143 5–4 5°, m 31 5–2 5°, gives with 10% EtOH *2-ethoxybromohydrindene*, oil; the *2-MeO deriv* is also an oil Distn of the EtO deriv *in vacuo* gives *1-bromoindene*, $b_{11}$ 135 5–6°, concd $H_2SO_4$ gives an intense ruby-red color the Mg deriv with $CO_2$ gives *indene-1-carboxylic acid*, m about 70° (decompn) Distn of indene dibromide at atm pressure gives *3 bromoindene*, $b_{11}$ 110–20°; Mg in $Et_2O$ followed by $CO_2$, gives the *3 carboxylic acid*, m 160° (decompn) A by-product is *3-indenophenone (dindyl ketone)*, m 235°, indene is also formed in small amts *1,2,3-Tribromohydrindene (3-bromoindene dibromide)*, oil which readily decomps, 10% EtOH gives *3-bromoindene hydroxybromide*, m 90° I and Br in $H_2O$, boiled 3 hrs, give a *tribromoindene*, pale yellow, m 133 5–4°, $HNO_3$ gives a dibromophthalic acid, showing that 2 of the Br atoms must be in the benzene ring

C. J. WEST

Alkali organic compounds. OTTILIE BLUM-BERGMANN *Ann* 484, 26 51(1930) — Schlenk and Bergmann (*C. A.* 22, 4495), by the action of Na upon 1-benzohydrylidene 3 phenylindene (I), obtained 2 dihydro derivs, m 174 5–5° (II) and 133–4 5° (III). Wieland and Kloss (*C. A.* 23, 3696), by the reduction of 1-benzohydrylidene-3 phenyl 2 chloroindene (IV), obtained a 3rd isomer (V), m 115° In order to clear up this matter, II and V have been synthesized IV is dimorphous, crystg from benzine as orange-red cubes, m 147–8°, and red-violet needles, m 157–8°; reduction with HI and red P in AcOH gives V, needles, m 115°, or rhombic leaflets, m 130–1 5°; the leaflets are changed into the needles on repeated crystn The Li deriv (VI) of 3-phenylindene and BzPh give I. VI and $ClCO_2Me$ give *di-Me 3-phenylindene-1,1-dicarboxylate*, m 105–7°; catalytic reduction gives the *dihydro deriv*, m. 102–3 5°; the *free dicarboxylic acid* m 175–7° (decompn), heated above its m p, it gives *3-phenylhydrindene-1-carboxylic acid*, $b_{11}$ 227–9°, m 143–4 5°; *Me ester*, $b_{11}$ 204 5–5°, the latter with PhMgBr gives *3-phenyl-1-(α hydroxybenzohydryl)hydrindene*, m 122–4°, which loses $H_2O$ when heated with AcCl, giving V. The Li deriv of fluorene and MeI give 9,9 dimethylfluorene and the 9-Me deriv The Li deriv of indene and $Ph_2CHBr$ give 1-benzohydrylindene, m 163–4° VI and $Ph_2CHBr$ give II, m 174 5–5°; the by-products



(V) (II) (III)

include $(Ph_2CH)_2$ and 3,3'-diphenyl-1,1'-diindenyl; a *dimer* of 3 phenylindene, yellow, m 207–9°, and a *compd* $C_{18}H_{12}$, leaflets, m. 166–7°, and yellow prisms, m 162–4 5°; reduction of the last gives the *compd* $C_{18}H_{14}$, m 182–4° The Li deriv of 2 phenylindene and $Ph_2CHBr$ give *1-benzohydryl-2-phenylindene*, m 175°, whose *dihydro deriv* m 151° This shows that the compd $C_{18}H_{12}$ above is not produced by the wandering

of the Ph group The action of Al Hg upon I gives a mixt of II and III. Reduction of III with Na and AmOH gives 1 benzohydryl-3-phenylhydrindene, m 133–5°, also obtained by reducing V. In the reduction of anthroic acid, there results a *double compd* of this acid with the tetrahydro acid, $C_{15}H_{12}O_2$, m 190–2°, green luster The action of $CO_2$ upon the Li deriv of anthracene gives *9,10-dihydro 9,10,10-tricarboxylic acid*, crystg with 1 mol $Et_2O$, m 289–92° (decompn ), heating 13 hrs at 100° splits off the I $Et_2O$, further heating for 14 days also splits off 1 mol $CO_2$. *tri-Me ester*, m 147 5–8°. Heating the acid in AcOH gives *α* 9,10 dihydroanthracene 9 10-dicarboxylic acid, m 162–3 5°. $Ph_2CNa$ and $CO(OPh)_2$ give $Ph_2CCO_2Ph$, m 124–7°, $CO(OEt)_2$ gives $Ph_2CCO_2Et$, m 118–20°, $(Ph_2CNa)_2$ and $CO(OPh)_2$ give (PhC )$_2$ The Li deriv of fluorene and $CO(OMe)_2$ give Me biphenyleneacetate and *dibiphenyleneacetone*, m 230–2° (decompn ) $Ph_2CHNa$ and $CO(OMe)_2$ give $(Ph_2CH)_2CO$, m 134–4 5°. $(Ph_2CNaCH_2)_2$ and $CO(OMe)_2$ give 1,1,4,4 tetraphenylcyclopentan-5-one The di Li deriv. of anthracene and $CO(OMe)_2$ give *bisdihydroanthracyl ketone*, m 238–40° (evolution of CO); in its thermal decompn , 88 5% of the theory of $CO_2$ is evolved and a mixt of anthracene and its dihydro deriv is formed The Na deriv of anthracene behaves in the same way $(Ph_2CH)_2CO$ with Na in $Et_2O$ gives the *Na salt* of the enolate, $C_{31}H_{21}ONa$, dry distn gives tetraphenylallene and 1,1,3,3 tetraphenylpropylene C J West

Coupling of diazonium compounds with 2-methoxy-3-naphthoic acid G B Jambuserwala and F A Mason *J Soc Dyers Colourists* 46, 339–41(1930) — The Me ether of *β* hydroxynaphthoic acid will couple in $H_2O$ with diazotized *p*-, *o*-, and *m* nitroaniline, 4- and 5-nitro-*o*-anisidine, sulfanilic acid, benzidine and tolidine. Milton Harris

Keto-oxidation product of *α*-acetylacenaphthene. K. Dziewoński and J Reiss. *Bull. intern acad. polonaise* 1930A, 62–5 —Contrary to Graebe and Haas (*Ann* 327, 77–103(1903)) oxidation of 5-acetylacenaphthene (best prepd by the action of $AlCl_3$ on AcCl and acenaphthene without solvent) with $Na_2Cr_2O_7$ and AcOH at 50° gives only traces of 4,1,8-$C_{10}H_5Ac(CO_2H)_2$, the main products being *5-acetylacenaphthenequinone*, m 192–3° [*bisphenylhydrazone*, m 240–2°, *dioxime*, m 275–8° (decompn )], and *2,2'-diketo 5,5'-diacetyldiacenaphthylidene*, m 295° (decompn ) B C A

Derivatives of 3-bromoacenaphthene. K Dziewoński, Mlle J Schoen and Mlle A Glazner *Bull intern acad polonaise* 1929A, 636–49 —Oxidation of 3-bromoacenaphthene by $Na_2Cr_2O_7$ in AcOH at 30° yields, besides 4 bromonaphthalic acid 3-bromoacenaphthenequinone, m 235–6° (Graebe, *Ann* 327, 77–103(1903), gives m p 194°) [monophenylhydrazone, m 179–80°, bisphenylhydrazone, m 225–6° (literature 153° and 134°, resp ), *dioxime*, m 230–1° (decompn ), *3 bromoacenaphthaphenazine*, from the foregoing quinone and *o* $C_6H_4(NH_2)_2$, m 261–3°], and *3,3'-dibromodiacenedione*, $\left(C_{10}H_{11}Br\begin{matrix}C\\CO\end{matrix}\right)_2$, m 320–1° (for nomenclature, cf *C A* 20, 1234). Nitration of 3 bromoacenaphthene in AcOH gives mainly *3 bromo-4 nitroacenaphthene*, m 159–61°, converted by $Na_2S_2O_4$ into *3 bromo-4-aminoacenaphthene*, m 133°. The orientation of these derivs is established by the further reduction of the latter, by means of Na Hg and alc , to the known 3 aminoacenaphthene 3 Bromo-4 nitroacenaphthene is oxidized by $Na_2Cr_2O_7$ to *4 bromo 5 nitronaphthalic acid*, m 295° (*anhydride*, m 312°, *Me ester*, m 162°) Two isomeric $SO_3H$ acids, termed *α* and *β* resp , are obtained by the interaction of $ClSO_3H$ and 3-bromoacenaphthene at the ordinary temp , and are sepd by means of their Na salts *3-Bromoacenaphthene α-sulfonic acid* forms the more sparingly sol *Na salt* (*aniline salt*, m 260–1°, *β naphthylamine salt*, m 265–6°, *chloride*, m 134–5°, *amide*, m 137–8°), oxidation affords *3 bromo α sulfonaphthalic anhydride*, isolated as its *Na salt*. *3 Bromoacenaphthene β sulfonic acid* (*aniline salt*, m 256–7°, *chloride*, m 192–3° *amide*, m 233–4°, *Et ester*, m 140–1°) yields a similar naphthalic acid on oxidation Sulfonation with $H_2SO_4$ (d 1 84) at 80–90° converts 3 bromoacenaphthene into a *disulfonic acid* isolated as the *Ba salt* the *di Na salt* (+$3H_2O$) is readily sol in water [*dichloride* m 181–2°, *diamide*, m 289° (decompn ), *Et ester*, m 164°] B C A

Reduction products of the hydroxyanthraquinones. XII. Gordon F. Attree and Arthur G Perkin *J Chem Soc* 1931, 144–73, cf *C A* 24, 2456 —2 Methoxy anthraquinone (I) in $H_2SO_4$ and Cu powder, gradually added and heated to 140° for 1 hr , and the resulting product treated with $Ac_2O$ and $C_5H_5N$, give the *acetate*, m 152–4°, of *3 methoxy-9-anthranol* (II), m 108–9° II with $FeCl_3$-AcOH and EtOH gives about 30% of *3 3 -dimethoxydianthrone*, m 215–7° to a green liquid, concd $H_2SO_4$ gives a pale yellow soln , the main product of the reaction is I. *3,3'-Dimethoxydianthranyl 9,9 -diacetate*, m 228–30°, sol in $H_2SO_4$ with a violet red tint, I in $C_5H_5N$

transforms this to *3,3'* dimethoxydianthraquinone, yellow, m 291–5°, the latter in $C_5H_5N$, exposed to light for 2 weeks, gives *2,2'* dimethoxynaphthadianthrone, orange-red, does not m 340° and gives a red soln in $H_2SO_4$. Isoanthraflavic acid (III), reduced by $SnCl_2$-HCl, gives *3,6* dihydroxy *9* (iso anthraflavic acid) anthrol m 181–4° (Roemer and Schwarzer, *Ber* 15, 1011 (1882), give 173°). $FeCl_3$ in AcOH and EtOH gives *3,7',6,6' tetraacetoxy 9,9' dianthranyl diacetate*, pale yellow, m 280.2°, hydrolysis with HCl AcOH gives *3,7',6,6' tetrahydroxydianthrone*, pale yellow, darkens 270°, turns green 300° and does not have a definite m p. The hexaacetate does not give a dianthraquinone with I in $C_5H_5N$. III gives a *di Me ether* (IV), yellow, m 215.7°, with Cu and $H_2SO_4$ this yields the *acetate* pale yellow, m 180.1° of *3,6 dimethoxy 9 anthranol*, m 158.60°, the latter with $FeCl_3$ in AcOH gives *3,3,6,6' tetramethoxy 9,9'-dianthrone*, m 242.3°, whose *diacetate*, yellow, m 275.6°, does not react with I in $C_5H_5N$. IV and $SnCl_2$ HCl in AcOH give *3 methoxy 6 acetoxy 9 anthranyl acetate*, m 197.9°, sol in $H_2SO_4$ with a bluish red color, becoming yellow, hydrolysis with HCl AcOH gives *6 hydroxy 3 methoxyanthranol*, m 214.6°, giving a yellow soln with a green fluorescence in $H_2SO_4$, oxidation of the acetate with $CrO_3$ in AcOH gives the *mono Me ether* of III, yellow m 283.5° as the *Ac deriv*, m 194.6°, giving a crimson color in $H_2SO_4$, the mono Me ether also results in very small yields in the action of $Me_2SO_4$ on III. *6,6' Dihydroxy 3,3' dimethoxydianthrone* m 292.5°. *3,7 Dihydroxy 9 anthranol* and $FeCl_3$ AcOH give *3,7,7,7 tetrahydroxydianthrone* m 315.8° sol in $H_2SO_4$ with an orange yellow color; the *tetraacetoxy diacetate* darkens about 280° but does not have a definite m p. $H_2SO_4$ gives a scarlet color changing through brown to green. *2,2',3,3'* Tetrahydroxydianthrone, from hystazarin (V) through acetyl hystazarinanthrol, with $Ac_2O$ gives the *tetra Ac deriv*, pale yellow m 274.7° with $C_5H_5N$ there results the *tetra Ac diacetate*, m 293.5°, sol in $H_2SO_4$ with a red color, changing to green and then brown. The di Me ether of V, with $SnCl_2$ HCl AcOH, gives the *acetate*, m 169.71°, of *2,3-dimethoxyanthranol*, pale yellow, m 143.6°, with $FeCl_3$-AcOH there results *2,2',3,3' tetramethoxydianthrone*, m 243.5°, sol in $H_2SO_4$ with an orange red color, the *diacetate* m 191.6°. Oxidation of the anthrone with $(NH_4)_2S_2O_8$ gives *2,2',3,3' tetramethoxydianthraquinone* (VI), pale yellow, m 290.1°, sol in $H_2SO_4$ with a dull violet color, quickly passing to a blackish brown. $C_5H_5$ gives a deep green soln. Exposure to light in $C_5H_5$ EtOH for 20 days gives *2,2',3,3' tetramethoxyhelianthrone*, m 287–8°, sol in $H_2SO_4$ with a deep indigo blue color. HCl AcOH at 100° for 3 hrs. splits off the MeO groups, giving the *tetra HO deriv*, iridescent metallic leaflets; *tetra Ac deriv*, orange, m 295.7°. $CrO_3$ and AcOH oxidize this to *2,2',3,3'-tetraacetoxy-1,1' dianthraquinonyl*, pale yellow, m 290°, and then 268.70°, $H_2SO_4$ gives a red brown soln. Hydrolysis gives the *tetra HO deriv*, dull yellow, does not m 360° and gives a green blue soln in alkalies and a brick red color in $H_2SO_4$, it dyes Sn-, Al-, Fe- and Cr-mordanted calico, producing bright orange, dull red purple, purple and dull brown shades. VI in $C_5H_5$ and EtOH, exposed to the light for 6 weeks, gives *2,2',3,3'-tetramethoxynaphthadianthrone*, orange needles; the *tetra HO deriv* forms scarlet needles, sol in $H_2SO_4$ with a violet red color, it possesses little affinity for mordanted calico and is a poor dye toward wool mordanted with Sn, Al, Fe or Cr. *tetra-Ac deriv*, yellow, does not m 360°. *4,4'-Dihydroxydianthrone*, m 256.8°, sol in $H_2SO_4$ with an orange red color; the *diacetoxy diacetate* m 205.7°. *1-Methoxyanthrone* m 129–31°, $FeCl_3$-AcOH gives *1,1'-dimethoxydianthrone*, pale yellow, does not m 330°; the *diacetate*, pale yellow, m 290–1°, the crimson soln in $H_2SO_4$ changes to violet and then blue on standing. Iodine and $C_5H_5N$ give *1,1'-dimethoxydianthraquinone*, pale yellow, m 315.6°; oxidation of a colloidal soln with alk. $K_3Fe(CN)_6$ did not have any effect; however, exposure of a $Me_2CO$ soln to the light for 1 month gives *4,4'-dimethoxynaphthadianthrone*, orange red, does not m 360° and gives with $H_2SO_4$ a highly fluorescent, crimson soln; HBr and AcOH give the corresponding *4,4'-di HO deriv*, scarlet needles, does not m 360°. The other product of the action of light is *4,4' dimethoxyhelianthrone*, salmon, does not m 360°, gives a violet color in $H_2SO_4$, the 1,1'-di-HO deriv, orange red needles, was insol in alkalies and does not appear to give an Ac deriv. Anthrarufin di-Me ether (VII) and $SnCl_2$-HCl in AcOH give *1,5-dimethoxyanthrone*, brown-red, m 181–2°, giving a red soln in $H_2SO_4$, quickly changing to green blue; *acetate*, pale yellow, m 169.71°. The anthrone and $FeCl_3$ in AcOH give *1,1',5,5'-tetramethoxydianthrone*, m 305–7°, which is not attacked by $Ac_2O$ and $C_5H_5N$ or by I or $(NH_4)_2S_2O_8$. VII and $SnCl_2$ HCl at 65° for 3 hrs. give *10 hydroxy 1,5-dimethoxyanthrone*, violet, m. 153–5°, sol in $H_2SO_4$ with a pure blue color; boiling the mixt. for 1 hr. gives *1-hydroxy 5 methoxyanthrone*, pale yellow, m 131–3°, *1-acetoxy acetate*, yellow, m. 161–3°, the EtOH soln has a strong blue fluorescence. *1,1'-Dihydroxy-5,5'-dimethoxydianthrone*, pale yellow, m 287–9°, sol in $H_2SO_4$ with an

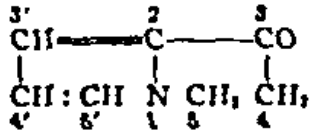
orange-yellow color, quickly passing to greenish blue, *1,1'-diacetoxy diacetate*, pale yellow, m 250–2°. Chrysazin di-Me ether (VIII) yields *1,8-dimethoxyanthrone*, yellow, m 196–7°; air oxidation of an alk. soln. gives *1,1',8,8' tetramethoxydianthrone*, does not m. 340°, gives a red brown color in $H_2SO_4$, rapidly changing to dull green, is un changed by prolonged digestion with $Ac_2O$ and $C_5H_5N$. $SnCl_2$-HCl and VIII give *1-hydroxy-8-methoxyanthrone*, pale yellow, m. 183–5°, the *1-acetoxy acetate*, m. 164–5°. *1,1'-Dihydroxy-8,8'-dimethoxydianthrone*, pale yellow, does not m. below 330°. Ac compd., m. 284–7°. *Alizarin* 2 Me ether and $SnCl_2$-HCl give 1-hydroxy-2 methoxy anthrone (IX), oxidized to *1,1'-dihydroxy-2,2'-dimethoxydianthrone* yellow, m. 195–7°; the *1,1'-diacetoxy diacetate* m. 242–5°; IX and I in $C_5H_5N$ give *4,4'-dihydroxy-3,3'-dimethoxyhelianthrone*, iridescent magenta like leaflets, does not m. 330°, sol. in $H_2SO_4$ with an intense greenish blue color, various other methods of prepn. are given. HCl and AcOH give the *tetra HO deriv.*, maroon-colored, does not m. below 300°. $H_2SO_4$ gives a deep blue color. $NH_4OH$ gives a violet color, it does not dye mordanted calico but has weak tinctorial power toward mordanted wool. $Ac_2O$ and $C_5H_5N$ give *4,4'-dihydroxy-3,3'-diacetoxyhelianthrone*, iridescent, chocolate-colored needles, m. about 325°. *1,1',2,2'-Tetrahydroxydianthrone*, pale yellow, m. 240–1°, *tetra Ac deriv.*, m. 245–7°. Purpuroxanthin di-Me ether, on reduction, gives *10-hydroxy-1,3-dimethoxyanthranol*, red, m. 156–8°, reduction of the di-Me ether with $SnCl_2$-HCl in hot AcOH gives a *tri-Ac deriv.*, yellow, m. 154–5°, of 1,3-dihydroxy(purpuroxanthin)anthrone, m. 217–9°. *3,4-Dimethoxy-9-anthranyl acetate*, yellow, m. 146–8°; the *Me ether* yellow, m. 116–8°. C. J. West

**The action of organomagnesium compounds upon furalacetophenone. New ketones in the furan ring.** N. N. Maxim. *Bul. soc. chim. Romînia* **12**, 24–7 (1930). cf. *C. A.* 25, 513.—M. allowed organomagnesium compds. to react upon furalacetophenone and always obtained satd. ketones in the furan ring according to the following equation: $2\,C_4H_3OCH{:}CHCOPh + RMgX \longrightarrow 2\text{-}C_4H_3OCHRCH_2COPh$. The furalacetophenone was prepd. according to Kostanecki and Podrajanski (*Ber.* 29, 2218) by allowing furfural to act upon PhCOMe in the presence of dil. NaOH. From this, M. prepd. *β-furylbutyrophenone*, $MeCH(C_4H_3O)CH_2COPh$, *β-furylvalerophenone* $EtCH(C_4H_3O)CH_2COPh$ and *β-phenyl-β-furylpropiophenone*. These ketones have been characterized by their semicarbazones and oximes. The yield is almost quant. This reaction can be used as a general method of prepg. satd. ketones in the furan ring. The mechanism of the reaction will be published elsewhere. T. R. G.

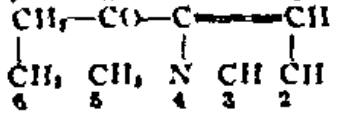
**Preliminary work to ring syntheses of porphyrins, etc. IV. A bromovinylpyrrole and its reactions.** Hans Fischer and Oskar Sös. *Ann.* **484**, 113–30 (1930). cf. *C. A.* 25, 961.—2,4-Dimethyl-5-carbethoxypyrrole-3-acrylic acid (I) and Br in $CS_2$ give a *dibromide*, $C_{12}H_{13}NO_4Br_2$, which does not have a sharp m. p.; the Br is labile and with $Me_2CO$ on the $H_2O$ bath 60% I is regenerated, with EtOH $H_2O$ on the boiling $H_2O$ bath there results *2,4-dimethyl-5-carbethoxy-3-ω-bromovinylpyrrole* (II), m. 158° (decompn.). Heated with HI-AcOH at 100° for 2 hrs., II is transformed to dimethylpyrrole; catalytic reduction of II gives cryptocarbethoxypyrrole. Br gives a *dibromide*. AgCN in MeOH gives a *2,4-dimethyl-5-carbethoxy-α,β-3-dimethoxyethylpyrrole*, m. 112°. Ag-O Ag or Cu gives the same product, with EtOH in place of MeOH there results *2,4-dimethyl-5-carbethoxypyrrole-3-ω-vinyl ether*, m. 87°. One mol. II and 1 mol. $SO_2Cl_2$ give a *mono-Cl deriv.*, $C_{11}H_{12}O_2NClBr$, m. 168°, 2 mols. $SO_2Cl_2$ give *2-formyl-4-methyl-5-carbethoxy-3-bromovinylpyrrole* (*III*), m. 140°, the *aldazine* m. 280° (decompn.), the *phenylhydrazone* m. 142° (decompn.). condensation of III and cryptopyrrole with HBr give the *methene HBr* $C_{18}H_{24}O_2N_2Br_2$, brick red, blackens 170° but does not m. 300°. Hydrolysis of III gives *2-formyl-4-bromovinyl-4-methyl-5-pyrrolecarboxylic acid*, m. 238° (decompn.) which condenses with cryptopyrrole to a *methene HBr*, $C_{17}H_{21}O_3N_2Br_2$, reddish brown needles. Three mols. $SO_2Cl_2$ and II give a di-$CO_2H$ acid, whose *α-Me α'-Et ester* $C_{13}H_{14}O_4NBr$, m. 131°, *di-Et ester* m. 115°, the free *acid* $C_9H_8O_4NBr$ slowly carbonizes above 230°. catalytic reduction gives 3-ethyl-4-methylpyrrole-2,5-dicarboxylic acid. The *Et ester* (IV) of I, m. 134°, results from I, EtOH and HCl or by condensation of 2,4-dimethyl-5-carbethoxypyrrole and HO-$CCH_2CO_2Et$ with $PhN_2Br$; the *dibromide* m. 121° (decompn.), the Br is removed by Zn in AcOH, giving IV, while catalytic reduction gives *Et 2,4-dimethyl-5-carbethoxypyrrole-3-propionate*, m. 73°. EtOH-KOH gives *2,4-dimethyl-5-carbethoxy-3-ω-carbethoxy-ω-ethoxyvinylpyrrole*, m. 136° and a Br-contg. acid m. 196° (decompn.), with MeOH a compd., $C_{18}H_{28}O_4N$, m. 178° results. Oxidation of I with $CrO_3$ gives 2,4-dimethyl-5-carbethoxypyrrole-3-carboxylic acid, m. 271°. C. J. West

**New derivatives of pyrrole. I. Synthesis of 3-keto-4,5-dihydro-di-(1,2)-pyrrole and of 8-keto-5,6,7,8-tetrahydropyrrocoline.** George R. Clemo and George R.

RAMAGE *J Chem Soc* 1931, 49-55.—K pyrrole and $ClCH_2CO_2Et$ in $C_6H_6$, heated 0.5 hr at 100°, give the *Et ester*, $b_{14}$ 112°, of *1-pyrrylacetic acid*, m 91°; *amide*, m 169°. *β-1-Pyrrylpropionic acid*, m 62°, *Et ester*, $b_{14}$ 122°, *amide*, m 81°. Attempts to effect ring closure were unsuccessful. It was also not possible to effect ring closure with *succinobutylimide*, $b_{12}$ 140°. K pyrrole and *p*-$MeC_6H_4SO_2CH_2CH_2Cl$ give *1-β chloroethylpyrrole*, $b_{14}$ 84°, *β-cyano deriv* (I), $b_{14}$ 140°, *1 γ chloropropylpyrrole*, $b_{14}$ 87°. The last compd is recovered unchanged after prolonged boiling with EtOH-KOH. $AlCl_3$ also failed to effect ring closure. Passing dry HCl through I in dry $Et_2O$ contg $ZnCl_2$ gives *3-keto 4,5-dihydro-di-(1,2) pyrrole* (II), m 61°, best isolated through the *semicarbazone*, m 211°, *piperonylidene compd*, pale yellow, m 191°. $EtO_2CCH_2CH_2COCl$ and K pyrrole give *Et β 1-pyrroylpropionate*, m 50°, treatment with Na in $C_6H_4Me_2$ and distn with $CaCl_2$ failed to remove EtOH. Levulyl chloride and K pyrrole give *β 1-pyrroylethyl Me ketone*, $b_{14}$ 148° (*phenylhydrazone*, m 131°, *semicarbazone*, m 190°), treatment with acids and alkalies always resulted in amide hydrolysis. *γ-1-Pyrrylbutyronitrile*, $b_{17}$ 152°, with $ZnCl_2$ and HCl, gives *8 keto-5,6,7,8 tetrahydropyrrocoline* (III), m 31°, *semicarbazone*, m 193°, *piperonylidene deriv*, yellow, m 136°.



(II)



(III)

C. J. WEST

**Cyclotellurobutane (tetrahydrotellurophen).** GILBERT T. MORGAN AND FRANCIS H. BURSTALL. *J. Chem Soc* 1931, 180-4.—$(CH_2)_4I_2$ and amorphous Te, heated at 130-40° for 5 hrs., give *cyclotellurobutane 1,1-diiodide* (I), purple plates or bright red prisms, m 149-50°; reduction with $SO_2$ in boiling $H_2O$ gives *cyclotellurobutane* (II), $b_{760}$ 165-6°, $b_{14}$ 166-7°, $n_D^{15}$ 1.6175, penetrating and unpleasant odor, oxidizes readily in the air, reacts explosively with concd $HNO_3$ and gives a red color with $H_2SO_4$; the *mercurichloride* m 146-7°. II and Cl give *cyclotellurobutane 1,1-dichloride*, m 111-2°, *dibromide* (III), m 130°, decomps at 210°. III and IV in equimol proportions in $H_2O$ or II and $Na_2CO_3$ or NaOH sufficient to remove half the Br, give the *1,1'-oxydi bromide*, $[(CH_2)_4TeBr]_2O$, m 207° (decompn.); alkalies convert this into the *1-oxide* IV, $(CH_2)_4TeO$, m 241° (decompn.), also obtained by the oxidation of II or the action of excess alkali on the dihalides; halogen acids regenerate the corresponding dihalides. II and MeI give *cyclotellurobutane 1-methiodide*, vaporizes without melting at 240°. $(CH_2)_4Br_2$ and Al telluride, heated at 125° for 2 hrs., give *1 δ bromobutylcyclotellurobutane 1-bromide*, $(CH_2)_4Te[(CH_2)_4Br]Br$, obtained from the $Me_2CO$ and EtOH exts. of the reaction product, m. 152-3°; above its m. p. it dissocs. into $(CH_2)_4Br_2$ and II; the corresponding *iodide* m. 175-6° (decompn.), the aq. ext. of the above reaction product contains *tetramethylene-α,δ biscyclotellurobutane 1,1'-dibromide*, $(CH_2)_4TeBr\cdot(CH_2)_4TeBr(CH_2)_4$, crystg. with 1 mol. $H_2O$, m. 225° with dissocn. to $(CH_2)_4Br_2$ and II; *diiodide*, deep yellow, decomps. 215°.

C. J. WEST

**Heterocyclic systems containing selenium. IV. Cycloselenohexane.** GILBERT T. MORGAN AND FRANCIS H. BURSTALL. *J. Chem Soc* 1931, 173-80; cf. *C. A.* 24, 4297.—$(CH_2)_4Br_2$ and $Na_2Se$, refluxed 2 hrs., give a mixt. of yellow polymers and a very small quantity of *cycloselenohexane* (I), $b_{14}$ 105-6°, $b_{760}$ 188-90°, $n_D^{15}$ 1.5470, $d_4^{14.6}$ 1.353, $d_4^t = 1.378 - 0.001011t$; the concd $H_2SO_4$ soln. develops yellow to red tints on warming. I is not oxidized in the air; *mercurichloride*, m. 193-4° (decompn.). I and I in EtOH give *cycloselenohexane 1,1-diiodide*, reddish purple, m. 82°, *1,1-dibromide*, yellow, m. 118-9°; it slowly decomps. giving $(CH_2)_4Br_2$ and Se, *1,1-dichloride*, m. 78°; *1-methiodide*, m. 149-50° (decompn.). The more sol. fraction of the polymerides (in petr. ether, b. 60-80°) is a *dimer*, $(C_4H_{10}Se)_2$, m. 92°, depolymerizes above 220°; *dibromide*, pale yellow, m. 145° (decompn.). The less sol. *polymer*, $(C_4H_{10}Se)_x$, is a waxy microcryst. powder, m. 30-7°; mol.-wt. detns. indicate approx. 12 mols. I; the *bromide* decomps. slowly and m. 94-5° (decompn.). Heating this polymer at 220° gives *2 methylcycloselenopentane* (II), $b_{14}$ 90°, $b_{760}$ 169-71°, $n_D^{18}$ 1.5205, $d_4^{22}$ 1.287, $d_4^t = 1.3115 - 0.00111t$; the dichloride is a colorless liquid, the dibromide a reddish yellow gum and the diiodide a deep red gum; *mercurichloride*, m. 112°; *1-methiodide*, m. 164° (decompn.). The constitution of II is shown by heating the dibromide, which gives $Br(CH_2)_2CHMeBr$, which was converted into the dinitrile and α-methylpimelic acid $(CH_2)_4Br_2$ and KSeCN, refluxed in $Me_2CO$ for several hrs., give *hexamethylene α,ζ-diselenocyanate*, thick yellow oil which decomps. on distn.; oxidation by the air gives *cyclodiseleno-*

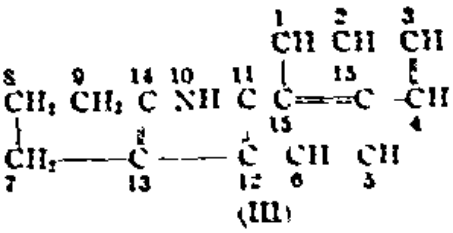
*hexane*, brown, highly polymerized, m about 40° and decomps at 250°, giving II; oxidation of either of these compds with $HNO_3$ gives *hexamethylenediselenious acid*, decompg 147°. The mean parachor of I (302 1) and of II (304.2) indicates that they are normal liquids C. J WEST

Behavior of certain thiophanes in heptane and naphtha solutions. R. W BOST AND M. W. CONN *Ind Eng Chem* 23, 93-5(1931).—Tetramethylene and pentamethylene sulfides have been studied along with $Et_2S$ and thiophene, in heptane and three naphtha solns $HgCl_2$, $KMnO_4$, $H_2O_2$, and MeI react with the thiophanes to form definite products easily identified and purified. *Br and $HgI_2$ form* unstable products B and W state in general thiophanes resemble alkyl sulfides more than *thiophene* M C ROGERS

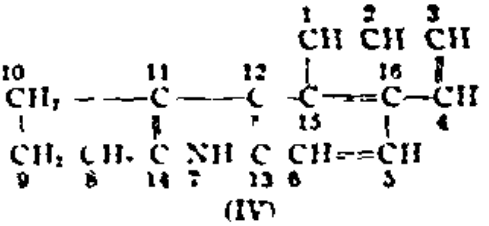
Indophenin. GUSTAV HELLER. *Chem.-Ztg* 54, 985-7(1930), cf *C. A.* 19, 1277.—A theoretical discussion of the formula proposed by Steinkopf and Roch (*C. A. 25, 202) for the constitution of indophenin* JULIUS WHITE

Syntheses of glucosides. VII. Synthesis of 6-bromoindican. ALEXANDER ROBERTSON AND ROY B WATERS *J Chem Soc* 1931, 72-6, cf *C. A* 25, 1232.—*Me 4-bromoanthranilate*, m 78°, does not react with $ClCH_2CO_2Me$ when heated alone *or with* AcONa or $C_5H_5N$ 4 Bromoanthranilic acid and $ClCH_2CO_2H$, heated in 5.5% aq KOH for several hrs and the resulting product esterified with MeOH and $H_2SO_4$, give *di-Me 5 bromophenylglycine 2-carboxylate*, m 101° (almost quant yield), Na in $C_6H_6$ contg a little MeONa gives *Me 6 bromo-3 hydroxyindole 2-carboxylate* (I), m 192°, *di Ac deriv*, m 151° Refluxing the ester with MeOH NaOH in N for 1 5 hrs gives *6-bromoindoxylic acid*, sepg *from* $H_2O$ as the *trihydrate*, m 198° (decompn.), $Ac_2O$ and AcONa give 6-bromo-1-acetyl-3-acetoxyindole, crystg from dil EtOH as the *hydrate*, sinters 122°, m 150-2° Adding aq KOH to I and *O* tetraacetyl α-glucosidyl bromide in $Me_2CO$ at 10° gives *Me 6-bromo-3-O tetraacetyl β glucosidoxyindole 2-carboxylate* m 171°, $[\alpha]_D^{22}$ —59 7° ($Me_2CO$), a penta Ac deriv could not be obtained. Hydrolysis by heating with MeOH KOH on the $H_2O$ bath for 1 hr gives the *K salt* (II) of 6-bromo-3-β-glucosidoxyindole-2-carboxylate, which forms a gel, prolonged hydrolysis by dil *HCl* gives *6,6'-dibromoindigotin and glucose* *II*, AcONa and $Ac_2O$, heated on the steam bath for 1 hr and then at 160° for 1 hr, give *penta-acetyl 6 bromoindican (6 bromo-1 acetyl-3 O-tetraacetyl-β-glucosidoxyindole)*, m. 159°, $[\alpha]_D^{22}$ —48 8° ($Me_2CO$), with dry $NH_3$ in MeOH at 0° there results *6 bromo-3-β-glucosidoxyindole (6-bromoindican)*, crystg with 4 $H_2O$, m 64°, $[\alpha]_D^{22}$ —6 4° ($Me_2CO$), drying over $P_2O_5$ for 60 hrs gives the *semi hydrate*, m 177°, the anhyd compd results by heating at 110° for 15 hrs and at 160° for 5 min This is rapidly hydrolyzed by warm 2% HCl and by emulsin at 35-7°, with the liberation of glucose and 6-bromoindoxyl, partly oxidized by the air to 6,6'-dibromoindigotin Hydrolysis by warm 3% *HCl in the presence of isatin gives quant 6 bromoindirubin*, purple with green metallic luster, does not m 340°, with *p*-$O_2NC_6H_4CHO$, there results *p-nitrobenzaldehyde-6-bromoindogenide* brick red, m. 297-8° C J WEST

Action of nitric acid on polycyclic indole derivatives. IX. STEPHEN A BRYANT AND SYDNEY G P PLANT *J Chem Soc* 1931, 93-105, cf *C A* 24, 114, 1375.—In view of the widely different nature of the products obtained when $HNO_3$ acts on the acyl derivs of tetrahydrocarbazole, dihydropentindole, 7,8 9,10-tetrahydro-α,β-naphthacarbazole and 8 9,10,11 tetrahydro-α',β' naphthacarbazole, and of the deep-seated variations observed in the reactions of substances formed in such cases by the addn. of HO and $NO_2$ or OH and OH to the double linkage, it is of interest to extend the investigation to certain closely related types *Cyclopentanone α-naphthylhydrazone* (I), m 95°, the *β-deriv* (II), m 77° I and dil $H_2SO_4$, heated 15 min at 100°, give *7,8-dihydro-α β-naphthapentindole (III)*, *m 167°*, this is also formed by boiling *I* in glacial AcOH, its picrate, reddish brown, m 167° (decompn) III and $Ac_2O$ contg. a little $H_2SO_4$, boiled 10 hrs give the *10-Ac deriv*, m. 157°, and the *1(?)-Ac deriv*, *yellow, m. 215° stable toward dil EtOH-KOH*, *oxime*, m 295° (decompn) II and dil $H_2SO_4$ give *9,10-dihydro-α',β'-naphthapentindole* (IV), m 103°, *picrate*, brown, *m 189° (decompn)* AcCl and *IV* in $Me_2CO$ and aq NaOH give the *7-Ac deriv*, m 170° with $Ac_2O$ and $H_2SO_4$ this gives the *5(?),7-di-Ac deriv*, pale green, m. 234°, also obtained from IV and $Ac_2O$, partial hydrolysis gives the *5(?)-Ac deriv*, greenish yellow m 259°, yielding with BzCl and KOH the *5(?)-acetyl-7 benzoyl deriv*, pale greenish yellow, m 163°, which may again be partially hydrolyzed to the 5(?) Ac deriv, *7 Bz deriv*, pale yellow, m 195°, *7-carbethoxy deriv*, m. 160°. The 7-Ac deriv, nitrated in AcOH, yields a *5(?) $NO_2$ deriv*, lemon-yellow, m 217°, $K_2CO_3$ splits off the Ac group, giving the *5(?)-$NO_2$ deriv of IV*, brick red, m. 228°.



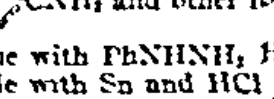
(III)



(IV)

The 7-Bz deriv also yields a *5(1) NO₂ deriv*, yellow, m. 250°. The 7-carbethoxy deriv yields a *5(1) NO₂ deriv*, lemon yellow, m. 202°, and also a *di NO deriv*, yellow, m. 220° (decompn.). 2-Methylcyclohexanone and *β*-$C_6H_5NHNH_2$, heated 0.5 hr. and the resulting oily hydrazone treated with dil. $H_2SO_4$ give a mixt. of *1-methyl-1,2,10,11-tetrahydro-α',β'-naphthacarbazole* (V), m. 115° (picrate, dark crimson, m. 201° (decompn.)), and 1,2-methyl-8,9,10,11-tetrahydro-α,β-naphthacarbazolenine, m. 92° (picrate, bright yellow, m. 166°). A mixt. of V, S and quinoline, boiled for 45 min., gives *1-methyl-α,β-naphthacarbazole*, m. 144°; this was also synthesized from 2,3-$HOC_6H_4CO_2H$ and *o*-$MeC_6H_4NHNH_2$ by heating at 150° and then distg. the 8-methyl-α',β'-naphthacarbazole-6-carboxylic acid with soda lime. 5,6-Dihydro-α,β-naphthacarbazole (Ghigi, *C. A.* 24, 3797) with $Ac_2O$ contg. a little $H_2SO_4$ gives the *1(1) Ac deriv.*, yellow, m. 253° (*crimson*, m. 252° (decompn.)). Benzopentindole gives a *7 Bz deriv.*, pale yellow, m. 187°, with $HNO_3$ in AcOH there results *14-nitro-6-hydroxy-7-benzyl-6,14-dihydrobenzopentindole*, m. 109° (decompn.). 20% KOH gives *14-nitro-6-hydroxy-6,14-dihydrobenzopentindole*, m. 200° (decompn.). C. J. West

Diazotization in the pyrazole series. J. Reilly and D. Macsweeney. *Proc. Roy. Irish Acad.* 39B, 497–504(1930).—The diazonium salts of 4-aminopyrazole derivs. had been shown (*C. A.* 9, 1173) to be more stable than those of 5-aminopyrazoles contg. a Ph substituent. The stability of the diazonium chloride of 1-phenyl-3,5-dimethyl-4-aminopyrazole (I) showed this stability to be a function of the position of the $NH_2$ group and not to be due to the presence of the substituent Ph group. From the study of pyrazolediazonium derivs., it appears that the essential factors for diazotization are the grouping $\rangle CNH_2$ and other loci of unsatn. I was prepd. by condensing isonitrosoacetylacetone with $PhNHNH_2$.HCl (*Ann.* 325, 129–93) and reducing the resulting nitrosopyrazole with Sn and HCl. I forms a yellow, dibasic chloroplatinate, an unstable red ppt. with $AuCl_3$ and a Bz deriv., m. 153–4°. It also condenses with BzH to give a benzylidene deriv., m. 90–1°. 4-Amino-3,5-dimethylpyrazole gives characteristic colors with phenols in alk. soln. and its diazonium chloride forms a triazo deriv. with $NaN_3$ but I fails to give these reactions. Treatment of an acid soln. of I in dil. EtOH with $EtNO_2$ yielded the diazonium chloride (II) of I which probably has the structure



It is a white powder, very stable under ordinary conditions, and heated at 100° for 6 hrs. it loses only about 20% of its coupling power. With KCN in acid soln. it loses its coupling power and yields a yellow ppt. II couples with $PhNMe_2$, $PhNEt_2$, *p*-$MeC_6H_4NH_2$, α-$C_{10}H_7NH_2$, and *β*-$C_{10}H_7NH_2$ (orange-yellow crystals, m. 195–6°) to give colored azo derivs., with *β*-$C_{10}H_7OH$ it gives a red compd. m. 180–90°, with 8,3- and 2,6,8-$C_{10}H_4(OH)(SO_3H)_2$ it gives sol. red dyes; with 1,8,3,6-$C_{10}H_4(OH)_2(SO_3H)_2$ it gives a sol. purple dye, and with *m*-$C_6H_4(NH_2)_2$ it gives a red azo chrysoidine color. II also couples with $Ac_2CH_2$ to give dark yellow crystals, m. 84–5°, and with $AcCH_2CO_2Et$ to give yellow crystals, m. 115–6°. These compds. with diketones are sol. in the usual org. solvents but not in alkalies and may possess one of the following 3 structures (Pyr = pyrazole nucleus) Pyr.N:N.CH(COR')COR, Pyr.N:NC(COR')C(OH)R, Pyr.NHN:C(COR')COR.

C. H. Peet

Organic catalysts. V. Investigation of the cleavage of α-keto acids. Wolfgang Langenbeck, Rudolf Hutschenreuter and Robert Jütte mann. *Ann.* 485, 53–61 (1931); cf. *C. A.* 24, 4285.—The following study was made in an effort to det. the cause of the retarding action of aldehydes upon the catalytic cleavage of α-keto acids. $BzCO_2H$.$PhNH_2$ (2 g.) and 0.1 g. $BzCO_2H$ (I) or 5 drops BzH, heated at 250° for 5 min., give 0.05 g. of *pentaphenyldihydroimidazole* (II), $C_{27}H_{24}N_2$, pale yellow, decomps. between 400–50°, a part of the compd. being sublimed; it crystallizes with 2 mols. $H_2O$, which are not lost at 150° in vacuo. II also results in 0.5 g. yield from 5 g. desyl chloride

and 2 g $PhNH_2$ at 140–50° for 1 hr., removing the $PhNH_2$ HCl and again heating with BzH at 150–60° for 1 hr PhC( NPh)CHPhNHPh is probably an intermediate *product*, since with BzH at 150–60° for 1 hr., this yields 72% of II. *Perchlorate* of II, needles from boiling AcOH, decomps when heated; *periodide*, brown leaflets, becoming colorless at 250°, losing I; *perbromide*, needles, *HCl salt*, needles, decompg above 300°, with KI this gives the difficultly sol III salt II does not give a cryst oxidation product with $O_2$ in AcOH $CrO_3$-AcOH gives a chromate but has no oxidizing action II is probably formed in a similar manner in the catalytic cleavage of I by $PhNH_2$ β Aminooxindole forms a *picrate* (III), yellow, darkens at 150°. Further expts on the action of $PhNHCH_2CO_2H$, $BzCO_2K$, *p*-$MeOC_6H_4NHCH_2CO_2H$, *m*-$O_2NC_6H_4NHCH_2CO_2H$ *and III on* I are reported C. J West

**Absorption spectra and constitution of azoxy derivatives and analogous compounds** L Szegö and P Ostinelli *Atti III congresso naz chim pura applicata* 1930, 395–401.—The ultra violet absorption spectra of alc soln of *desoxybenzoin* and the following derivs have been detd *α p nitro, α-p-amino*, α- and *β-p-hydroxy*, α- and *β p-methyl* and *β-p-chloro* (*α* form is $C_6H_4COCH_2C_6H_4R$, *β* form is $C_6H_4CH_2COC_6H_4R$) *β p-Chloro desoxybenzoin* is prepd as follows phenylacetyl chloride is condensed with chlorobenzene (I) in the presence of $AlCl_3$ by heating 2 hrs on a water bath and 2 hrs at 120°. The excess of (I) is distd off and the mass decompd with $H_2O$ and then extd. with ether This was distd off and the residue treated with animal charcoal in 95% alc. It was pptd with $H_2O$ and recrystd from ether; it m 102°. The oxime was prepd by heating an alc. soln of the ketone with the equiv quantity of hydroxylamine-HCl and $Na_2CO_3$ in $H_2O$. The alc. was evapd and the product, washed with $H_2O$ dissolved in alc. and pptd with $H_2O$, m 117°. The *α* isomers and non-substituted desoxybenzoin behave alike but give a different type of absorption curve from the *β*-isomers J. B A

**Absorption spectra and the constitution of the desoxybenzoin series.** L Szegö and P Ostinelli *Gazz chim ital* 60, 677–88(1930).—In a previous paper (cf. preceding abstr.) it was shown that substituents have different effects on the absorption spectra of desoxybenzoin compds from their effect on those of azoxy compds (cf S., *C A* 23, 4406) In the latter the influence of the substituent in the nucleus on the absorption power is less when it is nearer the azoxy group ($XC_6H_4N(O)NPh$) than when it is in the farther position ($XC_6H_4N\,N(O)Ph$) On the contrary, absorption is greater in $XC_6H_4COCH_2Ph$ compds than in $XC_6H_4CH_2COPh$ compds The behavior of the azoxy compds is explained by the fact that *double bonded O* in the azoxy group dampens the effect of the substituent by partial valences, resulting in a more stable condition in the substituted nucleus This hypothesis is supported by the great similarity between azo and $XC_6H_4N\,N(O)Ph$ compds The opposite effect in the desoxybenzoin series does not permit a similar hypothesis, so further expts were carried out with isomers of other desoxybenzoins (substituted in both nuclei), most of which are new *p*-$ClC_6H_4CH_2CO_2H$ cannot be prepd satisfactorily by the method of Petrenko Kritschenko (cf *Ber* 25, 1240(1892)), so it was prepd. by sapon of *p*-$ClC_6H_4CH_2CN$ It was then transformed into *p*-$ClC_6H_4CH_2CO_2Cl$ (I) The latter condensed with $C_6H_6$ in the presence of $AlCl_3$ yields *p*-$ClC_6H_4CH_2COPh$ (II) *p*-$MeC_6H_4CH_2Cl$ condensed with PhCl in the presence of $AlCl_3$, heated several hrs at 130°, excess PhCl distd off, the residue decompd with water, washed with HCl, then with $Na_2CO_3$, extd. with $Et_2O$, the residue dissolved in EtOH, purified with animal charcoal, pptd with water and crystd repeatedly from a mixt of petr ether and $C_6H_6$, yields *4-chloro-4'-methyldesoxybenzoin*, *p*-$MeC_6H_4CH_2COC_6H_4Cl$ *p* (III), m. 123°. Similarly, condensation of I with PhMe yields *4-methyl-4'-chlorodesoxybenzoin (IV)*, *m* 113° $MeC_6H_4CH_2CO_2H$, PhOH and $ZnCl_2$, heated 0.5 hr at 200°, dissolved in $C_6H_6$ and a little water, washed free of $ZnCl_2$ by HCl, made alk with $Na_2CO_3$, acidified with HCl (d 1.19), the ppt purified with animal charcoal and recrystd from dil. EtOH, yields *4 hydroxy 4' methyldesoxybenzoin* (V), m. 162°. *p*-$O_2NC_6H_4CH_2Cl$, PhMe in $CS_2$ and $AlCl_3$ heated 3 hrs on a water bath, the $CS_2$ and PhMe distd., the residue decompd by water washed with HCl and $Na_2CO_3$, crystd from dil EtOH, reduced with Sn and HCl in EtOH, made alk., extd. with $Et_2O$, the ext. evapd., the residue *recrystd from dil EtOH*, diazotized in $H_2SO_4$ and the product recrystd from hot water, yields *4-methyl-4' hydroxydesoxybenzoin* (VI), m 146° *4-Hydroxy-3 methyldesoxybenzoin* (VII) was prepd by the method of Blau (*Monatsh* 26, 1149(1905)) $PhCH_2Ac$ was prepd by dry-distg a mixt. of $Ca(OAc)_2$ and $(PhCH_2CO)_2Ca$ (2 parts) The measurements of the absorption consts in the ultra violet range were carried out by the method already described (*loc cit*) The ketones were examd in hexane (optically pure) (cf Wolf and Herold, *C A* 23, 5416) and the desoxybenzoins in EtOH (the absorption curves with EtOH and with hexane are identical) The results are tabulated

in complete detail In all cases the phenomena were similar to those previously described, viz., the max absorptions of the β isomers of *p* chloro-, *p*-methyl and *p*-hydroxydesoxybenzoin are displaced toward lower frequencies with respect to their α isomers The displacement between the 2 OH isomers is greater than between the 2 Cl derivs which in turn show greater differences in the isomers with a nuclear Me group The weak absorption band of the β isomers of hydroxy-, methyl- and chlorodesoxybenzoin, and to which has been attributed the color, disappears after complete purification Thus, β hydroxydesoxybenzoin, described by Weisl (*Monatsh* 26, 951 (1905)) as orange red, is colorless when highly purified In the compds with substituents in each nucleus, as in the methylhydroxy derivs., V has a great max displacement compared with that of VI and the displacement increases still more when both substituents are in the nucleus on the CO group, viz., in VII. Similar relations are found in the Me Cl derivs., *where the effect of the Cl prevails over that of the Me group*, as with the compds contg a single substituent Therefore the increase in light absorption resulting from proximity to the CO group is not unusual but is found in all compds The CO group has an effect wholly apart from a dampening of the substituent and its nucleus The proximity of CO to unsatd bonds greatly increases the absorption power (cf Bielecki and Henri, *C. A.* 8, 691), and even the $C_6H_5$ nucleus with its conjugated double bonds has a similar influence (cf v Auwers, *C.* 1 9, 1459 13, 432 3) Measurements of ketones of the PhCOR t and $PhCH_2COMe$ type show how profound is the influence of the position of CO with respect to the $C_6H_5$ nucleus In every case there is an increase in the power of extinction, beginning with compds with the CO directly on the $C_6H_5$ nucleus This effect is much more intense in the ketones than in the desoxybenzoins, since in the ketones the distance between 2 centers of oscillation has a greater influence than in the desoxybenzoins, in which the displacement of frequency indicates only the variations in the state of satn of 1 $C_6H_5$ nucleus with respect to the other The joint effect of the 2 centers of oscillation with unsatd character leads to greater optical exaltation In desoxybenzoins the CO group has a lower degree of satn. than the neighboring $CH_2$ group, while the azoxy —N(:O)= group corresponds to nitric N and involves a greater satn of the same N atom Therefore, of the 2 N atoms in the azoxy compds., the quinquevalent N is in the higher state of satn The proximity of an O or quinquevalent N atom should not have a depressing effect on the substituted nucleus, while the tervalent N has an excitant effect like the CO group, which induces an increase in the absorption power by the reciprocal influence of the 2 unsatd groups A comparison of the absorption spectra of the simplest aromatic derivs having their N in the form of $NO_2$, NO or $NH_2$ groups confirms these deductions The same reasoning may be extended to diazo compds According to Angeli (*C. A.* 20, 2991) these are not simply stereoisomers. Cambi (*C. A.* 21, 3895) on the contrary gives the structures $(RN(\cdot O):N)'K^+$ and $(RN.N\ O)'K^+$ to the normal and isodiazotates, resp Cambi and Szegö (*C. A.* 23, 337) have shown that normal diazotates have continuous absorption spectra with low coeffs of extinction, whereas the iso derivs have a max absorption in the ultra-violet. Based on the formula above of normal diazotates, the quinquevalent N carrying the O is next to the nucleus, while in iso compds the O is on the terminal N The optical behavior *agrees perfectly with* the hypothesis

| $[p\text{-}XC_6H_4N(\ O)\ N]'$ | $[p\text{-}XC_6H_4N\ N\ O]'$ |
|---|---|
| (normal) | (iso) |
| smaller absorption | greater absorption |

Both in the aromatic ketones with the $CH_2CO$ chain and in azoxy derivs and diazotates, the variation in absorption power for ultra violet light depends upon the distance of the 2 centers of oscillation with the lower degree of satn., and it increases when the 2 centers are closer together. C. C. Davis

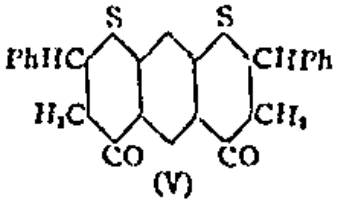
Spectrography of the flavone series. III. The constitution of wogonin. Shizuo Hattori. *Acta Phytochim* 5, 99–116(1930), cf. *C. A.* 22, 3661.—Wogonin (I) is present in small amounts in the roots of *Scutellaria baicalensis* Georgi (*Labiatae*) while baicalin forms the much larger part. I is extd. with benzene and recrystd. from 80% alc., forming yellow needles, m. 201°. The analyses correspond with the formula $C_{16}H_{12}O_5$; it contains two HO and one MeO group One of the HO groups is methylated by $CH_2N_2$, forming a Me ether, m. 183°, which gives a brown color with $FeCl_3$ This behavior indicates a free HO group in the *o*-position to the C:O group Methylation with $Me_2SO_4$ and alkali yields a di-Me ether, m. 167–8° (II), which does not give a color with $FeCl_3$ Upon hydrolysis with 20% NaOH, PhCOMe and BzOH are obtained. Upon boiling with HI (d. 1.7), I is demethylated with the formation of a deep yellow

product, m. 225–7°, which has three HO groups, probably in the 5,7,8-positions, and the formula $C_{18}H_{18}O_6$. Comparison of the absorption spectra of acetylwogonin with 8-hydroxy- and 8-methoxyflavone showed an analogy from which it is concluded that I has the *MeO group* in position 8. The structure was finally detd. by synthesizing 5,7,8-trimethoxyflavone and comparing it directly with II. The reaction of $AlCl_3$ with 2,3,4,6-(MeO)$_4$C$_6$HCOMe yielded a substance, m. 112–3° (III), identical with I of the 4 substances obtained by Bargellini and later by Chapman, *Perkin and Robinson* (*C. A.* 22, 911) contg. one HO and three MeO groups. The HO group gave a $FeCl_3$ reaction indicative of being in the *o*-position to the *C O group* (2 or 6). *Fusion of* III with Br$_2$O and Br$_2$ONa yielded a flavone, m. 167–8°, identical with II and not with the known 5,6,7-trimethoxyflavone. I, *therefore*, is 5,7-dihydroxy-8-methoxyflavone. Absorption spectra are given of 8-methoxyflavone, acetyl-, mono- and dimethylwogonin and wogonin and 5,7,8-trihydroxyflavone. E. Gebauer-Fülnegg

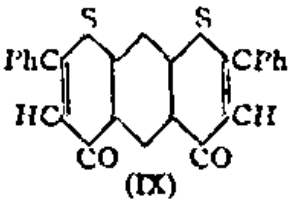
Diflavone group. V. *m*-Methoxybenzaldehyde and diacetoresorcinol. Elisabeth M. Klan and Hugh Ryan. *Proc. Roy. Irish Acad.* 39B, 425–33(1930); cf. *C. A.* 8, 1107, 9, 2229, 10, 1506, 1848, 2230, 2577.—The diacetate of tetrabromodibenzylidenediacetoresorcinol (I) yielded diflavone upon treatment with alc. KOH, but the corresponding anisylidene and veratrylidene compds. yielded dicoumaranones. The type of ring formed must depend upon the relative lability of the *o*- and *p*-Br atoms and it appeared that a *p*-MeO group increased the lability of the *p*-Br atoms. According to the theory of induced alternate polarities, a *m*-MeO group should have a less marked influence so the *m*-MeO homolog (II) of I was prepd. by condensing diacetoresorcinol with *m* MeOC$_6$H$_4$CHO, followed by acetylation and bromination. The principal product was the corresponding *3',3"*-dimethoxydicoumaranone (*III*) but the absence of a diflavone was not proved. Di-*m*-methoxybenzylidenediacetoresorcinol di-Me ether, slightly sol. in EtOH, Et$_2$O, sol. in *PhH*, *Me-CO*, *CHCl$_3$*, m. 157–8°, gave a dibromide m. 213° (decompn.), a tetrabromide (purity uncertain), m. 176° (decompn.), and a pentabromide (purity uncertain), m. 186° (*decompn.*). *Di-m*-methoxybenzylidenediacetoresorcinol (IV) was insol. in H$_2$O and petroleum ether, slightly sol. in EtOH and Et$_2$O, sol. in dil. KOH, CHCl$_3$, Me-CO and PhH and m. 157°. IV prepd. in EtOH was orange-yellow; better yields were obtained in MeOH but the color was light yellow. The resp. colors of these chromoisomers remained unchanged after repeated recrystns., their m. ps. and mixed m. ps. were the same and they formed the same diacetate, m. 122°. II could not be crystd. III, crystd. from C$_5$H$_5$N, m. 277–9° (decompn.). Dipiperonylidenedi-*m*-methoxydiflavanone prepd. by treating a mixt. of 2 g. of IV and 5 g. of piperonal in 60 cc. of CHCl$_3$ with 4 cc. alc. HCl, m. 245°. Similarly BzH condensed with IV to give dibenzylidenedi-*m*-methoxyflavanone, m. 249–50°. C. H. Peet

Thiophenols. Dithioflavone and linear dithioflavanone. C. Finzi, G. Ventorini and L. Sartini. *Gazz. chim. ital.* 60, 798–811(1930).—Previous expts. which dealt with compds. contg. 2 heterocyclic sulfurated nuclei arranged symmetrically in the C$_6$H$_4$ nucleus and in which diketothiazine, dithiochromanone and dithioxanthone were prepd. (cf. *C. A.* 20, 1902, 21, 740, 22, 443) were continued in the present work by the prepn. of dithio derivs. It was necessary in this connection to study the behavior of polythiophenols with unsatd. compds. of the C$_3$H$_4$ and C$_2$H$_2$ series. *Dithioresorcinol* (I) was chosen because of the ease of prepn. of its isomers and because from it could be obtained derivs. contg. 2 sym. heterocyclic sulfurated groups on the central C$_6$H$_4$ nucleus. It was found that I forms addn. products with C$_3$H$_4$ and C$_2$H$_2$ derivs., each group adding to a double or to a triple bond. The addn. of PhCH:CHCO$_2$H (II) to I can be accomplished by heating I, II (2 mols.) and glacial AcOH satd. with HBr at 100° in a sealed tube for several hrs., steam-distg. (to remove excess I) and washing the residue with boiling water, but the yield is very small. A much higher yield is obtained by heating I, PhCHBrCH$_2$CO$_2$H (cf. *Ber.* 11, 1271) (3.5 parts) and AcOH satd. with HBr (7 parts) at 100° in a sealed tube for 5–6 hrs., pouring into water, steam-distg. and washing the residue with boiling water. The product is *m phenylenedithio-α-α'-hydracrylamic acid*, *m*-C$_6$H$_4$[SCH(CH$_2$CO$_2$H)Ph]$_2$ (III), pitch which cannot be crystd., sol. in aq. alk. hydroxides and carbonates. III (5 g.) in aq. Na$_2$CO$_3$, oxidized with aq. KMnO$_4$, 5 g. (*the reaction mixt. being partially neutralized with dil. H$_2$SO$_4$ during* the oxidation), filtered, washed with boiling water, the filtrate concd., acidified with H$_2$SO$_4$ and the ppt. recrystd. from EtOH, yields *m phenylenedisulfoxyl-β-hydrocinnamic acid*, *m*-C$_6$H$_4$[SO$_2$CH(CH$_2$CO$_2$H)Ph]$_2$ (IV), m. 192°. III and POCl$_3$ (15 parts), heated on a water bath for a long time (with vigorous agitation), poured into ice-water (before the reaction product has become too thick), the sepd. green-brown oil allowed to solidify, digested with warm dil. Na$_2$CO$_3$, extd. with boiling EtOH, the ext. concd., and the ppt.

purified by repeated crystns from EtOH, yield *dithioflavanone* (V), greenish yellow, softens around 65–70°, semifuses at 85–90°, completely fused at 120.5°, gives intense carmine red solns in concd $H_2SO_4$ (test of thioflavanone group). IV is also formed from III and $PCl_5$ with anhyd $AlCl_3$ under the same conditions. I (5 g.) in anhyd PhMe (40 cc.) and Na (2 g.), boiled several hrs., with frequent agitation, the unaltered Na carefully removed, PhC $CO_2$Et (12.5 g.) in PhMe added, with vigorous agitation, let stand several hrs., water added, acidified with dil. $H_2SO_4$, extd. with $Et_2O$, the PhMe-$Et_2O$ ext. extd. with aq. KOH, the PhMe-$Et_2O$ residual soln. dried with $CaCl_2$, and the solvents distd. *in vacuo*, leaves a residue of straw yellow oil which is a mixt. of *Et m-phenylene α-dithiocinnamate* and *Et m-phenylene β-dithiocinnamate which could* not be crystd. This mixt., saponified by refluxing with alc. KOH (4 g.) for 2 hrs., dild. with water (equal vol.), the EtOH distd., the aq. residue extd. with $Et_2O$ (to remove traces of styrene formed by decompn. of the acid), the aq. residue acidified with dil. $H_2SO_4$, the ppt. (mixt. of α- and β-acids) extd. with warm EtOH, and the ext. evapd., leaves *m-phenylene α-dithiocinnamic acid*, *m* $C_6H_4[SC(CHPh)CO_2H]_2$ (VI), oil. The residue from the EtOH extn., recrystd. from boiling AcOH, yields *m-phenylene β-dithiocinnamic acid*, *m* $C_6H_4[SC(CHCO_2H)Ph]_2$ (VII), pale yellowish, m. 221°. VII heated above its m. p. evolves $CO_2$ and leaves *m-phenylenedithiostyrene*, *m* $C_6H_4[SC(CH_2)Ph]_2$ (VIII), oil, cannot be crystd. Also I (3 g.) in anhyd. PhMe and Na (3 g.), refluxed for a long time, cooled, the excess Na removed, agitated with HC:CPh (4.5 g.) in PhMe, let stand, a little water added, acidified with dil. $H_2SO_4$, extd. with $Et_2O$, the PhMe-$Et_2O$ ext. extd. with aq. NaOH, the residue washed with water, dried with $CaCl_2$, and the $Et_2O$ and PhMe distd., leaves VIII. Na-Hg (90 g. of 3%) added slowly to VII (1.5 g.) suspended in water, acidified with dil. $H_2SO_4$, forms an oil which cannot be crystd. This oil (1 g.) in aq. $Na_2CO_3$, oxidized with concd. $KMnO_4$ (calcd. quantity), filtered, washed with boiling water, the filtrate concd., acidified with dil. $H_2SO_4$, and the ppt. recrystd. from boiling EtOH, yields IV. $PCl_5$ (1.95 g.) and then anhyd. $AlCl_3$ (4.5 g.) added with continuous agitation to VII (2 g.) suspended in anhyd. $C_6H_6$ (20 cc.), warmed gently to complete the reaction, let stand with frequent agitation, cooled, ice added, filtered, the residue washed with water, digested in dil. aq. $Na_2CO_3$ and the residue recrystd. twice from boiling $C_6H_6$, yields *dithioflavone* (IX), pale lemon-yellow, m. 235.6°, gives a yellow soln. in concd. $H_2SO_4$. VII (1 g.), agitated with concd.



(V)



(IX)

$H_2SO_4$ (5 cc.) (cooling), heated at 50–60° for some time, poured into water, filtered, the residue washed with water, digested in aq. $Na_2CO_3$ and recrystd. from $C_6H_6$, also yields IX. VI in oil form (*loc. cit.*) could not be made to cryst. from any solvent, but by acidification of its soln. in aq. $Na_2CO_3$ it seps. in the solid state, though not cryst. The only means of purification is to dissolve it in dil. $Na_2CO_3$, filter, reppt. with dil. $H_2SO_4$ and repeat this operation. Thus prepd., VI is a yellowish amorphous solid, which in time becomes compact and friable. It has no sharp m. p., but softens around 70° and at 73° it becomes a frothy liquid. Hydrogenated with Na-Hg and then oxidized with $KMnO_4$, VI partially decomps., but does not yield crystallizable products. It is decompd. by concd. $H_2SO_4$, with evolution of $SO_2$ and RSH, in this case the $H_2SO_4$ not having the dehydrating action which occurs in the formation of the thiochromanone and thioxanthone nuclei, but rather an oxidizing action which results in cleavage of the double bond. VI, heated at 180–90° until $CO_2$ is no longer evolved, cooled, washed with aq. $Na_2CO_3$ (to remove unaltered VI), suspended in EtOH, reduced with a great excess of Na-Hg, the Hg sepd., filtered, the filtrate partially evapd., dild. with a large vol. of water, let stand, yields a light yellow oil which cannot be crystd. and which is *m-phenylenedithioethylbenzene*, *m*-$C_6H_4(SCH_2CH_2Ph)_2$ (X), does not distl. up to 300° *in vacuo*. Aq. NaOH (12 g.) and then $PhCH_2CH_2Cl$ (4 g.) added to alc. I (2 g.), refluxed 0.5 hr., the EtOH distd., the residue extd. with $Et_2O$, the ext. dried with $CaCl_2$, and the $Et_2O$ evapd., yields X. This confirms the constitution of VI and VII, for in the reaction between I and PhC:$CCO_2$Et, the addn. of the thiophenol groups on the $C_6H_5$ bond takes place in 2 ways: union of the S to the α-C and to the β-C atom of the PhC:$CCO_2H$, giving rise to 2 groupings PhC(:CHCO$_2$H)S— and PhCH:C(CO.H).S—.

C. C. Davis

The position of the glucuronic acid linkage in baicalin. KEITA SHIBATA AND SHIZUO HATTORI *Acta Phytochim* 5, 117–8(1930).—In baicalin (I), a glucuronic acid deriv of baicalein (5,6,7 trihydroxyflavone), the glucuronic acid radical (II) can be linked only in positions 6 or 7 since on methylation only 1 mono-Me ether can be obtained which gives a violet brown color reaction with $FeCl_3$, showing that the HO group in position 5 and ortho to the C O group is still free. Position 7 for the linkage with II is likely on account of the green color reaction of I with $FeCl_3$ in analogy with the 5,6-dihydroxyflavone. Furthermore cobalti pentammine salts, which are known to oxidize vicinal phenolic derivs., attack alc. solns of I easily, forming ppts after a color change. E. GEBAUER FUELNEGG

Quinoline compounds containing arsenic. II. Synthesis of 6-methoxyquinoline derivatives of aminophenylarsonic acids by the use of 4-bromo-6-methoxy-2-methylquinoline. ROBERT H. SLATER *J. Chem. Soc.* 1931, 107–18; cf. *C. A.* 24, 4039.—An improved method is given for the prepn. of 4-hydroxy-6-methoxy-2-methylquinoline (61% yield). $POBr_3$ gives the *4-Br deriv.* (I), m. 117–8°, the AcOH and dil. $HNO_3$ solns. exhibit a blue fluorescence and a dil. $H_2SO_4$ soln. a greenish blue fluorescence changing to violet on dilg. Heating a mixt. of 8.5 g. I, 5.4 g. *o*-$H_2NC_6H_4AsO_3H_2$, 70 cc. AmOH, 16 g. $K_2CO_3$ and a trace of Cu bronze and I at 130–40° for 22 hrs. gives 5.9 g. *o-6′-methoxy-2′-methyl-4′-quinolylaminophenylarsonic acid* (II), m. 302–3° (decompn.), isoelectric pt. $p_H$ 7.3, crystals from dil. AcOH. A colloidal soln. does not give a color with 0.001 *N* I, addn. of a few drops of concd. HCl gives a brilliant violet color, which disappears on addn. of more HCl, the warm concd. $H_2SO_4$ soln. exhibits a blue fluorescence. Various salts are qual. described. Reduction of II in EtOH HCl contg. a trace of I with $SO_2$ gives *12-chloro-7-methoxy-11-methyl-5,12-dihydroquinbenzarsazine* (III), pale yellow, m. 245–7° (decompn.). Oxidation of III with $H_2O_2$ in AcOH gives *7-methoxy 11-methylquinbenzarsazinic acid*, pale yellow, does not m. 310°, various solns. exhibit a blue fluorescence; salts are qualitatively described. $POCl_3$ below 80° gives the *chloride*, pale yellow, m. 165–7°, the dil. aq. NaOH soln. exhibits a bright blue fluorescence. I (5 g.) and *o*-tolidine (10 g.), heated 9 hrs. at 140–50°, give 7.2 g. of *4-o-tolidino-6-methoxy-2 methoxyquinoline* (IV), pale yellow, crystg. with EtOH, m. 152°, heating 5 hrs. at 100° gives the anhyd. compd., m. 199–200°, the diazo chloride gives a blood red azo dye with alk. β $C_{10}H_7OH$, a dil. soln. in EtOH or AcOH gives a reddish brown color with 0.001 *N* I. *Ac deriv.*, m. 182–3°. The diazo compd. from IV, pale orange, with $Na_3AsO_3$ gives *4′,6″-methoxy 2″-methyl-4″-quinolylamino-3,3′-dimethyldiphenylylarsonic acid*, m. 304–5°; the warm concd. $H_2SO_4$ soln. shows a light blue fluorescence, which disappears on dilg. *4-o Dianisidino 6 methoxy 2 methyl quinoline* (V), pale yellow, m. 195–6°, was best prepd. by heating the components at 140° and 10–5 mm., a dil. EtOH soln. gives a red color with 0.001 *N* I. *Ac deriv.*, crystals with $H_2O$, m. 140° and then 200–1°, the $C_6H_6$ soln. exhibits a greenish blue fluorescence, the EtOH soln. gives a brilliant blue color with 0.001 *N* I, while the AcOH soln. gives an intense red color. The Bart reaction with V gives *4′,6″-methoxy-2″-methyl 4″ quinolylamino 3,3′-dimethoxydiphenylylarsonic acid*, pale grey, m. 243–5° (decompn.), the dil. AcOH soln. gives a dark brown ppt. with 0.001 *N* I. I and $(p\text{-}H_2NC_6H_4)_2CH_2$, heated at 135–40° and 10–5 mm., give *p-6-methoxy 2 methyl-4-quinolyl amino-p′-aminodiphenylmethane*, pale yellow, crystals with 1 mol. $H_2O$, m. 135–45°, the Bart reaction gives *p-6-methoxy-2-methyl-4-quinolylaminodiphenylmethane p′-arsonic acid*, pale yellow, chars at 300°, a soln. in concd. $H_2SO_4$ gives a brilliant purplish blue fluorescence which is destroyed on dilg. with $H_2O$. *4-Anilino-6 methoxy-2 methyl quinoline*, m. 208–9°, *HCl salt* does not m. 310°. The chemotherapeutic tests will be published elsewhere. C. J. WEST

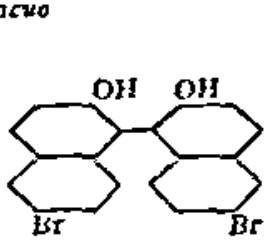
β-Diketones in ring formation. II. UMAPRASANNA BASU *J. Indian Chem. Soc.* 7, 815–24(1930); cf. *C. A.* 24, 5752.—$Bz_2CH_2$ (I), supposedly 96% enolic, gives 45% of *3 cyano 4,6-diphenyl 2 pyridone*, when condensed with $CNCH_2CONH_2$ (IV). To exam. the influence of the adjacent substituent in the enolic modification in the course of such condensations, IV has been condensed with I, *p*-$MeC_6H_4COCH_2Bz$ (II) and $CH_2(COEt)_2$ (III). I condensed with IV in the presence of NaOEt, gave 5–20% of *NH CO C(CN) CPh CH CPh*, m. 320°. By using $Et_2NH$ as a condensing agent, 55–70% was obtained, a 50% excess of IV improving the yield. The condensation of IV with II by the aid of $Et_2NH$ gave 34% of *NH CO C(CN) CPh CH CC₆H₄Me*, m. 267° (which on heating with $H_2SO_4$ evolved $CO_2$ and formed *NH CO CH CPh CH CC₆H₄Me*, m. 226–8°), and 17% of *NH.CO.C(CN) C-*

$(C_6H_4Me)$ *CH CPh*, m 311–2°, hydrolyzed to *NH CO CH C(C₆H₄Me) CH CPh*, m 237–9° According to B the main crop is derived from the PhC(OH) CHCOC₆H₄Me modification owing to the greater inhibiting effect of the β tolyl group in the MeC₆H₄C(OH) CHCOPh form That the reaction had taken place only through the enolic phase was evident by the isolation of only *NH CO C(CN) CPh CH CC₆H₄Me* from the condensation of IV with PhC(OMe) CHCOC₆H₄Me

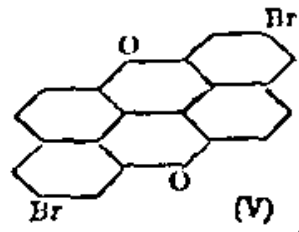
*NH CO C(CN) CPh CH CH*, m 184°, the condensation product of III and IV, was heated with concd HCl for 3 hrs at 150° and hydrolyzed to *NH CO CH CH₂ CH CH₂* m 61 2° The influence of substituents on the reactivity of the $CH_2$ group of IV was studied by condensations involving the use of $CH_2(CONH_2)_2$ (VI) and $CH_2(CN)_2$ (VII) $Ac_2CH_2$ (VIII) and VI formed *NH CO C(CONH₂) CMe CH CMe*, m 224 5° (which was hydrolyzed with concd HCl to *ψ-lutidostyril* m 179 80°), whereas $ClCH_2CONH_2$ and $PhCH_2CONH_2$ could not be condensed with VIII. A mixt of VII and VIII with the addn of a little $Et_2NH$ gave 77% of *3 cyano ψ lutidostyril*, *NH CO C(CN) CMe CH CMe*, m 289° With $CNCH_2CO_2Et$ and VII, resp., Br $CH_2Ac$ gave *NH CO C(CO₂Et) CMe CH CPh*, m 216–7°, and *NH CO C(CN) CMe CH CPh*, m 310° C R ADDINALL

**Derivatives of dinaphthylene dioxide.** A CORBELLINI AND PASTURINI *Gazz chim ital.* 60, 843–61(1930).—The expts continue the previous ones (cf C and Vietti, *C A.* 23, 3458) Concd β-dinaphthol (I) in AcOH and Br (calcd quantity) in AcOH, heated on a water bath, cooled, the ppt. removed, the mother liquor concd until further crystn is complete, and the combined products recrystd from $C_6H_6$ or $CHCl_3$, yield almost 100% of dibromo-β-dinaphthol (II), m 202–3° (which is far from the 155° obtained by Fosse (cf. *Bull soc chim* [3], 21, 657), when prepd in the same way). Methylation of alk. II by $Me_2SO_4$ with crystn from PhCl yields the *di-Me deriv.*, $C_{22}H_{16}O_2Br_2$, m 239 5° (not cor.). To det the position of the 2 Br atoms the oxidation products of II were studied With a compd of this complexity, the products vary with the nature and quantity of the oxidizing agent II (15 g.) in AcOH, oxidized with $CrO_3$ (15 g.) on a water bath, when the reaction is completed heated to boiling, concd., dild with water, acidified with $H_2SO_4$, the ppt. dissolved in dil $Na_2CO_3$, oxidized with $KMnO_4$ (at first cold, then on a water bath), the excess $KMnO_4$ reduced with EtOH, filtered, the filtrate concd. on a water bath, acidified with HCl, extd. with $Et_2O$, the ext evapd almost to dryness, $CHCl_3$ added, the ppt. sublimed *in vacuo* around 150° and the sublimate recrystd. from abs $Et_2O$, yields 4 bromophthalic acid (III), m 105–7° (cf *Ber* 20, 1017(1887), Stephens, *C A* 16, 253). Oxidation in the same way with $KMnO_4$ of the product obtained by extg with $Et_2O$ the dild AcOH soln., or that obtained by sepn on long standing, yields more III. Alk II (5 g.), oxidized with dil aq $KMnO_4$ (8 35 g.) first cold and then on a water bath, the excess $KMnO_4$ reduced with EtOH, filtered hot, the residue washed thoroughly with boiling water (to ext. the slightly sol. K salt), the combined filtrates acidified with HCl and the ppt recrystd. from $PhNO_2$, yields *2-[2 hydroxy-6-bromo-1-naphthoyl]-5-bromobenzoic acid* (IV), pale brown-yellow, m 346° (not cor.) The *Na salt* of IV (0 2 g.) and fused KOH (1 g.), kept at a min. temp. until the product is completely sol in water, dissolved in water and aq HCl added, ppt. an unidentified *compd.*, does not m. up to 300°, contains no Br, sol. in aq $Na_2CO_3$ This reaction with KOH was carried out with the purpose of decompg IV into III and bromo-2 naphthol, a decompn which takes place easily with 2-[2-hydroxynaphthoyl]benzoic acid (cf Walder, *Ber* 16, 299(1883)), but in the present case KOH probably merely replaced 2 Br atoms by OH groups, without rupture of the mol Boiling aq 6-bromo-2 naphthol (m 128 5°, cf. Franzen and Stauble, *C A.* 16, 1945) (0 25 g in 150 cc.), oxidized with boiling aq $FeCl_3$ (0 3 g.), boiled for some time, filtered, the residue washed with dil. HCl and recrystd from $C_6H_6$, yields *2,2'-dihydroxy 6,6'-dibromo-1,1'-dinaphthyl*, m 203°, mixed with II it melts at the same temp., establishing the constitution of II. II cyclized by CuO according to the method already used for I (cf. C. and Vietti, *loc. cit.*), the product extd. with PhCl, the ext. concd and the ppt sepd. by fractional crystn from $PhNO_2$, yields 2 products (1) a less sol. *compd.* $C_{20}H_8O_2Br_2$ (V), m. 361–2° (not cor.), yellow, corre-

sponds in compn to a di Br deriv of dinaphthylene dioxide, sublimes unaltered *in vacuo*, and (2) a more sol unidentified *compd* $C_{24}H_{16}O_4Br_2$, *red*, m 421–2°, sublimes unaltered *in vacuo*



(II)



(V)

C. C. Davis

*Quinoline compounds.* II. Some derivatives of 4-phenyl-2-methylquinoline. Upendra N. Brahmachari and Tarapada Bhattacharyya, *J. Indian Chem. Soc.* 7, 831–4(1930). cf. *C. A.* 24, 5875.—The enhanced toxicity of 4-phenyl-2-methylquinoline toward protozoa compared to that of quinoline induced B. and B. to synthesize *6-nitro-4-phenyl-2-methylquinoline* (I) and *8-nitro-4-phenyl-2-methylquinoline* (II). A mixt. of 50 cc. AcPh and 30 cc. $(AcH)_2$, cooled in ice and satd. with HCl was allowed to stand for 48 hrs. After resatn. with HCl, and standing for 24 hrs. the mixt. was added to 58 g. of *p*-$NO_2C_6H_4NH_2$ and 90 cc. conc. HCl and the whole was heated for 5 to 6 hrs. on a water bath. After dilu. and filtration, the cooled filtrate was freed from *p*-$NO_2C_6H_4NH_2$ by neutralization with NaOH and filtration. The filtrate was supersatd. with NaOH with pptn. of I, m. 141°. I was reduced by $SnCl_2$ and HCl to *6-amino-4-phenyl-2-methylquinoline*, m. 188°, and condensed with *p*-$Me_2NC_6H_4CHO$ to *6-nitro-4-phenyl-2-p-dimethylaminostyrylquinoline*, m. 64°. II, similarly prepd. from *o*-$NO_2C_6H_4NH_2$, m. 94°, was reduced to *8-amino-4-phenyl-2-methylquinoline* and condensed with *p*-$Me_2NC_6H_4CHO$ to give *8-nitro-4-phenyl-2-p-dimethylaminostyrylquinoline*, m. 129°.

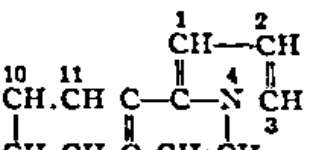
C. R. Addinall

*Quinoline derivatives.* VII. Hanns John. *Ber.* 63B, 2657–61(1930). cf. *C. A.* 21, 914, 25, 953.—The need for prepg. large amounts of quinine acid (6-methoxyquinoline-4-carboxylic acid) (I) from quinine or conquinine (II) by oxidation with $CrO_3$ led to a study of the conditions for obtaining the max. yield in the min. time. The expts., carried out under identical conditions as regards quality of the starting materials and reagents and the method of procedure, led to the following results. II by the Skraup method gave 42% I. Addn. of Fe (as $FeSO_4$) raised the yield to 55%. Co, Ni and Vd were without effect. Mn, as $MnO_2$, $MnSO_4$ or $KMnO_4$, at a concn. of 0.1 atom metal per l., gave 75% of very pure I; to obtain this yield the wt. of $CrO_3$ used must be at least twice that of the II. The optimum $H_2SO_4$ concn. is 8%. Replacement of the Mn by Mg, Al, Cu, Ag, Ce and Pb did not raise the yield above 48%, and Hg lowered it to 28%. Cl, As and kieselguhr also did not prove suitable. The procedure for oxidizing 100 g. II in the presence of Mn is given in detail.

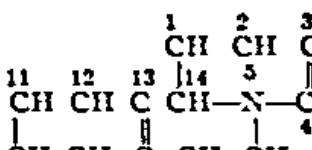
C. A. R.

1-ω-*Halogenoalkylisoquinolines and their derivatives.* Reginald Child and Frank L. Pyman. *J. Chem. Soc.* 1931, 36–49. cf. *C. A.* 24, 119.—This work was undertaken to prep. substances having amebicidal properties and followed clues indicated by the structure of emetine. The following acyl phenylethylamides were prepd. as intermediates from the acid chloride and the amine in $Et_2O$. *Chloroaceto-β-phenylethylamide* (I) m. 67° (all m. p. cor.). *m-MeO deriv* (II) m. 56–7°. *β-piperonyl deriv.* (III), m. 72°. *β-veratryl deriv.* (IV) m. 96°. *bromoaceto-β-veratrylethylamide* (V), m. 115°. *cyanoaceto deriv.* (VI) m. 115° but after solidifying m. 127–8°. *hippuro-β-phenylethylamide* (VII) m. 161°. *β-veratryl deriv.* (VIII), crystals with 1 mol. $H_2O$, m. 85–95°. *β-chloropropiono-β-veratrylethylamide* (IX) m. 102–3°. *γ-bromobutyro deriv.* (X) m. 65°. *chlorovalero deriv.* (XI) m. 60–2°. *Br deriv.* (XII), m. 70–2°. IV (30 g.), 30 cc. $POCl_3$ and 90 cc. PhMe heated at 120–30° for 1 hr. give 93.8% of *1-chloromethyl-6,7-dimethoxy-3,4-dihydroisoquinoline HCl* (XIII), canary yellow, darkens 210°, effervesces 217°. *picrate* yellow m. 196° (decompn.). XIII and KCN in $H_2O$ give *1-chloromethyl-1-cyano-6,7-dimethoxytetrahydroisoquinoline* (XIV), m. 125° (decompn.), if the moist gummy ppt. of XIV is transferred to KCN in $H_2O$ and EtOH and boiled for 0.5 hr. there results 95% of the *1-cyanomethyl deriv.* (XV), corresponding to XIII, m. 173°, the *HCl salt* pale yellow, m. 205–6° and is readily dissocd. by $H_2O$. *picrate*, orange yellow m. 225° (decompn.). XV also results in 40% yield from VI and $POCl_3$ in PhMe. Reduction of XV with Na and EtOH gives 40% of *1-β-aminoethyl-6,7-dimethoxytetrahydroisoquinoline*, whose *picrate*, yellow, crystg. with 1 mol. EtOH, m. 205°, the *di HCl salt*, cream colored, m. 276–7° (decompn.). V and $P_2O_5$, followed by picric acid, give 70% of *1-β-bromomethyl-6,7-dimethoxy-3,4-dihydroisoquinoline*

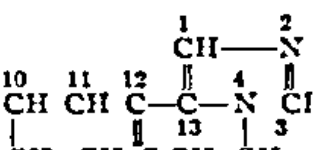
*picrate*, orange-yellow, m. 190–1° (decompn.) V and $POCl_3$ give 80% of XIII. II and $POCl_3$, followed by picric acid, give *1-chloromethyl-6-m methoxy-3,4-dihydroisoquinoline picrate*, yellow, m. 169–70° (uncor.), the HCl salt, m. about 170°, appears to contain $Me_2CO$ of crystn. From III there was obtained *1-chloromethyl-6,7-methylenedioxy-3,4-dihydroisoquinoline picrate*, orange red, m. 179–80° (decompn.), the HCl salt decomps. 204°, it also crystallizes with $Me_2CO$, m. 150–70°. IX and $POCl_3$ give a mixt. of 2 picrates, m. 235° and 145–85° (both uncor.), the 1st contained no Cl, the 2nd only a trace. Boiling X and $POCl_3$ in PhMe for 30 min. gives a mixt. of *1-γ-chloropropyl-6,7-dimethoxy-3,4-dihydroisoquinoline picrate*, which m. 163–4° (not pure), and *4,13-dehydro-9,10-dimethoxy-1,2,3,5,6,13 hexahydrobenzopyrrocolinium picrate*, yellow, m. 201–2°, which is explosive, the *chloride* (XVI) crystallizes with $2H_2O$, m. 120–2°, or, anhyd., m. 204–5°, the dry salt is hygroscopic. Reduction of XVI with Sn and HCl in EtOH gives 80–5% of *9,10-dimethoxy 1,2,3,5,6,13 hexahydrobenzopyrrocoline*, m. 88–9°, *HBr salt*, m. 185°, *picrate*, yellow, m. 187° (decompn.). XI or XII with $POCl_3$ give over 90% *1 δ-chlorobutyl-6,7-dimethoxy 3,4-dihydroisoquinoline picrate*, yellow, m. 156–7°, *HCl salt*, m. 172–3° (decompn.), the $H_2O$ soln. has a marked blue fluorescence. With $NH_4OH$ the HCl salt gives 90% of *5,14-dehydro-10,11-dimethoxy-1,2,3,4,6,7 hexahydrobenzopyridocolinium picrate*, golden spangles, m. 185–6°, the *chloride* crystallizes with 1 mol. HCl and 2 mols. $H_2O$, m. 197–8°, iodide, yellow, m. 210–2°. Reduction gives *10,11-dimethoxy-1,2,3,4,6,7 hexahydrobenzopyridocoline*, m. 59–60°, $b_{15}$ 225°, *HCl salt*, m. 235–7°, *picrate*, bright yellow, m. 172–4°. MeI gives a mixt. of *β methiodide*, m. 214–5°, and the more sol. *α methiodide*, m. 228°, heating the latter at 250° gives the *β* salt. VIII and $POCl_3$ give 90% of *9,10-dimethoxy-3-phenyl-5,6-dihydrobenzoglyoxalocoline* (XVII), m. 187°, *HCl salt*, m. 286–7° (decompn.), sol. in 25–30 parts cold $H_2O$, *HBr salt*, m. 203°, *methiodide*, pale cream color, m. 255°, *picrate*, yellow, m. 226–7°, *$NO_2$ deriv.*, orange-yellow, m. 202°. Heating XVII with concd. HCl 5 hrs. at 100° gives the *9,10-di HO deriv.*, whose *HCl salt* crystallizes with $3H_2O$, m. 293°, $FeCl_3$ gives a deep green color. XVII prevented the growth of *Entameba histolytica* in cultures at a dilu. of 1 in 25,000, whereas the control substance, emetine, was effective in a dilu. of 1 to 500,000. All other compds. were far less effective. The salts had no antimalarial activity and were also found to be devoid of trypanocidal activity. The nomenclature used above is based on the following types:



Benzopyrrocoline



Benzopyridocoline



Benzoglyoxalocoline

C. J. West

The γ-triazines. Syntheses of arylaminothioltriazines. A. Ostrogovich and V. Galea. *Atti accad. Lincei* 11, 1108–16(1930).—Using the method of prepn. described in a previous paper (*C. A.* 25, 705), *i. e.*, condensing *cyanoguanidine* with the *arylthiol acid*, 5 new *arylaminothioltriazines* have been prepd. *phenyl* (I), PhC.N C(NH₂)·N.C(SH) N, m. 281–2° (decompn.); *o-tolyl* (II), m. 243–4° (decompn.); the *m-* (III) and *p-deriv.* (IV), m. 272–3° and 279–80°, resp.; *p-anisyl* (V), m. 282–3° (decompn.). The metallic salts of some of the above, as well as some esters, were prepd. I *picrate*, pptd. from the EtOH soln. by adding picric acid, m. 193–4° (decompn.). I also gives insol. salts with many heavy metals as Ag, Cu, Hg, Pb, Fe, etc. The Ag salt shows very slight discoloration in sunlight. I is also readily methylated by adding the calcd. amt. of $Me_2SO_4$ and KOH, the product being insol. in alkali, m. 170–1°. II, III, IV and V, form similar salts with the heavy metals as well as picrates. The *picrates* m. 224–5°, 210–1°, 191–2°, 198–9°, resp. A. W. Contieri

The influence of light, carbon monoxide and quinone on the methylene blue reduction. Hiroshi Tamiya, Tatsutaro Hida and Kiyoshi Tanaka. *Acta Phytochim.* 5, 119–55(1930).—$AcCO_2H$, "Koji" acid, $AcCH_2CO_2Et$, phloroglucinol and resorcinol reduce methylene blue (I) in the absence of $O_2$ at a certain *p*H. Light energy is essential for this reaction. The presence of a mobile H atom in these substances (keto-enol tautomerism) is emphasized. The enzymatic reduction of I was studied with *Bacterium pasteurianum* and liver exts. It also was found to be speeded up by light. The I *mol.* is activated in this photochem. reaction, not the H donor or the dehydrase.

The I reduction by chem means or by liver exts. is not influenced by CO (II) However, I reduction by bacterial suspensions was found more or less prevented by II. The ratio I II dets the degree of inhibition The light does not influence it. II apparently prevents the adsorption of I on the bacterial surface *AcOH dehydrase is not affected* by II. Small amounts of quinone interfere with the chem as well as the enzymatic reduction of I. Extensive exptl data are given and a special app is described

*E. Gehauer-Fuehrer*

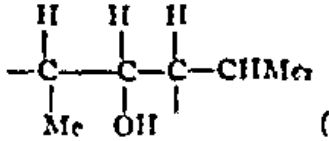
Thiodiazines. VI. Prafulla Kumar Bose and Birendra Kumar Nandi. *J. Indian Chem Soc* 7, 733–9(1930), cf *C A* 19, 831.—The mechanism proposed by Guha and Roy Choudhury (*C A* 23, 139), for the formation of the thiodiazine PhNH-NHC N N CPh CH$_2$ S from the action of PhNHNHCSNHNH$_2$ on BrCH$_2$COPh is different from that suggested by B who pointed out that varying quantities of thiazoles are formed in the above condensation (*C A* 20, 415) The formation of such thiazoles can be explained by the assumption of an intermediate of the type NH$_2$N C(NHR)SCH$_2$COPh Reactions between thiosemicarbazides and *p*-MeC$_6$H$_4$COCH$_2$Br led, however, either to the formation of a thiodiazine or to a thiazole, but not to both as expected 4-Substituted thiosemicarbazides gave thiodiazines whereas thiosemicarbazide gave a thiazole. One g NH$_2$NHCSNH$_2$ and 2.3 g *p*-MeC$_6$H$_4$COCH$_2$Br (I) were shaken with 35 cc. abs alc., and after refluxing for 20 min the mixt. was cooled and dild with Et$_2$O The crude product was collected, washed with Et$_2$O, dried and dissolved in dil HCl After filtering and neutralizing with Na$_2$CO$_3$, the free base *2 keto-4 p-tolyl 2,3-dihydro-1,3 thiazole hydrazone* (II) was pptd., which after recrystn from MeOH, m 178°; *HCl salt* m 133°, *benzylidene deriv*, m 205° (identical with the condensation product of PhCH NNHCSNH$_2$ and I), *isopropylidene deriv* m 230°; *Bz deriv*, m 201°, *Ac deriv*, m 195° (identical with the condensation product of AcNHNHCSNH$_2$ and I) The formation of the *PhCH* and *Ac* derivs. rules out the formulation of II as a thiazole NH C S CH C(C$_7$H$_7$) NNH$_2$ II reacted with isothiocyanates, forming addn. compds. of the type, NH C(C$_7$H$_7$) CH S C NNHCSNHR (R = Me, Ph, *o*- and *p*-tolyl, m 146°, 191°, 174° and 166°, resp.), and with HCNS to form HN C(C$_7$H$_7$) CH S C NNHCSNH$_2$ (III), m 218 III dissolved in abs. alc., condensed with II to give [HN C(C$_7$H$_7$) CH S C N]$_2$, m 120° NH$_2$NHCSNHMe condensed with II to give *2-methylamino-5-p-tolyl 1,3 4 thiodiazine*, MeNH-C N NH C(C$_7$H$_7$) CH S, m. 249° (*HCl salt* m 195°), *2 isobutylamino homolog*, m 159°, was prepd from II and *iso*-BuNHCSNHNH$_2$ (*HCl salt* m 125°, *Ac deriv*, m 167°), *2 phenylamino analog*, m 198° (*HCl salt* m 135° *Ac deriv*, m 170°), *2-o-tolylamino compd*, m 179° (*HCl salt*, m 171°, *Ac deriv*, m 199°), and *2 p-tolylamino isomer*, m 187° (*HCl salt*, m 199°, *Ac deriv*, m 154°) C. R. Addinall

Correction to G. Hahn and W. Schuch Yohimbehe alkaloids. VI. Two further secondary alkaloids of yohimbine. R. Lellig *Ber* 63B, 2680(1930).—H and S. state (*C A* 24, 5039) that L.'s α yohimbine does not lose in wt when dried at 105° and that the 15% loss cannot be ascribed to a const. hydrate or alcoholate. This is due to the use of aq MeOH instead of EtOH for the recrystn., from 95% alc. the compd seps with 1 mol each of EtOH and H$_2$O the loss in wt., compn and titration results agree with the formula C$_{21}$H$_{26}$O$_3$N$_2$, EtOH H$_2$O The alc. can be detected by rubbing 2 g of the base with 5 cc. H$_2$O distg off 2 cc. and testing the distillate with I KI-NaOH or with BzCl NaOH C. A. R.

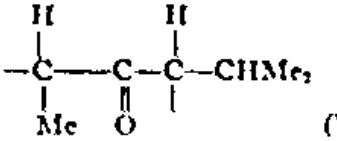
Sulfonation of alkaloids. Zenjiro Kitasato and Kakuji Goto *Ber* 63B, 2696–700(1930).—In general, practically nothing is known as to the reactions which take place between alkaloids and concd H$_2$SO$_4$. K. and G have found that alkaloids having a HO (or MeO) group on the aromatic nucleus, with a free *p*-position, are sulfonated by concd (not fuming) H$_2$SO$_4$ below 10°, the resulting acids generally form well-defined crystals and the SO$_3$H group always combines with the basic N to an inner salt. In this way were obtained *papaverine-* (I), *apomorphine-* (II) and *sinomeninesulfonic acid* (III) These acids no longer give the diazo reaction and the SO$_3$H group is probably in the *p*-position to the phenolic HO group Strychnine, which has no HO (or MeO) group, and brucine, in which the *p*-position to the HO group is not free, are not sulfonated under these conditions, and neither are those derivs of sinomenine and thebainone, such as bromosinomenine, disinomenine and dithebainone (IV), in which,

judging from the failure to give the diazo reaction, the *p* position to the HO group is not free. For I, the 2 position for the $SO_3H$ group is assumed from analogy with nitropapaverine. To det. whether the color reaction of certain alkaloids with $H_2SO_4$ is due to the formation of a colored compd. or to a decompn., IV was studied first. It dissolves in concd. $H_2SO_4$ with deep red color, and when poured on ice forms a colorless soln. which with $Na_2CO_3$ regenerates the unchanged IV. I m. 301° (decompn.), easily sol. in $Na_2CO_3$ alkalies and $Ba(OH)_2$. II, needles with $3H_2O$, m. above 300°. III, m. 265–7°. *Sinomeninonesulfonic acid* from sinomenine hydrate prisms with 0.5 $H_2O$, m. 275–80°, gives in MeOH with $NH_2OH$.HCl a *dioxime*, m. above 300°, also obtained by sulfonation of sinomenine hydrate dioxime. C. A. R.

**Saponin of Panax repens, Maxim. IV. Panaxsapogenin.** S. Aoyama. *J. Pharm. Soc. Japan* 50, 1070–95(1930). German abstr. 139–41; cf. *C. A.* 24, 125. A previously has reported on *panaxsapogenin* (I) and *panaxprosapogenin* (II) and shown that II is made up of *panaxsapogenin* ($C_{30}H_{48}O_4$) and glucuronic acid. Recently Kotake, Matsubara and Kimoto (*J. Chem. Soc. Japan* 51, 396–400(1930)) have shown that saponin obtained from *Panax repens, Maxim.* is identical to that obtained from *Aralia chinensis, L. var. glabrescens*. K. also proposed to change the mol. formula of $C_{30}H_{48}O_4$ (Murayama and Tanaka, *C. A.* 21, 3359) to $C_{30(31)}H_{48(49)}O_4$, but he could not account for the large mol. wt. of its Ac deriv. A. obtained slightly different results. Analysis of I indicates the mol. formula $C_{30}H_{48}O_4$ as previously reported. *Dihydrosapogenin* $C_{30}H_{50}O_4.H_2O$, m. 290–3°. I probably contains 2 double linkages, but no MeO, hydroxymethylene, ketone or aldehyde groups. I forms a *diphenylurethan*, $C_{44}H_{60}O_6N_2$, decomps. 133–40°, hence contains 2OH groups. *Me ester* of I, $C_{31}H_{50}O_4$, m. 186°, contains 2 alc. OH and 1MeO groups. *Monoacetylsapogenin* (III) $C_{32}H_{50}O_5$, m. 262–4.5°, and corresponds to the $C_{32}H_{52}O_5$ of K. Only 1OH group is acetylated, the other is probably tertiary alc. *Diacetylsapogenin anhydride* (IV), m. 315.8°. IV, when treated with KOH followed by HCl, gave III. *Me ester* of III, $C_{33}H_{52}O_5$ (V), m. 221°. Oxidation of V with $CrO_3$ gave a diketone, $C_{33}H_{50}O_5$ (VI), m. 182–3°, and an acid decompg. 215–8°. This acid is under further investigation. VI shows neither the Liebermann nor the $CHI_3$ reaction, hence it contains no —COMe group. VI is an unsatd. ketone. Reduction of VI by Clemmensen's method gave the original compd. *Dioxime* of VI, $C_{30}H_{48}O_3N_2$, decomps. 237°, probably contains a –C.CO.C.C.C.C– linkage. VI forms a *monosemicarbazone*, $C_{34}H_{53}O_5N_3$, which does not m. 290°. V gives neither the osazone, pyrrolen or pyrazoline reactions, hence the position of the C:O group must be either at 1 and 5 or further apart. A. suggests the following structure to explain the position of OH and CO groups in I and VI:

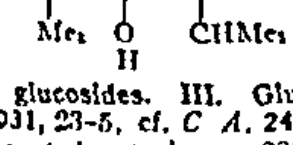


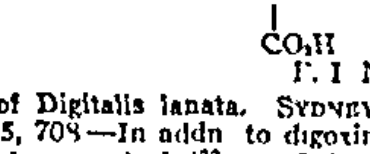
(I)



(VI)

Sapon. of V gave the Me ester, m. 195°, while I gave a compd., $C_{31}H_{50}O_4$ (VII), m. 293°, which did not depress the m. p. of I. VII is probably an isomer of I and is called *α isopanaxsapogenin*. III and VI also give VII. The exact mechanism of the formation of the isomer is not known. I is stable toward concd. HCl, even on boiling, and also alc. HCl. When treated with dry HCl in excess MeOH I gives a compd. m. 268° (VIII). VIII is probably another isomer of I and is called *β isopanaxsapogenin*. A. suggests the following partial structure for I:





F. I. Nakamura

**Digitalis glucosides. III. Glucosides of Digitalis lanata.** Sydney Smith. *J. Chem. Soc.* 1931, 23–5; cf. *C. A.* 24, 2753, 25, 708.—In addn. to digoxin, which was previously reported, gitoxin, m. 285° (cor., decompn.), $[\alpha]_{5461}^{20}$ 3.5° ($C_5H_5N$, *c* 1.02), has been isolated from the leaves of *Digitalis lanata*, thus has hitherto been found only in the leaves of *D. purpurea*. Other glucosides in the leaves are being examd.

C. J. West

**Brazilin and hematoxylin questions. XI. Hydroxybenzylchromanones.** Paul Pfeiffer, Erwin Breith and Hans Hoyer. *J. prakt. Chem.* 129, 31–54(1931); cf.

*C. A.* 24, 4301.—Chromanone (I) (0.5 g.) and 0.46 g. *p* $MeOC_6H_4CHO$ in abs. EtOH with dry HCl at 0° give 0.51 g. *4'-methoxybenzalchromanone*, yellow, m. 131°, 0.0001 mol. in 1 cc. concd. $H_2SO_4$ gives a blood red color. I and 0.55 g. vanillin Me ether give 0.28 g. *3',4'-di-MeO deriv.*, pale yellow, m. 117°, color in $H_2SO_4$ *blood red*. I and 0.5 g. piperonal give 0.45 g. *3',4' methylenedioxy deriv.*, yellow, m. 134.5–7°, color, Bordeaux red. I and 0.5 g. vanillin give 0.62 g. *3'-methoxy-4'-hydroxy deriv.*, yellow, m. 126–9°, color, deep blood red, *Ac deriv.*, golden yellow, m. 160° (84% yield). I and 0.47 g. 3,4-$(HO)_2C_6H_3CHO$ give 0.42 g. of *3',4'-di-HO deriv.*, golden yellow, m. 224–5°, color, wine red, *di Ac deriv.*, m. 166° (52% yield). 7-Methoxychromanone (5 g.) and 4.3 g. isovanillin in abs. EtOH with HCl give 9.2 g. *4',7-dimethoxy-3' hydroxybenzalchromanone*, bright yellow, m. 153–4°, color, deep orange, *Ac deriv.*, pale yellow, m. 139–40°; catalytic reduction of the Ac deriv. gives the *benzyl deriv.*, red, m. 123–4°, *oxime*, m. 160–1°, *Ac deriv.*, m. 90–1°. 7-Hydroxychromanone and vanillin Me ether give *3',4'-dimethoxy 7 hydroxybenzalchromanone*, brown, m. 245–9°, color, dark red, *Ac deriv.*, yellow, m. 151–2°. *3',4'-Methylenedioxy deriv.*, brown, m. 234–6°, color, blood red, *Ac deriv.*, yellow, m. 132.5–4°. *3'-Methoxy-4',7-dihydroxy deriv.*, golden yellow, m. 230–1.5°, color, dark red, *Ac deriv.*, m. 151–2.5°. *3',4',7-Trihydroxy deriv.*, yellow, m. 250–3°, color, blood red, *tri Ac deriv.*, pale yellow, m. 132–4°. The corresponding *benzyl deriv.*, yellow, m. 201–2°, *color, light wine yellow, Ac deriv., m.* 117°. 7,8-Dimethoxychromanone with $AlCl_3$ or concd. HBr give the *7,8-di-HO deriv.*, crystg. *with 1 mol.* $H_2O$, *m.* 188–8.5°; color, citron-yellow, *di Ac deriv.*, m. 111°, *semicarbazone*, pale brown, m. 224–5° (decompn.). With *p* $MeOC_6H_4CHO$ and HCl in EtOH there results *4'-methoxy 7,8-dihydroxybenzalchromanone*, greenish yellow, m. 192°, color, deep brownish red, *Ac deriv.*, light yellow, m. 140°. *3',4' Di MeO deriv.*, crystg. with 1 mol. $H_2O$, light yellow, m. 174–5°, color, carmine red, *Ac deriv.*, pure yellow, m. 183°, the corresponding *benzyl deriv.*, reddish needles m. 177°, *Bz deriv.*, m. 177.5–8°. *3'-Methoxy-4',7,8 trihydroxybenzalchromanone*, crystg. with 1 mol. $H_2O$, yellow, m. 206–7°, attempts to remove the $H_2O$ by heating at 17 mm. over PhMe caused decompn., *Ac deriv.*, m. 180–1°. *3',4',7,8 Tetra-HO deriv.*, light yellow, begins to decomp. at 220° and is complete at 265°, color, brick red, *Ac deriv., m. 166–7°*; the corresponding *benzyl deriv.*, yellow red, decomps. above 200°, *Ac deriv.*, m. 107.8°. C. J. West

Santonin. Karl Josephson. *Svensk Farm. Tids.* 35, 29–33(1931).—The lactone ring of santonin is opened by $NH_3$ in alc. giving santoninic acid amide. This reaction is easily reversed. J. gives a general discussion on the constitution of santonin with bibliography up to Clemo and Haworth (*C. A.* 24, 4046). A. R. Rose.

Hydrolysis of benzoylated amino acids and polypeptides. Stefan Goldschmidt and Wilhelm Lüner. *Ann.* 483, 190–216(1930).—The hydrolysis of various benzoylated mono- and diamino acids, aminohydroxy acids and polypeptides with NaOH (2% usually) at 25° and 100° and $H_2SO_4$ at 100° is reported. The rate of alk. hydrolysis of the monoamino acids increases with rise in temp. and HO ion concn., for a definite HO ion concn., the coeff. decreases with increasing length of the C chain. *Alk. hydrolysis of hippuric acid is increased at both 25° and 100° by the addn. of NaCl* but is decreased by added glycine. The *O* Bz group is eliminated from *O,N* dibenzoyl serine and tyrosine at 25°, at 100° both Bz *groups are readily eliminated from the* former compd. Alk. hydrolysis of dibenzoylarginine causes the very ready elimination of 1 Bz group with the production of α benzoylornithine, the velocity of hydrolysis of the second Bz group is measurable when 8% NaOH is used. Similarly, α ε-dibenzoyllysine (I) is first hydrolyzed to the α Bz deriv. With benzoylated glycyl-, diglycyl- and alanylglycylglycines the peptide linkings are rapidly broken, during this hydrolysis little BzOH is produced. The rate of hydrolysis of benzoylated monoamino acids by *70%* $H_2SO_4$ *at 100°* increases with the length of the C chain. Dibenzoylarginine behaves similarly with acidic hydrolytic agents as with alk., but the behavior of I is reversed *the α Bz group being eliminated first*. *The peptide linkings* are first broken when the above benzoylated peptides are hydrolyzed with 70% $H_2SO_4$. The velocity of hydrolysis of benzoylproteins is greater with 30% than with *more concd.* $H_2SO_4$, the rate corresponds with the sp. cond. of the acid. The velocity of hydrolysis of hippuric acid by 70% $H_2SO_4$ is increased by the addn. of glycine. C. J. West

A higher alcohol obtained from "Cortinellus Shitake." Mizuho Sumi. *Bull. Inst. Phys. Chem. Research* (Tokyo) 9, 966–9(1930). *Abstracts* 92 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 15, Nos. 278–81.—*A higher satd. alc.* $C_{30}H_{62}O$ is obtained from finely powd. *Cortinellus Shitake*, needles or prisms, sol. in $Et_2O$, $C_6H_6$, $CHCl_3$, *not easily sol. in* EtOH, $Me_2CO$, etc., m. 245–55°, $[\alpha]_D^{23}$

—22° *Acetate*, m 260-5°, $[\alpha]_D^{23}$ —30 2° *Benzoate*, m 210°. *Palmitate*, m. 171-2°. The spectrum shows no special absorption band K. KONDA

The bile acids. XXXI. The constitution of pseudocholoidanic acid. HEINRICH WIELAND, LUDWIG FRTEL AND ELIZABETH DANE *Z physiol Chem* 194, 107-14 (1931).—The study of pseudocholoidanic acid has been resumed with the hope of detg the location of 2 remaining C atoms in the bile acids The tetrabasic pseudocholoidanic acid $C_{21}H_{34}O_{10}$ is formed along with the pentabasic cholodanic acid, $C_{21}H_{32}O_{12}$, when desoxybilianic acid is oxidized by $HNO_3$ The former view that this oxidation breaks open ring III is now abandoned in view of the subsequent location of a Me group at $C_{11}$ Pseudocholoidanic acid forms a neutral tetra Me ester, but no keto groups can be demonstrated, hence the remaining 20 atoms must be present in ether or lactone linkage When heated it loses $CO_2$ and $2H_2O$ and forms a pyropseudocholoidanic acid $C_{19}H_{22}O_8$ which is monobasic and yields a mono-Me ester, m 192° Treatment of the pyro acid with alc KOH opens up a lactone ring with formation of a dibasic acid, $C_{21}H_{34}O_{11}$, m 212°, from which a di-Me ester was obtained with $CH_2N_2$ The mono-Me ester of pyropseudocholoidanic acid was also obtained by heating the di-Me ester of pseudocholoidanic acid A by product in the prepn of the pyro acid was a dibasic acid, $C_{21}H_{32}O_8$ The open pyro acid is tribasic when titrated hot, due to hydrolysis of an anhydride grouping Desoxybilianic acid in AcOH takes up 2Br, yielding 50–60% of *dibromodesoxybilianic acid* m 215° (decompn) Treatment of this with *N* KOH in MeOH removes HBr with formation of *bromodesoxybilienic acid*, m 218° (decompn), in 80% yield, *tri-Me ester*, m 93° Both of these brominated acids revert to desoxybilianic acid when reduced with Zn and HCl Oxidation of the unsatd bromo acid with $HNO_3$ yields pseudocholoidanic acid This new manner of obtaining pseudocholoidanic acid proves it to be a lactonetetracarboxylic acid, in which ring II has been opened by breaking the linkage between $C_6$ and $C_7$, since the oxidation product contains no Br Formulas representing the characteristic groupings of pseudocholoidanic acid and its pyro acid are proposed XXXII. Attempts at a new breakdown of desoxybilianic acid ELIZABETH DANE AND HEINRICH WIELAND *Ibid* 119-23.—In dibromodesoxybilianic acid (vide supra) both Br atoms are on $C_6$ One is easily removed as HBr, but the 2nd is tenaciously held as would be expected from the presence of an adjacent double linkage Oxidation of the unsatd bromodesoxybilienic acid by alk. $KMnO_4$ converts it into the tribasic *5 hydroxy-6 ketodesoxybilianic acid*, $C_{21}H_{34}O_9$, m 233-5°, *oxime*, m 200° Esterification with $CH_2N_2$ yields a *tri-Me ester*, m 154°, while esterification with MeOH-HCl yields an *isomeric tri-Me ester*, m 178°. The difference between these isomers is not understood The HO acid when boiled with AcOH and HCl loses $H_2O$ and forms a *diketolactonedicarboxylic acid*, $C_{21}H_{32}O_{11}$, m. 258-60° Catalytic hydrogenation of the latter yields 70% of a *6-ketodesoxybilianic acid*, $C_{21}H_{34}O_9$, m 255°, *tri-Me ester*, m 108° Oxidation of the above HO acid with fuming $HNO_3$ gave a *pentabasic acid*, $C_{21}H_{30}O_{11}$, m 180° A. W. DOX

Tauroisolithocholic acid from chicken bile. TADAO HOSIZIMA, HIROSI TAKATA, ZIRO URAKI AND SIGETOSI SINUYA *J Biochem* (Japan) 12, 393-7(1930).—Chicken bile is freed from mucus by alc and is coned on the water bath to the original vol. of 1 l $FeCl_3$ is then added until the acid soln gives no further ppt The ppt. is filtered off and is decompd with warm $Na_2CO_3$ The filtrate is evapd and the dry residue extd with alc The alc soln is decolorized with animal charcoal and evapd, the residue again taken up in alc and decompd with $H_2SO_4$ and mixed with ether. The flocculent ppt is now filtered off This ppt is dissolved in dil $Na_2CO_3$, gradually acidified with HCl and extd by shaking with ether The ppt thus formed is recrystd. several times from dil alc and gives a yield of 2 13 g These crystals are not sol in $H_2O$, ether, petroleum ether or benzene, but do dissolve easily in alc, AcOH or $Me_2CO$, they give the Pettenkofer reaction and m 210–1°. In abs. alc soln (0 54%) they have a sp rotation of 65 74° Its elementary compn corresponds to the formula $C_{23}H_{39}OCONHCH_2CH_2SO_3H$ Heated for 24 hrs under a reflux with 5% NaOH, it gives a mass of beautiful roset shaped needles The Na salt was converted to a Ba salt which was recrystd from dil alc by a special procedure Analyses on this Ba salt show that the bile acid is related to lithocholic acid, and is identified as tauroisolithocholic acid S MORGULIS

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Magnetic rotatory power of hydrocarbons in the gaseous state (MALLEMANN GABIANO) 2. Trichloromethyl perchlorate (BIRCKENBACH, GOUBEAU) 6. Recent experiments on the pyrolysis of $CH_4$ (WHEELER, WORD) 21. Kinetics of the formation of malonamide from ethyl malonate and $NH_3$ in homogeneous solution (BAILEY) 2. Formation of $CH_4$ during the electrolysis of K acetate and the mechanism of Kolbe's elec-

trosynthesis (Sitchla, Walker) 4. Natural and synthetic rubber (Midgley, Henne) 30. Apparatus for effecting gas reactions such as catalytic production of MeOH (U S pat 1,700,853) 18.

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Ellis, Carleton: Hydrogenation of Organic Substances 3rd ed New York: D Van Nostrand Co, Inc 980 pp M. 15 Reviewed in *Ind Eng Chem* 23, 342 (1931).

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**Hydrocarbons.** Alfons Deschauer Ger 515,177, Dec. 1, 1926 Partly hydrogenated polycyclic hydrocarbons are prepd by treating the acid sulfates of cyclic hydrogenated alcs with aromatic hydrocarbons in the presence of $H_2SO_4$ Thus, cyclohexanyl sulfuric acid and $C_6H_6$ yield phenylcyclohexane. The acid sulfates used as initial materials need not be separately prepd Thus, an aromatic hydrocarbon may react, in the presence of $H_2SO_4$, with a cyclic unsatd hydrocarbon such as cyclohexene, or with a cyclic hydrogenated alc. Examples are given

**Hydrocarbons.** I. G Farbenind. A.-G Fr. 693,054, Mar 31, 1930 Hydrocarbons of high b p are converted into hydrocarbons of lower b. p by cracking or hydrogenation in the presence of catalysts composed of metal compds of the type of acetylacetonates, with or without other catalysts.

**Partial combustion of hydrocarbons.** Johann S. Ohlendieck-Dolge Ger 514,394, May 4, 1928 This relates to the manuf of mixts contg CO and H by treating hydrocarbons with air or other oxidizing gas at a raised temp in the presence or absence of catalysts The improvement consists in using an alloy of Fe, Cr, and Ni, that has been fused *in vacuo*, for constructing the parts of the reaction chamber that come into contact with the gases.

**Condensing diolefins with other hydrocarbons.** I G Farbenind A.-G Brit. 335,512, July 5, 1929 In the further application of the general type of reactions described in Brit 315,312 (*C A* 24, 1649), isoprene, toluene and Na are heated in an autoclave at 160° (yielding 3-methyl 5 phenyl-2-pentene or 2 methyl-5-phenyl 2-pentene $\beta,\gamma$-Dimethylbutadiene, toluene and Na yield 2 3-dimethyl-5-phenyl 2-pentene, and butadiene, tetrahydronaphthalene and Na yield butenyltetrahydronaphthalene Cf *C A* 24, 3247.

**Aliphatic compounds.** Henry Dreyfus Fr 692,736, Mar 25, 1930 Org O compds are synthesized by passing the reaction gases through a no of reaction vessels in series in an open circuit An example is given of the prepn of MeOH from water gas Cf *C A* 25, 963

**Organometallic compounds.** Louis P. V Lecoq Fr 692,949, July 1, 1929 Salts and complex metallic compds of dithiocamphocarboxylic acid which are sol in org solvents, particularly in animal and vegetable oils, are prepd by double decompn or by the action of the acid on oxides Examples are given of the prepn of the Cu, Au, Ag and Hg salts and of a complex compd contg As which is sol in olive oil, by the reaction of dithiocamphocarboxylic acid with *p*-hydroxy-*m* aminophenylarsonic acid Cf *C A* 24, 2138

**Diazo compounds.** I G Farbenind A.-G (Erich Lehmann, inventor) Ger 515,205, Nov 6, 1928. Diazo compds of unsulfonated diphenylamine derivs. are salted out from their solns at atm temp by means of neutral, unhydrolyzed salts in the presence of a weak acid, *e g*, $H_3BO_3$, and a compd capable of reacting with $HNO_2$ *e g*, urea The oxidation products which sep after the diazotization should be removed before salting out The products are stable in the cold and in warm, damp air Examples are given.

**Alcohols from olefins.** N.-V. de Bataafsche Petroleum Maatschappij Brit 335,551, May 23, 1929 Olefins (including those contg 2 or more double bonds) are hydrated in the vapor phase in the presence of a metal of the Pt group, Au, Ag, Cu, Fe, Ni, Co, Cr, Ta, V, W, Mo or Mn or their salts or other compds (most suitably compds which during the reaction yield the metals such as oxalates, carbonyls and the like, although compds such as Bi vanadate, Cu vanadate or Cu phosphate also may be used) Several examples with details of procedure are given for treating ethylene and propylene

**Cyclic aldehydes.** I G Farbenind A.-G (Georg Kalischer, Heinz Scheyer and Karl Keller, inventors) Ger 514,415, Feb 3, 1927. The aldehyde group is introduced into oxygenated cyclic compds by treating these with formyl derivs of secondary amines and a chloride or oxychloride of P or S The reaction may be effected in an inert solvent Thus, $\beta$-naphthol may be added to a benzene soln of the product obtained by treating formylmethylaniline with $POCl_3$ while cooling 2 naphthol 1-

aldehyde is obtained from the mixt after standing for about 20 hrs. Other examples are given also. The method may be used to prep aldehyde derivs of anthrone, benzanthrone, naphthostyril, hydroxythionaphthene and like compds. Cf. C. A. 24, 3480.

**Polycyclic ketones.** I. G. Farbenind. A.-G. (Otto Nieschlenus and Walter Bernth, inventors). Ger. 514,110, Dec. 10, 1925. Polycyclic ketones are prepd. from aromatic or heterocyclic ketones having halogen in the *o*- or *peri* position to the CO group by treating these at a raised temp. with alkali or alk. earth salts or with feebly alk. acid binding agents. The ketones may be treated in the gas or liquid phase and in the presence or absence of catalysts, e. g. Cu or $CuCO_3$. Thus fluorenone may be prepd. by heating *o*-chlorobenzoylbenzene with $Na_2CO_3$ at 600° for some hrs. Other examples are given also. Cf. C. A. 25, 1290.

**Acetals.** Consortium für elektrochem. Ind. G. m. b. H. (Hans Deutsch and Willy O. Herrmann, inventors). Ger. 513,700, Jan. 20, 1931. Addn. to 502,111. The method of Ger. 501,411 (C. A. 24, 4701) is modified by using ales. contg. water. The water is converted into AcH, which may be fractionated out of the reaction products or removed by washing, e. g., with the alc. used. The yield of acetals may be increased by partly condensing the reaction products and returning the condensate to the reaction vessel, or by circulating the products through the vessel. Examples are given.

**Aldehyde bases.** Produits Roche Soc. anon. Belg. 370,810, July 31, 1930. Hydroaromatic aldehydes are condensed with $CH_2O$ and aliphatic amines.

**Aldehyde amines.** The National Carbon Co. Fr. 692,835, Mar. 27, 1930. The deterioration of condensation products of aldehydes with amines such as heptylic aldehyde with $PhNH_2$ is retarded by treating the products with a polyhydroxylated or polyhydroxy substituted aromatic compd. such as catechol, resorcinol, pyrogallol, dinitroresorcinol, hydroquinone or its mono- or di-chloro deriv.

**Esters.** Otto Evans (to Deutsche Gold und Silber Scheideanstalt vorm. Roessler). U. S. 1,701,278, Feb. 5. In producing esters such as MeOAc, aliphatic acids such as HOAc and ales. such as MeOH are caused to react together at temps. of about 100–180°, corresponding to working pressures of 2–10 atm., in the presence of catalysts such as $H_2SO_4$ or $NaHSO_4$, which are capable of producing moderate H ion concns., and the ester formed is continuously removed from the reaction mixt. as produced.

**Vinyl esters.** Willy O. Herrmann, Hans Deutsch and Erich Haarer (to Consortium für Elektrochemische Industrie). U. S. 1,700,020, Feb. 5. An excess of $C_2H_2$ is passed through a monocarboxylic aliphatic acid such as HOAc in the presence of not more than about 1% of a Hg compd. such as Hg acetate and the resulting vinyl ester is removed from the reaction mixt. by entrainment with the escaping excess of $C_2H_2$ and is recovered by rectification. Several examples with details of procedure are given. Cf. C. A. 24, 627.

**Conversion products of vinyl esters.** Consortium für elektrochem. Ind. G. m. b. H. (Hans Deutsch and Willy O. Herrmann, inventors). Ger. 513,307, Mar. 11, 1927. Ketene and other ketones, AcH, acid anhydrides and vinyl ethers are among the products obtained by passing vaporized vinyl esters at a temp. between 250° and 600° and at atm. or raised pressure through a packed reaction vessel which may contain a catalyst. Thus, the reaction vessel may be packed with wood charcoal on which ZnO has been deposited. Examples are given.

**Polyvinyl alcohol esters.** I. G. Farbenind. A.-G. Fr. 692,816, Mar. 27, 1930. Sol. mixed esters of polyvinyl ale. are made by the reaction simultaneously or successively of the ale. mixts. with acid halides or condensation products obtained by elimination of halogen hydride from halide acids. The products are converted to an insol. form by heat. Thus a mixt. of polyvinyl ale., HCl, naphthenic acid chloride, PhCl and pyridine bases are heated to 35–40° for 24 hrs. The product is sepd. by MeOH and filtering. It can be formed into a film from its soln. in acetone. Other examples are given.

**Alkyl chlorides.** E. I. du Pont de Nemours & Co. Fr. 692,790, Mar. 26, 1930. Alkyl chlorides are made by bringing a mixt. of vapors contg. ale. and HCl into contact with an aq. soln. of a metallic chloride such as $ZnCl_2$ or $LiCl_2$ at a temp. of about 100–160°. The mixt. of vapors may be formed by the reaction of NaCl, $H_2SO_4$ and ale. at a high temp. An example is given of the prepn. of LiCl. Cf. C. A. 25, 303.

**Calcium benzoate.** The Gotsenmayer A.-G. Fr. 692,521, Mar. 21, 1930. Phthalic anhydride is ground with an aq. suspension of $Ca(OH)_2$ and heated to a temp. above 350°. The mixt. is introduced gradually into the reaction chamber and a dilg. agent such as some of the material already transformed may be added to the mixt.

**Sulfonates of pyridine and its homologs.** I. G. Farbenind. A.-G. Brit. 333,817, Nov. 20, 1929. In the sulfonation of pyridine and its homologs (suitably with fuming

$H_2SO_4$), Hg or a Hg salt such as the sulfate is used as catalyst Examples are given *of the sulfonation of pyridine and of α-picoline.* Previous use of various other catalysts also is mentioned

*Stabilizing solutions of salts of aromatic stibinic acids.* I G Farbenind A.-G (Hans Schmidt, inventor) Ger 515,113, Feb 25, 1927. A polyhydric alc., *e. g.*, glycerol or glucose, is included in the solns. The alc and the salt may be present in equal amounts

Amine derivatives. Imperial Chemical Industries, Ltd Fr 693,180, April 2, 1930 *N,N'*-Thio derivs of primary and secondary amines are made by the interaction of a primary or secondary amine with a chloride of S in aq., neutral or alk suspension *Examples are given of the prepn of* $Et_2NSSNEt_2$ *from* $Et_2NH$ and $(CH_2)_5NSSN(CH_2)_5$ from piperidine

Anthraquinone derivatives. I G Farbenind A.-G (Max Kugel, *inventor*) Ger. 513,025, June 12, 1927 Mixts of α- and β aroylaminoanthraquinones or their halogen derivs are sepd by treatment in alc. suspension with caustic alkali at a temp sufficiently low to avoid sapon The α-derivs remain undissolved, while the β derivs. go into soln., and can be recovered by acidification. Examples are given Cf. *C. A* 25, 965

Benzanthrone derivatives. I. G Farbenind A.-G (Heinrich Neresheimer and Willy Eichholz, inventors) Ger *515,327, Aug 11, 1926 Addn to 431,774.* According to Ger 431,774, *Bz*-1,*Bz*-1'-Dibenzanthronyls are prepd by treating benzanthrone, or its derivs having the 2 position free, with acid oxidizing agents It is now found that the reaction proceeds differently if oxidation is effected with $MnO_2$ and moderately dil $H_2SO_4$, products sol in alkalies and in cold bisulfite soln being obtained Like products can be prepd from benzanthrone derivs. substituted in the 2 position, and in treating these, other acid oxidizing agents may be used Examples are given *Cf C A 25, 1262*

Naphthocarbazole derivatives. I G Farbenind A.-G (Albert Schmelzer, Fritz Ballauf and Heinrich Hefner, inventors) Ger *514,420, Feb 9, 1929* See *Fr.* 689,515 (*C A* 25, 966)

Alkyl cyclohexanols and cyclohexanones. Schering-Kahlbaum A.-G (Walter Schoeller and Hans Jordan, inventors) Ger 515,112, Jan 27, 1928 Addn to 512 881 The hydrogenation process described in Ger 512,881 (*C A* 25, 1259) is carried out in *the presence of a surface catalyst, e. g., Al Mg hydrosilicate* The hydrogenation catalyst (Ni) may be deposited on the surface catalyst Examples are given Cf Ger 512,236 (*C A* 25, 974)

Phenols. I G Farbenind A.-G (Friedrich W Stauf and Gerhard Kröner, inventors) Ger 513,798, Mar 20, 1928 See Brit 308,220 (*C A* 24, 130).

Improving the odor of phenols. Gewerkschaft Mathias Stinnes. Ger 515,467, Oct 29, 1927 Addn to 514,341 The method of Ger 514,341 (*C A* 25, 1336) is modified by partially etherifying the phenols instead of partially esterifying

Indoles. Imperial Chemical Industries, Ltd Fr 692,500, Mar. 24, 1930 See *Brit.* 330,332 (*C A 24, 5770*)

Styrenes. The Naugatuck Chemical Co Fr 693,876, April 14, 1930 Styrenes are prepd by heating an alkylbenzene and $C_4H_6$. A substance such as S or a mixt of $C_4H_4Cl_2$ and S capable of forming a stable compd with the H liberated may be added

Acetic acid. Henry Dreyfus. Fr 692,735, Mar. 25, 1930 The vapor of $CH_2O$ alone or mixed with CO is submitted to the action of heat under a pressure of 100–300 kg or more A temp of 300–400° is preferred and the $CH_2O$ may be used in the form of formal and in the presence of steam Catalysts such as inorg acids may be used

Aliphatic anhydrides. Henry Dreyfus *Fr 692,537, Mar 21, 1930* Aliphatic anhydrides, particularly $Ac_2O$, are made by passing the vapor of aliphatic acids, par*ticularly AcOH*, in contact with a heated mass of Cu or other metal of good heat cond Catalysts known to favor the reaction may be mixed with the Cu

Aliphatic anhydrides. Henry Dreyfus Fr 693,483, April 7, 1930 Aliphatic anhydrides, particularly $Ac_2O$, are prepd by the thermal decompn. of aliphatic acids, particularly AcOH, in the presence of a catalyst composed of or contg one of more anhydrides or acids of As or Sb or the salts of such acids, such as arseniates or antimoniates of Na, K or Ca. The preferred temp is 350–700° Cf *C A* 25, 971.

Ethyl alcohol and other oxygenated organic compounds. *H Dreyfus Brit* 335 631, July 2, 1929 EtOH and other products such as higher alcs., esters, aldehydes and ketones are prepd by heating *MeOH vapor in the presence of catalysts* comprising compds. of alkali or alk. earth metals in which these are the sole metallic compo-

nents (excluding Mg compds) such as oxides, hydroxides and alcoholates of Na, K, Ba and Ca, preferably at 400–600°, although higher or somewhat lower temps. may be employed. Various details of app. and procedure are described.

**Methyl and ethyl acetates.** Deutsche Gold und Silber Scheideanstalt vorm Roessler (Otto Fuchs, inventor). Ger. 513,943, Jan. 16, 1927 and 514,744, Mar. 22, 1927. Addns. to 507,205. In applying the method of Ger. 507,205 (*C. A.* 25, 524) to the esterification of crude pyroligneous acid the acid is preliminarily purified by heating under pressure (513,943). This purification treatment may be effected in the presence of salts, *e. g.*, 20–40% of a bisulfate (514,744).

**Benzanthrone, etc.** Ivan Gubelmann, Robert J. Goodrich and Edward T. Howell (to Newport Chemical Corp.). U. S. 1,791,309, Feb. 3. In producing anthraquinone derivs. such as benzanthrone or methyl benzanthrone, a starting material such as anthraquinone or methyl anthraquinone is caused to react in concd. $H_2SO_4$ with a Cu salt such as $CuSO_4$ and a metal such as Zn or Al which is higher than Cu in the electromotive series (suitably at 25–30°).

**3-Nitro-5-ketotetrahydronaphthalene.** I. G. Farbenind. A. G. (Emil Lange, inventor). Ger. 515,111, Apr. 12, 1929. The anil of 5-ketotetrahydronaphthalene is nitrated and the product decompd. with dil. mineral acid. An example is given.

**α-Naphthol.** I. G. Farbenind. A. G. Fr. 693,596, April 9, 1930. α-Naphthol is prepd. by heating α-ketotetrahydronaphthalene with S at about 200°. A catalyst such as Se, finely divided Sn, ZnO, arsenious anhydride or diphenylguanidine may be used.

**1,4,1',4'-Tetrahydroxy-2,2'-dianthraquinonyl.** I. G. Farbenind. A. G. (Robert E. Schmidt, Berthold Stein and Kurt Bamberger, inventors). Ger. 515,114, Sept. 22, 1929. Quinizarin is treated with piperidine or its homologs or analogs at atm. or slightly raised temp. An example is given.

**1,4,4'-Trihydroxy-2,2'-dianthraquinonyl-3,1'-oxide.** I. G. Farbenind. A.-G. (Robert E. Schmidt, Berthold Stein and Kurt Bamberger, inventors). Ger. 515,115, Oct. 2, 1929. 1,4,1',4'-Tetrahydroxy-2,2'-dianthraquinonyl in nitronaphthalene or other nitro compd. of high b. p. is boiled for a short time. An example is given. *Cf.* preceding abst.

**Triazine derivatives.** I. G. Farbenind. A.-G. Brit. 335,783, Oct. 31, 1928. See Ger. 501,087 (*C. A.* 24, 4530).

**Mercaptobenzothiazole, etc.** Imperial Chemical Industries, Ltd., and K. H. Saunders. Brit. 335,567, March 26, 1929. Mercaptobenzothiazole is prepd. by introducing a soln. of S in $CS_2$ mixed with $PhNH_2$ into a reaction vessel heated to 200–275° and under pressure, and allowing the mixt., on completion of the reaction, to overflow into a second chamber when it is drawn off. App. is described adapted also for other reactions of liquids and overflow of the reaction products.

**β-Hydroxy-α-picoline.** I. G. Farbenind. A.-G. Brit. 335,818, Nov. 26, 1928. α-Picoline-β sulfonic acid (which may be prepd. as described in Brit. 335,817) is fused with an alkali such as KOH. Production of an *azo dye* by coupling it with diazotized *p*-nitroaniline in $Na_2CO_3$ soln. is described.

**Polymerized vinyl chloride.** Iwan Ostromislensky (to L. A. Van Dyk). U. S. 1,791,000, Feb. 3. For obtaining the β-modification of polymerized vinyl chloride, the vinyl chloride is polymerized until the δ modification is formed, followed by addn. of aniline, pptn. with alc. and dissolving in $C_2H_2Cl_4$.

**Purpurin.** Henry R. Lee and Ivan Gubelmann (to Newport Chemical Corp.). U. S. 1,790,932, Feb. 3. A soln. of 3-chloroquinizarin in concd. $H_2SO_4$ is heated at about 220° for a prolonged time (suitably about 20 hrs.).

**Quinizarin.** Ivan Gubelmann and Henry J. Weiland (to Newport Chemical Corp.). U. S. 1,790,915, Feb. 3. In prepg. a quinizarin, a *p*-chloroaniline is diazotized in $H_2SO_4$, the diazo compd. thus formed, without isolation, is reacted upon in substantially anhyd. $H_2SO_4$ with phthalic anhydride in the presence of $H_3BO_3$ at a temp. of about 200° and this temp. is maintained until condensation is substantially complete, followed by cooling and dilg. with water to ppt. the quinizarin compd.

**Leuco indigo.** Imperial Chemical Industries, Ltd. Fr. 693,469, April 7, 1930. Leuco indigo is made in a continuous manner by passing a paste of alk. indigo over a Ni catalyst on a rigid or semi rigid support composed of a granular reticular or tangled mass, in the presence of H under pressure. A temp. of 120–140° is used and the catalyst may be activated with $Al_2O_3$.

# 11—BIOLOGICAL CHEMISTRY

PAUL E HOWE

## A—GENERAL

FRANK P UNDERHILL

Chemical properties of blood pigments and related substances A STIEBMAN. *Chem Weekblad* 27, 170–4(1930).—The general chem. and optical properties of hemoglobin and its derivs. are described, and the variations exhibited by various types of blood are discussed B. C. A

Philothione as hydrogenase. J DE REY-PAILHADE *Compt rend soc biol* 99, 1700–2(1929).—Egg white, dild. with an equal vol. of water, was used as a source of philothione, the addn of S liberates $H_2S$ in 30 min The philothione formed contains the -S S- linking characteristic of cystine The reaction does not occur after heating with dil acid or alk. media; further, the ppt formed by heating does not give $H_2S$ after the addn of S It is maintained that philothione is an enzyme. B C. A.

The Spierer lens and what it reveals in cellulose and protoplasm. WILLIAM SEIFRIZ. *J Phys Chem* 35, 118–29(1931).—The Spierer lens is an oil immersion objective in which is inserted a mirror, smaller than the lens, which reflects all direct light coming into the objective. A diaphragm controls the admission of light Scattered light is picked up by the *lens around the mirror The structure of cellulose and protoplasm* as revealed by the Spierer lens is that of tiny rods or supermicelles arranged end to-end to form long parallel striae F. E BROWN

The chylomicron emulsion. S DEW. LUDLUM, A C TAFT AND R L NUGENT. *J. Phys Chem.* 35, 269–88(1931).—Chylomicrons are oil droplets in the blood Their diams. are 1$\mu$ and smaller That they are surrounded by a protective protein layer is indicated by: (*a*) their max flocculation at $p_H$ 4 8–5 2, (*b*) the reversal of their charges at $p_H$ 4 8–5 and (*c*) coalescence to form larger droplets at a point in acid or alc concn at which protein would be salted out Mixed serum albumin and globulin would behave in exactly this way when acting as protective layers on colloidal particles The application of the Mudd interface technic gives results similar to those observed for fat globules in milk These milk globules are believed to be surrounded by protein The question of the assimilation and storage of fats and the behavior of lipoid drop lets in clinical tests, as those for syphilis, make this an important subject for study. The known behavior in these fields is in accord with the assumption of a protein sheath. F. E. BROWN

The end point of tryptic action. J TEMMINCK GROLL. *Pharm Weekblad* 68, 109–21(1931).—A study is made of the factors which might be expected to influence the extent of hydrolysis of casein and gelatin by trypsin prepns from hog pancreas Ordinarily about 20% of the total N is converted in 1 week into amino N which can be titrated with $CH_2O$ After several weeks the conversion may be as high as 30%, but this further increase does not represent enzymic action since the control without enzyme behaves similarly The enzyme does not become inactivated since it readily attacks fresh addns of substrate Moreover, the addn of fresh enzyme does not increase the extent of hydrolysis The final equil is not appreciably influenced by the purity of the enzyme prepn, by variations in $p_H$, nor by the concn of enzyme No evidence could be obtained of the formation of an inhibitory substance (Northrop, *C A* 16, 1598), nor of an equil due to the inhibitory effect of decompn products Addn of another protease, *e g*, that of yeast, readily carries the proteolysis to a further stage after the tryptic digestion has come to a standstill A W. DOX

Proteolytic enzymes in the leucocytes of man ERIK HUSFELDT *Z. physiol Chem* 194, 137–65(1931).—Different types of leucocytes were examd separately for their proteolytic enzymes This is the first time that such expts have been performed with a single variety of cell, since the organs previously studied, *e g*, spleen, liver and even normal blood, contain mixts of cells The enzyme material consisted of (1) exudates from acute inflammations where polymorphonuclear neutrophilic leucocytes are present almost exclusively (2) cells from the blood of a patient with myeloid leucemia where granulocytes and their precursors are exclusively present (3) cells from normal blood, (4) acute inflammatory exudates of rabbits which consist essentially of polymorphonuclear pseudoeosinophilic leucocytes corresponding biologically to the neutrophilic leucocytes of man The substrates employed were casein edestin and synthetic polypeptides, all in solns in which the $p_H$ was varied by the aid of buffers. Proteinase action was measured by pptg with $CCl_3CO_2H$ and Kjeldahl detn of the uncoagulable

N before and after the expt Peptidase action was detd by Willstatter's titration with 0 05 *N* KOH in EtOH In the glycerol ext of leucocytes from the blood of a patient with myeloid leucemia, where practically all the cells belong to the myeloid system 2 proteinases were found a *cathepsin*, active between $p_H$ 3 and $p_H$ 7, showing optimal cleavage of casein at $p_H$ 4 3 and of edestin at $p_H$ 5 2, and a *trypsin* increasingly active from $p_H$ 4 0 on The cathepsin resembles that of organs and represents the actual autolytic enzyme found in all animal cells In the autolysis of cells with $CHCl_3$ the trypsin is formed in increasing quantity with progressive destruction of the cells. In the cells from acute exudates (polymorphonuclear leucocytes) trypsin is so abundantly present as to obscure the cathepsin Attempts to adsorb the trypsin on casein did not give a satisfactory sepn., since so much of the enzyme still remained in soln that cathepsin activity could not be demonstrated Glycerol exts of the leucocyte mixt from normal blood contained a considerable quantity of *peptidases* These showed a characteristic dipeptide cleavage like the enteric secretion. Alanylglycine was readily hydrolyzed at an optimum $p_H$ of 7 2, while the optimum cleavage of leucylglycine at $p_H$ 8 1 was only $\frac{1}{4}$ as great Tripeptides gave the strongest cleavage, the optimum for alanylglycylglycine being at 7 3 Cleavage of the tetrapeptide, leucylglycylglycylglycine was less pronounced though distinct In the glycerol ext of cells from myeloid leucemia (granulocytes) the same enzymes were present and in the same relative proportions Certain of the enzymes of the polymorphonuclear leucocytes are bound to the so-called granula of the cells These granula are droplets of a protein and their isoelec points can be detd with the aid of microscopic staining reactions In different animals the granulations have different isoelec points. These points, as also the dissocn of the protein, coincide with the $p_H$ activity curve of the proteinases The isoelec point of the pseudoeosinophilic granulations of rabbit leucocytes, *e. g.*, is at $p_H$ 7 0 and the proteinase acts from 7 0 to 3 0. The neutrophilic granulations in the polymorphonuclear leucocytes of man have an isoelec point at 4 5, the corresponding proteinase is increasingly active from $p_H$ 4 0 into the alk. region It is possible that the dissocn of the protein present in the granulations dets. the $p_H$ activity curve of the proteolytic enzyme likewise bound to the protein of the granulations

A. W. Dox

**The cephalin from human brain. II. The question of oxidation and purification of cephalin.** Irvine H. Page and Margarete Bclow *Z. physiol. Chem.* 194, 166–90(1931), cf *C. A.* 25, 718.—In contact with the air cephalin undergoes an oxidative alteration, the progress of which can be followed by noting the decrease in I no At the same time the values for C, H and N decrease. The P content remains const and never increases. The neutralization no rises A change in all these values does not occur if the cephalin is kept under EtOH. Various prepns. of cephalin show the same relationship between I no. and elementary analysis Cephalin, like lecithin, may be oxidized by atm O and Fe as catalyst, and the addn of AcOH is not necessary The product thus obtained shows the same regularity in analytical values as that obtained by atm. oxidation Purification of cephalin with HCl by the Erankel and Neubauer procedure (*C. A.* 5, 715) leads to an ash free material, but in only 50% yield The main losses are due to an EtOH sol product which does not differ from the EtOH-insol cephalin with respect to I and neutralization no but gives quite different analytical values By repptn of purified cephalin a certain sepn of the complex can be effected When $Et_2O$-EtOH is used, the component with lower I and higher neutralization no may be centrifuged out, leaving the other component in soln Repptns in the presence of $H_2O$ lead invariably to products with lower neutralization and higher I no.

A. W. Dox

**Phosphatides. II. The highly unsaturated fatty acids of the phosphatides from various organs.** E Klenk and O v Schoenebeck *Z. physiol. Chem.* 194, 191–2 (1931), cf *C. A.* 25, 120.—The highly unsatd $C_{22}$ acid recently found in the cephalin fraction of brain occurs also in the lecithin fraction of brain and in the phosphatides of beef liver The sepn. of the highly unsatd. acids from the total fatty acids was accomplished by the Li salt-MeAc method of Tsujimoto (*C. A.* 15, 1227). The fatty acids were converted into the Me esters and fractionated in a high vacuum. The highest boiling fractions were in both cases the most unsatd. Hydrogenation and sapon. yielded behenic acid. Bromination of the unsatd. acids from liver phosphatides gave an $Et_2O$-insol product, the analysis of which was in fair agreement with $C_{22}H_{30}Br_8O_2$ Removal of Br and subsequent hydrogenation, however, converted it into a mixt. contg. behenic acid, but no arachidonic acid could be identified The highly unsatd $C_{22}$ acid appears to be of wide distribution in phosphatides of animal origin

A. W. Dox

**Chemistry of enzymes, hormones and vitamins.** FELIX HAUROWITZ. *Pharm. Presse*, Wiss.-prakt. Heft 1930, 161–5.—A review of the chief members of these 3 groups. W O E

**Amylase protecting substances. IV. Protective action of infusions of yeast, malt and barley.** HIROICHI NAKAMURA. *J. Soc. Chem. Ind., Japan* 34, Suppl. binding 16–7(1931), cf. *C. A.* 25, 1270.—Yeast juice, prepd. by plasmolyzing yeast with PhMe, then autolyzing with $H_2O$ 24 hrs. and filtering, was found to have very little protective action against the inactivation of takadiastase by heat at 50°. Infusions of malt and barley, prepd. cold, then boiled and filtered, had a marked protective action but no activating action. V. Isolation of the protective substances from proteases. *Ibid* 18–9.—Solns. of papain, papayotin and pepsin, which had been found to have a protective action, were made alk. to *p*H 11.5 with NaOH and $KH_2PO_4$ and allowed to stand. The clear solns. were then found to have no protective action, but the pptd. material was 10–30 times as active as the original protease. VI. Isolation of the protective substances from peptones and malt and yeast infusions. *Ibid* 19–20.—Yeast, malt and peptone solns., treated as in part V, gave similar results, the pptd. material having a very powerful protective action. VII. The identification of the chemically pure protective substances. *Ibid* 21–2.—The ash from the ppts. obtained in V and VI was also found to have a most powerful protective action. Expts. showed the action is due entirely to the Ca content. Conclusion: Amylase is an org. Ca compd. and its decrease in amylolytic power when heated is due to loss of combined Ca. L. E. G.

**A unit of expression for the hemolytic index.** A. WEIL AND D. M. LIPSCHÜTZ. *Arch. ges. Physiol. (Pflügers)* 226, 239–42(1930).—Sapotoxin is suggested as a standard for expressing hemolytic activity. The hemolytic index is expressed as the no. of mg. of sapotoxin whose activity is equiv. to 100 cc. of the soln. in question. A. G.

**The reversibility of coupled reactions in biological systems and the second law of thermodynamics.** DEAN BURK. *J. Phys. Chem.* 35, 432–55(1931).—The object of this paper is to indicate the extent to which the applicability of the second law of thermodynamics to like processes has so far received direct exptl. support. In general exit. data do not exist. Two types of free-energy efficiencies are distinguished viz., "machine free-energy efficiency" in which the work done in a given reaction is compared to the total free energy dissipated by the organisms in all of their life processes, and "second law free-energy efficiency," in which the work done in a reaction is compared to the free energy dissipated by that reaction alone. Obviously, the 2 may differ greatly and it is the object to det. if the latter may ever exceed 100%. The reversibility of autotrophic reduction of $CO_2$ by $H_2$ in the case of *B. pycnoticus* (Ruhland *Jahrbuch wiss. Bot.* 63, 321 (1924)) is practically perfect, when the extraneous energy consumed in the metabolic processes of the organisms is taken into account. On the other hand the second-law efficiencies calcd. from available data on autotrophic $CH_4$ oxidation and heterotrophic nitrate reduction are low. Second law efficiency calcns. may be useful in detecting impossible improbable or incomplete exptl. biological data. H. F. J.

**The specificity of animal proteases. XX. Mechanism of enzymic dipeptide cleavage.** ARNOLD K. BALLS AND FRANZ KÖHLER. *Ber.* 64B, 34–45(1931), cf. *C. A.* 20, 3702; 21, 2910; 23, 4235; 24, 3522.—Erepsin (I) from the intestines can be sepd. into 2 components, a polypeptidase (II) and a dipeptidase (III), proving the presence in the ereptic enzyme-complex of an independent dipeptide splitting enzyme. I may be used to det. the action of III in cases where the substrate is not attacked by II. The purpose of the expts. of B. and K. was to det. the reaction mechanism of the enzymic dipeptide cleavage by the study of a no. of "aniline peptides," many of which undergo cleavage by III. Because their constitution and properties may be varied by introducing different substituents, they are valuable for the study of the mechanism of peptide hydrolysis. The enzyme apparently attacks the peptide first at the $NH_2$ group, and then at the NH group. The prepn. of I, II, III and the substrates used is described by B. and K. in detail. The substrates used were the following glycyl derivs.: aniline (IV), *o*-toluidine, *p*-toluidine (V), *o*-aminobenzoic acid (VI), *m*-aminobenzoic acid, *p*-aminobenzoic acid (VII), *p*-nitroaniline (VIII), *p*-chloroaniline and *p*-nitroaniline-*o*-carboxylic acid (IX). Since VII, VIII and IX undergo cleavage by I, but IV, V and VI do not, B. and K. conclude that the substituent group (COOH or $NH_2$) affects the acid character of the peptide linkage and thus of the NH group. Interference with the action of III by such substances as chloroacetyltyrosine and aceturic acid supports the theory that the NH group is the 2nd point of attachment for the enzyme. The cause of the interference is the attachment of the enzyme to the NH group. The cleavage of ordinary di- and polypeptides by I, II and III was also studied. Cleavage of all of the higher glycine peptides was difficult. Apparently the presence of several

glycine residues forms an unfavorable configuration for the action of II. XXI. The causes of steric selection by enzymes. ERNST WALDSCHMIDT-LEITZ AND ARNOLD K. BALLS *Ibid* 45–8.—Of the 3 isomeric chloroacetylaminobenzoic acids only the *m*-compd undergoes cleavage by the carboxy polypeptidase from hog pancreas, indicating that only in the *m* acid does the spatial arrangement of the substituents permit the reaction of the enzyme with COOH LOUISE KELLEY

Experiments on denatured proteins. HENRY F HOLDEN AND MAVIS FREEMAN *Australian J Exptl Biol Med Sci* 7, 13–26(1930).—Denaturization of proteins causes an increase in $[\alpha]$ which varies with the degree of change, the treatment producing the change and its subsequent history. Ox globin, ox euglobulin, horse globin, sheep euglobulin and hen egg albumin were studied, giving the following values, resp., for native and denatured proteins, $[\alpha]_{578}$, —13° (water soln.) and —72° (NaOH soln.), —44.8° (NaCl) and —67.7 (NaOH), —18° (water) and —71 (NaOH) —46.6° (NaCl) and —88.8° (NaOH), —31.1 (water) and —51.4° (NaOH). The pptn by Hg salts is slight in soln. not near the isoelec. point, on account of a low degree of ionization. The denatured proteins including casein show a higher $[\alpha]$ in acid soln. than in alkali, and when denatured by alc., a lower $[\alpha]$ than when denatured by HCl C G KING

Action of dilute formaldehyde solution on proteins and protein derivatives. MAVIS FREEMAN *Australian J Exptl Biol Med Sci* 7, 117–24(1930).—Proteins and their hydrolytic products were partially (25–70%) pptd. by treatment with 0.5% HCHO at 37° for 10 days. Slight changes in $[\alpha]$ and in soly. were produced, the products being readily sol. in dil. acids and alkalies C G KING

The toxicity of blood which has been frozen. WILLIAM ALEX OSBORNE *Australian J. Exptl Biol Med Sci* 7, 223–8(1930).—Defibrinated dog blood becomes toxic to the donor when frozen and thawed and injected intravenously. Toxicity is thought to be due to a denatured protein C G KING

Rabbit-liver glycogen and its preparation. MELVILLE SAHYUN AND CARL L ALSBERG *J Biol Chem* 89, 33–9(1930). cf. *C A* 23, 4273.—Glycogen can be readily obtained from liver by the use of 3% $CCl_3CO_2H$ to remove the proteins. Thus prepd. it contained between 0.20 and 0.18% of ash. $P_2O_5$ and traces of Ca and Fe were present in the ash. By hydrolysis the purity of this glycogen was shown to be from 96.4 to 99.6%; and the P content calcd. as $P_2O_5$ was 0.032%. Glycogen is readily "denatured" by heating it to 105°; its soln. is considerably less opalescent, it acquires very strong adhesive properties even to smooth glass surfaces and the port-wine color with I changes to pink as it vanishes instead of gradually fading out. A. P. LOTHROP

Neutral-red reaction. V KOFRANYI *J. Morphol Physiol* 49, 45–138(1930).—In living organisms neutral red combines with enzymes wherever they exist in digestive lumina. When cellular vacuolar systems are permeable, enzymes can usually be demonstrated upon the mitochondria. Neutral red serves as an indicator of hydrolysis and synthesis within the cell, it indicates that eggs developing in the ovary show hydrolysis in the early stages and synthesis later. Developing spermatozoa are poorly nourished C. M McCAY

Enzymes. JORGE W HOWARD *Semana méd* (Buenos Aires) 1930, II, 1023–42.—The physiol. and pathol. action of enzymes is discussed and the therapeutic value of organ exts. is emphasized A. E MEYER

Influence of alcohols on the heat coagulation of protein solutions buffered with acetate. TORSTEN TEORELL. *Biochem Z* 229, 1–15(1930).—Heat coagulation of protein occurs only within the $p_H$ range of 4.7 to 6.2 in the presence or absence of alc. Alcs. exert an increasing inhibitory effect on the heat coagulation in the order. MeOH < EtOH < PrOH in the presence of an acetate buffer. The inhibition increases with the concn. of the buffer. At an alc. concn. of less than 15–20% the coagulum becomes partially or completely dissolved on heating, to be repptd. on cooling. Pure serum albumin or native plasma from the horse or man is similarly affected by the alc.-acetate mixt., but the coagulation of the ovalbumin is not thus affected. It is pointed out that the use of alc. in tests for the Bence-Jones protein may cause erroneous conclusions S. MORGULIS

The multiple nature of the enzyme carrier in polypeptide hydrolysis by yeast maceration juice. Preparation of protein-free eluates which act exclusively on polypeptides. A FODOR AND L FRANKENTHAL *Biochem Z* 229, 16–27(1930).—The kaolin adsorbate of yeast maceration juice can be leached out with an absolutely neutral soln. of glycine which yields an enzyme prepn. practically free from protein; this prepn. exerts a hydrolytic action on peptone, polypeptides and dipeptides. S M.

Hydrolysis of proline polypeptides by yeast and pancreas extracts, also by pancreatin preparations. A. FODOR, MAX FRANKEL AND S KUK. *Biochem. Z.* 229, 28–

40(1930).—The water insol residue of pancreatin prepns which has a specific hydrolytic effect on dipeptides also hydrolyzes prolylalanine. The water-sol fraction which hydrolyzes dipeptides only after prolonged autolysis has no effect at first on the prolylalanine, but after 140 hrs. hydrolyzes 29%. Fresh pancreas maceration juice hydrolyzes prolylalanine, this action being increased by dialysis. The yeast maceration juice produces this hydrolysis very effectively. S. Morgulis

The effect of proteases on urease preparations. Joseph Zakowski *Biochem. Z.* 229, 41–84(1930).—*The destruction of the Jack bean urease by papain and trypsin at 30° and 40° and a definite $p_H$ has been studied.* At 40° with a ratio of proteases to urease 6:1 as much as 70–80% of the enzyme was destroyed in 7 hrs. Even with a papain urease mixt. in the proportion of 1:6 a loss of 52% of activity was observed under the same conditions after 7 hrs. However, it is not concluded from these observations that this indicates simply a protein hydrolysis either of the urease itself or of its carrier. The expts. exclude the possibility that the inactivation of the urease is due to a liberation by the proteases of inhibiting substances. The fact that factors which activate papain and trypsin (HCN and enterokinase) also increase the destructive effect on the urease argues in favor of the enzymic nature of the inactivating process. Erepsin had no influence on the inactivation of the urease prepn. The inactivation by the various buffers employed in these expts. was practically a linear function of time during 7 hrs. S. Morgulis

Effect of irradiation by means of the quartz lamps in vitro on the protein fractions of the blood plasma. Ladislaus Kostyál. *Biochem. Z.* 229, 100–8(1930).—The different protein colloids of blood manifest different sensitivities toward irradiation by quartz lamps under different disease conditions, the effect being much greater on plasma with stable than on plasma with labile proteins. The influence of this irradiation is min. on the blood plasma from normal individuals. The accelerating effect on the rate of red cell sedimentation is produced only over a limited range, beyond which the rate tends to be retarded. S. Morgulis

Some comments on the paper by Genesius on the metabolic effect of the Gurwich-rays. A. Gurvitch *Biochem. Z.* 229, 109–14(1930).—Some important bearings of Genesius' work (*C. A.* 24, 5795) are emphasized. S. Morgulis

Studies on glycogenolysis. H. K. Barrenscheen, Johannes Pany and Robert Berger. *Biochem. Z.* 229, 196–215(1930).—Postmortem glycogenolysis of the liver for the first 2–4 hrs. does not proceed in a linear but in a step like fashion, the splitting off of $H_3PO_4$ takes place in the same way, the curves of both processes coinciding so as to suggest that the 2 reactions are coupled. As source of the new inorg. phosphate there is not only the pyrophosphate fraction which is easily hydrolyzable by acid, but also the difficultly hydrolyzable fraction of the acid sol. org. phosphate. Neither the addn. of insulin *in vitro* nor preliminary insulin intoxication affects the glycogenolysis or the hydrolysis of $H_3PO_4$. A hexosemonophosphate ester is formed during glycogenolysis evidently at the periods when the sugar formation and hydrolysis of phosphate show a diminution. The Ba salt of the hexosemonophosphate obtained during the glycogenolysis of rabbit or dog liver is the same and corresponds to the biological or artificial hexosemonophosphate esters in reducing power and optical activity. S. Morgulis

A protein-ethereal sulfate from the gastric mucosa. Hermann Mathis. *Biochem. Z.* 229, 263–4(1930). cf. *C. A.* 24, 4548.—Protein-ethereal sulfate compds. have recently been isolated from the anterior hypophysis, liver and gastric mucosa. The protein moiety of the hypophysis compd. is a globulin and of its 9 S atoms 7 are in the form of $H_2SO_4$ and none is present as cystine. The compd. prepd. from liver is an acid and has no globulin properties, and of its 3 S atoms 2 are in the form of $H_2SO_4$, but the third S atom is not in the form of cystine. Insulin, on the contrary, contains no $H_2SO_4$ but much cystine. The gastric mucosa prepn. has the following characteristics. It contains only 1.67–1.77% S (liver prepn. 7.49–7.68% S, anterior hypophysis prepn. 2.16–2.49% S) of which 1.56% is hydrolyzable by HCl, so that the S is entirely in the form of the protein-ethereal sulfate combination. S. Morgulis

Enzymes and light. XVII. The influence of the visible and ultra-violet light on the succinodehydrogenase of horse muscle. Ludwig Pincussen and Wadim Roman. *Biochem. Z.* 229, 281–90(1930). cf. *C. A.* 24, 1130.—The effect of succinodehydrogenase in the reduction oxidation system: succinic acid-fumaric acid is greatest at $p_H$ 6.9, with a second max. at $p_H$ 7.7. The enzyme is more stable in an acid medium than in an alk. medium. Illuminating succinodehydrogenase for 15 min. with ultra-violet light causes a strong injury to the enzyme within the range of $p_H$ 6.0 to 8.0, but not so much on the acid side. The enzyme is also injured by illuminating for 1 hr. with ordinary light, and it is claimed that the injury is greatest at the $p_H$ of max. ac-

tivity of the enzyme Apparently exposure to the light only for 30 min stimulates the enzyme's activity S Morgulis

Equilibrium between egg albumin, calcium and potassium salts. M Giuffré *Biochem Z* 229, 296–310(1930).—Egg albumin freed by electroultrafiltration of electrolytes binds increasing amts of $CaCl_2$, $CaSO_4$, $Ca(CSN)_2$ and of KCl from solns of increasing concn No satn *is attained up to salt concns of 0.05 N or 500 milli*equivs per 100 g albumin At higher concns the behavior is irregular Although the curves obtained for 2 different samples of similarly purified egg albumin are of the same type, the abs values for the 2 are different Albumin binds Ca from $CaCl_2$ solns. of weak or medium concn more than K from KCl solns, but although in weak concn the difference may be 100%, the 2 values tend to come close together as the concns increase In the presence of both $CaCl_2$ and KCl the 2 are bound Ca from $CaSO_4$ is bound 10% more and from $Ca(CSN)_2$ 25% less than from $CaCl_2$ S Morgulis

The postmortem lactic acid formation in the liver. Egon Fenz and Hans Popper *Biochem Z* 229, 397–426(1930).—The lactic acid formed and diffused from liver pulp *upon standing 2 hrs was detd by the colorimetric method of Dische-Laszlo*, with hydroquinone and $H_2SO_4$ as reagents The lactic acid of the guinea pig liver increases in the first 7 hrs up to 400 mg % but later the increase is less marked In the human liver macerated in Ringer $NaHCO_3$ soln and kept in an incubator preserved with $CHCl_3$ there was no further increase in lactic acid after 7 hrs and therefore the livers obtained 8 hrs after death already attained the max lactic acid production In some 60 cadavers the av amt of lactic acid was about 0.30% (0.136 to 0.574%), and since among these were persons with diabetes, cirrhosis, acute yellow atrophy and various endocrine disturbances there was thus no evidence of any dependence upon the total glucide content of the liver. Also in livers which 10–33 hrs after death remained for many hrs without $CHCl_3$ at 37° either in $NaHCO_3$ or in $Na_2HPO_4$, even with the addn of glucose, there was no further increase in the lactic acid Expts on the livers from guinea pigs show that shortly after death the lactic acid formation is considerable, becoming somewhat less after 2 hrs and very much less after 4 hrs, almost ceasing after 7 hrs There was no difference whether $NaHCO_3$ or $Na_2HPO_4$ was used in the Ringer soln Nor could the addn of glucose, levulose or of glycogen cause any alteration, and only occasionally was there an irregular increase in the lactic acid upon the addn of hexose-diphosphate *Otherwise the max value of 500 mg % was never exceeded In animals* with a particularly low glycogen content of the liver the max formation of lactic acid fell below this value. Similar results were obtained in studies on the kidneys The results of the lactic acid formation in practically all organs of 2 human cadavers and of 2 guinea pigs are tabulated S Morgulis

The cleavage of tyrosine and tryptophan from casein by papain activated by hydrocyanic acid. Theodor Leipert and Irmgard Häfner *Biochem Z* 229, 427–32 *(1930)*.—*Only 47% of the total N of casein is hydrolyzed as amino N in 12 days' digestion* by papain-HCN Tyrosine is set free entirely in proportion to the total amino acid cleavage, and tryptophan is only more or less proportional to the total hydrolysis Under the combined action of papain-HCN and trypsin for a week 71% of the total N is hydrolyzed as amino N, but the hydrolysis of tyrosine and tryptophan by the 2 enzymes together seems to be unaffected S Morgulis

Studies on tobacco enzymes. Carl Neuberg and Maria Kobel. *Biochem Z* 229, 455–63(1930).—In the present day methods of prepn roof-dried tobacco is passed through a flume with a gradually rising temp, for the purposes of removing the $H_2O$ In the zone of max heat the temp reaches 100° The entire passage occupies 60 min It was found that the tobacco enzymes do not lose their activity *in this process. The* following enzymes were studied amylase, invertase, phosphatase, pectase, glycolase and ketonaldehydemutase. S Morgulis

A model for studying pectase. Carl Neuberg and Clara Ostendorf *Biochem. Z.* 229, 464–6(1930).—The action of pectase may be represented as follows: Under the influence of this hydrolyzing enzyme upon probably the acid Me ester of a complex polybasic glucidic acid (pectin), the MeOH is split off while the poorly sol. Ca and Mg salts of the *pectic acid form a gelatinous ppt. For better investigation* of the action of the pectase a substrate of definite chem composition, namely, the Ca salt of methyl-*d* tartaric acid, is substituted for the pectin whose compn is highly variable This substance under the influence of pectase gives MeOH and the sparingly sol Ca tartrate. S Morgulis

Studies in comparative biochemistry. VII. Chemistry of the special saké yeast. Jun-Ichiro Sagara *J. Biochem.* (Japan) 12, 459–71(1930), cf *C. A.* 20, 3745.—In 2 strains *of saké yeast there was a close chem. resemblance both in the inorg. and*

org compn No lecithin was found but a phosphatide was bound, which because of its high N content must be either a tri- or diamino-monophosphatide The presence of a pentose was proved, and a substance related to bioses was isolated in pure cryst form. Arginine, histidine, lysine, phenylalanine, proline and valine were identified, the phenyl alanine and proline being the predominant components of the protein The nucleic acids of both strains are distinguished by their low N and P contents Both types of yeast contain amylase, esterase, glycerophosphatase, pepsin and trypsin. Data are also recorded on the inorg compn S. Morgulis

The properties of the biochemical constituents, the proteins in particular, in anhydrous solution. Jean Loiseleur *Compt rend* 191, 1477–9(1930).—In aliphatic solvents, biochemical substances form true, not colloidal, solns They manifest certain chem. properties: (1) they are not frothy, their viscosity is less than aq solns of the same concn, they are optically clear, not pptd by a formic soln of the ions Na, K, Mg, Fe, Cr or by tannin, MeOH, $CHCl_3$, pyridine or cyclohexanol (2) Addn of water to an aliphatic soln of protein forms a colloidal dispersion which shows a Tyndall effect, the micellar state, adsorption, and flocculation (3) Casein and keratin, in aceto-formic soln and in presence of HCl and $HNO_3$, form a nitration deriv having colloidal properties N M Naylor

Growth factor in plants. Hans v Euler, Margareta Rydbom and Harry Hellström *Svensk. Kem Tids* 42, 277–81(1930)(in German).—Petr ether exts. of sprouts examd spectrographically showed bands at 533, 497, 447 and 424 Distd at 150° and 0 02 mm Hg they gave bands at 256 and 325 A distillate from a carotenoid from swordfish liver had a band at 325 and Moore reports 328 for a rat liver fraction (*C. A.* 24, 5343) A R Ross

Membrane phenomena in living matter, equilibrium or steady state. A V. Hill. *Trans. Faraday Soc* 26, 607–78(1930).—The difference in f. p between the white and yolk of hen's eggs, observed by Straub (*C A* 23, 3482), is confirmed. Since it persists in an atm of H the oxidative mechanism at the membrane postulated by Straub for opposing the osmotic pressure cannot occur The p d between inside and outside of muscle or nerve is also far greater than can be accounted for on the Donnan equil basis The widespread occurrence of such steady states, maintained by the expendi ture of energy, is held to indicate their biol importance. K. V Thimann

The state of water in colloidal and living systems. Ross Aiken Gortner *Trans Faraday Soc* 26, 678–704(1930).—The work of Newton and Gortner (*C A* 18, 2543 3205) and that of Robinson (*C A* 23, 910, 1180) on winter hardiness are reviewed in relation to the general problem of "bound" water in the cell, and are compared to similar phenomena with inorg gels and proteins A discussion is also given K V Thimann

The $p_H$-stability regions of the proteins. T Svedberg *Trans Faraday Soc* 26, 740–4(1930). cf *C A* 25, 530.—Electrophoresis measurements show that the isoelec pt. of proteins is not identical with the point of min acid and alkali binding, but is identical with the soly min. The method can be used to sep mixts of proteins, since mutual neutralization does not occur The isoelec pts detd in 0 02 *N* NaOAc buffer are ovalbumin 4 55, serum albumin 4 88, R phycoerythrin 4 25, C phycocyan 4 76, hemocyanin (*Helix*) 5 05, Bence Jones protein 5.20 A summary of the results of sedimentation detns is given K V Thimann

The solubility of proteins. E W J Mardles *Trans Faraday Soc* 26, 750–60 (1930).—The soly in water of Coignet's gelatin varies with the amt. of the solid phase, and is greater when detd by cooling sols than by soaking gelatin in cold water It increases sharply at 26°, is diminished by washing, and is increased by the presence of HOAc $HCONH_2$, urea and other org compds It is concluded that gelatin is heterogeneous (cf Schryver and Thimann, *C A* 22, 968), from the corresponding behavior of blood albumin a similar conclusion is drawn. K V Thimann

Biological significance of the physical state of lyophilic colloids F F Nord *Trans Faraday Soc* 26, 760–8(1930).—A summary of the work (cf *C A.* 22, 4544, 23, 5475) in which increase of zymase activity on treatment with $C_2H_2$ and $C_2H_4$ is correlated with increase of surface tension and decrease in viscosity of cell free zymase solns Corresponding surface tension and viscosity phenomena with solns of albu min or Na oleate indicate surface adsorption of these gases, and also of $N_2O$, on col loids, leading to protective action and hence increase of enzymic activity K. V. T

Phase rule equilibria of horse serum globulin. James W McBain and Eloise Jameson *Trans Faraday Soc* 26, 768–9(1930).—The phase diagram for globulin prepd by Svedberg's method water and $Am_2SO_4$ at $p_H$ 6 0 at 40° is given "It appears that globulin solns, euglobulin and pseudoglobulin are but 3 phase of a system

of the same mother substance, dehydrated globulin—solns of globulin being the ordinary isotropic soln., while euglobulin and pseudoglobulin are liquid cryst. phases, or a liquid and glass which are slightly doubly refracting." K. V. THIMANN

The structure, behavior and physiological characteristics of vertebrate cells cultivated in vitro. H. B. FELL AND L. N. WILLMER. *Trans. Faraday Soc.* 26, 772-9 (1930).—A general lecture on the technic of tissue cultures and their physiol. behavior. K. V. THIMANN

Surface structure in the integration of cell activity. RUDOLPH A. PETERS. *Trans. Faraday Soc.* 26, 797-807(1930).—The importance of interface reactions in detg. the activities of the cell is discussed. The interfacial tensions of palmitic, capric and erucic acids in benzene solns. against phosphate buffer show a sharp fall at about $p_H$ 6 continuing to $p_H$ 9.5. Adsorption of weak acids and bases on purified charcoal follows closely the dissocn. curves, the undissocd. mol. being the most adsorbed (Phelps and Peters, *C. A.* 23, 5080). The pptn. of phosphotungstates of histamine and other bases is also a function of $p_H$, histamine being pptd. sharply at $p_H$ 7.8 and on the acid side. The presence or absence of a single H ion is called to be of considerable importance in detg. the reactions occurring in bacterial cells. A theory of mosaic cell structure, involving mobile chains of liquid crystals a few mols. thick, and orientating all substances in the cell, is developed. K. V. THIMANN

The isoelectric point of cells and tissues. HANS PFEIFFER. *Trans. Faraday Soc.* 26, 822-36(1930). cf. *Protoplasma* 11, 85(1930). *Biol. Reviews* 4, 1-40(1929). and *C. A.* 23, 3725. K. V. THIMANN

Decrease in the activity of β-glucosidase of emulsin of almonds in the course of successive syntheses of β-methylglucoside. M. BRIDEL AND N. JOANID. *J. pharm. chim.* [8], 12, 337-9(1930).—A mixt. of 3 g. emulsin and 150 g. dextrose in 500 cc. of 70% MeOH was continuously rotated for 8 days, *i. e.*, until the optical rotation of the soln. became const. (42°40'). The emulsin was then collected, washed with 90% alc. and dried *in vacuo*. Only 2 g. was obtained. The process was repeated 6 times with the recovered quantity of emulsin and 50 times its wt. of dextrose in each case. The following wts. of emulsin were recovered: 1.2, 1.2, 1.0, 1.0, 1.0, 1.0 g. The 7th synthesis required 10 days to reach equil., and in each of the 7 cases, about 77% of the dextrose became combined. *During equal periods of time in the 7 expts., the activity of β-glucosidase steadily diminished. Thus, measured by time, emulsin lost more than half of its activity. Nevertheless, having acted in these expts. for 3 months on 350 times its wt. of dextrose to cause 77% of it to form β methylglucoside, it was still active enough to complete the last synthesis in 10 days.* Mech. rotation shortened the time of these expts. materially. Also in *Bull. soc. chim. biol.* 12, 931-3(1930). S. WALDBOTT

Hydrolysis by emulsin of 2 glucosides not considered hydrolyzable by this enzyme: asebotoside (asebotin) and phlorhizoside(phlorhizin). M. BRIDEL. *J. pharm. chim.* [8], 12, 385-95(1930).—Contrary to the accepted belief, asebotoside (cf. Bourquelot and Fichtenholz, *C. A.*, 6, 1207) and phlorhizoside (cf. Johnson and Robertson, *C. A.*, 24, 1805), which are *l* rotatory glucosides, are hydrolyzable by emulsin of almonds, yielding in each case *d* glucose and a nonglucidic product insol. in water. Both glucosides *therefore belong to the class of β glucosides, i. e., they are hydrolyzable by β glucosidase.* Twenty-five references are given. Also in *Bull. soc. chim. biol.* 12, 921-30 (1930). S. WALDBOTT

The denaturation of albumin (BANCROFT, RUTZLER) 2. The influence of the wave length of the exciting rays *on the fluorescent spectrum of etioporphyrin* (ALTARONI, DUERR) 3. *Denaturing of protein of soy bean by alcoholic extraction* (OKANO, *et al.*) 27. The influence of light, CO and quinone on the methylene blue reaction (TAMIYA, *et al.*) 10. The bile acids (WIELAND, *et al.*) 10.

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## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The antineuritic vitamin (preliminary communication). A. G. VAN VEEN. *Rec. trav. chim.* 49, 1178-9(1930).—According to the method of Jansen and Donath (*Proc. Acad. Sci. Amsterdam* 29, 1390(1926); cf. *C. A.* 20, 2005) a product which contains about

20% of the vitamin may be easily obtained, the further purification being, however, very difficult and giving only 50–100 mg of the pure vitamin from 100 kg rice polishings after a few months' labor. Attempts have been made by Guha and Drummond (*C. A.* 24, 1140) and by Williams, Waterman and Gurin (*C. A.* 24, 4535) to obtain larger yields but without success the technic of Jansen and Donath for the purification of the 20% product had to be modified profoundly in order to get higher yields. After having studied the products which accompany the vitamin in the 20% product, the author has now succeeded in getting 140 mg of the cryst vitamin from 75 kg rice polishings, this product was, however, not pure, but could be purified by recrystn The 20% product may be freed from several physiologically active compds by treatment with acid chlorides or, even better, with sulfonyl chlorides, which leave the vitamin itself unchanged, and this may be purified further with the double salts of Pt or Cd chloride. It was found also that the Pauly reaction with diazotized sulfanilic acid is fainter the purer the vitamin This fact was confirmed by Jansen (private communication) C F VAN DUIN

An improved design of the Van Slyke apparatus for the estimation of amino nitrogen SIDNEY J FOLLEY *Biochem J* 24, 961–4(1930) BENJAMIN HARROW

*An apparatus for rotating serum-antigen mixtures in the Kline test for syphilis* PHILIP L VARNEY *Am J Pub Health* 21, 65–9(1931).—An electrically driven device is described, which mechanically mixes by rotation the serum-antigen mixt As many as 6 slides (2" × 3") are accommodated at one time. The rotary speed of the app has been arbitrarily set at 120 r p m through an arc of $^1/_4$" radius The app may be connected to an elec timing clock, thus relieving the technician of the necessity for timing the period of rotation resulting in a greater uniformity of results and a saving in time necessary to perform the tests J. A KENNEDY

Colorimetric method for determining silicon. EARL J KING *Bull soc chim biol* 12, 903–9(1930), cf *C A* 23, 405, 25, 662.—The phosphate error in Isaacs' method (*C A* 18, 3199) is pointed out and a modification proposed to avoid it C G K

The estimation of copper in organs. EMILE CHERBULIEZ AND STEFAN ANSBACHER *Arch Path Anat* (Virchow's) 278, 365–71(1930) See *C A* 24, 2402 F R L

A new microcolorimeter. A G SHEPTEL *J Lab Clin Med* 15, 1016–8(1930) E R MAIN

A graduated test tube colorimeter ARTHUR T BRICE, JR *J Lab Clin Med* 15, 1018–22(1930) E R MAIN

Microdetermination of urea by Nicloux and Welter's method (GUILLEMET, GOLAZ) 7 *An improved pipet manipulator* (DUFF) 1 *A new high-efficiency glass condenser* (CRANDALL) 1

Handbuch der biologischen Arbeitsmethoden. Edited by EMIL ABDERHALDEN Abt 1 Chem Methoden Tl 2 Allgemeine chem Methoden Hälfte 2 H 6 (Lfg 336) FRANZ BACHER Die Verseifung Pp 2585–2878 Reviewed in *J Am Chem Soc* 53, 818(1931) M 16 H 7 (Lfg 339) HANS HORSTERS AND HELENE HORSTERS Neuere Synthesen biologisch wichtiger Pyridinkörper. Pp 2879–2970 M 5 Abt 3 Physikal -chem Methoden Tl A Allg u spez Methoden zur Untersuchung d Verhaltens geloster Stoffe H 10 (Lfg 342) GÜNTHER RIENÄCKER *Potentiometrische Mikrotitration.* FRANZ LEUTHARDT Pufferung und Puffersysteme ROBERT BRINKMAN Registrierung d. Wasserstoffionenkonzentration im strömenden Blut. HANS FISCHER AND OTTO REHMANN Die Bestimmung von Gas- und Dampfdrucken Pp 1913–2201 M 17 Abt 4 Angewandte chem und physikal Methoden. Tl 14 Untersuchung d Nahrungs und Genussmittel H 3 (Lfg 340) WILHELM PLÜCKER Allgemeine Methoden zur Untersuchung der Nahrungs- und Genussmittel Pp 721 1034 M 17 *Cf C A* 24, 5391 Berlin and Vienna Urban & Schwarzenberg

Polarimeter for testing urine OPTISCH-MECHANISCHE FABRIK STEINDORFF & CO Ger 485 094, Jan 21, 1928

## C—BACTERIOLOGY

CHARLES B MORREY

Vital conditions of ferruginous bacteria. (MLLE.) I TUROWSKA *Bull intern acad polonaise* 1929B I, 255–62.—Fe bacteria are found in certain wells and other waters of Poland in which the Fe content is usually greater than 2 mg per l and the reaction is between *p*H 5 88 and 7 60 Large concns of salts appear to be unfavorable The bacteria are able to withstand temps. down to 0°. B C A

Disinfecting properties of chloropicrin. A. Sworobowicz. *Z. Pflanzenkrankh.* 41, 109–22(1931). Chloropicrin has a high penetrating power for porous materials. Its disinfecting power at 30° is double that at 4°. Spore-forming bacteria are very resistant. B. C. A.

Studies on the Coccaceae. XVI. Genus Leuconostoc. G. J. Hucker and Carl S. Pederson. N. Y. Agr. Expt. Sta., Tech. Bull. 167, 3–50(1930); cf. C. A. 23, 620. A bacteriological study is made of 166 strains of low acid producing types of streptococci (*Leuconostoc*) from dairy sugar solns. fermenting vegetables and from milk and milk products. All members of the genus *Leuconostoc* produce approx. 45% *l*-lactic acid from glucose, 30% $CO_2$ and 25% of volatile products, including AcOH and EtOH. In addn. the members of this group produce mannitol from fructose and a levulan or dextran from sucrose. In morphology, the genus *Leuconostoc* lies intermediate between the streptococci and the lactobacilli. Secondary characters used for recognition of species within the genus are the fermentations of pentoses and sucrose. Three species are well defined. *L. mesenteroides* ferments pentoses (arabinose or xylose) and sucrose, produces slime in sugar solns. and is generally found in fermenting vegetable material and in sugar solns. *L. dextranicum* ferments sucrose but not pentoses, produces a moderate amt. of slime in sugar solns. and may be associated with either vegetable or with dairy products. *L. citrovorum* fails to ferment either sucrose or the pentoses, produces no slime in sugar solns. and is generally associated with milk or milk products. C. R. Fellers.

Staining bacterial flagella. R. P. Lavrentiev. *Arch. Biol.* 41, 273–7(1931). A modified Zettnow technic is preferred. C. R. Fellers.

The physiology of the acetic acid fermentation. I. The importance of cytochrome in the physiology of cell respiration. Hikoshi Tamiya and Kiyoshi Tanaka. *Acta Phytochim.* 5, 167–211(1930).—The AcOH fermentation with *Acetobacter pasteurianus* was studied in a special app. It consists of 2 cylinders carefully ground into each other providing a piston-like air-tight closure. The outside cylinder is provided with an opening and a two-way stopcock. A series of 10 such cylinders is gently shaken on a machine. By this arrangement samples of both the gas and the fermentation must can be taken. It was found that quinone can also be used as a H acceptor for the AcOH fermentation instead of O. The extent of the fermentation is largely independent of the amts. of O. CO does not influence the quinone fermentation while it hinders noticeably the $O_2$ fermentation. In the presence of Light this effect is markedly ruled out. The independent reaction of the AcOH bacterium is also hindered by CO more so in the dark than in the Light. Toluene was found to retard strongly the $O_2$ fermentation even when the $O_2$ amts. were large; the quinone and methylene blue fermentation, however, is not influenced. While the independent reaction of the AcOH bacterium as well as yeast is also retarded by toluene, *Lactase* oxidase seems to be indifferent to its action. It furthermore was shown that the normal functioning of cytochrome is disturbed by the addn. of toluene and quinone, but is resistant toward methylene blue. The phenomena encountered are explained by assuming that cytochrome plays an important rôle in the $O_2$ fermentation of the AcOH bacterium and the normal $O_2$ respiration. Cytochrome is the "$O_2$ pressure regulator." The equation $D' = K' C_A$ ($D'$ = extent of fermentation, $K'$ = activity of the oxidizing enzyme system, $C_A$ = concn. of the acceptor substance present on the surface of the enzyme) is given and the process discussed theoretically. The expil. findings seem to agree with the theory of K. Shibata and H. Tamiya (*C. A.* 24, 3333). L. G. F.

## D—BOTANY

THOMAS G. PHILLIPS

Picroside of Black willow bark. M. Bridel and J. Rabaté. *Bull. sci. pharmacol.* 38, 332–41(1930).—The extn. of the glucoside (see *C. A.* 24, 4070) is described. B. C. A.

The action of radium on the germination of seeds. G. Meissonnier and E. Varenne. *Ann. agron. Louvain* 12, 77–88(1930); cf. *C. A.* 24, 3333.—A variety of seeds (cereals such as oats and corn; legumes such as peas, beans, soy) were exposed to the action of the same quantity of Ra at the same distance for 5 min., 30 min. and 3 hrs. The seeds were then planted and the relative growth was noted. Five min. is enough to stimulate growth somewhat; 30 min. has the max. effect, while with 3 hrs., growth is retarded. If ½ the amt. of Ra was used, 5 times the length of exposure was necessary. Therefore, Ra has a stimulating effect up to a certain period of exposure, beyond which the seeds are harmed. The stimulation is apparently permanent as seeds planted 2 months

after exposure showed the same accelerated growth as seeds freshly exposed for the same period of time. A. W. CONTIERI

Bibliography of Aspergillus, 1729 to 1928. HIROSHI TAMIYA AND SHINKICHI MORITA *Botanical Mag* (Tokyo) 43, No 506 to 44, No 524, pp 204(1929–30); cf *C. A.* 24, 2496.—A chronological bibliography of 2424 papers dealing with the taxonomy, morphology, physiology and enzymic and chemical activities of *Aspergillus* species, with author index A W. DOX

Researches in ionic interchange between yeast cells and salt solutions. PAUL GENAUD *Ann physiol physicochim biol* 6, 240–330(1930), cf *C A* 25, 316.—When yeast cells are placed in solns of dissociable salts, there is a rapid interchange of cations within a few min between the cellular membrane and the surrounding fluid, *the metal begins to penetrate the cell interior within about 10 min*, complete equil being reached in about 60 min Vital staining by basic dyes is due to just such a cationic interchange between the membrane and the surrounding fluid The *total* cation content is a fairly const quantity, characteristic for a yeast cell under definite conditions of growth. Although the cationic interchange usually concerns equimol quantities, with some metals (*e g*, Ag) there is an enormous absorption not conditioned by a simple interchange, but by other forces (*e g*, *reduction of the* $Ag^+$ *to Ag*) *In cases of simple* diffusion ($K^+$, $NH_4^+$, $Pb^{++}$) the vacuoles contain approx half as much of the absorbed cation as the membrane Dead yeast cells can take up 4 times as much Pb as living cells, probably because of the liberation of free acids Corresponding to their slight $Na^+$ content, the cells are impermeable to $Na^+$, possibly on account of the fact that the hydrated ion cannot pass through the pores of the cell membrane The enormous avidity of the cell for $Ag^+$ is conditioned by the fact that the latter is reduced by an as yet uncharacterized substance in the cell interior There is an extensive bibliography H E

Effect of spiral ringing on solute translocation and the structure of the regenerated tissues of the apple. L. H MACDANIELS AND OTIS F CURTIS Cornell Agr Expt Sta, *Mem* 133, 3–31(1931).—Trunks of young apple trees were ringed by removing narrow strips of tissue extending twice around the trunks spirally In some cases the *phloem* and outer tissues only were removed, but in others the outer annual ring of *xylem* also was cut out The effect of this ringing upon solute translocation was studied by making N analyses and catalase detn on the leaves The structure of the regenerated tissues was studied by sectioning and microscopic examn Lateral transfer of solutes and of food substances is relatively slow, though it does occur when forced by *spiral ringing* *Foods from above and nutrient salts from below tend to move in straight* lines parallel to the long axes of the conducting elements When the trunk is spirally ringed and nitrate is added to the soil, N movement to branches immediately above the end of the spiral is greatly reduced as in a completely ringed trunk, whereas movement to those branches on the side not obstructed by this upper end of the spiral is normal as in the check trees The phloem is the more important tissue involved in translocation, since the effect of cutting the phloem alone was the same as when both xylem and phloem were cut There is a close correlation between high N content and high catalase activity of the leaf tissues of all trees examd The conducting tissues formed by the cambium subsequent to the ringing changed their orientation so that the long axes of the elements were parallel to the spiral After the new tissues were formed, the localized effects of the ringing upon solute transfer to the leaves on the tree top disappeared Cambial growth is made in response to the coming together of the food from the leaves and the nutrients from the roots The position of greatest thickening of the xylem is detd more by the food supply than by the nutrient salts The change in the orientation of the cambium is detd by a change in the direction of the movement of foods and of nutrients, or possibly something of the nature of an elec. polarity may be a factor in the orientation The general conception that lateral conduction of food and of nutrients is slow, that these substances move in straight lines parallel to the long axes of the vascular elements, and that cambial growth is a response to the coming together of the streams of food and nutrients is valuable in explaining *plant response in practical problems of propagation, grafting and pruning* The possible bearing of this conception of greatest growth activity upon the practice of tapping trees for *oleoresin* is discussed C R FELLERS

Growth behavior and maintenance of organic foods in Bahia grass W A. LEUKEL AND J M COLEMAN Fla. Agr Expt. Sta., *Tech Bull* 219, 5–56(1930).—Except for the first year, frequent cuttings yielded more top growth and greater wt than a single cutting at mature growth. The top growth from plants cut frequently retained more of a vegetative growth condition, more uniform % of N and a narrower carbohydrate N ratio than plants grown to maturity The *latter gradually decreased*

in % N, were less vegetative and gradually showed a wide carbohydrate-N relation assocd with increased reproduction Increased vegetative top growth production on plants was assocd with a variation in % and quantity of org foods in the stolons During periods of slow growth such stolons again increased in wt and quantity of reserve foods. Heavy seed production was assocd with some decrease in org foods in stolons but such foods again increased in quantity thereafter The elaboration of org foods by the more horizontal leaf area not removed by cutting appeared to be sufficient for the growing needs of the plant C R FELLERS

Carbohydrate metabolism of Stipa pulchra. ARTHUR W SAMPSON AND EDWARD C MCCARTY *Hilgardia* 5, 61-100(1930).—The growth cycle of *Stipa pulchra* is an orderly process characterized by periodicity in that intervals of rapid growth alternate with intervals of depression in the growth rate An inverse correlation existed between the annual march of carbohydrates and the growth rate Accumulation of foods is related to low or to declining growth velocity and is most active near the close of the annual growth cycle Practically complete accumulation of carbohydrate foods occurred where 43-70% of the total annual herbage yield was produced prior to the peak in the growth rate Clipping or grazing had little effect on the total herbage yield and did not prevent the accumulation of max amts of carbohydrates in the latter part of the growth cycle The herbage of *Stipa pulchra* on the range retains its succulency for 9-10 months C R FELLERS

Experiments in forcing gladioli. F F WEINARD AND S W DECKER Ill Agr Expt Sta., *Bull* 357, 345-61(1930).—The most desirable corms for forcing are those over 1½ in in diam Storage at 5-8° early in the season and at 20° for a short time previous to planting gave the best results *Ethylene dichloride* and *ethylene chlorohydrin* forced the corms into early growth The chem treatment, however, is not yet well standardized and sometimes causes injury C R FELLERS

Some effects of defoliation on fruit spur composition and fruit bud formation in the Oldenburg apple. G F POTTER, H R KRAYBILL, S W WENTWORTH, J T SULLIVAN AND P T BLOOD N H Agr Expt Sta., *Tech Bull* 41, 3-27(1930).—All the blossom buds were removed when in the "pink" stage from 3 heavily blooming Oldenburg apple trees Every second spur on 2 similar trees was deblossomed so that along each branch defloated spurs alternated with those blossoming and setting fruit Four trees from which no blooms were removed served as controls The wt and the compn. of the developing fruits were detd at 10 dates between the period of petal fall and harvest The compn and the fruit bud formation of bearing spurs from the control trees and of defloated spurs from the other 2 treatments were studied The increase in dry wt of the individual fruits followed the usual logarithmic curve of growth, the rate of increase reaching a max in the second and third weeks in July At this period each apple absorbed about 1 mg of N daily and about 300 mg. of carbohydrate Throughout June and July the N content of the bearing spurs was much higher than that of either of the other 2 types, and also was considerably higher on a % basis than the N content of the fruits The starch content of bearing spurs and the adjacent 50% defloated spurs was similar and lower throughout the season than in the 100% defloated spurs on non fruiting trees The sugar starch equil of the fruit was independent of that in the spur to which it was attached, and sugars in the fruit reached a concn several times that in the spur The ash content of the bearing spurs was comparatively low, that of the 2 types of defloated spurs was essentially similar No difference large enough to be detd existed among the 3 types of spurs in content of free reducing substances, sucrose, P, phlorhizin, acid hydrolyzable substances and total carbohydrates The compn and fruit-bud formation of adjoining spurs are materially altered by the presence of blossoming and fruiting spurs No critical evidence is afforded, however, as to the fundamental nutritional causes underlying fruit bud formation C. R. FELLERS

Relation of hydrophilic colloids to hardiness in the apple as shown by the dye absorption test. STUART DUNN N H Agr Expt Sta., *Tech Bull* 44, 3-18(1930).—Results are compared both to general experience and opinion as to the ranking of varieties and to a freezing test by solid $CO_2$ Results of tests for 5 yrs on 1-yr-old twigs gathered each fall for 22 different varieties grown in Iowa and of direct freezing tests for 2 of these yrs show a correlation of about 65% of the varieties compared to field experience, and 55% in 1 series and about 80% in the other on the basis of the parallel freezing test The freezing tests agree with each other to a less extent. A marked consistency in the varieties not in agreement, as shown by a comparison of the various tests, and their variations in position in the different series, suggest that a lack of constancy in hardiness in any variety is assocd with its failure to respond consistently or correctly

to any hardness test. A similar conclusion is drawn from results on N. H. varieties. Similar tests on 12 N. H. varieties show a correlation between the dye test and either of the other standards of from 60 to over 90%. A large no. of freezing tests were made, distributed throughout the dormant season, which offered a wider basis of comparison. A marked trend toward a closer agreement was shown in the series gathered later in the season. Conclusion: The dye absorption test is not sufficiently consistent to be used in a quick, conclusive detn. of hardness in the apple, but possibly in conjunction with other tests such as the freezing test, will serve to differentiate between the hardiness of unknown varieties which are rather const. in that respect, if a sufficient no. of detns. is made. Some other factors besides the hydrophilic colloids are apparently partially responsible for hardiness, at least in lignecous plants like the apple. C. R. F.

Development and ripening of peaches as correlated with physical characteristics, chemical composition and histological structure of the fruit flesh. II. Histology and microchemistry. P. M. Anders, G. T. Nightingale and M. A. Blake. N. J. Agr. Expt. Sta., *Bull.* 507, 3–19(1930); cf. *C. A.* 24, 5223.—Elberta and Shipper Cling varieties were used. Microchem. tests showed a gradual decrease in *protopectin, cellulose* and *hemicellulose* content as ripening proceeded. The change from hard ripe to soft ripe occurs within a very short time and is accompanied by profound changes in the cell walls, many of which completely break down and become disorganized. Comparisons made on fruits from a highly vegetative tree and a less vegetative tree, higher in carbohydrates, showed no chem. differences for the first 75 days after bloom. However, the latter contained more tannins and oxidases, but no histological differences were noted. Differences in microchem. and histological reactions in the Elberta and Shipper Cling varieties were evident only in the final stages of ripening. The non-melting quality of ripe fruits of Shipper Cling variety is assoc. chiefly with the retention of a high content of insol. protopectin in the cell walls of the flesh. A bibliography is given. C. R. Fellers.

Studies on tree root activities. III. G. H. Harris. *Sci. Agr.* 11, 191–9(1930); cf. *C. A.* 24, 5054.—The immediate influence of top pruning on root respiration is due to the injury caused. On the other hand, the immediate influence of injecting sugar in the top on root respiration is due to the injections stimulating bud activity. The buds in turn stimulate root respiration. In the nutrient solns. used, where all the nutrients were readily available, the amt. of $CO_2$ excreted by the root and absorption appeared to have little relation. Absorption seemed more closely related to the activity of the growing top. Cutting off the light from the growing tops reduced the amt. of root respiration. When transpiration is high, the $CO_2$ excreted by the roots is lower than if transpiration were low at this time. Some of the $CO_2$ produced during root respiration is apparently swept up to the tops during a time of high transpiration and consequently less is excreted by the root than if transpiration were low. C. R. F.

Sparassole in the roots of *Rhododendron japonicum*. Kōyō Kinoshita. *Acta Phytochim.* 5, 157–63(1930).—Sparassole (I) is obtained from the alc. exts. of roots of *Rhododendron japonicum* collected in November. I is found in the cooled receiver upon distn. of the alc. It m. 67–68°. The yield is 0.26%. Hydrolysis yielded the monomethyl ether of orsellinic acid (II), m. 174–175° from 80% alc. The m. ps. given by previous authors are too low. II is converted to orcine by concd. HCl or HI. A mixed m. p. with a sample of I obtained from another source finally identified the substance as the monomethyl ether of orsellinic acid methyl ester. F. G. F.

The amount of sorbitol in rowan berries. G. Tanret. *Bull. soc. chim. biol.* 12, 541–3(1930).—The sorbitol isolated as the dibenzaldehyde deriv. found on Aug. 11, Sept. 12 and Oct. 15 was 44.4, 66.5 and 68.9 g. per kg. whole berries of *Sorbus aucuparia* corresponding to 147.8, 206.4 and 173.2 g. total sol. material. Acid and sugar analyses are also given. C. G. Krug.

The penetration of 1-naphthol-2-sulfonic acid indophenol, *o*-chlorophenol indophenol and *o*-cresol indophenol into Valonia. Matilda Mollenhauer Brooks. *Proc. Natl. Acad. Sci.* 17, No. 1, 1–3(1931).—B. (*C. A.* 23, 4241) presents the continuation of the studies on oxidation-reduction indicators and their penetration into living plants of Valonia. Indicators lying further toward the pos. end of the scale are considered. Naphthol-2-sulfonic acid indophenol does not penetrate into the sap within 24 hrs. at $p_H$ values from 5.8 to 9. *o*-Cresol indophenol and *o*-chlorophenol indophenol penetrate into the sap in a colorless form and faster from an acid than alk. soln. Different equil. concns. are established accordingly as a phosphate or borate buffer is used. Where reduction has changed the color of the dye, its identity was established spectrophotometrically. B. S. Levine.

A source of error in the determination of amide nitrogen in plant extracts. Hubert

B VICKERY AND GEO W PUCHER *J Biol Chem* 90, 179–88(1931) —HCl is an unsuitable reagent for the hydrolysis of amides in plant exts and may lead to uncertain results if nitrates are also present, although the so-called Sachsse method in which *N* HCl is used and hydrolysis is continued for 4 hrs actually gives quite accurate results if these definite conditions of hydrolysis are rigidly maintained A compensation of errors occurs in which the oxidation of $NH_3$ by the mixt of $HNO_3$ and HCl is counterbalanced by extra $NH_3$ formed by reduction of $HNO_3$ under the influence of an easily oxidized unknown substance present in tobacco leaf and other plant exts Substitution of 2 *N* $H_2SO_4$ and a 6-hr hydrolysis are recommended When this is done accurate and reproducible results are secured with no interference from nitrates and considerable latitude is permissible both in acid concn and in time of hydrolysis A P L

**Biochemical transformation of acetic acid by molds and the chemistry of citric acid formation.** T CHRZASZCZ AND D TILKOW *Biochem Z* 229, 343–57(1930) —In the metabolism of AcOH by the mold *Penicillium* succinic fumaric, oxalic, *l* malic and citric acids are formed and probably also other acids not yet identified The finding of *l*-malic and citric acids is here reported for the first time It is concluded that the citric acid formation in sugar cultures also proceeds over AcOH The AcOH is changed to succinic acid and by dehydrogenation, and this in turn is dehydrogenated to fumaric acid The fumaric acid is changed to *l* malic acid by taking up a mol of $H_2O$ It is assumed that at some moment both malic and acetic acid ions are present in the culture, citric acid being formed from these two by a dehydrogenation The transformation of the sugar to citric acid proceeds over the intermediate stages of pyruvic acid ⟶ acetaldehyde ⟶ AcOH, then as outlined before K and Na ions have a greater effect than Ca ions on the transformation of AcOH and the formation of citric acid proceeds better, in fact, in the presence of Ca ions alone only succinic and *l* malic acids have been found S MORGULIS

**Carbohydrate metabolism of higher plants Formation of methylglyoxal by enzymes of germinating seeds.** CARL NEUBERG AND MARIA KOBEL *Biochem Z.* 229, 433–42(1930) —Peas or beans were sterilized by submersion for 40 min in 0.1% $HgCl_2$, then washed thoroughly with sterile $H_2O$ and germinated in Petri dishes After 1–2 days the fresh sprouts were removed from the seed membranes and ground finely, and either extd or made into dry prepns with alc.-ether Exts were made from the latter by 17–20 hrs digestion with $H_2O$ contg 3% toluene The methylglyoxal was produced from added hexose-phosphate ester, whereby the enzyme was completely removed from the fresh material or from the alc. ether dry prepn, and could not be found in the residue Obviously methylglyoxal is the intermediate product in the desmolytic changes in the sugar mol both in plants and animals S MORGULIS

**Microchemical study of hemicellulose in some plant cells, with special reference to its distribution in the protoplasm.** R C MALHOTRA. *J Biochem* (Japan) 12, 341–9 (1930) —Recent studies on hemicellulose seem to suggest that this substance is not merely present in the cell walls impregnated in cellulose, pectin or lignin, but actually is present as a reserve carbohydrate Microscopic studies reveal that the hemicellulose is present not only in the cell wall but also as protoplasmic inclusions Hemicellulose tests on tomato cells grown in warm and cold temp seem to show that there is more hemicellulose in cells of plants grown in the cold than in the warm temp S MORGULIS

**Glucides and glucidic compounds of the brown algae.** H COLIN AND P RICARD *Compt rend* 190, 1514–6(1930) —Many algae have been analyzed for mannitol, laminarine and algine The figures are given T. H RIDER

**The relationship between intracellular $r_H$ and cytoplasmic sexualization of horsetail spores.** PH JOYET-LAVERGNE *Compt rend* 191, 865–6(1930) —The spores of *Equisetum arvense, E limosum* and *E maximum* are divided into 2 groups There is a relationship between the sexualization of the groups and their intracellular oxidation-reduction potentials T. H. RIDER

**The presence of tannoids in flowers.** ST IONESCO *Compt rend.* 191, 867–8 (1930) —Flowers or their parts are boiled in 96% alc or in $(CH_3)_2CO$ until decolorized, then soaked in distd $H_2O$ until soft again, when the presence of tannoids can be demonstrated by the production of color by treatment with $Fe_2(SO_4)_3$, U acetate, $Cu(OAc)_2$ or $K_2CrO_4$. All parts of many flowers were found to contain tannoids. T. H. R

**The soluble enzymes secreted by Hymenomycetes. The quinones and the antioxidant function.** L. LUTZ. *Compt rend.* 191, 880–2(1930); cf. *C. A.* 24, 5796.—*Quinone* is shown to have an antioxidant effect, retarding the action of the soln enzymes of *Hymenomycetes.* T. H RIDER

**Callusing of cotton stem cuttings.** H. E REA. *Plant Physiology* 5, 575–85 (1930); cf *C. A.* 13, 139 —The treatment of cotton cuttings with 2.0, 1.0, 0.5 and

0.25% of aq. solns. of $KMnO_4$ for 30 min., prior to placing in propagators, reduced the percentage of callusing 37%. WALTER THOMAS

Preliminary study of elongation of roots of Georgia collards as affected by sodium luminal. T. W. PRATT *Plant Physiology* 5, 587–97(1930).—Pronounced retardation of root elongation by Georgia collards (*Brassica oleracea*) was produced by sodium luminal, used in concns. from 0.1 to 1.0%, within 1.5 hrs. after administration. The effect of the sodium luminal on the root elongation was immediate, the greatest retardation occurring during the first of the six 15-min. intervals of observation. Distd. water partially removed the depressing action of the sodium luminal. The stronger the concn. of the drug, the greater was the retardation of root growth. WALTER THOMAS

Effect of various methods of storage on the chlorophyll content of leaves. PHILIP A. HARRIMAN *Plant Physiology* 5, 599–606(1930).—*Soy bean* and *nasturtium* leaves dried at 98° suffered a considerable loss of chlorophyll (approx. 70%). Leaves dried at room temps. (18° to 24°) lost 20 to 30% of their chlorophyll. Even at the optimum temp. range for oven drying (45° to 60°) some chlorophyll may be lost. Low temps. are ineffective in preventing the loss of chlorophyll unless the leaves are actually frozen. Leaves frozen with "Dry Ice" retain all of their chlorophyll, also leaves desiccated at reduced pressure (7 cm. mercury) over concd. *sulfuric* acid at *room* temp. lost little or no chlorophyll. Leaves desiccated at reduced pressure in the absence of O and $CO_2$ lost *more chlorophyll* than leaves desiccated in air at the same pressure. *Conclusion*.—Freezing is the most satisfactory method of storing leaves for later detn. of chlorophyll. WALTER THOMAS

Production of kojic acid by Aspergillus flavus. O. E. MAY, A. J. MOYER, P. A. WELLS AND H. T. HERRICK. *J. Am. Chem. Soc.* 53, 774–82(1931).—With 20% dextrose soln., *Aspergillus flavus*, under favorable conditions, is capable of transforming more than 45% of the dextrose present and 55% of that consumed into kojic acid in 12 days from the time of inoculation from spores. $(NH_4)_2SO_4$ was unsatisfactory as nutrient N, $NH_4NO_3$ was most satisfactory, $NaNO_3$ was much less satisfactory. Better results were obtained with a $KH_2PO_4$ 1 g. and $MgSO_4.7H_2O$ 2 g. per l. than with KCl 0.1, $H_3PO_4$ 0.054 and $MgSO_4.7H_2O$ 0.5 g. per l. A range from 30° to 35° promoted rapid vegetative development with high yields of acid. In a range of sugar concns. from 15 to 35% growth and acid production were satisfactory, the highest yield occurring at a concn. of 20%. The max. quantities of acid were most economically produced in 12-day cultures when the ratio of the surface area of mycelium to the vol. of the soln. had a value of from 0.3 to 0.5. C. J. WEST

Chemical changes in infectious chlorosis in leaves of Abutilon. H. v. EULER, W. HERTZSCH, S. MYRBÄCK, D. RUNEHJELM AND A. FORSBERG. *Arkiv Kemi Mineral. Geol.* 10B, No. 13, 6 pp.(1930). cf. *C. A.* 24, 5332, 25, 131.—Those portions of the leaves affected with infectious chlorosis have much lower catalase activity, higher proportion of amino N, less chlorophyll, xanthophyll and carotene, and less tryptophan than the normal green portions. J. J. WILLAMAN

Studies on the ripening of rice grains. T. TADOKORO AND M. ABE. *J. Faculty Agr. Hokkaido Imp. Univ.* 27, 349–87(1930). cf. *C. A.* 22, 967, 3096.—Rice was harvested at 4 weekly intervals, the last sample being dead ripe. The ash and P decreased at first. The total N showed no definite tendency to change, but the ratio of protein to non-protein N increased constantly. Of the 4 groups of rice proteins detd., the water-sol. group gradually decreased, while the NaCl-sol. and alc.-sol. groups increased. The alkali-sol. group was inconstant in its changes. All of these changes are just the opposite of those during germination. While the non-protein N is decreasing, the amino N of the proteins is also decreasing, indicating a formation of higher proteins from lower. Oryzenin, the alkali-sol. protein, decreased in ash and P during ripening, but increased in N, S and amino N. Its isoelec. point changed toward the alk. side, and its $[\alpha]$ increased. The amt. of amino N liberated from oryzenin by ultra violet light increased with ripeness. Arginine increased at first and then decreased, while histidine increased continuously. Lysine decreased at the later stage, while cystine decreased and then increased. Thus the authors think that oryzenin is at its highest degree of condensation sometime before dead ripening. The ash and P content of rice starch decreased gradually while the sapon. value increased. The amt. of glucose formed by hydrolysis with HCl attained a max. before complete ripeness, and at this same period the $[\alpha]$ of the acetylated starch reached a max. and the content of acetyl its max. J. J. W.

A limnological significance of free $H_2CO_3$ (LINDEMANN) 14.

## E—NUTRITION

PHILIP B HAWK

**Urinary syndrome of metabolic disturbances caused by lack of vitamin B in the rat.** J. ROCHE *Bull soc chim biol* 12, 342-56(1930), cf *C A* 23, 1166.—In rats receiving *ad libitum* the diet of Randoin and Simonnet, the C/N ratio of the urine and feces is practically const for a normal animal on a given diet, although the actual value varies according to the age of the rat. On a diet deficient in vitamin B the ratio increases (more rapidly as the point of death is approached). Ingestion of yeast temporarily reduces the ratio. The consequences of lack of vitamin B are manifested sooner on a diet rich in carbohydrate. Death is not due to inanition, which would cause a fall in the C/N ratio. B. C. A.

**Fractional dialysis of urine.** A. BOIVIN. *Compt rend soc biol* 101, 722-4(1929).—A vegetable diet increases the quantity of easily dialyzable substances in urine, while a meat, and particularly a milk, diet has the reverse effect. B. C. A.

**The effect of irradiated ergosterol (vitamin D) on the calcium-phosphorus metabolism of the chicken.** I. J. KING AND G. I. HALL. *Can. Chem. Met.* 15, 22(1931).—One group of 4 month old chickens was fed an adequate basal diet contg. all the essential elements for growth except vitamin D. Another received the same diet plus 2 drops of irradiated ergosterol soln. daily. Their growth was normal. Group No. 3 was fed excessive amounts of irradiated ergosterol equiv. to 250-1500 times that given the normal birds. These birds lost wt. rapidly, became strikingly anemic and weak legged. *In the rachitic birds there was an increased phosphatase content of the bones* accompanied by a hypocalcemia of the serum and in the hypervitaminous birds a subnormal phosphatase content accompanied by a hypercalcemia. W. H. B.

**Effect of acidic and basic diets in chronic nephritis.** D. M. LYON, D. M. DUNLOP AND C. P. STEWART. *Edinburgh Med. J.* 38, 87-108(1931).—High basic, high acid and high purine diets of similar protein content were investigated for their effect in chronic nephritis. The basic diet alone brought about clinical improvement as well as favorable variations in the blood and urine chemistry. RACHEL BROWN.

**The group of "water-soluble vitamins" and their relationship. III. The scurvy of rats.** WERNER KOLLATH. *Arch. exptl. Path. Pharmakol.* 153, 359-80(1930); cf. *C. A.* 25, 132.—Rats can be given a disease histologically identical with guinea pig scurvy by a proper diet. The addn. of alk. hematin to such a diet causes 75% of young rats to develop beriberi; their bones, however, show the same scorbutic changes. It is therefore suggested that the absence of a common factor underlies both beriberi and scurvy, other factors of age, species, or diet detg. which disease will appear. *H. E.*

**Methylglyoxal as an intermediary product of carbohydrate catabolism.** ERICH SCHNEIDER AND ERNST WIDMANN. *Klin. Wochschr.* 9, 1916-7(1930).—Previous workers have demonstrated that methylglyoxal is formed by liver, kidneys, muscle cells and red cells in the course of sugar metabolism. By removing the substance (as the 2,4 dinitrophenylhydrazone) S. and W. have shown that it is formed by human red cells, even after hemolysis, and also by white blood cells. As much as 70-75% of the total glucose added passes through the methylglyoxal stage. *Diabetic blood cells* show no abnormality in this respect. Material from abscesses did not form the substance, even though the bacteria involved were quite active, either in pure culture or when added to fresh leucocytes. H. EAGLE.

**Biological significance of milk peroxidase: Preliminary report concerning a relation between vitamin B and peroxidase.** TAYURU ARAKAWA. *Tohoku J. Exptl. Med.* 16, 118-22(1930).—Pregnant rabbits on a diet contg. no vitamin B secrete milk contg. *no peroxidase.* With the addn. of vitamin B (beriberol) to the diet, peroxidase appears in the milk. H. EAGLE.

**"Aperoxidatic" milk as a possibly early symptom of avitaminosis B. An experimental study.** KAZUÉ SUZUKI AND TAYURU ARAKAWA. *Tohoku J. Exptl. Med.* 16, 228-31(1930).—In rabbits secreting peroxidase free milk on a diet contg. no vitamin B, the peroxidase reaction of the blood leucocytes remains as strong as normal. H. E.

**Studies on the quantity of the glomerular filtrate. I. Glomerular filtrate in beriberi.** FUSAKICHI NAKAZAWA AND HYOE KUSAKARI. *Tohoku J. Exptl. Med.* 16, 321-8 (1930).—The glomerular filtrate of normal humans is 200-150 cc. per min., as estd. by creatinine output (if it is assumed to be a simple filtrate, with neither tubular secretion nor resorption). In beriberi it is much lower, and may fall to as little as 10 cc. per min. With the administration of vitamin B, this returns to its normal value. H. EAGLE.

**The toxicology of the irradiated products of ergosterol.** WOLFGANG HEUBNER.

*Nachr. Ges. Wiss. Göttingen Math.-phys. Klasse* No. 2, 149–63(1930).—The irradiated products of ergosterol were prepd. according to the method of Windaus, some of the samples being irradiated in ether, some in benzene and others in alc. In most cases the light from Mg was employed. Expts. on rabbits which were fed with the ergosterol products showed various pathological effects centered chiefly in the aorta and arteries. Death, following a loss in wt., occurred in all cases. Calcification foci were found in the aorta upon postmortem exam. *Data are presented in 13 tables.* Russell C. Ess

The feeding of milk goats with a ration consisting of oat straw and nutritive material but poor in vitamin A, and its supplement. A. Scheunert and K. Bertram *Tierernähr.* 1, No. 1, 70–87(1929).—During a 400-day expt. 3 milk goats were fed on a ration of oat straw, dried scraps and nutritive matter, but lacking in hay or green food. To secure milk production it was necessary to add a salt mixt. of $CaO$, $H_3PO_4$ and NaCl. Before the addn. of this mixt. the milk yield dropped but rose to normal again upon the addn. Adding wheat germ, which contains a small amt. of vitamin A, produced a temporary increase in the milk yield. The *effects of a lack of* vitamin A were evident in 2 of the animals. One of these did not become pregnant and the other gave premature birth to 2 dead kids. The one goat that was given vitamin A daily in the form of 10 cc. of cod-liver oil went through an apparently normal pregnancy and gave birth to two dead kids and one living kid. The latter showed good development. After 3 months on the vitamin-A-deficient diet, the milk showed a deficiency in vitamin A. A long time was required to bring the milk vitamin content back to normal. Russell C. Ess

*Nutritional study of the white school children in five representative counties of Florida.* Chester F. Arnaud, Otha D. Abbott and Georgia Westover. Fla. Agr. Expt. Sta., Bull. 215, 3–30(1930).—A survey of defects in white school children as correlated with diet, wt., age, etc. C. R. Fellers

Effect of the use of mineral oil upon the absorption of vitamin A. Jennie I. Rowntree. *J. Nutrition* 3, 345–51(1931).—The effect of mineral oil on the absorption of vitamin A is dependent on the amt. of vitamin A in the diet. When the quantity of mineral oil given to rats is comparable to the human therapeutic dose and the vitamin A only enough to produce subnormal growth, the rats are unable to withstand the effects of the mineral oil. However, if the amt. of vitamin A is adequate, mineral oil can be given without noticeable effects. If sufficient vitamin is given the amt. of mineral oil could be increased 5% without producing a slackening of growth or preventing the cure of severe ophthalmia. If this laxative is employed, it should be accompanied by a generous amt. of fat-sol. vitamins. Bibliography. C. R. Fellers

Preparation of a concentrated source of the heat-labile vitamin B, free from contamination with the heat-soluble factor G. Herbert M. Evans and Samuel Lepkovsky. *J. Nutrition* 3, 359–74(1931).—25% EtOH is an *efficient extractive of* both the heat-labile and heat-stable, water-sol. vitamins, the heat-stable factor is in low concn. in the outer layers of the rice kernel and decreases further in abundance in the inner layers, whereas the heat-labile factor is in high concn. in the rice outer layers and decreases only slightly in the inner layers. Clay activated by the 25% ext. furnishes an excellent source of vitamin B free from the heat-stable factor. When the syrup resulting from concn. of a 25% ext. is treated with 80% alc. so that the resulting concn. is 8%, most of the heat-stable factor is removed, nevertheless, large losses in the heat-labile factor are produced in this way. When the final concn. is 8% these losses are much reduced, though somewhat more heat-stable vitamin is present. In the case of the rice polish, so little of the heat-stable factor is initially present that fractionation with the 8% alc. yields an ext. almost free of the heat-stable factor and very rich in vitamin B. Finally, adsorption with clay is more selective for the heat labile vitamin and thus the last traces of the heat-stable factor are left behind. Quant. removal of antineuritic B from cane by means of $Ba(OH)_2$ was not achieved, though feeding of these cane gave a high dosage of antineuritic B with assured absence of the heat-stable factor. Bibliography. C. R. Fellers

Factors which determine renal weight. VII. Protein intake and age. Elton M. MacKay and Lois Lochard MacKay. *J. Nutrition* 3, 375–86(1931); cf. *C. A.* 23, 2744.—An extended study of the linear relationship between renal wt. and protein intake proved that it is not influenced by age. The empirical linear formula, *protein intake* = 0.0183 *renal wt.* − 2.72, expressed the relationship in normal male rats 70, 130, 250 and 410 days old when receiving adequate amts. of protein in the form of casein. VIII. Protein intake and sex. *Ibid* 387–94.—A linear relationship between renal wt. and protein intake was demonstrated for female rats at all ages. When receiving adequate amts. of protein in the form of casein it may be expressed *protein intake* =

4–5(1930) —Osteoporosis, a disease of horses where the bones, especially of the head, become porous and soft, was caused by diets deficient in Ca. The heavy clay soils of Central Porto Rico are definitely deficient in lime and the crops raised thereon are similarly deficient, thus giving rise to the disease in animals when the crops are used for fodder. The addn. of sea salt, bone meal and lime to the ration is recommended. C. R. Fellers

Nutritional discoveries in relation to livestock feeding practices. G. Bonstedt. *Sci. Agr.* 11, 65–73(1930) —General. C. R. Fellers

Mineral feed problem with dairy cattle and swine. G. Bonstedt. *Sci. Agr.* 11, 74–7(1930) —Tabular data are presented showing the most common mineral deficiency diseases in livestock and the remedy. C. R. Fellers

Antiscorbutic power of fruit and flour. T. Schlossberg. *Compt. rend. soc. biol.* 102, 1104(1930). *Physiol. Abstracts* 15, 101 —Orange juice and lemon juice prevented the onset of scurvy in guinea pigs on a diet which otherwise caused it. Powd. milk and yeast added to flour had no preventive action. G. G.

Value of fats in the feed of dairy cows. Arnold Buschmann. *Tierernähr.* 1, 129–78(1930) —The effect of adding vegetable oils or oil rich seed meals to the ration of dairy cows was studied. Up to a certain limit, varying from 0.4 to 1.0 kg. oil per day per 1000 kg. body wt., the fat content of the milk was not changed or was increased less than 0.1%. Feeding larger amts. slightly decreased the milk fat. The limit was lowest for rapeseed oil, highest for coconut, with sesame and linseed intermediate. The chem. and phys. constants of the milk fat were altered to the same extent as though approx. 18% of the particular oil in question had gone directly into the milk as so much butter fat. L. E. Gilson

Vitamin D efficacy of hog feeds. Valentin Horn. *Tierernähr.* 1, 194–205 (1930) —Healthy hogs made greater gains in wt. in proportion to the amt. of food eaten when "Hemon," a com. irradiated phytosterol prepn., was added to the ration, but not sufficient to show a profit over the addnl. expense. L. F. Gilson

Does the addition of potassium iodide to the diet affect the composition of the intestinal and fecal flora? A. Schreuert and J. Rodenkirchen. *Tierernähr.* 1, 206–18 (1930) —This question has been raised by the widespread adoption of table salt contg. KI. Pats were given 0.20 mg. KI per day in their ration and compared with rats not given KI. There was no apparent difference in the counts of the various bacteria and fungi. Tables of bacterial counts are given. L. F. Gilson

Vitamin D preparations in hog feeds. Valentin Horn. *Tierernähr.* 1, 295–307 (1930) cf. preceding abstr. —Vigantol Merck and Hemon when fed in equiv. quantities were equally efficacious in restoring to health and promoting the growth of groups of sick, coughing, rachitic young pigs. L. E. Gilson

Tryptophan and histidine as "anabolites." Georges Fontès and Lucien Thivolle. *Compt. rend.* 192, 63–5(1931) cf. *C. A.* 25, 1575 —Simultaneous injection of tryptophan and histidine allows a living organism (dog) in equil. with an unchanging diet, to make very clear gains in wt., which are attained rapidly and maintained for a long time. These gains may be explained only by an improvement in the general assimilation processes, and especially those which have to do with N metabolism. The name anabolite as proposed for these amino acids, seems justified. L. K.

Metabolism of lipides. The role of the pancreas endocrine in the phenomena of pulmonary fat catabolism. I. I. Nitzescu and Gr. Benetato. *Bull. soc. chim. biol.* 12, 827–48, 849–72(1930). cf. *C. A.* 24, 5811 —From the content and rate of catabolism of fats in lung tissue and blood, *in vivo* and *in vitro*, N. and B. conclude that the destruction of fats in the tissues is dependent on a localized thermolabile factor which is activated by insulin which functions as a coenzyme or kinase. The localized factor is also diastatic, controlling the catabolism of glycogen. C. G. King

Resistance of chickens to parasitism affected by vitamin A. James E. Ackert, Marian Fisher McIlvaine and Naomi Zimmerman Crawford. *Am. J. Hyg.* 13, 325–56(1931) —The resistance of growing chickens to the intestinal round worm, *Ascaridia lineata*, was lowered when the fowls, 4–7 weeks of age, were kept on a diet deficient in vitamin A for a period of 5 weeks. The larger no. of worms remaining in the chickens is attributed to a weakened peristalsis. The source of the vitamin A in the control animals was cod liver oil. The criteria for judging whether this vitamin affected the resistance of the chickens to the parasites were the no. and the lengths of the worms remaining in the chickens at the close of the expt. N. A. Lange

Resistance of chicken to parasitism affected by vitamin B. James E. Ackert and L. O. Nolf. *Am. J. Hyg.* 13, 337–44(1931) —Preliminary tests were carried out to ascertain if the vitamin B complex is a factor in the resistance of chickens to the in-

testinal round worm, *Ascaridia lineata*. The source of vitamin B was baker's yeast. Groups of chickens given the same no. of embryonated eggs of the parasite had more worms when their diets lacked vitamin B than did similar groups fed adequate amts. of this vitamin. The larger no. of worms is attributed in part to partial paralysis of the intestine due to lack of vitamin, the greatly weakened peristalsis probably aiding the worms in remaining in their habitat. It is suggested that yeast may contain a factor which is favorable to the growth of worms since larger worms were found in those chickens whose diet contained yeast. N. A. Lange

Variations in the chlorine content of the blood serum and urine of mice subjected to acute experimental scurvy. Lucie Randoin and Andrée Michaux. *Compt. rend.* 191, 1178–80(1930); cf. *C. A.* 24, 1585. B. S. Levine

The effect of fluorine on the calcium metabolism of albino rats and the composition of the bones. J. J. McClure and H. H. Mitchell. *J. Biol. Chem.* 90, 207–220 (1931). Fluorine especially when consumed in the more sol. form of NaF at levels of 0.0011 and 0.0023% of F, may cause the deposition of an apparently abnormal constituent in the bones or an abnormal deposition of a non-Ca constituent, possibly a fluoride of a mineral other than Ca, as evidenced by an increase (av. 13%) in the % of ash in the bones above the normal. There is also an interference with the deposition of Ca in the bones (av. decrease in Ca content 10%). The P content of the bone ash was not significantly affected by NaF feeding but the Ca:P ratio was depressed. When either $CaF_2$ or NaF was fed at the above levels, growth was inhibited entirely aside from any effect on food consumption; the higher level of NaF only lowered the food consumption also. The Ca balance was unaffected by either $CaF_2$ or NaF up to the level of 0.0113% F in the ration but at a level of 0.0023% the % of Ca that would otherwise have been retained by the exptl. rats was lowered. The peculiar effect of F on the development of the teeth was again demonstrated, the characteristic abnormalities appeared when either the sol. NaF or the insol. $CaF_2$ was fed. Bibliography of 37 references. A. P. Lothrop

The physiological effects of diets rich in egg white. Helen I. Parsons. *J. Biol. Chem.* 90, 351–67(1931); cf. *C. A.* 24, 1582. Diets rich in egg white speedily cause a nutritional disorder and death in young rats weaned from stock rations. As little as 6% of dried liver fed for 3 days before the beginning of the egg diet protects the rats from this disorder. The swiftness of onset of the first acute symptoms suggests that the effect is due to a direct injury from the egg white rather than to a nutritional deficiency in the usual sense of the term. In rats surviving the 1st few weeks on a ration contg. 16% of dried egg white, either raw Chinese, or from raw fresh eggs, symptoms developed which strikingly resemble pellagra even though the ration contained 20% of potent dried yeast. These symptoms were prevented or cured by 20% of dried beef liver (but not by 10%) no matter how far advanced the dermal or nerve involvement. Lard and raw linseed oil were ineffective as preventive or curative agents. The symptoms noted were loss of wt., lessened activity, an awkward gait in walking, a humped back, meteorism, increased shedding of hair, soiled fur, paws and tail, closed eyelids, bloody urine, and progressive spasticity. The results suggest caution in the use of as large quantities of egg white in invalid feeding as has been the common practice in many hospitals. The introduction of egg white into the somewhat restricted dietary of a child may also perhaps need to be safeguarded with protective foods in somewhat the same way as its introduction into the diets of the rats used in the expts. A. P. L.

Ketogenesis in relation to the food of swine. V. Yagami. *Arch. intern. physiol.* 33, 160–72(1930). Swine excrete considerable amts. of "ketone bodies" when fed carbohydrate diets. These are increased considerably upon fat or protein diets. Fats produce a greater increase than proteins. The $NH_3$ excretion does not parallel that of the ketones but bears a relation to the protein ingested as well as to the "ketone bodies" excreted. In this phase of intermediary metabolism swine contrast with the herbivora. C. M. McCay

The metabolism of nitrogen. VII. Comparative influence of carbohydrates and fats upon the utilization of nitrogen. G. D'Asquasino. *Arch. intern. physiol.* 33, 185–95(1930).—A series of diets was designed contg. casein, egg albumin and glutin. These proteins were fed with either starch or butter. The N balances were detd. D' supports his earlier thesis that 10–10% of the N intake cannot be accounted for by fecal N plus urine N plus body weight increase. He finds no influence of fats or carbohydrates upon the "lost" N. C. M. McCay

Experimental studies on the influence of diet on the formation of biliary and renal calculi. II. Feeding on a diet deficient in fat-soluble vitamins. 2. The quantitative change in potassium, sodium, calcium, magnesium, total cholesterols and total

*fatty acids in the blood.* KAZUMASA USUNI *Japan J Gastroenterology.* 2, 226–30 (1930) —Normal values upon the sera of 82 young rabbits (50–120 days) were established as follows:

| | Range (mg %) | Mean (mg %) |
|---|---|---|
| Ca | 26 25— 17 56 | 22 37 |
| K | 17 56— 8 23 | 13 36 |
| Mg | 3 76— 2 40 | 3 24 |
| Na | 605 00—360 00 | 492 00 |
| Total cholesterol | 80 35— 47 56 | 60 5 |
| Total fatty acids | 254 12—160 00 | 19 0 |

These same constituents were detd upon 72 normal rabbits after they were placed upon a diet deficient in vitamin A. In cases that developed eye symptoms there was a marked increase in serum Ca All the blood constituents increased in cases of calculi formation independently of the appearance of symptoms of avitaminosis Ca and cholesterol increased the most C. M. McCAY

Vitamins. Physicochemical constants of serum and plasma of animals fed on autoclaved meat with or without yeast. FERDINANDO NEGRI *Biochim terap sper* 17, 445–60(1930) —Dogs, fed exclusively on autoclaved meat, do not live longer than 2 months The body temp decreases especially in the last week of life The $p_H$ and the alkali reserve decrease, the refractive index of the serum decreases constantly The sugar and N in the blood decrease; the latter increases in the urine, creatine in the blood and creatinine in the urine increase considerably The addn of yeast restores the animal almost to normal, only an innocent hyperglucemia was observed A. E. M.

Changes in the central nervous system in some avitaminoses. SILVIO BRAMBILLA. *Sperimentale* 84, 537–52(1930) —Histological investigations of the central nervous system in scurvy of guinea pigs and in rickets of rats showed only slight degenerative changes, higher in scurvy than in rickets No reason was found to suppose a unity of the neuropathol picture in different avitaminoses A. E. MEYER

Sauerkraut as a source of vitamin C. B. A. LAVROV AND NATALIE YARUSOVA *Biochem Z* 229, 115–27(1930) —Hay and oats which have been autoclaved invariably produce typical scurvy in guinea pigs receiving this as their basic diet Addn of sauerkraut to such a basic diet inhibits the development of the disease process, 30 cc of the juice being required for a prophylactic dose If it is assumed that the amt. of vitamin C present in the min prophylactic dose of a definite product is a vitamin unit, 1 kg sauerkraut juice contains only 33 units, 1 kg sauerkraut 26 units while apple juice (cider?) will contain 330 to 660 units per kg S. MORGULIS

Hypervitaminosis in chickens EARL J. KING AND G. EDWARD HALL. *Biochem Z* 229, 315–22(1930) —Under the influence of overdosage with radiated ergosterol no calcareous deposits were observed in the organs of chickens, nevertheless the bones were weak and bent. There was a decreased phosphatase content in the bones and in the kidney S. MORGULIS

Studies in experimental scurvy. X. Adrenaline content of the suprarenals and the amount of the adrenaline-like substance in the serum of guinea pigs fed on a vitamin-C-free diet. SHINSUKE OHATA *J Biochem* (Japan) 12, 419–27(1930) —In the serum of scorbutic guinea pigs there is a definite diminution in the amt of adrenaline like substance as well as a decrease in the adrenaline content of the suprarenal glands Although the adrenaline content of the gland decreases also during inanition, this decrease is not as great as during scurvy The change in the adrenaline like substances of the serum is the same in inanition and scurvy The effect on a vitamin C-free diet is, therefore, not purely an inanition effect S. MORGULIS

The relation of carotene to vitamin A. BASHIR AHMAD *J Soc Chem Ind* 50, 12–4T(1931) cf *C A* 23, 1941, 24, 402, 5801 —Colored palm oils from different sources were tested colorimetrically for carotene and biologically for vitamin A Tests were also made upon oils in which the carotene had been partly or largely destroyed by hydrogenation. The results of these tests indicate that the yellow coloring matter in the vegetable oils is carotene and that this substance shows vitamin A activity Certain charcoals adsorb carotene, during which process it is oxidized and so made biologically inactive In fish liver oils, the pigment can be adsorbed without destruction of vitamin A N. M. NAYLOR

Lung calcification in healthy and tuberculous rabbits caused by massive doses of irradiated ergosterol. H. SIMONNET AND G. TANRET *Compt rend.* 190, 1526–9 (1930), cf *C A* 24, 2499 —Irradiated ergosterol increases pulmonary calcification in

normal rabbits in a ratio of 1 20, while in tuberculous rabbits the increase was as high as 1 80 In chronic tuberculosis the evolution of tubercules is checked I. H R.

**Biochemical investigations on rubrene.** M Javillier and (Mlle) I. Pineroux. *Compt rend* 191, 882 4(1930) *Rubrene* (I), $C_{44}H_{56}$, is a cryst, orange red compd rich in double bonds, and is decolorized by fixation of $O_2$ It is in many ways analogous to *carotene* (II), $C_{40}H_{56}$ Albino rats fed on a diet deficient in vitamin A were fed I without improvement in the vitamin A deficiency symptoms 75% of I by mouth is eliminated in the feces The remainder is probably altered in the body since I cannot be detected in the organs I and II are therefore not physiologically similar T H Rider

**Further observations on the toxic effects of irradiated ergosterol.** J C Hoyle. *J Pharmacol* 40, 451 72(1930), cf C *A* 25, 131 Bread or milk added to a synthetic diet did not protect rats against the toxic action of ale irradiated ergosterol which contained a high concn of vitamin D A diet modified to contain protein, carbohydrate fat and ash in the proportions found in a bread and milk diet conferred no protection A diet contg a smaller proportion of Ca and P had no protective action against irradiated ergosterol with either high or low concn of vitamin D A bread and milk diet had no protective action against amts of irradiated ergosterol contg more than 70,000 antirachitic units R Ruegg.

**Further biochemical studies on the antineuritic vitamin.** Arthur Seidell and Maurice I Smith *U S Pub Health Repts* 45, 3191-3200(1930) The potency of a vitamin salt mixt prepd from brewer's yeast by the methods described by Smith (*C. A* 24, 1109 0) and Seidell (C *A* 23, 1721) was compared with that of a sample of the crystals prepd by Jansen (C *A* 21, 2150) 0 05 mg S and S prepn contg 0 0052 mg. $N_2$ has the same curative value as 0 01 mg J's crystals contg 0 0009 mg $N_2$ There is not sufficient evidence to conclude that the same compd is involved in both prepns S and S purified their prepn by J's method, but no crystals were obtained Rats were placed on a diet deficient in the antineuritic vitamin, until polyneuritis developed The ration was then changed to one deficient in both vitamins, and the antineuritic concentrate administered intravenously (0 1 mg per day) The rats recovered from paralysis but failed to grow Death, due to nutritive failure, followed in 22 32 days W Gordon Rose

**Catalytic vitaminic substances and their action in beriberi.** Alessandro Stutzer. *Zymologica, Zym., Chim Col e Zuch* 5, 11-7(1930).—The expts prove that besides having a strong action against putrefactive bacteria lactic ferments also cure polyneuritis in pigeons R Sansone

**Further fractionation of yeast nutrilites and their relationship to vitamin B and Wildiers' "bios."** Roger J. Williams and Elizabeth M Bradway. *J. Am Chem. Soc* 53, 781 9(1931).—Expts with Wildiers' original yeast culture show that his "bios" is not readily adsorbed by fuller's earth and appears to be the same as the nutrilite which stimulates the growth of Gebrüde Mayer yeast. No conclusive evidence of its multiple nature is available The yeast nutrilites studied by Miller and his associates are shown to be distinct from the "bios" of Wildiers The Toronto workers should be credited with the discovery of a new series of yeast nutrilites Yeast No 578 of the Am Type Culture Collection and old process baker's yeast appear to have more complex requirements than Wildiers' yeast Evidence is presented for the existence of a fourth distinct nutrilite concerned in the growth stimulation of yeast No 578 It seems reasonable to suspect that several of the nutrilites for this yeast may be components of "vitamin B," since the antineuritic vitamin has previously been shown to affect its growth very strikingly C J. West

**Optical activity of cystine preparations used for animal experimentation.** J R. Haag *J. Am Chem. Soc.* 53, 808 9(1931).—Marston and Robertson (C *A*. 24, 1070) have criticized studies of the use of cystine because the optical activity of the prepns. was not detd. Of 7 prepns examined, the value for $\alpha_D^{25}$ varied from −207.1° to −216.6°; one had the value −185.9°. This variation cannot be explained on the basis of S content but is partly due to the prolonged washing of certain samples with hot $H_2O$ in order to remove the tyrosine present. It is highly probable that any one of the 7 samples is suitable for animal feeding unless it is assumed that inactive cystine is highly toxic. C J. West

Kalk-vitrym (Hachenbrunner) 17. Effect of nitrogenous fertilizers on pastures (Nottr, *et al*) 15.

Cantarow, Abraham: Calcium Metabolism and Calcium Therapy. Philadelphia. Lea & Febiger. 215 pp $2 50.

HARROP, GEORGE A., JR.: Diet in Disease. Philadelphia: P. Blakiston's Son & Co., Inc. 404 pp. $4. Reviewed in *J. Am. Med. Assoc.* 96, 382, *Ann. Internal Med.* 4, 852(1931).

HOLCK, H. G. O.: Diet and Efficiency. A Five-Year Experiment on Man. Chicago: Univ. of Chicago Press. $1.

KEELER, LYMAN F.: Eat and Keep Fit. Washington, D. C. (1322 Park Road): the author. 302 pp. $3. Reviewed in *J. Am. Pharm. Assoc.* 19, 1160(1930), *Am. J. Public Health* 21, 221(1931).

SCHEUNERT, ARTHUR: Der Vitamingehalt der deutschen Nahrungsmittel. Teil I. Obst und Gemüse. 2nd ed. Heft 8 of "Die Volksernährung." Berlin: J. Springer. 40 pp. M. 2.40.

**Irradiation products from ergosterol.** SOC. DES USINES CHIMIQUES RHÔNE POULENC. Brit. 335,277, June 25, 1929. In order to obtain substances having intense antirachitic effect, unconverted ergosterol is sepd. from the product obtained by the irradiation of ergosterol, by crystg. from org. solvents in which the ergosterol is slightly sol. such as alc., acetone and EtOAc (the sepn. being continued until the sol. residue in alc. soln. shows a dextro-rotatory power greater than 25° for the yellow line of Hg). The active product may be obtained by distn. of the solvent or may be taken up in a vegetable oil. The irradiation may be effected in EtOH at a temp. of 75° while agitating the soln. with an inert gas, preferably with light having few or no rays below 2750 A. U. and is preferably stopped somewhat before the max. production of antirachitic vitamin is reached.

## F—PHYSIOLOGY

E. K. MARSHALL, JR.

**Skin. III. Sugar content of the skin under physiological and pathological conditions.** E. URBACH AND G. SICHER. *Arch. Dermatol. Syphilis* 157, 160–82(1929), cf. *C. A.* 23, 174, 893.—Values of the sugar content of the skin and blood resp., are: man 47, 98, rabbit 117, 109, guinea pig 119, 117, rat 80, 83, dog 60, 92, mouse 53, 108 mg. per 100 g. (cc.). After administration of sugar the skin sugar increases like the blood sugar and returns to normal values. The skin sugar is diminished by insulin. The effect of pathol. conditions of the skin is described. B. C. A.

**Water and phosphorus compounds of the nerve on degeneration.** R. M. MAY. *Compt. rend.* 190, 1150–1(1930).—During the first month the water content of the degenerated sciatic nerve of the rabbit increases to 14% above the normal and thereafter falls to the normal value. The total P diminishes progressively during the first 2 months to a third of its normal value. The lipin P decreases after 100 days to a tenth of its normal value, when histological examn. shows complete reabsorption of the lipin products of the nerve. The alc. sol. and the protein P after an initial rise diminish to a third of the initial values, while the water sol. P shows a steady increase up to 35% above the normal value after 6 months. Also in *Bull. soc. chim. biol.* 12, 934–53(1930). B. C. A.

**Urea and ammonia in normal gastric juice.** D. SIMICI, R. VLADESCO AND M. POPESCO. *Compt. rend. soc. biol.* 101, 199–202, 202–4(1929).—The gastric juice of fasting persons contains 0.014–0.042% of urea and 0.0048–0.0098% of $NH_3$, the values being scarcely affected by a test meal. Injection of urea (5–10 g. in 20 cc. of water) raised the values to 0.06 and at least 0.03% resp. In pathol. conditions not affecting the kidneys these values are not markedly changed, in those affecting the kidneys they are increased to 0.3 and 0.11%, resp. B. C. A.

**Dextrose in normal urine.** H. ROTH. *Compt. rend. soc. biol.* 101, 218–20(1929).—The amt. of dextrose in normal urine varies between 0.02 and 0.30%, depending on the time of day. After fermentation with yeast there remains in the urine 0.01–0.02% of reducing non sugar substances. B. C. A.

**Non-dialyzable fraction of urine.** A. BOIVIN. *Compt. rend. soc. biol.* 101, 724–6(1929).—The wt., C:N ratio, S content and P content of the non dialyzable fraction of human urine depend on the technic of the dialysis. B. C. A.

**Oxygen consumption of the heart in varying, approximately isotonic, work.** L. BAUER. *Z. Biol.* 89, 513–22(1930).—By the method of Fismayer and Quincke (*C. A.* 23, 2504), it is shown that the amt. of O used for each contraction of the heart does not increase proportionately with increase in pressure, and therefore in work done, but bears a linear relationship to the initial vol. before contraction. B. C. A.

**The equilibrium between glycogen and lactic acid.** WILDER D. BANCROFT AND GEORGE BANCROFT. *J. Phys. Chem.* 35, 195–214(1931).—The rate of formation of

lactic acid during fatigue and the quantity of lactic acid found in fatigued muscle can be explained by assuming that enzymes catalyze its formation from glycogen. The reaction is reversible, but glycogen may be stabilized by adsorption on protein. The formation of acid would be slow during anaerobic rest for this reason. The rapid action as a result of heat rigor or administering $CHCl_3$ is due to liberation of glycogen from the protein. Narcotics might act by freeing adsorbed glycogen from protein or by freeing enzymes from adsorption on the lipins or by a combination of the 2 reactions. The lactic acid found in the muscle is dextrorotary. One would expect inactive *lactic acid to be formed by ordinary* chem. *processes*. The adsorption of glycogen on protein could account for the conversion of lactic acid to glycogen during recovery of a muscle. Some failures to find glycogen adsorbed on protein or as a result of the action of enzymes on lactic acid are due to faulty methods of analysis. The *formation of lactic acid from glycogen in cancer* follows a path different from that followed in normal tissue.

T. T. Brown

**Recent advances in the physiology of digestion. IV. The intestine.** H. H. Dukes. *J. Am. Vet. Med. Assoc.* 31, 235–9(1931); cf. *C. A.* 25, 903.—A review.

Rachel Brown

**Studies in blood diastase. Factors which cause variation in the amount of diastase in the blood.** Charles Reid and B. Narayana. *Quart. J. Exptl. Physiol.* 20, 305–11 (1931).—The diastase in the blood was detd. by the method of Fyfe. Observations were made chiefly on dogs but also on humans, rabbits and cats. The blood diastase decreased after meals, injections of glucose, glycogen and insulin, but increased after anesthetics and injections of starch. Since pancreatectomy and ligature of the pancreatic duct caused little or no change in the amt. of circulating diastase the pancreas is not the main source of blood diastase. Since definite variations can be induced by injections of insulin and glycogen, it appears likely that the circulating diastase is not entirely a waste product on its way to excretion. Evidence is adduced that variations in blood diastase are probably due to its being taken up or given out by the liver cells according to the requirements of the body with respect to the glycogen-glucose equil. probably in assocn. with insulin.

Rachel Brown

**Placental hormones.** J. B. Collip. *Can. Med. Assoc. J.* 23, 631–3(1930); cf. *C. A.* 24, 5812.—A brief résumé of work already reported, in which C. stresses his view that the human placenta contains at least 3 distinct active principles, one a sp. product of placental tissue functioning, and actively related to the condition of pregnancy.

A. T. Cameron

**Notes on the clinical use of certain placental extracts.** A. D. Campbell and J. B. Collip. *Can. Med. Assoc. J.* 23, 633–6(1930); cf. *C. A.* 24, 2781.—Observations on 135 cases of deranged ovarian function led to the following conclusions. Emmenin does not alter normal menstrual cycles. Its effect in dysmenorrhea has been particularly encouraging, and it appears to correct certain types of amenorrhea of recent origin. It definitely lengthens the cycles in polymenorrhea. It relieves the menopausal symptoms of recent origin, but not in castrates. An anterior pituitary like principle from the placenta arrests certain forms of metrorrhagia.

A. T. Cameron

**The basal metabolism during harvesting.** G. Farkas, J. Grüdrich and A. Szakáll. *Arbeitsphysiol.* 3, 468–76(1930); cf. *C. A.* 23, 887; 24, 5352.—The basal metabolism of 6 harvesters was detd. by the Douglas bag method during varying lengths of time, the longest for a period of over 7 weeks. The basal metabolism at the time of the most strenuous work varied from 1.20 to 1.36 cals. per kg. per hr. and was about 10% higher than the min. values obtained during the periods of idleness after harvesting and threshing were finished.

T. M. Carpenter

**The protein catabolism at extraordinary altitudes. A contribution to the question of the limits of acclimatization at high altitudes.** A. Loewy. *Arbeitsphysiol.* 3, 596–604(1930); cf. *C. A.* 25, 98.—Ten urines obtained from 6 members of Dyhrenfurt's expedition to the Himalayas at altitudes between 5150 and 7300 m. and preserved in air-tight sterile bottles contg. powd. thymol were analyzed at Davos. Expressed in % of total N the constituents averaged: urea 75.4, ammonia 5.05, preformed creatinine 3.74, total creatinine 4.80, uric acid 2.22, amino acids 0.94 and undetd. N 12.5%. The urines were more nearly normal than those collected by Hopf (cf. *C. A.* 23, 5223) in the second winter Olympic. This cannot be explained by the inhalation of O as only one sample was obtained under this condition and its compn. agreed well with that from the same person without previous inhalation of O. The approach to normality may be explained by the extensive acclimatization at the high altitudes. The acclimatization began at 2700 m. and the urines were collected 49 to 80 days later.

Meanwhile the subjects had successively gradually attained the high altitudes at which the urines were collected. T. M CARPENTER

The growth and metabolism of mice. PH L'HÉRITIER *Ann physiol. physicochim biol* 6, 1-31(1930) H. EAGLE

The semi-permeable membrane of the cell. ROBERT CHAMBERS. *Ann physiol physicochim biol* 6, 233-9(1930) —A brief summary of the evidence furnished by microdissection for the existence of a true cellular membrane. H EAGLE

The demonstration of bile acids in the blood. M JENER AND FR. STEINBERG *Arch exptl Path. Pharmakol* 153, 244-56(1930) —By use of the Pettenkofer reaction, bile acids are shown to be occasionally less than 0.025 mg % in normal blood, disproving the theory that they regulate cardiac frequency. In jaundice, however, they may reach as high as 2-8 mg %. H EAGLE

Androkinin (male sex hormone) in male blood. S. LOEWE, F ROTHSCHILD, W. RAUTENBUSCH AND H E. VOSS. *Klin Wochschr* 9, 1407(1930) —By extn of saponified blood with ether, the active principle can be demonstrated in small quantities (1-2 mouse units per l.), by injection into a castrated mouse, and histological examn. of the glands of the seminal vesicle. H. EAGLE

Oxygen consumption following bodily work. DIETRICH JAHN *Klin Wochschr* 9, 1757-9(1930). H EAGLE

The significance of raw egg white for the deposition of glycogen in the liver. I. ABELIN. *Klin Wochschr.* 9, 1759-61(1930) —Egg albumin promotes the deposition of glycogen in the liver H EAGLE

Lactic acid metabolism in pregnancy and its relationship to hepatic and thyroid function. KARL JULIUS ANSELMINO AND FRIEDRICH HOFFMANN *Klin Wochschr.* 9, 1768-70(1930), cf *C A* 25, 731 —In pregnancy there is an increased formation of lactic acid in muscles, both resting and active, due to increased thyroid function. Similarly increased lactic acid is observed in hyperthyroidism and in circulatory decompensation. H. EAGLE

The role of lactic acid in muscle fatigue. W FLEISCHMANN AND F SCHEMINSKY. *Klin Wochschr* 9, 1773(1930) —By reversing the direction of the elec. stimulus, a fatigued muscle can be made to contract, despite its lactic acid content, indicating that muscle fatigue does not depend upon this factor H EAGLE

The anterior pituitary hormone. W. FALTA AND F. HÖGLER. *Klin Wochschr.* 9, 1807-12(1930) H EAGLE

Investigations in the role of the liver in the intermediary metabolism. KARL PASCHKIS. *Klin Wochschr* 9, 1917-9(1930) —In liver damage, as, *e g*, in toxic jaundice, there is an abnormal increase in blood amino acids following the peroral administration of amino acids, suggesting that deamination is a function of the liver H EAGLE

Effect of temperature upon the height of contraction and time of maximal contraction of skeletal muscles. I. Frog muscles. KISUO SUGAI *Tôhoku J Exptl Med* 16, 1-24(1930) —The time required for maximal contraction decreases with increasing temp (10-40°), the temp coeff is 2 between 10° and 25°, but only 1.2 between 25° and 40° The degree of contraction is usually a min. at 22-27°, it increases at either higher or lower temps, occasionally it remains quite const., and in a third group decreases uniformly with temp II. Muscles of white guinea pigs. *Ibid* 54-70 —Contrary to the results obtained with the muscles of poikilothermic animals the extent of contraction of guinea pig striated muscle decreases with temp (10-40°) The latent period and the time required for maximal contraction both show a similar decrease with temp, the temp coeff being 1.2 between 40° and 25° and 1.8 between 25° and 10°. At the same temps, the contractility gradually decreases, but the max contraction time remains unaffected. H EAGLE

Effect of temperature upon the contraction curve with several peaks. KISUO SUGAI *Tôhoku J Exptl Med* 16, 25-53(1930) H EAGLE

Studies in the internal secretion of the pancreas. XV. TAIZO KUMAGAI AND SAIORO UKAI *Tôhoku J Exptl Med* 16, 157-68(1930) —Aq exts. from various portions of pigeon pancreas were tested for their hypoglucemic effect upon rabbits. Those prepd from regions relatively rich in alpha cells were found to be distinctly more active, contrary to the theory of beta-cell activity H EAGLE

Indispensability of the suprarenal glands in causing nicotine hyperglucemia in rabbits. TATSUSABIRO INABA AND KOGORO OIKAWA. *Tôhoku J Exptl Med* 16, 169-77(1930) —Double splanchnicotomy does not affect nicotine hyperglucemia in rabbits, but removal of the suprarenals prevents it completely H E

The vascular effect of tissue fluids. SABURO FUKAMI. *Tôhoku J Exptl. Med* 16,

181 8(1930).—Perfusion of Ringer fluid through surviving tissue (rabbit kg) endows the fluid with vasodilating properties, not observed if $H_2O$ or NaCl soln is used. The vasodilating activity is most marked 1½ hrs after the fluid is prepd., and gradually disappears in the course of 24 hrs. H. Fagan

**The resorption of parenterally introduced emulsified fats.** Shinosuke Hotta *Tohoku J. Exptl. Med.* 16, 311-20(1930).—The number of very fine granules seen in blood plasma (fat droplets) is an accurate measure of parenteral fat absorption paralleling the results obtained on chem. analysis. Absorption from serous cavities is very rapid, and is conditioned by the circulation of the underlying tissues. H. F.

**Biochemistry and biophysics of the developing hen egg. I. Influence of humidity.** Alexis I. Romanoff. Cornell Univ. Agr. Expt. Sta., *Mem.* 132, 3-27(1930).—From the exptl. data it is concluded that the extreme conditions in the incubator, 80 and 40% relative humidity, have both direct and indirect influence on the developing chick embryo, as follows. The growth of the embryo was rather irregular, being somewhat hastened at high and retarded at low humidity. The cycles in the growth of the embryo were decidedly disturbed. The Ca metabolism in certain stages of the embryonic development was much better at high than at low humidity. The mortality of the embryo was noticeably increased during the 2nd critical period, at the 10th day of incubation, particularly at high humidity. The physicochem. constitution of the yolk sac was slightly changed; this might have affected the embryonic metabolism, leading to the low vitality of the embryo and to its susceptibility to environment. The water content of the shell membranes and the contents of the allantoic sac corresponded to the humidity condition, this might have made an obstruction to hatching through the restriction of free movement of the embryo and through the hindrance to pulmonary embryonic respiration. Bibliography. C. R. Fellers.

**Effect of the estrus-producing hormone on the growth of the mammary gland.** C. W. Turner and A. H. Frank. Mo. Agr. Expt. Sta., *Research Bull.* 145, 5-56 (1930).—In the normal rabbit after continued estrus, the mammary glands show extreme extension of the duct systems resembling the naked branches of a tree. If pregnancy or even pseudo-pregnancy now ensues, the ducts develop lobules contg. large nos. of alveoli, resembling the budding of leaves from the smaller branches. The daily injection of 20 rat units of the estrus producing hormone recovered from pregnant-cow urine, for 30 days in male castrate rabbits and in female rabbits castrated previous to puberty caused the growth of the duct system of the glands equal to that produced during continued estrus in the normal female. The results obtained seem to warrant the conclusion, that the estrus producing hormone will cause the growth of the ducts equal to that produced during estrus, that the rate of development is not hastened by increasing the dosage and that there was present in none of the oils used a hormone or hormones which would produce the type of growth characteristic of pregnancy. C. R. Fellers.

**Basal metabolism of young women.** Hughina McKay. Ohio Agr. Expt. Sta., *Bull.* 465, 3-37(1930).—The Benedict-Roth metabolism app. was used to study the basal metabolism on 91 girls aged from 11 to 18 yr. O consumption averaged 197 cc. per min.; basal heat production 1304 cal. and av. basal cal. production was 25.4 per kg. Heat production per kg. decreased fairly regularly as age increased. No significant differences among the age groups were noted on O consumption. When age was disregarded, heat production per kg. decreased decidedly with increased wt. The overwt. group averaged 9% less and the underwt. group, 12% more per kg. than the entire group. Predictions of basal metabolism on surface area are less liable to error than those based on height or wt. Basal metabolism of young college women is somewhat higher in the spring than in autumn or winter. C. R. Fellers.

**The effect of manganese on the growth of rats.** V. E. Nelson, J. M. Evvard and W. E. Siewell. *Proc. Iowa Acad. Sci.* 36, 267(1929).—Mn in small quantities stimulated the growth of rats. The basal diet employed consisted of casein 18, yeast 12, cod liver oil 5, salts (mixt. no. 185) 3.7 and dextrin 61.3. $MnSO_4 \cdot 4H_2O$ was fed at 2 levels, 100 and 600 p. p. m. of ration. In 60 days the control gained 1.78 g. daily and consumed 431 g. of feed per 100 of grain. On the smaller Mn allowance the gain was 2.06 g., and the feed requirement was 301.1 g. for 100 gain. On the larger Mn allowance the figures were 1.69 and 358.5. Apparently the 600 parts of $MnSO_4 \cdot 4H_2O$ per million inhibited growth. W. G. Gabbatiss.

**Hydrolysis of levorotatory substance in human milk.** M. Polonovski and A. Lespagnol. *Compt. rend. soc. biol.* 101, 64-5(1929); *Physiol. Abstracts* 14, 373.—A levorotatory non reducing lactoside, a glucoprotein, exists in human milk, which is converted to a reducing substance by hydrolysis. G. G.

**Basal metabolism as a function of temperature.** C Karper *Compt rend soc biol* 101, 708-10(1929), *Physiol Abstracts* 14, 653 —*The influence of the surrounding* temp on the min heat production of pigeons after a 26 hrs' fast has been detd By a simple mechanism of adaptation the exchanges in a pigeon may be diminished by 29 4% *The adaptation is slow, and may take several weeks for completion In con* trast with this slow mechanism is the rapid chem regulation setting up increased heat production when the temp is lowered G G

**Coagulation of blood and cholesterol content.** L Bugnard *Compt rend soc. biol.* 102, 291-3(1929), *Physiol Abstracts* 14, 552 —The cholesterol of serum is greater than that of plasma The coagulation of blood under oil or in air is accompanied by an increase of cholesterol in the fluid phase G G

**Mechanism of concentration of urinary indoxyl.** G Larochie, A Grigaut and P Delille *Compt rend soc biol.* 102, 532-4(1929), *Physiol Abstracts* 15, 38 — Parenteral injection of isotonic saline soln in the dog leads to a lowering of urinary indoxyl Ingestion of water by the mouth increases it because of the absorption of indole from the alimentary canal Peptone shock causes an augmented output Tissue disintegration with transformation of tryptophan to indole may account for some of the increase This would imply the endogenous formation of indole, which cannot be demonstrated G G

**Cholesterol regulation in the lung.** L Bugnard *Compt rend. soc biol* 102, 550-1(1929), *Physiol Abstracts* 15, 18, *cf C A.* 24, 647; 4816 —The distribution of cholesterol in the blood depends on the reaction When the acidity is increased the amt of cholesterol in the plasma rises, the effect being explained by a transference of *cholesterol from the corpuscles* Diminution of $CO_2$ in the lung is accompanied by the reverse change in the cholesterol distribution The distribution seems to be a factor in maintaining the physicochemical equil and the $p_H$ of the blood G G

***Oxidation-reduction potential of the vitreous humor.*** E Redslob and P Reiss *Compt rend soc biol* 102, 1060-2(1930), *Arch phys biol* 7, 221-5(1930), *Physiol Abstracts* 15, 145 —The oxidation reduction potential of the vitreous humor in the rabbit was *measured by the injection of indicators and by the insertion of a fine platino* Ir point with an indifferent electrode on the skin for elec measurement The results of the 2 methods agreed well A potential of +110 mv was found, which corresponds *with an $r_H$ of 19 1 for a $p_H$ of 7 6 Arrest of the circulation caused a fall of potential* to +51 mv, corresponding to an $r_H$ of 16 9 G G

**Reactions of ovary to placental injections.** M Klein *Compt rend soc biol* 102, 1068-9(1930) *Physiol Abstracts* 15, 181 —*Exts of total placenta cause a great dis*turbance of the ovary in the rabbit The changes resemble those obtained with hypophysin The effects are produced with human placenta at all stages of pregnancy and at term G G

**Is the active placental substance a hypophyseal hormone?** M Klein *Compt rend soc biol* 102, 1070-1(1930) *Physiol Abstracts* 15, 181-2 —Hemorrhagic follicles and corpora lutea are found in the ovary after injection of the placental ext *These* changes are supposed by some workers to be sp tests of hypophysin The increased thyroid activity described as resulting from injections of hypophysin did not occur as a result of placental injection It is probable that the placenta contains a substance which acts on the ovary but which is not hypophysin G G

**Acidosis in pregnancy.** E L Solal, J Dalsace and M Girardot *Compt rend soc biol 103, 111 2(1930), Physiol Abstracts 15, 184* —Uncompensated acidosis has been demonstrated in albuminuric pregnancy Now it is shown that acidosis exists to some extent toward the end of normal pregnancy It is greatest in labor and dis *appears after parturition* There is a lowering of $p_H$ and of the alk reserve *In pre*eclamptic conditions the $p_H$ and alk reserve are lowest G G

**Oxytocic properties of woman's blood during parturition** J Fontes *Compt rend soc biol 103, 349-50(1930), Physiol Abstracts 15, 119* —The oxytocic substance in woman's blood must be a fetal product or a product obtained from fetal accessory structures, as it disappears a few hrs after parturition The blood of the umbilical cord is not active, while that *from the placental site of the uterus is* The placenta may be the seat of formation of the oxytocic substance The oxytocic element is the detg factor in setting up labor pains G G

**Secretory phenomena *in the thyroid of birds.*** P Florentin and M. Weis *Compt rend soc biol* 103, 601-3(1930), *Physiol Abstracts* 15, 179-80 —In certain birds massive degeneration of the parenchyma of the thyroid was observed The débris is poured directly into the circulation, cellular *emboli being seen in the small* vessels Amitotic multiplication is supposed to be the method of regeneration The

analogy with mammalian thyroid processes is marked. The phenomenon seems to be connected with changes in the sexual organs G. G.

**Difference in cerebral effects of a new thyroid extract and thyroxine.** G. Ficus. *Compt. rend. soc. biol.* 103, 603-5(1930). *Physiol. Abstracts* 15, 180.—An ext. has been made from the thyroid of vagotome animals which acts on psychomotor centers in lowering their chronaxie. It contains a hormone which is different from that affecting metabolism. Thyroxine does not lower the chronaxie of the nervous centers. G. G.

**Substances extracted from the suprarenal glands by hydrogen peroxide.** J. Stitt. *Compt. rend. soc. biol.* 103, 650-2(1930). *Physiol. Abstracts* 15, 180. In extg. the cortical hormone of the suprarenal gland, adrenaline may be excluded by using $H_2O_2$. The ext. contains no lipoids, but choline is abundant. The alc. ext. contains lipoids and a crystallizable substance. The crystallizable substance is supposed to be identical with the oxidation product of adrenaline. Choline exists only in the peroxide ext., not in the alc. It probably arises from the decompn. of lecithin. G. G.

**Remarks on the work of Mond and Netter "does the ionic permeability of muscle change during muscular activity?"** J. Ernst. *Arch. ges. Physiol.* (*Pflügers*) 226, 243(1930). cf. *C. A.* 24, 5351. Polemical. Arthur Grollman

**Hemin, bilirubin and porphyrins.** Hans Fischer. *Naturwissenschaften* 18, 1026-37(1930). cf. *C. A.* 25, 520. An elaborate review of the present knowledge of the chemistry of blood pigment and related chem. compds., numerous references are given. B. J. C. van der Hoeven

**Morphology of the porphyrins.** M. Borst. *Naturwissenschaften* 18, 1038-41 (1930).—A review of recent work on morphological distribution of porphyrins and derivs. (cf. Borst and Königsdorffer, Untersuchungen über Porphyrine, Leipzig, 1929). B. J. C. van der Hoeven

**Proteoclastic function of the thyroid.** M. Loeper, A. Lemaire and J. Tonnet. *Compt. rend. soc. biol.* 102, 279-80(1929). *Physiol. Abstracts* 14, 580.—The thyroid gland breaks up proteins. Nucleo-albumins (precipitable by AcOH) are less abundant in the venous than in the arterial blood. Serine is more abundant in the venous blood. The amino acids are less abundant in the efferent blood. Fresh thyroid ext. breaks up albumins *in vitro*. E. C. K.

**Rest-nitrogen percentage of the blood of natives and of Europeans in the Tropics.** W. Radsma. *Mededeel. Dienst Volksgezondheid Nederl.-Indië* 19, Pt. 2, 227-32 (1930).—A series of urea estns. with undernourished natives resulted in an av. of 21 mg. %; from 3 to 4 hrs. after the last meal at 10 or 11 A. M., the av. was 25.8 mg. %. The blood examd. was capillary blood from the fingertip. J. A. Kinsbergen

**Gasometric determination of the relative affinity constant of carbon monoxide and oxygen in whole blood at 38°.** J. L. Sendroy, S. H. Liu and D. D. Van Slyke. *Bull. soc. chim. biol.* 12, 532(1930).—Three normal and 3 pathol. samples of human blood gave a value of 210 for the affinity const. $K$ ($p_{O_2}/p_{CO}$) = ($HbCO/HbO_2$), and for 10 samples of beef blood $K$ = 170. All values found were within 2.5% of the av. C. G. King

**Food balance and nutrition.** Lucie Randoin. *Bull. soc. chim. biol.* 12, 815-26 (1930), cf. *C. A.* 24, 5805.—Pigeons receiving 60% carbohydrate on a vitamin B free diet died in 17-27 days, but when on a carbohydrate free diet (51% protein) they survived 3 months. Similarly rats died in 30-60 days or survived 4 months. Expts. also indicate a needed balance of mineral salts and carbohydrate. Details concerning purification of the diets are not given. C. G. King

**Relationship between electrical differences of potential in the skin and normal basal metabolism.** Charlotte Purdy, A. Frances Johnson and Charles Sillard. *Science* 73, 46-9(1931). W. D. Langley

**Regulation of cholesterolemia.** L. Bernard and C. Soula. *Compt. rend.* 191, 1382-4(1930).—The regulation of cholesterolemia is an automatic function of the blood tissue. It is accomplished by the globular cholesterol existing in this tissue although it is neither generated nor destroyed by it. The mechanism of such regulation is purely a physical one and depends upon the cholesterol circulating generally in the cellular constituents of the blood and in the plasma. B. S. Levine

**The work of the kidney in the production of urine.** Henry Borsook and Howard M. Winegarden. *Proc. Nat. Acad. Sci.* 17, 3-12(1931).—Summary: (1) The work of the kidney in the excretion of urine is analyzed by means of the second law of thermodynamics. (2) It is shown that the work performed by the normal kidney in man in the excretion of urine is of the order of magnitude of 0.7 g. cal. per cc. of urine, or 70 g. cal. per g. of N excreted. B. S. Levine

**The energy cost of the excretion of urine.** Henry Borsook and Howard M.

Winegarden. *Proc. Nat. Acad. Sci.* 17, 13–25(1931).—Summary: (1) The work of the kidney in the excretion of urine is analyzed by means of the second law of thermodynamics. It is shown that the production of either hyper- or hypo-tonic urine entails work on the part of the kidney. The excretion of a urine which is the same as the plasma in all details incurs no work by the kidney. (2) The energy consumed by the kidney in man in the production of urine was found to be 6–11 kg. cal. per g. of N excreted. (3) It is shown that the normal healthy kidney considered as a chem. machine possesses a great capacity for work, but performs its work with an "efficiency" probably not greater than 1–2%. (4) The effect of disease is to reduce markedly the capacity of the kidney for work. B. S. Levine

Gas tensions in the tissues. J. Argyll Campbell. *Physiol. Rev.* 11, 1–40 (1931).—General review covering diffusion, absorption, quant. measurement and other problems concerning gases in body tissues, cavities and secreted fluids. Extensive bibliography. E. R. Long

Factor influencing oxidative and lytic systems. W. Loele. *Virchow's Arch. Path. Anat.* 279, 207–13(1930).—In the oxidation system. OH + α-naphthol + $NH_2$·(COOH) + COH + Fe*** a variety of amino acids may take the place of the glycocoll. Thus artificial oxidation system, in its susceptibility to heat, prolonged standing, $ZnCl_2$, etc., behaves much like the cell oxidase supposed to function in the granules of eosinophilic leucocytes. Amino acids function in tryptic systems *in vitro*, inhibiting the action of alkali. While *in vitro* the groups COH and $NH_2$(COOH) both inhibit the action of alkali, they are themselves antagonistic, the inhibiting action of COH being removed by $NH_3$. In the formation of blood cells peptic processes occur in the lymphocytes and tryptic processes in the granular leucocytes and red blood corpuscles. The formation of these cells may be modified by changing the OH concn. of tissue, and by treatment with aldehydes, amino acids or ferric salts. E. R. Long

The equilibrium between cerebrospinal fluid and blood plasma. III. The distribution of calcium and phosphorus between cerebrospinal fluid and blood serum. H. Houston Merritt and Walter Bauer. *J. Biol. Chem.* 90, 215–32(1931).—Normal serum contains from 9.35 to 10.6 mg. of Ca per 100 cc. (av. 10.0 mg.) while the Ca content of cerebrospinal fluid is approx. ½ this amt. (4.5 to 5.23 mg., av. 5 mg.) The Ca content varies directly with the serum protein in such a way that there is no significant change in the ratio with changes in the serum protein. In meningitis there is a slight diminution in serum Ca and an increase in cerebrospinal fluid Ca which is accounted for by increased permeability of the meninges and the choroid plexus with a resulting increased protein content in the spinal fluid. There is a definite decrease in serum Ca at the end of pregnancy; the amniotic fluid Ca averages 6.59 mg. per 100 cc. In non-suppurative diseases of the central nervous system the Ca content of both serum and spinal fluid is normal; the spinal fluid P content varies between 31 and 45% of the serum P (av. 38%) in these diseases while in suppurative conditions the ratio varies between 35 and 123% (av. 40%). The serum and spinal fluid Ca content of cats is slightly higher than in humans, the spinal fluid Ca averaging 54% and the aqueous humor 60% of the serum Ca. IV. The calcium content of serum, cerebrospinal fluid and aqueous humor at different levels of parathyroid activity. *Ibid.* 233–46.—The cerebrospinal fluid Ca remains markedly constant in spite of a well-marked change in the serum Ca level, the striking lowering of serum Ca in parathyroid tetany and its sustained elevation following parathormone administration being without appreciable effect on the spinal fluid Ca level. Injection of parathyroid hormone causes only a slight increase also in the Ca content of the aqueous humor (0.6 mg.). If one accepts the cerebrospinal fluid as a dialyzate in osmotic and hydrostatic equil. with the blood plasma, the data would indicate that variations in serum Ca occurring during parathyroid tetany or following the administration of parathyroid gland ext. are chiefly and perhaps wholly limited to the non-diffusible Ca. Variations in serum Ca associated with different levels of serum protein involve both the diffusible and non-diffusible Ca. Bibliography of 55 references. A. P. Lothrop

Studies in hyperthermia. II. The acid-base equilibrium in hyperthermia induced by short radio waves. Fritz Bischoff, M. Louisa Long and Elsie Hill. *J. Biol. Chem.* 90, 321–9(1931). *cf. C. A.* 24, 2754.—"With the exception of a fall in blood vol., which is probably not a direct effect, no difference in effect was noted between raising the body temp. by placing the subject in the field of condenser plates in circuit with a short wave radio transmitter and in raising the body temp. by means of diathermy, warmed air or hot water baths. Of fundamental importance was the loss of $CO_2$. The $p_H$ of the blood became more alk., there was a shift of bases to the blood proteins and an increased oxygenation of the hemoglobin of venous blood. No signifi-

cant change in the non protein N constituents of the blood was noted No evidence was obtained that the body was attempting to compensate for the condition of alkalosis through the urinary or perspiratory excretions" III. The phosphorus equilibrium. FRITZ BISCHOFF, L. C. MAXWELL AND ELSIE HILL. *Ibid* 331-9 — No P is eliminated in the perspiration during a hyperthermia induced by radio waves The decrease in the rate of urinary P excretion is accounted for by the decrease in P elimination with increase in metabolism and the conversion of inorg to org P in the blood with an alk. shift of blood $p_H$ The decreased rate of urinary N excretion is accounted for by the increased N elimination through the perspiration" A. P. LOTHROP

The action of general cold stimuli (sea bathing) on the resistance of erythrocytes. A. CHIATELLINO *Arch. sci. biol* (Italy) 15, 349-53(1930) cf *C. A.* 24, 4824 —Cold stimuli such as sea bathing cause an increase in the no. of red blood corpuscles and a definite but slight decrease in the resistance of the corpuscles to hemolysis. P. M.

The place of origin of the biliary pigment. EMILIO BECCARI *Arch. sci. biol* (Italy) 15, 356-95(1930). —A review PETER MASUCCI

The reaction of articular tissues. BRUNO BORGHI. *Minerva med.* 1930, II, 913-7.—The object was to see whether intensive work, immobility and the local action of heat and cold have the power to modify the $p_H$ of articulations. One knee of the rat was used for the study while the other was kept as a control. The $p_H$ was detd. by means of phenol red which was injected intraperitoneally into the rats. The following results were obtained. Intense work changed the tissues of articulation toward the alk. side. immobility did likewise at first, but later the reaction of the tissues changed toward the acid side of the normal. The local application of heat increased the alky. Cold produced slight and inconst. changes toward the acid side which was revealed by the diminution of the buffer value of the tissues toward acids. The mechanism of these changes and their significance in the general pathology of articulation are discussed. PETER MASUCCI

The curve of alveolar carbon dioxide tension during voluntary apnea. GIORGIO GIORGI *Arch. ital. biol.* 84, 11-22(1930).—For the same individual there is an av. value for alveolar $CO_2$ tension beyond which it is impossible to maintain apnea. This max. alveolar $CO_2$ tension varies for different individuals, but for the same individual it is fairly const. S. MORGULIS

Influence of the liver on the function of the heart. A. RONCATO. *Arch. ital. physiol.* 84, 23-31(1930).—Blood perfused through the liver produces a marked hemodynamic effect upon the isolated heart. The perfusion arrangement is such as to permit the inclusion or exclusion of the pancreas, and this shows that the pancreas does not contribute to the effect upon the heart of the blood circulating through the liver. No conclusion is drawn as regards the nature of the substance given off by the liver which may be a hormone, or some nutritive factor furnished by the liver to the heart. Finally, it is also considered that the liver may detoxicate the blood which passes through it before reaching the heart and thus increase its action upon the contraction of the heart. S. MORGULIS

Studies of carbohydrate metabolism of blood and organs with the aid of a new colorimetric method. I. The presence of different hexoses besides glucose in human blood and their formation in vitro. ZACHARIAS DISCHE *Biochem. Z.* 229, 100-95 (1930).—Two methods were employed for the detn. of the blood sugar. A part of the blood is deproteinized with 25% and another part with 10% $CCl_3CO_2H$. After remaining overnight this is centrifuged. It has been definitely established that no free sugar is retained in the ppt. nor do any substances pass into the fluid which affect the color reactions utilized in the sugar detn. Added glucose has always been quantitatively recovered. The color reactions were produced with diphenylamine-HCl or with indole-$H_2SO_4$. The former reaction was so modified that it included all hexoses and not merely fructose. For this purpose to 1 part of the sugar soln. are added 2 parts of Rothenfusser's reagent (100 cc. concd. HCl, 80 cc. glacial AcOH, 20 cc. of 10% alc. diphenylamine); this is then heated in the boiling water bath 3, 10 or 30 min. The ketoses show a much stronger coloration than aldoses, the difference being greater the shorter the time of boiling. By the indole-$H_2SO_4$ reagent the relative color intensities for various sugars are as follows: glucose 100, fructose 125, Harden-Young ester 100, mannose 70 and galactose 75. The results by the former reaction are invariably higher (10-150%) than by the latter. In some instances the diphenylamine-HCl procedure gave variable results depending on whether the heating was for 10 or 30 min., which is regarded as an indication that blood contains 2 other hexoses besides glucose, an aldose and a ketose, which are designated as the "additional sugar." Following a large glucose dose the intensity of both the diphenylamine-HCl and indole-$H_2SO_4$ reaction gen-

erally increases to the same extent, so that only the glucose but not the "additional sugar" of the blood is raised under these circumstances, but occasionally there is an increase also in the "additional sugar" An hr after the injection of 20–30 units of insulin both glucose and the 'additional sugar' disappear, but the latter disappears more rapidly Incubating blood at 37° for 2 hrs causes practically all the 'additional sugar" to disappear From the behavior of fluoride or citrate blood kept for several hrs at room temp it is evident that a ketose sugar is formed, which disappears more quickly than glucose when the blood is kept in the incubator Addn of glucose to citrated blood causes the formation of a ketose as well as an aldose The newly formed ketose is present only in the red cells whereas the preformed 'additional sugar" is practically equally distributed between cells and plasma The formation of the ketose in blood at room temp is much increased through the addn of $Na_2HPO_4$, and it is believed that this ketose is really a hexosephosphate ester S Morgulis

**Influence on the development of the female sex organs of hyper-interrenalization.** Carl Müller *Endokrinologie* 8, 5–14(1931).—Expts were performed on female rats exactly 3 weeks old Some of these young rats were thymectomized, and only about 15% of the operated animals were lost A special ext. of the adrenal bodies was used to inject some of the intact and of the thymectomized rats For this purpose very fresh beef suprarenal glands were freed from fat, etc., and the cortex, carefully sepd from the medulla, was ground fine in a few cc. 0.9% NaCl The thick, reddish pulp obtained from about 150 g substance is boiled in an Erlenmeyer flask for 10 min on the water bath to remove proteins This is filtered through gauze, about 30 cc soln being obtained Traces of adrenaline are removed by passing air through the ext which is now neutralized with 0.05 *N* NaOH Every 2–3 days 0.5 cc of this was injected. These injections of the cortical ext produced a typical strong inhibition of development of the external as well as internal female sex organs In the ovary defective development of the ova was observed and absence of normal corpora lutea S Morgulis

**Inactivation by proteolytic enzymes of the anterior hypophysis hormone obtained from pregnant urine.** M Reiss, A Schaffner and F Haurowitz *Endokrinologie* 8, 22–4(1931).—Expts were made with the following proteolytic enzymes aminopolypeptidase carboxypolypeptidase, pepsin, inactive trypsin and activated trypsin Only the activated trypsin brought about complete destruction of the hormone S Morgulis

**The significance of the bile acids in the carbohydrate metabolism. IX. The effect of bile acids on the sugar assimilation.** Sei Fuzita *J Biochem* (Japan) 12, 383–91(1930).—The glycogen forming capacity of the fasting rabbit liver from different monoglucides decreases in the following order *d* fructose, *d* glucose, *d* mannose and *d* galactose The glycogen forming capacity in this series can be raised on the av 42–52% by the administration of cholic acid Fructose yields the greatest glycogen production both with or without cholic acid, in point of extent of the glycogen formation with cholic acid this is followed by glucose, mannose and finally galactose The lowering of the excretion threshold for these various sugars under the influence of cholic acid is therefore to be attributed to its stimulation of glycogen formation in the liver S Morgulis

**Studies on the nature of the prophyrin appearing in urine following ingestion of chlorophyll.** Yasuo Nakamura *J Biochem* (Japan) 12, 475–85(1930).—Spectroscopic studies as well as biol tests show that urine porphyrin following the ingestion of chlorophyll is isomeric with blood porphyrin The urobilin output after chlorophyll ingestion is always increased S Morgulis

**The site of ammonia production** A Følling *Skand Arch Physiol* 61, 23–6 (1931).—F experimented upon himself on an ordinary diet, and in a condition of acidosis caused by $NH_4Cl$ or alkalosis by $NaHCO_3$ The plasma $NH_3$ was detd by the Parnas method, the rate of kidney filtration by Rehberg's method and the urinary $NH_3$ in hourly samples So long as the urine is more acid than $p_H$ 7.8 more $NH_3$ is found in the urine than is filtered through the kidney during the same time, so that the $NH_3$ must be formed by the kidney The results of analysis also allow the calcn. of the concn of undissocd $NH_4OH$ in plasma and urine, according to which the latter is 10 times as great as the former, thus precluding any possibility of a direct diffusion from plasma into urine S Morgulis

**Further observations on the depressor substance in brain tissue.** Ralph H Major and C J Weber *J Pharmacol* 40, 247–52(1930), cf *C A* 24, 2109.—The depressor substance is adsorbed on Lloyd's reagent from a brain ext and then freed by treatment with $Ba(OH)_2$ The soln is further purified by pptn with phosphotungstic

acid and $AgNO_3$. The final soln. produces a fall in blood pressure in dogs before or after atropinization. It gives a positive Sakaguchi, and a negative Pauly, reaction. The substance is not histamine, choline or acetylcholine. C. Rieger

## G—PATHOLOGY

H. Gideon Wells

**Chloride determinations in cases of intestinal obstruction.** M. Paget. *Bull. soc. chim. biol.* 12, 409–10(1930).—Chloride detns. in cases of high or low obstruction of the intestine should be made on whole blood when the alk. reserve is increased and on the serum when it is normal. B. C. A.

**Magnesium and calcium in the liver of hyperthyroidized animals.** M. Cahane. *Compt. rend. soc. biol.* 100, 577–8(1929).—With guinea pigs the increase was 0.0021 and 0.0015%, resp. B. C. A.

**Relation between changes in the alkali reserve and relative chlorine and sodium contents of the blood in experimental immobilization of the intestine and in histamine shock.** J. D. Alsina. *Compt. rend. soc. biol.* 100, 1098–1101(1929). The changes in the alkali reserve are accompanied by a relative increase in blood Na and decrease in blood Cl. B. C. A.

**Dextrose and normohemolysins.** J. Djuricic. *Compt. rend. soc. biol.* 100, 1224–5(1929).—Dextrose has no influence on hemolysis by hemolysin; hence the mechanism is not that in hypertonia and is not accompanied by colloidal changes of the proteins of the surface layer. B. C. A.

**Gaseous exchange in fever caused by naphthylamine-yellow or by β-tetrahydronaphthylamine.** J. Dadlez and W. Koskowski. *Compt. rend. soc. biol.* 100, 1234–6, 1238–40(1929). B. C. A.

**Nature of the toxic product arising from closure of the intestine.** A. Blanchetière and L. Binet. *Compt. rend. soc. biol.* 101, 14–7(1929).—On occlusion of the intestine there is present a single chain substance of protose character, probably arising from the decarboxylation of leucine; it is possibly isoamylamine. B. C. A.

**Action of formaldehyde, hydrogen peroxide and white phosphorus on tuberculin.** J. F. Heymans and C. Heymans. *Compt. rend. soc. biol.* 101, 153–5(1929).—Tuberculin, which is not decomposed by the above reagents, is exceptional among proteins. B. C. A.

**Affinity of hemoglobin for oxygen in anemia.** G. Litarczek, H. Aunert and I. Cosmulescu. *Compt. rend. soc. biol.* 101, 220–1, 222–3(1929).—The affinity of hemoglobin for O is reduced in anemia. The ratio of $1/k$ to $C_H \times 10^4$, where $k$ is the dissocn. const. of the oxyhemoglobin, is abnormally high in anemia. B. C. A.

**Bile protein in diabetes.** J. Gavrila and A. Moga. *Compt. rend. soc. biol.* 101, 404–6(1929).—In diabetes the bile protein is increased. B. C. A.

**Susceptibility and resistance to tar cancer, an experimental study.** J. Matsin. *Ann. Surgery* 93, 180–9(1931).—Tar cancer is the result of a local irritation as well as of a general intoxication. Certain mineral salts (Mg, Cu) used in convenient doses are capable of delaying the appearance of cancer and of lowering the percentage of induced tumors. Other salts, *i. e.*, salts of radioactive metals, have the opposite effect. Diet can influence the appearance and evolution of tar cancer. The liver diet activates the development of cancer. It is probable that other diets would retard its appearance. Vitamin A adsorbed in addn. to a normal alimentation has no inhibitive effect on the appearance of cancer. Preceding closely the development of tar cancer and during its evolution, the metabolism of fats is deficient and the variations of the cholesterolemia are marked. The same variations are to be noticed after repeated ionium injections. Rachel Brown

**Dehydration in intestinal obstruction.** Gavin Miller. *Edinburgh Med. J.* 38, 47–53(1931).—In high simple obstruction in dogs, death is caused by loss of intestinal secretion causing dehydration and loss of Na and Cl ions. Only the blood plasma and interstitial fluid are lost. The intracellular fluid is maintained by an ionic concn. consisting mainly of $H_2PO_4$ and K. These are not lost in the gastrointestinal secretion and so dehydration does not impair the intracellular fluid. Rachel Brown

**Experiences with a high carbohydrate-low calorie diet for the treatment of diabetes mellitus.** I. M. Rabinowitch. *Can. Med. Assoc. J.* 23, 489–98(1930).—A report from the clinical point of view is given of a diet such as the title indicates. Provided the fat content is kept very low and the cal. value is within the min. requirements, it is possible, in the majority of cases, to make the diet of the diabetic quite attractive without the use of insulin. Where insulin is necessary, the dosage and frequency of

administration are less than with diets ordinarily in use. Special articles of food are not necessary. Low plasma cholesterol and N retention in the early stages are characteristic metabolic features assocd. with the treatment. A. T. Cameron

Chloropenia with excess of tissue chlorine in cirrhoses. H Thiers. *Compt rend soc biol* 101, 475–6(1929). *Physiol Abstracts* 15, 36, cf *C A* 24, 5370.—In alc. cirrhosis of the liver the following syndrome is described (1) diminution of Cl in blood, (2) normal or raised alk. reserve, (3) urea and non protein N diminution in blood, (4) excess of Cl in tissues. The hepatic lesion plays a part in this. It is not attributable to the same mechanism as in nephritis. H L D.

Superventilation tetany. Friedrich Holtz. *Z. physiol Chem* 194, 76–80(1931).—The tetany resulting from a prolonged period of voluntary forced breathing is accompanied by a lowering of the phosphate content of the serum. This may drop to a value as low as 1/3 of the normal, while the Ca remains normal. A study was made of the effect on nervous excitability by measuring a low-voltage current in milliamperes required to produce tremors in the tibial nerve. No fundamental difference was observed between normal and epileptic subjects except that epileptics reached the excitable stage somewhat sooner A. W Dox

Disturbances in the carbohydrate metabolism in Basedow's disease. Bernhard Kuegelmann *Klin Wochschr* 9, 1533–4(1930).—Thyreotoxic patients given 100 g of levulose *per os* show an appreciably higher and more prolonged curve, presumably due to functional liver insufficiency H Eagle

An experimental contribution to the serodiagnosis of carcinoma. I. The use of a scale-photometer in the albumin-A reaction of Kahn. W Bachmann. *Klin Wochschr.* 9, 1540–1(1930).—The demonstration of normal quantities of albumin-A in the serum is strong presumptive evidence for the absence of carcinoma. II. The comparison of the Kahn method of albumin-A determination by scale-photometric measurement with the modified Botelho reaction. W Bachmann and Fr. Schmidt *Ibid* 1541–3(1930).—A Kahn estimate of albumin A over 32 signifies the absence of cancer, readings of 32–20, with the Botelho M or Z tests negative, make carcinoma improbable, Kahn < 32, and positive Botelho M and Z tests are strong evidence for the existence of cancer, Kahn < 20, and Botelho tests negative or conflicting signify possible cancer It is important to regulate the $p_H$ in the Botelho tests. H Eagle

Eclampsia and ion economy H. Rossenbeck. *Klin Wochschr* 9, 1545–7 (1930).—In eclampsia Na leaves the blood and goes into the tissues there is also a relative increase in muscle Ca and a decrease in K. In the liver there is an increase of Na and K and a decrease in Ca. There is a theoretical discussion as to the significance of these findings. H Eagle

The clinical significance of the porphyrins. Hugo Kammerer. *Klin Wochschr* 9, 1658–63(1930).—A critical analysis of the literature. H. Eagle

Causal relationship and metabolic effects in diseases of abdominal organs and kidneys. Sigurd Frey *Klin Wochschr* 9, 1678–81(1930) H Eagle

Organ-antibody formations in human beings. Oedeon Fischer and Felix Georgi. *Klin Wochschr* 9, 1817–9(1930).—Spirochetes grown in a rabbit brain medium and injected into humans cause the appearance of antibodies which react with an alc. ext. of either spirochetes or human brain. Spirochetes grown on a rabbit kidney medium, and injected into humans, cause the appearance of antibodies against an alc. ext. of beef kidney, against sheep red blood cells, and against spirochetes. Absorption of this latter serum with sheep red cells removes its reactivity for the sheep cells as well as for the kidney, but leaves undiminished its reactivity with the spirochetes The greater reactivity of the kidney-spirochetes antisera for spirochetes grown on a kidney medium is not affected by this absorption. F and G conclude (1) that sheep red cells, rabbit kidney and beef kidney contain common receptors, which may or may not be identical with the Forssman receptor, (2) that organ-specific antibodies may be induced in humans (anti-brain, anti-kidney), which are not species specific, (3) that the difference between spirochetes grown on kidney and brain media, manifested by their greater reactivity with the homologous antisera, are not dependent upon the organ-antibodies present in these sera. It is highly significant that none of these anti-spirochetal sera is Wassermann-positive. H Eagle

Decrease of the urine chloride in acute fibrinous lung involvement. P. Reiche *Klin Wochschr* 9, 1850–2(1930) H Eagle

The significance of elastin in arteries. F Rosenthal. *Klin Wochschr* 9, 1909–13 (1930).—In jaundice, there is not a uniform satn. of the body by the bile pigments, but a selective absorption detd. by the affinity of the various organs for bilirubin. Thus, in dogs with exptl. jaundice (toluylenediamine), despite a very high blood bilirubin,

the bilirubin content of the spleen, heart, muscle, fat, brain, etc., is minimal, while the liver, kidney, skin conjunctive heart valves, vascular intima and lungs contain large quantities The bilirubin content of the liver and kidney is probably due to their excretory function, while the great affinity of the other tissues is detd chiefly by their high content of elastic fibers. *In vitro*, these fibers absorb bilirubin from soln In jaundiced skin, conjunctival, nuchal ligament, etc., the pigment cannot be extd by alc., acetone or $CHCl_3$ save in small quantities, while it is readily extd from liver or kidney Apparently, elastin enters into a firm combination with bilirubin It should be emphasized *that the foregoing holds only for acute exptl* jaundice H Eagle

The iodine-deficiency theory of goiter. C Alexander Hellwig *Klin Wochschr.* 9, 1914–6(1930).—See *C A* 24, 3052 H Eagle

Icterus neonatorum gravis. H. Kleinschmidt *Klin Wochschr* 9, 1951–4 (1930).—The disease is characterized by a high degree of erythroblastosis The large quantity of hematin in the blood and the pronounced siderosis both indicate toxic destruction of the blood Larly transfusion is suggested H Eagle

Acid-base balance in gastric and duodenal ulcer. F Reiche and F Fretwurst *Klin Wochschr* 9, 1954–9(1930).—The authors cannot confirm the findings of Balint that there is acidosis in cases of duodenal ulcer H Eagle

Testing the detoxicating function of the liver. Mich Schour and Cel. Rosengarten *Klin Wochschr* 9, 1968(1930).—With increased putrefaction and a normally functioning liver, there may be indicanuria, but indole or urorosein does not appear In cases of liver insufficiency, indican decreases, and the other 2 substances appear in the urine, the quantity depending upon the degree of intestinal putrefaction and of liver damage. H Eagle

Studies in the experimental autohemolysin of rabbits. Shunyo Suyami *Tôhoku J. Exptl Med* 16, 277–97(1930).—A mixt. of lecithin and pig serum injected intravenously into rabbits causes the production of autohemolysin. A certain proportion of rabbits normally contain autohemolysin in the serum and only a certain proportion contain the necessary receptor groups in the red cells which can combine with the antibody. H. Eagle

The distribution of water in the animal body. I. Distribution of water in the rabbit with a functional impairment of the thyroid gland. Hyoe Kusakiri and Kenjiro Takeda *Tôhoku J Exptl Med* 16, 329–40(1930).—In hyperthyroidism, the body as a whole loses water, particularly the skin, in hypothyroidism there is water retention, also chiefly in the skin Variations in the other organs are not const. H. Eagle

Studies in the colloid-osmotic pressure of the blood in normal and pathological conditions. III. Colloid-osmotic pressure of the blood in hypotension and hypertension. Fusakichi Nakazawa and Jiro Izumi *Tôhoku J Exptl Med.* 16, 341–51(1930), cf. *C A* 24, 2801.—In both hypotension and hypertension without kidney involvement there is no significant change in the colloid-osmotic pressure of the blood or in the osmotic pressure per gram of serum protein. In hypertension with kidney damage, however, the total colloid osmotic pressure is very low, even though the serum protein may show no striking change IV. Colloid-osmotic pressure of the blood in experimental kidney damage. Kotaro Kimura and Fusakichi Nakazawa *Ibid* 352–60.—Following poisoning with cantharidin or U, the total colloid-osmotic pressure of dog serum is strikingly low, as is also the pressure per unit serum. In marked contrast following U poisoning, the colloid osmotic pressure of the urine per unit protein is 3–5 times its normal value. Nephrectomy or bilateral obstruction of the ureters has qualitatively the same effect upon serum colloid pressure as poisoning, although to a less degree. These results are ascribed to the presence in serum of larger protein aggregates, due either (1) to an increased capillary permeability allowing the passage of small protein "molecules" into the tissues, (2) albuminuria, with passage of the smaller protein particles into the urine; (3) functional changes in the organs responsible for the regulation of blood protein These results take on an added significance in the light of the recent work of Van Slyke H Eagle

Metabolism of blood glucose in experimental trypanosomiasis. G Zotta and E. Radacovici *Arch. roumaines path exptl. microbiol* 2, 55(1929), *Rev. hyg méd. prév* 53, 65(1931).—Exptl. studies with guinea pigs in Nagana showed no definite relation between hyperglucemia and the nos of trypanosomes present in the blood It is believed that the hyperglucemia in trypanosomiasis is due to a disturbance of the central gluco-regulating mechanism in the body. C. R. Fellers

Cholesterol content, viscosity and $p_H$ of blood after splenectomy. L Bugnard *Compt rend. soc. biol.* 101, 546–8(1929); *Physiol Abstracts* 14, 661; cf *C. A.* 24, 3556.—

Zn was demonstrated as the cause in certain cases. In the intervals between crises the Zn in the urine amounted to 1 mg. per 24 hrs., whereas during the attacks it was at least 3 times more abundant. The crisis is regarded as probably due to anoxemia and an indication is provided for treatment with Zn. G. G.

**Mode of action of manganese salts in immunization.** A. Lumière and R. H. Grange. *Compt. rend. soc. biol.* 103, 381–3(1930). *Physiol. Abstracts* 15, 112.—Injection of Mn salts in the dog caused a marked leucocytosis. It is probable that the increase of immunity produced by this method is due to this leucocytosis. Substances capable of stimulating the leucogenic function should be made use of for immunizing purposes. G. G.

**Variations of affinity of hemoglobin for oxygen in hyperthyroidism.** G. Liebmann, H. Aubert and J. Costulescu. *Compt. rend. soc. biol.* 102, 1110–1(1930). *Physiol. Abstracts* 15, 80. In hyperthyroidism an increase of the const. 1 K, expressing the affinity of hemoglobin for O was found. An increase of 1 K corresponds to a lower assoen. curve and to a more ample liberation of O to the tissues. The increase is not so accentuated as in anemic subjects. G. G.

**The pathology of iron.** I. Prokschek. *J. Lab. Clin. Med.* 13, 807–18(1928). *Physiol. Abstracts* 13, 541. A histological study of blood of brain and of other tissues in cases of pernicious pernicious anemia and malignant growths was carried out with the Berlin blue and methyl green methods of staining. Many speculative suggestions are put forward to account for the distribution of Fe found by this method. G. G.

**Ammoniacal output in alkalosis.** M. Piotrowski, P. Rottenberg and H. Warmbrunn. *Compt. rend. soc. biol.* 100, 207–9(1929). *Physiol. Abstracts* 14, 30. *cf. C. A.* 23, 4970.—It has not been possible to confirm the views of Janney that increased $NH_3$ in the urine is anti-acid in function and that excess of $NaHCO_3$ by the mouth annuls the $NH_3$ eliminated. $NH_3$ seems to be taken from the blood by the kidney in obedience to a law similar to that governing the selection of urea. It is further confirmed that the $NH_3$ output does not follow that of total N, and exptl. alkalosis causes reduction of the ammoniacal coeff. which, according to the law of Hasselbalch, should remain const. I. C. K.

**Blood creatinine and creatine in pathological states.** J. Gavrila, V. Voir and Ramsantzev. *Compt. rend. soc. biol.* 100, 381–3(1929). *Physiol. Abstracts* 14, 471.—In 15 cardiovascular cases the creatinine varied from 1.3 to 2.14 and creatine from 3.04 to 6.65 mg. %. In 13 cases of diabetes the creatinine varied from 1.33 to 2.5 and creatine from 4.05 to 7.5 mg. %. In leucemia creatinine varied from 1.42 to 2.5 and creatine 3.6 to 6.72 mg. %. In 24 cases of chronic nephritis the creatinine varied from 1.33 to 10 and creatine from 3.93 to 17 mg. %. N showed parallel variations. In 7 cases of pulmonary tuberculosis the creatinine varied from 1.20 to 1.61 and creatine from 3.44 to 5.81 mg. %. In tuberculosis, pleurisy and bronchiectasis the normal limits were maintained. I. C. K.

**Soap-venom complexes in immunization against cobra venom.** M. Renaud. *Compt. rend. soc. biol.* 103, 143–4(1930). *Physiol. Abstracts* 15, 107.—Venom of the cobra mixed with Na oleate or palmitate loses its toxicity. The immunizing power of this mixt. was tested by repeated injection into guinea pigs. In 30% of animals it was distinctly demonstrated. Soap behaves toward venom as it does toward toxin, notwithstanding the remarkable differences of chem. structure between venom and toxin. It annuls the toxic action while leaving the antigenic properties intact. R. C. K.

**Pathological variations of protein osmotic pressure and the protein composition of blood serum.** Ch. Achard, A. Grigaut and A. Coponats. *Bull. soc. chim. biol.* 12, 417–40(1930).—By using the osmometer of Grigaut and Boutroux, greater variations were found in the osmotic pressure of the serum proteins than in the ratio of albumin to globulin. From the study of 4 normal and 50 pathol. subjects very little correlation was found between the values and the condition of disease, except the low total protein in nephritis. The albumin-globulin ratio was found to be of little significance. C. G. King.

**The iodine content of the thyroid gland accompanying simple and exophthalmic goiter.** P. Sayetton and H. Simonnet. *Bull. soc. chim. biol.* 12, 773–6(1930).—The av. I contents from 13 cases of simple goiter and 11 cases of exophthalmic goiter were 0.005 (0.010–0.215) and 0.081 (0.010–0.267)% dry wt., resp. C. G. King.

**The absence of tryptophan and histidine as the cause of pernicious anemia. Therapy of the anemias by supplementing the organism with hematogenic amino acids.** Georges Contis and Lucien Tinozzi. *Compt. rend.* 191, 1305–7(1930).—C. and T. argue that the absence of tryptophan and histidine may be regarded as the cause of anemias. Experimentally the administration of the 2 amino acids in cases of leu-

cemic, secondary, splenomegalic and neoplastic anemias produced encouraging results
B S LEVINE

**The "zoning" phenomenon in complement fixation with cholesterolized alcoholic beef heart extract. Its mechanism and significance.** B S LEVINE *J. Infectious Diseases* 48, 189–202(1931) —L. presents theoretical considerations and exptl evidence to explain the mechanism and significance of the "zoning" phenomenon occurring in complement fixation employed in the lab diagnosis of syphilis in which the preliminary incubation is done in the ice box By "zoning" L means the occurrence of a stronger fixation of complement in a lesser amt. of suspected serum He concludes that in the serum of most adults there are various types of immune substances either in the free state or in union with their respective homologous antigens. Upon the addn of cholesterolized alc beef heart suspension, the action of which L proves to be non-specific, interfaces are created at the suspended particles of the colloid The so-called immune complex concentrates at such interfaces in spherical and spheroid configurations With *the increase in the dilu of the serum, the dispersion of the suspended complexes increases,* leading to an increase in the surface area of the sensitized spheres in accordance with the following formula: $S_2/S_1 = \sqrt[3]{n_2/n_1}$, where $S_2$ = surface area of the suspensoid in the more dil serum, $S_1$ = surface areas of the sensitized spheres in the original dilu of the serum, $n_2$ = the no of suspended spheres in the more dil serum, and $n_1$ = the no of spheres in the serum of the original dilu In a special case where $n_1 = 1$, the formula becomes $S_2/S_1 = \sqrt[3]{n_2}$ With a ration of the dispersion in the serum of the higher dilu to that of the lower exceeding 8 1 the consumption of the complement by vol., $v/2$, of full strength serum will be greater than the consumption of complement by vol., $v$, of full strength serum when both are dild. with the saline antigen suspension to the same final volume Hence, "zoning" will appear in all serums in which the consumption of complement by the so called "non specific" antibodies in the first tube of the cold fixation procedure just exceeds, equals or nearly equals one "unit." The significance of the "zoning" phenomenon rests on the fact that it definitely proves the general immunologic rather than the specific leutic nature of complement fixation with cholesterolized alc beef heart ext L. concludes that to consider serum specimens manifesting 'zoning" "positive for syphilis" is paramount to denoting positive for syphilis specimens showing hemolytic inhibition in a complement fixation procedure where 1 0 or 1 1 unit of complement is considered the "dose" B S LEVINE

**Chemical investigations in Dercum's disease.** IRVINE H PAGE *Virchow's Arch Path Anat* 279, 262–4(1930) —The depot fat of the abdominal cavity and that of the thigh were similar, and likewise normal, in a case of Dercum's disease Chem findings do not explain why fat is laid down in Dercum's disease. E R. LONG

**Animal ochronosis and porphyry.** R. FIKENTSCHER *Virchow's Arch Path Anat* 279, 731–9(1931) —Beef kidneys, bone marrow and bone from a case of so-called animal ochronosis' were examd for the presence of porphyry The results were negative in the kidneys and bone marrow and positive in the bone In bone the substance was detected by direct chem analysis and spectroscopic examn of extd. pigment. F concludes that the ochronosis, or better, osteohemochromatosis of cattle depends, in part at least, on porphyry. E. R. LONG

**The glycogen content of the cadaver liver.** HANS POPPER AND OSKAR WOZASEK. *Virchow's Arch Path Anat* 279, 819–68(1931) —The total carbohydrate and glycogen content of the liver was detd in 177 human bodies Examn was made as soon as possible after death Usually the values obtained by chem detn. of total carbohydrate and histol estn of glycogen corresponded In sudden deaths, in persons previously in good health, the total carbohydrate content of the liver ranged from 1 56 to 6 17% of the moist wt., with considerable amounts of glycogen histologically visible When death occurred after a wasting disease, the figure ranged from 0 24 to 1 53%, with little or no glycogen demonstrable in sections In 22 cases of cirrhosis of the liver, where death came gradually, the value for total carbohydrate was 0 38–0 94% Histologically demonstrable glycogen was relatively high. In 17 diabetics the total carbohydrate was 1 19–8 50%, *i. e.*, significantly higher than in other pathological conditions and equal to, or higher than, in the normal state. Glycogen could always be found, usually in considerable amount. In 11 liver tumor metastases total carbohydrate was 0.28–1 45%, glycogen was histologically not demonstrable In 26 kidneys the total carbohydrate ranged from 0.28 to 1 64%, the higher values being found in cases of diabetes mellitus E. R. LONG

**A study of the blood urea clearances with relation to diuresis in normal and nephritic animals.** ROBERT L JOHNSTON *J Lab Clin Med.* 15, 943–52(1930) —The ability

of the kidneys of the normal and nephritic, fasting animal to clear the blood of urea is correlated with the water-diuresis curve. A simple diuresis test is described for the detn. of the status of renal function. F. R. MAIN

The incidence of lipoids in urine. A report of the micropolariscopic examination of 1470 specimens. ARTHUR T. BRICE, JR. *J. Lab. Clin. Med.* 15, 953–60(1930).—Lipoid substances were detected in 13.3% of the pathol. urines exam'd. A high incidence of urine lipoids assocd. with degenerative diseases of the kidneys suggests that pathol. conditions in the gall bladder may be an etiologic factor. F. R. MAIN

The Congo red test with special reference to excretion of the dye in the urine. NELSON W. BAKER AND ALBERT M. SNELL. *J. Lab. Clin. Med.* 16, 202–7(1930).—The disappearance of more than 60% of intravenously injected Congo red from the blood stream in 1 hr. appears to be a sp. test for amyloidosis. The dye is not excreted in the urine in the absence of albuminuria. It is excreted in relatively large amts. in chronic lipoid nephrosis and in some instances, in nephrosclerosis with albuminuria and in renal amyloidosis. F. R. MAIN

Adrenaline glucemia in disturbances of the liver. G. NANNINI. *Minerva med.* 1930, II, 874–7.—The glucemic curve was studied after the injection of adrenaline into 20 patients suffering from various hepatic lesions. The results indicate that the glucemic values are useful in the diagnosis of hepatic lesions and also for differentiating various types of icterus. PETER MASUCCI

The function of the liver in cardiopathic cases investigated by means of the amino acid curve. LUIGI ALFONSA. *Minerva med.* 1930, II, 917–23.—The hepatic function in patients with various forms of cardiac disturbances was studied by detg. the amt. of amino acids in the blood after the intravenous injection of glycocoll. A. concludes that the deamminizing action of the liver in cardiopathic cases varies according to the valvular lesion, the relation between compensation and the deamminizing power of the liver is not const., in aortic lues, glycocoll disappears from the blood with more difficulty; as a general rule, the older the lesion, the more impaired is the hepatic function. PETER MASUCCI

The determining factors of the hypoglucemia in diabetic children. PEDRO B. LANDABURE. *Semana méd.* (Buenos Aires) 1931, I, 100–4.—In 50% of diabetic children subjected to a diet and insulin treatment, hypoglucemic symptoms develop. This is due to a high variability of the glucemia in children. Even doses of 2 to 5 units may cause the syndrome which is not controlled by the sugar forming substances in the diet. The symptoms appear at a blood sugar between 0.07 and 0.02% A direct relation between the sugar level and the severity of the symptoms could not be established. A. E. MEYER

The passage of some normal antibodies from the mother to the fetus. ELISA MORELLI. *Sperimentale* 84, 431–41(1930).—The bactericidal power against cholera vibrios in the blood of the pregnant guinea pig is not transmitted to the fetus. The hemolytic capacity of rabbit blood decreases during pregnancy and is not present in the new born. The lack of antibodies does not seem to be connected with changes of the complement in the blood. A. E. MEYER

The action of proteins in the growth of grafts of homologous neoplasms. GIOVANNI FAVILLI. *Sperimentale* 84, 489–504(1930).—Mouse carcinoma and rat sarcoma were transplanted after a previous stimulation of the reticulo-histiocyte system by injection of protein. The growth was stimulated in this case, this is probably due to injuries in the spleen caused by the proteins. A. E. MEYER

Isolation of the toxin of Fraenkel's gas gangrene bacillus. II. ALFRED EBEL. *Biochem. Z.* 229, 253–8(1930); cf. C. A. 24, 5854.—Culture filtrates acid to litmus were evapd. *in vacuo* and completely pptd. by the addn. of 96% alc. The alc. soln. was then evapd. *in vacuo* to a very small vol. and again pptd. with alc. The alc. soln. of the poison was treated once more as above, until the condensed material dissolves completely in 96% alc. Upon the addn. of abs. alc., however, a thick, inactive ppt. is again produced. The soln. of the poison in the abs. alc. is now put through the same process of purification with abs. alc. until the concentrate completely dissolves in the abs. alc. and gives no ppt. even with an alc. soln. of $Pb(OAc)_2$. The soln. of the poison in abs. alc. is subjected to electrodialysis against distd. water, when only the cathode portion reveals strong activity and an alk. reaction. This portion was greatly concd. *in vacuo* and mixed with 4 vols. of 96% alc.; upon standing in the ice box inactive crystals sep. out. The alc. soln. is again concd. and purified by electrodialysis. The alk. dialyzate is pptd. with Pb acetate, the soln. freed from Pb and once more electrodialyzed. The dialyzate is concd. *in vacuo* and treated with alc. until the residue of the abs. alc. soln. is completely sol. in abs. alc. Pptd. now with ether, the

ether alc soln retains the bulk of the poison A further attempt is in progress to isolate the poison from this ether alc soln S MORGULIS

Studies on glucolysis of the blood. I. H K. BARRENSCHEEN AND KARL HÜBNER *Biochem Z* 229, 329-42(1930).—An investigation of a number of glucolysis curves shows that the application of the equation of a first order reaction even with Fukushima's corrections for adsorption and diminished enzyme activity does not yield uniform reaction consts, more particularly during the initial stages of glucolysis Studies on blood from normal fasting persons show that there is a 15-30 min induction period which can be eliminated under the influence of $SO_4$ ions The blood glucolysis is similarly stimulated by $PO_4$ and $AsO_4$ ions The inorg P during the first hrs of glucolysis does generally diminish; this is attributed to a process of phosphorylization, the $SO_4$ ions stimulating this diminution in the P It is interpreted that $SO_4$ ions activate the P esterifying process Previous excessive ingestion of carbohydrate causes the disappearance of the induction time observed in the glucolysis of blood from the fasting subject, and the decrease in inorg P occurs sooner and to a greater extent Similarly the addn of hexosediphosphate (but not of mono-phosphate esters) causes the disappearance of the induction time and accelerates the glucolysis S MORGULIS

Disturbances in the mineral regulation mechanism in diseases of cattle. A study of tetany B SJOLLEMA AND L SEEKLES *Biochem Z* 229, 358-80(1930).—A study of blood serum of cattle suffering from delivery paresis and a "grass tetany" reveals some remarkable changes in the mineral metabolism, particularly in the Mg content, the concn of Ca ions and of the inorg P In the former disease these quantities were on the av 2.19, 0.44 and 2.16 mg %, in the latter, 0.46, 1.18 and 4.33 mg %, resp The difference between these 2 pathol states was also manifested in the total Ca content, namely, 4.35 and 6.65 mg %, resp In the normal cattle the concns of Mg, P, $Ca^{++}$ and Ca on the av were 1.66, 4.57, 1.65 and 0.35 mg %, resp A graphic method has been developed for representing the total blood content of Mg, Ca and P in such a way that the normal and pathol states are spatially sepd In delivery paresis the ratio Ca/Mg = 2 approaches that (0.9) existing when narcosis is produced through the injection of a Mg salt In "grass tetany" this ratio is Ca/Mg = 14.6, while in normal cattle it is 5.6, showing that there is actually a condition of excitation. In "grass tetany" the Mg content of the blood varies according to the time of the collection of the sample If taken at the beginning of an attack of tetany the Mg is low and after the attack it is almost invariably high, possibly because of the strong muscle contraction during the convulsions The tetany attacks in "grass tetany" occur even when the Ca/P is relatively high, namely 1.5, whereas in parathyroid tetany the attack does not take place unless this ratio is less than 1 In both pathol conditions however, the % of diffusible Ca undergoes wide variations Whereas in normal cattle the diffusible Ca constituted 48-66% of the total, it ranged from 25 to 100% during delivery paresis and from 40 to 100% during "grass tetany," but no connection was observed between the change in the % of diffusible Ca and the attacks. The inorg P of the serum is completely diffusible under all conditions The diffusible fraction of the Mg varied greatly in the normal and in the sick cattle In delivery paresis no evidence was found of a relationship between the concns of the $Ca^{++}$, $H^+$, $HCO_3^-$ and $HPO_4^{--}$ of the serum S. MORGULIS

Behavior of blood water during asphyxia. TAKESHI SASO *J Biochem* (Japan) 12, 281-315(1930).—The plasma vol in acute asphyxia decreases about 14.8% this being practically independent of the dehydration of the blood The sp gr of the serum is always raised by about 0.3% in acute asphyxia The dehydration of both blood and serum during acute asphyxia is very small, being on the av 0.6% for serum and only 0.3% for the whole blood In prolonged asphyxia, on the contrary, the water content of the serum or blood always increases and there is never any dehydration The dehydration occurring in acute asphyxia is not extensive enough to account for all the changes in the concn of the various blood constituents, and the passage into the blood from the tissues must be the chief source from which these increases originate. Particularly in prolonged asphyxia, when there is actual hydremia the increased concn of different blood constituents is obviously due to migration of substances from the tissues S MORGULIS

Comparative study of proteins in blood serum and pathological serosities CH ACHARD AND A ARCAND *Compt rend* 189, 510-2(1929).—The authors question the fact that the proteins of exudates and transudates come only from blood plasma Pointing out that the protein content of plasma varies notably in pathol. conditions they compare the protein content of blood serum with that of serous liquids In 12 cases of pleurisy (10 inflammatory and 2 cardiac) about 50% of protein was found in

the serous liquids while 63-86% was found in the blood serum. The ratios between the proteins of blood plasma and serous liquids (serum/liquid) were 1.25 to 1.76 for the inflammatory cases, and 2 to 2.89 for the cardiac. The ratios for individual proteins were: albumin 1.16 to 2.24 (one exceptional value of 0.01), globulin, 1.14 to 2.23 (2 exceptional values of 0.96 and 4.13), *myxoprotein*, 1.07 to 1.79 in six cases, but 3.53, 5.66, 6.50 and 17.92 in four cases. In the two cardiac cases the values were raised for albumin and globulin, but were discordant for *myxoprotein* (1.07 to 5.60), in two cases exceeding the ratio for globulin in the blood serum but not in the serous liquid. In seven cases of dropsy the values of serum/liquid were 11.13 to 22.96 (one exceptional value of 1.60 in a case of serum rich in protein). The ratios for the individual proteins were: albumin 3.61 to 46.47, globulin, 1.60 to 40.13, *myxoprotein*, 4.75 to 32.31. The ratios show that there was always much less albumin, globulin and *myxoprotein* in the serous liquids than in the blood serum, but the proportion was much more variable for *myxoprotein*. A. and A. conclude that most of the proteins of serous liquids come from blood plasma, but that this does not exclude the possibility of protein formation in the serous membranes. A. L. RAWLINS.

Guanidine-like substances in the blood in experimental yellow fever. G. M. FINDLAY AND E. HINDLE. *Lancet* 1930, II, 678-9.—In exptl. yellow fever in monkeys there is an increase in the blood content of guanidine like substances, similar to that assocd. with other conditions involving liver necrosis. This increase can be reduced by the administration of Ca lactate, which, however, does not prevent death but does tend to prevent hemorrhages. The method of Pfiffner and Myers was used for detg. the guanidine like substances. F. B. SEIBERT.

Manganese in foodstuffs and its possible relation to cirrhosis of the liver. A. F. BOYCOTT AND G. R. CAMERON. *Lancet* 1930, II, 959.—The method of Bradley (Lindow and Peterson *C. A.* 22, 125) was used for detg. the Mn. Various food products were analyzed and of them cloves, tea, pepper, ginger, coriander, winkles and scallops contained the most Mn. F. B. SEIBERT.

Plasma-protein loss with edema but without proteinuria and its bearing on the concept of nephrosis. T. I. BENNETT, E. C. DODDS AND J. D. ROBERTSON. *Lancet* 1930, II, 1006-8.—Massive loss of protein may occur from the blood by routes other than the kidney and edema follows this loss. In such cases no pathol. changes are produced in the kidneys. F. B. SEIBERT.

Urea content of the cerebrospinal fluid in status epilepticus. O. R. BIRSON AND J. TAYLOR FOX. *Lancet* 1930, II, 1233-4.—There was a high urea and glucose content of the cerebrospinal fluid. F. B. SEIBERT.

Inflammation. V. The mechanism of fixation by the inflammatory reaction. VALY MENKIN. *J. Exptl. Med.* 53, 171-7(1931); cf. *C. A.* 24, 4833.—Microscopic studies show the presence of a network of fibrin within the tissues and numerous thrombosed lymphatics at the site of inflammation. Pptd. Fe compds., possibly coagulated horse serum or particulate matter caught in this fibrinous reticulum, will disseminate less readily than trypan blue from the site of inflammation. Trypan blue injected at the periphery of an inflamed area fails to enter the site of inflammation. Fixation of foreign substances by the inflammatory reaction is primarily due to mechanical obstruction caused by a network of fibrin and by thrombosed lymphatics at the site of the inflammation. VI. Fixation of trypan blue in inflamed areas of frogs. *Ibid.* 179-83.—Trypan blue, injected into the circulating blood stream of frogs, accumulates rapidly in an inflamed area; injected directly into the area of inflammation, it is fixed *in situ* and fails to diffuse outward. If the dye is injected at the periphery of an inflamed area, it fails to enter the site of the inflammation. This failure of penetration is caused by the occlusion of lymphatic vessels and the presence of a network of fibrin in the inflamed area. C. J. WEST.

Mineral content of pastures research (ASTON) 12. The detection of horse meat as an adulterant in sausage and other studies of the precipitin test (BOLIN) 12.

HOLMES, BARBARA: Cancer and Scientific Research. New York: The Macmillan Co. 160 pp.

## H—PHARMACOLOGY

A. N. RICHARDS

Elimination of quinine in the bile. P. CAUJOLLE. *Bull. soc. chim. biol.* 12, 299-306 (1930).—The presence of quinine in the bile of dogs, after intravenous injection of an isotonic soln. of the neutral sulfate, is demonstrated by observing the fluorescence in

$H_2SO_4$ when exposed to light from a Hg vapor lamp after passage through a suitable filter Elimination is more rapid in the urine than in the bile B C A

Intestinal elimination of iron in the dog V. Henriquès and A Roche *Bull soc chim. biol* 12, 404-8(1930) —A daily oral administration of Fe (360–1675 mg) as lactate does not affect elimination by the colon The intestinal absorption of Fe (detd by the $TiCl_3$ method) varies with the salt used, and the results do not support the theory of absorption in the small intestine and elimination by the large intestine B C A.

Arrest of the internal secretion of the pancreas during decamethylenediguanidine hypoglucemia. E Zunz and J La Barre *Compt rend soc biol* 101, 141–3(1929), cf *C. A.* 24, 1149 —Synthalin hypoglucemia is accompanied by a diminution of the secretion of insulin B C A

Chemistry of overventilation. G Popovici and H Popescu *Compt rend soc biol.* 101, 406-8(1929) —In convulsions caused by over ventilation there is an increase in serum Ca and a decrease in the serum phosphate The decrease in phosphate is reduced by ergotamine and increased by adrenaline and ephetonine. All these drugs tend to reduce the serum Ca B C A

Effect of yohimbine on blood sugar. S Hanson *Compt rend soc biol* 101, 601-3, 603-5, 605-7(1929) —Yohimbine causes a slight rise in blood sugar, in small doses it suppresses adrenaline hyperglucemia although with larger doses a rise is observed The increase by yohimbine of the hypoglucemic action of insulin is discussed B C A

Effect of adrenaline on the respiratory metabolism in exophthalmic goiter. I Schill. *Magyar Orvosi Arch* 30, 202–9(1929) B C A

Influence of electrolytes on the syneresis and clotting of blood. Satya Prakash and N R. Dhar *J Phys Chem* 35, 629–37(1931) —The electrolytes used were KCl, $CaCl_2$, $(NH_4)_2SO_4$, KF, $K_2C_2O_4$, AcONa, $Na_3C_4H_4O_6$, NaOH and Na citrate Each test sample contained 230 cc of goat blood and was dild to 250 cc by the addn of $H_2O$ and salt soln The smallest quantity of electrolyte used was 2 cc of *N* soln and the largest was 15 cc. of 3 *N* soln In all cases syneresis decreases with increasing concn of any one electrolyte The concns necessary to suppress syneresis in the clots formed were KCl 0 12 *N*, $CaCl_2$ 0 0845 *N*, $(NH_4)_2SO_4$ 0 176 *N*, $K_2C_2O_4$ 0 016 *N*, Na citrate 0 016 *N*, KF 0 049 *N*, NaOH 0 039 *N* If still higher concns. of electrolytes were added the blood was stabilized and no clotting occurred Stabilizing of blood by fluorides, citrates and oxalates is due not to removal of Ca but to the influence of the anions Clotting of blood and syneresis are affected by the same forces which affect formation and syneresis of both org and inorg gels F E Brown

Therapy of spontaneous mouse cancer. Failure of tuberculin, karkinolysin and some inorganic compounds therein Burton T Simpson and Millard C. Marsh *Ann Surgery* 93, 169–79(1931) —Fifty-six inorg compds contg 33 chem elements for which there is evidence indicating therapeutic value for transplantable cancer and 4 forms of tuberculin, and 1 ext of thymus have been found to have no therapeutic action on spontaneous mouse cancer Rachel Brown

Experimental and clinical studies on the treatment of cancer by dichloroethyl sulfide (mustard gas). Frank E Adair and Halsey J Bagg *Ann Surgery* 93, 190–9(1931) —Mustard gas soln is an effective agent against a localized cancer lesion Rachel Brown

Excretion urography. an experimental investigation of the properties of uroselectan W Arthur Mackey *Glasgow Med J* 34, 9–18(1931) —Uroselectan, the Na salt of 5 iodo-2 keto-1-pyridineacetic acid, is well tolerated by rabbits even when administered in amts proportionately 10 times the human dose, provided the injection is made slowly Administered rapidly, doses smaller than the max may be fatal There is no evidence that the kidneys are injured during the excretion of the concd soln of uroselectan The urinary tract of the rabbit may be demonstrated by x rays during the excretion period R B

The results of the use of acriflavine hydrochloride in the treatment of undulant fever D S Twinder *Can Med Assn J* 23, 665–8(1930) —Results from a number of cases suggest the intravenous use of acriflavine materially shortens the course of undulant fever, and prevents the development of an incapacitating arthritis A T Cameron

The danger of indiscriminate iodine prophylaxis J F Reith *Pharm Weekblad* 68, 77–82(1931) —A review of the arguments against the indiscriminate and unsupervised use of iodized salt A W Dox

The silica content of human blood and its alteration by administration of silica

Heinrich Kraut *Z. physiol. Chem.* 194, 81-97(1931). The $SiO_2$ content of the blood of normal persons varies between 1 and 3% of the sulfate ash, but each individual maintains his $SiO_2$ value within much narrower limits. The blood of tuberculous subjects contains somewhat more $SiO_2$ than that of normal persons. Administration of easily absorbed $SiO_2$ increases the $SiO_2$ content of the blood by a multiple of the quantity administered. After discontinuing the treatment several weeks elapse before the $SiO_2$ content sinks again to normal. Two methods of administration were employed: (1) oral administration of silistren, a glycol ester of silicic acid, and (2) inhalation of a spray containing low mol. silicic acid obtained by hydrolysis of $SiCl_4$ or by treatment of silicates with acids at $p_H$ 2-3. The 2nd method is much more efficient. The av. of 27 cases showed an increase of 14% over the normal, while in 1 case it rose to 45%. The inhalation expts. show that the increase does not correspond to the quantity administered, but that a mobilization of the $SiO_2$ of the organism occurs, so that the $SiO_2$ value of the blood remains altered for a considerable time. Eventually the original value returns. The far greater absorption by inhalation is explained by the fact that the orally administered silistren encounters an unfavorable $p_H$ in the intestine and the bulk of it is there converted into an insol. and difficultly absorbed form. A. W. D.

**The fate of ternary chains other than those with three atoms of carbon.** V. Zagami *Ann. fisiol. fisiochim. biol.* 6, 65-70(1930). The subcutaneous administration of AcOH to rabbits causes an increased heat production equal to the energy produced by its complete oxidation. Lactose or ethylene glycol has no such effect. Z. concludes that the metabolism of proteins or of carbohydrates does not necessarily involve the formation of ternary C chains as an intermediate product of metabolism. H. L.

**The significance of chemical configuration for the pharmacological effects of adrenaline-like substances.** Bun-ichi Hasama *Arch. exptl. Path. Pharmakol.* 153, 161-88(1930). — β-Phenethylamine, the basic substance of the adrenaline group, has only slight sympathomimetic action. The introduction of a phenolic OH group in the para position or of an alc. OH group in the β C of the side chains increases its activity. Interchanging the NH and the OH groups of the β-hydroxy β-phenethylamine destroys its sympathommimetic action. Increasing the length of the side chains by a Me group decreases the activity by ½. The lability of the adrenaline groups is not necessarily detd. by the OH groups of the benzene ring. Replacing a H in the α C by a second phenyl group destroys the activity upon nerves, but endows the substance with strong muscle stimulating properties. Oxidizing the secondary alc. to a ketone diminishes the activity. The toxicity of the various members of the group does not parallel the intensity of the sympathomimetic action. H. Fagle.

**The kidney action of phlorhizin. Investigations upon frog kidneys.** Hans Haustein *Arch. exptl. Path. Pharmakol.* 153, 187-213(1930). — With a glucose-free perfusing fluid (Mines soln.) phlorhizin does not cause any change in urine secretion. Its glucuretic action is due (1) to an inhibition of the normal tubular resorption, and (2) to a change in the permeability of the vessel walls for glucose, which allows its passage through the walls of the tubules into the urine. H. Fagle.

**Distribution of insulin in the organism following its injection. I.** Hans Horstters *Arch. exptl. Path. Pharmakol.* 153, 214-30(1930). Following its intravenous injection into rabbits insulin is stored primarily in the liver; within 60 min., however, it appears in the muscles, and gradually increases in quantity, 50% of the total injected being recovered after 3½ hrs. from the muscles. In marked contrast, following subcutaneous injection, the max. storage is reached in 60 min., and then only amounts to 30% of that injected. H. raises the question as to whether the injection of insulin stimulates an endogenous secretion. **II. Relationship between method of nutrition and blood sugar.** *Ibid.* 231-44. — In both alimentary and adrenaline hyperglycemia the quantity of insulin which can be extd. from the organs is increased. Animals on a carbohydrate rich diet also show increased insulin. In such animals, the administration of insulin causes a mobilization of endogenous insulin in the tissues which may exceed the quantity injected. Exogenous insulin is much easier to ext. than endogenous. H. suggests that there are 2 types of insulin, fixed tissue insulin and free, loosely bound pancreatic insulin. In the diabetic the effective tissue insulin would be decreased. H. L.

**Pharmacological and physiological studies on the sweat centers. IV. The effect of inorganic cations upon the thermal and sweat center in the midbrain.** Bun-ichi Hasama. *Arch. exptl. Path. Pharmakol.* 153, 291-308(1930); cf. *C. A.* 24, 2188. — K, Ba and Na ions injected subcranially into the tuber cinereum cause an increase in temp. and in sweat secretion. Mg and Ca ions are inhibitory. H. Fagle.

**The mechanism of the lowering of blood pressure by histamine.** Max Hochrein and Rolf Meier *Arch. exptl. Path. Pharmakol.* 153, 309-21(1930). — In cattle dogs

and rabbits very small quantities of histamine cause capillary dilatation acceleration of circulation, moderate increase of arterial pressure and occasionally also of venous pressure All these effects can be explained by either a decrease in the total vessel vol , or an increased blood vol Larger doses cause a transient hypertension, followed *by hypotension Both arteries and veins contract, particularly the latter, causing a* diminished flow of blood through the dilated capillaries into the veins The fall in arterial pressure is therefore due to imperfect filling There is occasionally an increased liver vol , possibly because of the filling of the hepatic capillaries with blood A temporary decrease in respiration is followed by an acceleration, possibly on account of the increased pressure in the right auricle H. Eagle

The effect of homatropine methonitrate upon gastric secretion. M Tennenbaum *Arch exptl Path Pharmakol* 153, 325–30(1930) —Homatropine methonitrate is only $^1/_{18}$ as inhibitory upon gastric secretion by dogs as is atropine H Eagle

The effect of an extract of the posterior lobe of the hypophysis, morphine and caffeine upon the activity of the kidneys. B Sager. *Arch exptl Path Pharmakol* 153, 331–46(1930) H Eagle

The reaction of snake hearts to certain cardiac poisons. Otto Gessner *Arch exptl Path Pharmakol* 153, 347–58(1930), cf *C A* 24, 5374 —The heart of *Tropidonotus natrix* or *Vipera berus* is only $^1/_{1000}$ as sensitive to strophanthin as the frog heart. A qualitatively similar resistance was observed against the whole digitalis group, possibly due to decreased absorption by the cardiac muscle The symptoms of poisoning, and the effects of cations, particularly Ca and K, are the same as in frog hearts The stimulating and conducting portions of the snake heart are comparatively more sensitive to digitalis than the contracting portions Saponin and saponin like toxins affect snake and frog hearts similarly The blood of *Tropidonotus natrix* and that of *Vipera berus* are not toxic for the heart of these snakes H Eagle

Treatment of morphinism by insulin and grape sugar. Günther Anton and Josef Jacobi *Klin Wochschr* 9, 1547(1930) H Eagle

The differentiation of the total blood sugar into glucose and galactose following the administration of galactose H Petow, H Kosterlitz and H N Naumann *Klin Wochschr* 9, 1549–50(1930) —In normal patients, there is little change in the blood glucose following the administration of galactose The latter disappears from the blood within 2 hrs , reaching a max of 0 02–0 07% within the first hr In cases with hepatic damage the blood galactose may rise as high as 0 145%, and is still demonstrable after 2 hrs In diabetics the galactose curve is normal but there is a surprising increase of blood glucose which may double its original value H E

Effect of insulin upon secretion Peter F Meyer *Klin Wochschr* 9, 1578–81 (1930) —Insulin increases the acidity and usually the quantity of gastric juice within 15–90 min The blood sugar change is the inverse of this change, reaching min values when the gastric secretion is at its max Diabetics who do not become hypoglucemic following insulin show no gastric reaction In achylia, insulin like histamine, is ineffective H Eagle

The retention of uroselectan in the human body. W Tournè and F Damm *Klin Wochschr* 9, 1581–3(1930) —With normal kidney function there is no demonstrable uroselectan in the blood 4 hrs after its administration, residual quantities of $< 0.5$ g in the blood show partial impairment of kidney damage, $> 0.5$ g after 4 hrs indicates a high degree of kidney damage H Eagle

Effect of caffeine in hypoglucemia. Ludwig Popper and Susanne Jahoda *Klin Wochschr* 9, 1585–6(1930) —The symptoms of insulin shock are not related to the hypoglucemia and can be relieved by caffeine, which does not affect the blood sugar H Eagle

The effect of the administration of bilirubin upon the blood. Ludwig Popper *Klin Wochschr* 9, 1770(1930) —The intravenous injection of 0 05 g of bilirubin into humans causes a transitory (24 hrs ) increase in hemoglobin without affecting the red cell count H Eagle

Clinical experiences in the treatment of post-encephalitic phenomena with harmine. Heinz Frank and Otto Schlesinger *Klin Wochschr* 9, 1864–6(1930) —Good results are reported, increased by the simultaneous administration of scopolamine H Eagle

The vascular effect of minute iodine concentrations. Georg Barkan and Salme Prikk *Klin Wochschr* 9, 1872(1930) —No definite effect is produced by $I_2$ in concns between 1 50 000 and 1 10 000 000 upon the caliber of rabbit ear veins H E

Rhusinic acid, an active constituent of Rhus succedanea, L Kojiro Terauchi *Tôhoku J Exptl Med* 16, 123–56(1930) —The chem. and pharmacol. properties of an

acid isolated from the fruit of *Rhus succedanea* are described in detail It is primarily cardiotonic, is sympathomimetic and is very toxic for rabbits (lethal dose = 0 0067 g per kg ) H Lagu r

Effect of camphor upon the adrenaline output and the blood sugar content in non-anesthetized, non-fasted dogs Kogoro Oikawa and Tatsusaburo Inaba *Tohoku J Exptl Med* 16, 298 310(1930) — Camphor olive oil injected subcutaneously into dogs in quantities greater than 1 75 g per kg caused increased secretion of adrenaline, hyperglucemia increased pulse rate and respiration, lasting for as long as 2 hours with the max effect in 30 60 min H Lagu r

The effect of certain narcotics (urethans) on permeability of living cells to water. Baldwin Lucké *Biol Bull* 60, 72-9(1931) —Narcotics in the presence of sea water do not decrease permeability to water beyond the value normally found in the fluid There is a tendency to reduce permeability to water narcotics of this type are less effective in this respect than are bivalent cations This effect, too depends on the chem compn of the medium in which the narcotizing compd is dissolved F. G G

Action of ephedrine on the dog heart (electrocardiograph studies) I. E Corlieo *Compt rend soc biol* 99, 1525 7(1928) *Physiol Abstracts* 14, 521 —Synthetic ephedrine ephetonine (Merck) produces certain modifications in the electrocardiogram of the dog In small doses it causes bradycardia sinoauricular and auriculo ventricular block, ventricular extra systole and increase of the T wave In large doses it induces tachycardia and affects the whole conducting system including Purkinje's fibers Finally the heart fails in fibrillation G G

Intra-ocular tension and physico-chemical properties of the vitreous humor. T Redslob and P Reiss *Compt rend soc biol* 99, 1586 8(1928) *Physiol Abstracts* 14, 521 *cf C A* 22, 3122 —Swelling of the vitreous humor depends upon its reaction Isotonic solns of HCl and $H_3PO_4$ were injected into the vitreous humor of rabbits The tension fell in 30 min , and the normal condition was restored in 30 days Alk injections gave less characteristic results Hypotension often follows the rise In jection of gelatin causes a marked reduction lasting about 8 days $H_3PO_4$ was injected in a case of glaucoma and caused a marked lowering of tension with relief which lasted a month The effect of gelatin is due to its action on the isoelec point of the proteins of the vitreous humor G G

Action of mercurial diuretics on hydremia, chloremia, azotemia and the urinary elimination. I Hatzieganu, I Gavrila and Bornil. *Compt rend soc biol* 99, 1813-4 (1928), *Physiol Abstracts* 14, 258-9 —Neptal, solyrgan and novasurol given to man on a fixed diet cause identical variations in the blood and urine of subjects with different cardiac and renal affections Hydremia is increased, reaching a max 5 hrs after injection The Cl of blood is increased but not to the same extent in all cases The N of the blood is practically unchanged Intense diuresis occurs on the day of injection The output of Cl on the day of injection is 2 to 7 times greater than on the day preceding Urea is only slightly increased but not in all cases G G

Action of insulin and thyroxine on endocrine glands. J Vatrin and P Florentin *Compt rend soc biol* 100, 111-3(1929) *Physiol Abstracts* 14, 581 —After injection of insulin the thyroid becomes congested, and colloid degeneration increases in the hypophysis Thyroxine in increasing doses causes a marked reaction in the pancreas, the islets of Langerhans are multiplied and new islets are being formed at the expense of exocrine acini Insulin causes hyperplasic and thyroxine degenerative effects G G.

Ergotamine, yohimbine and post-hemorrhagic hyperglucemia. I I Nitzescu. *Compt rend soc biol* 100, 386-8(1929), *Physiol Abstracts* 14, 448 —Ergotamine and yohimbine inhibit the hyperglucemia produced by adrenaline Hemorrhage causes hyperglucemia with increase of P and Ca The latter form by hyperglucemia is also inhibited by the drugs mentioned, and it is therefore not due solely to increased glycogenolysis following increased output of adrenaline G G

Action of camphor, hexetone and sodium salicylate on cestodes and Ankylostoma of the dog. S F Gomes da Costa *Compt rend soc biol* 100, 600-1(1929), *Physiol. Abstracts* 14, 671.—*d* Camphor in 3 *M*/1000 soln is inactive on the *Tenia serrata* of the dog *l* Camphor has a stronger effect Hexetone in 5 *M*/1000 has a strong effect, and causes paralysis in twice this concn Part of this action is due to the salicylate in which hexetone is dissolved The action of these reagents on cestodes is somewhat less than on *Ascaris* On the whole, the action of the camphors on *Ankylostoma* is practically nil Hexetone is less active on *Ankylostoma* than on *Tenia* G G

Effect of sodium carbonate on polycythemia after muscular exercise. I I. Nitzescu and O. Mihalescu. *Compt rend. soc. biol* 100, 680-9(1929); *Physiol. Abstracts*

14, 476—Among the metabolites of muscular exercise supposed to stimulate splenic contraction lactic acid occupies a prominent place $Na_2CO_3$ injected intravenously opposes this action, which is therefore apparently due to the acid Psychic excitation and lack of oxyhemoglobin are probably secondary agents *It* is important to note that, while the alkali prevents splenic contraction and polycythemia, it does not prevent hyperpnea after exercise G G

Action of chloroform on mammalian plasma and serum. P Bordet *Compt rend soc biol* 100, 751–3(1929), *Physiol Abstracts* 14, 283–4 cf *C A* 24, 891—If oxalated rabbit plasma is coagulated under the influence of $CHCl_3$ after several hrs only traces of thrombin are found in it $CHCl_3$ coagulation of ordinary plasma yields abundance of thrombin $CHCl_3$ does not excite the formation of thrombin in the absence of Ca A serum resulting from normal coagulation rapidly loses its thrombin whereas that arising in presence of $CHCl_3$ maintains activity over long periods G G

Chlorine, bromine and iodine and cardiac excitability. L de Borgraaf *Compt rend soc biol* 101, 167–8(1929), *Physiol Abstracts* 14, 359—Br can completely replace Cl as an anion in the perfusing fluid of the frog heart without causing any important changes in the beat The irritability, however is diminished Iodine used to replace Cl entirely causes distinct changes The heart is slowed and the irritability diminished G G

Action of sodium glycocholate and sodium taurocholate in Ringer-Locke solution on isolated frog heart. D Mantf and S Ciorapciu *Compt rend soc. biol* 101, 225–6(1929), *Physiol Abstracts* 14, 375—Bradycardia was never observed as a result of the action of a weak soln of bile salts on the frog heart Tachycardia was common, except in case of concd soln which caused, besides bradycardia intoxication of the myocardium and tendency to arrest the beat G G

The pancreatic function in insulin hypoglucemia. B A Houssay, J T Lewis and V G Foglia *Compt rend soc biol* 101, 239–41(1929), *Physiol Abstracts* 14, 380—After the injection of insulin into (*a*) normal dogs, (*b*) dogs without pancreas and (*c*) dogs with cervical grafted pancreas the glucemic fall is similar in all, but the restoration is slowest in the last mentioned animals This fact may be due to the suppression of the extrinsic nervous system, which influences the pancreatic endocrine function and which is stimulated by the hypoglucemia G G

Effect of continued injections of insulin in depancreatized dogs. B A Houssay, J T Lewis and V G Foglia *Compt rend soc biol* 101, 241–5(1929), *Physiol Abstracts* 14, 380—There is a basal secretion of insulin which increases or diminishes *according to the glucemic fluctuation The amt. can be extd by injections of insulin* into depancreatized dogs It is necessary in such cases to inject a regular dose of 0 01 unit per kg per hr G G

Injection of sodium nucleate in dementia precox. H Claude, P Schiff and A Dimolesco *Compt rend soc biol* 101, 539(1929), *Physiol Abstracts* 14, 672—A markedly irresponsive condition of the nervous system to injection of nucleate of soda and to other kinds of interference is generally recognized Yet in cases which show no improvement a profound reaction of the organism is indicated by certain changes in the blood Leucocytosis is an early occurrence chiefly affecting mononuclears It may be exhibited before any signs of fever set in eosinophils are increased later The discordance between phys and psychic reactions is very marked in dementia precox G G

Influence of the thyroid on reticulo-endothelial blocking P Goebel. *Compt rend soc biol* 101, 596–7(1929) *Physiol Abstracts* 14, 658—Injection of colloidal Ag which blocks the reticulo-endothelial system and causes hyperglucemia in normal dogs does not cause hyperglucemia after removal of the thyroid The hyperglucemia is a function of the glycogen reserve and it may fail to occur when colloidal Ag is injected into a normal dog after thyroid feeding Blocking of the reticulo-endothelial system causes no change in the cholesterol content of the blood in the dog after thyroidectomy G G

Secretion and glucemia. E Zunz *Compt rend soc biol* 102, 339–40(1929), *Physiol Abstracts* 14, 576, cf *C A* 24, 413—Secretin free from hypotensive properties lowers glucemia in the dog, and the degree of this effect is in proportion to that on pancreatic activity But prepns. of secretin have been found which produce the effect on the pancreatic juice without hypoglucemia. Thus, the two actions are not caused by the same chem compd G G

Histamine and alkalosis R Rapflin and P Saradjichvili *Compt rend soc biol* 102, 559(1929), *Physiol Abstracts* 15, 39—Subcutaneous injections of histamine

in epileptics and alcoholics produced a condition of alkalosis due to gastric and urinary secretion of Cl. A max. of alky. was reached 20 min. after the injection. The max. of Cl output by the kidney occurred in 10 min., then there was a fall due to gastric secretion followed by a 2nd max. 35 min. after the injection. G. G.

Antagonism of the base tropine (tropanol) and pilocarpine on the submaxillary gland. P. Hazard. *Compt. rend. soc. biol.* 102, 674-6(1929). *Physiol. Abstracts* 13, 60; cf. *C. A.* 24, 901. Tropanol checks the secretion of saliva evoked by injection of pilocarpine and pilocarpine increases the secretion when inhibited by tropanol. G. G.

Changes in toxicity of uranyl nitrate in the rabbit. M. Garnier and J. Mayer. *Compt. rend. soc. biol.* 102, 676-81(1929). *Physiol. Abstracts* 13, 171.—The authors formerly stated that $UO_2(C_2O_4)$ injected subcutaneously in the rabbit was always fatal in a dose of 0.050 g. per kg. From a series of expts. they show now that the fatal dose varies under certain circumstances between 0.050 and 0.100 g. per kg. A cause of this variation, apart from the breed, is the sex of the animal and the season. Females are more resistant than males, and rabbits injected in the summer are less resistant than in cooler weather. G. G.

Action of ephedrine on the spinal and venous pressures of the dog before and after yohimbinization. M. Loeper, A. Lemaire and J. Patti. *Compt. rend. soc. biol.* 102, 691-3(1929). *Physiol. Abstracts* 13, 191-2. In the chloralosed dog the intravenous injection of 5 mg. of chlorate of ephedrine causes a prolonged rise of blood pressure in the carotid artery. In the yohimbinized dog the carotid rise of pressure is suppressed. Ephedrine acts on the meningeal pressure independently of the arterial system. Its action is the opposite of that of adrenaline, which augments the meningeal pressure even after yohimbinization. G. G.

Cholagog action of neptal. P. Chandon, P. Chabrol-Chat, M. Maximin, J. Poirier and Boccard-Petit. *Compt. rend. soc. biol.* 102, 701-2(1929). *Physiol. Abstracts* 13, 169; cf. *C. A.* 25, 252.—Increasing the mol. wt. of cholagog aromatic acids by substitution increases their effect on the flow of bile. The introduction of Hg into the formula of Na salicylate is effected in neptal. In doses of 2 to 4 cc. it doubles the amt. of bile, in 1 expt. the bile was quadrupled. The Hg *per se* does not affect the action. There is a certain parallelism between the cholagog and diuretic action of neptal. A diuretic like $CaCl_2$, on the other hand, has an inhibitory action on the secretion of bile. G. G.

Influence of the non-saponifiable substance of ox spleen on anemia of the rabbit. C. Sotta, J. Tapie and J. Pau. *Compt. rend. soc. biol.* 102, 1022-3(1929); *Physiol. Abstracts* 13, 174.—Bled rabbits require 10 to 20 days for the regeneration of the erythrocytes. A rabbit which receives 1 g. of cholesterol daily requires 14 days for this result. Given a daily dose of 1 g. of non-saponifiable substance (X), the rabbit needs but 7 days for the regeneration. G. G.

Study of *p*-aminobenzoate of *N*-diethylleucinol (panthesin). A. Poto. *Compt. rend. soc. biol.* 102, 1043-4(1929). *Physiol. Abstracts* 13, 192.—The formula of panthesin has the same aromatic nucleus as novocaine, $NH_2C_6H_4COOCH_2CH_2N(C_2H_5)_2$. It may be sterilized by boiling. It does not inhibit the action of adrenaline on the rabbit ear. Anesthesia of the cornea with a 2% soln. of panthesin lasts 58 min., as against 35 for cocaine. The relative toxicity of panthesin, *i. e.*, the ratio of toxicity to anesthetic power, is 2 or 3 times less than that of novocaine. The abs. toxicity of panthesin is greater. G. G.

Cholagog action of certain phenolic acids. M. Maximin and A. Boccard-Petit. *Compt. rend. soc. biol.* 103, 2-5(1930). *Physiol. Abstracts* 15, 109-9.—Sodium benzoate is inactive toward biliary secretion in the dog in doses of 1 g. per 20 kg. The salicylate gives inconstant results. The *m*-hydroxylbenzoate has a strong cholagog action. The diphenol acids, catechuic and caffeic, greatly increase the output of bile with increased wt. of solid ext. *p*-Hydroxylbenzoate is practically without effect. It seems that the position of the *m*-hydroxyl group favors the development of cholagog properties. Vanillic acid, in which the OH in the meta position is replaced by $OCH_3$, has a very marked cholagog action. Though the phenol function intervenes in the effectiveness of the compd., it is not in itself a sufficient factor. The role of the carboxyl group, as previously described, is further insisted on. G. G.

Action of insulin in tissue culture. P. Policard and L. Rouckhtman. *Compt. rend. soc. biol.* 103, 10-2(1930). *Physiol. Abstracts* 15, 173.—Insulin acting directly on mesenchymatous cells in artificial culture is without influence on the formation of glycogen, and, far from increasing the consumption of sugar, it diminishes this consumption. The diminution runs parallel with a disturbing influence on growth *in vitro*. G. G.

Action of dinitro-α-naphthol on the pigeon. P. V. Uytvanck *Compt rend soc. biol* 103, 29–31(1930), *Physiol Abstracts* 15, 193 —The pigeon after injection of dinitro-α naphthol exhibits polypnea; 12 min later the rectal temp. rises and reaches 46.5° in 18 min Peripheral vasodilatation, hyperglucemia and diminution of muscular and hepatic glycogen accompany the hyperthermia. The phosphates of blood and muscle are increased The Ca content of blood does not change The hyperthermic effects of dinitro-α naphthol are not suppressed by exposure of the reagent to the rays of a Hg vapor lamp G G

Action of calcium and potassium on the isolated heart. R. Kirsch and H Frédericq *Compt rend soc biol* 103, 34–6(1930), *Physiol Abstracts* 15, 157 —The chronaxie of the isolated heart of the tortoise is lengthened by an excess of Ca or a deficiency of K. It is diminished in the reverse conditions If the perfusion with the modified Ringer soln contg excess Ca or deficient K be prolonged, then the chronaxie slowly returns to its original normal value A fresh perfusion now with normal Ringer soln causes a new variation of the chronaxie in the opposite direction to the first change G G

Karyokinetic action of arsenious acid and alkalosis. M Rocmans *Compt rend soc biol* 103, 42–3(1930), *Physiol Abstracts* 15, 193–4 —In the guinea pig and dog increased multiplication of the cells in the lymphoid organs occasioned by $H_3AsO_3$ runs concurrently with a wave of alkalosis The soly of the Ca ion is diminished, and this effect is proportional to the dose of $H_3AsO_3$ The results obtained with $H_3AsO_3$ correspond with those obtained in peptone shock. The curves of cellular division and alkalosis run parallel In the dog the normal $p_H$ of 7.42 rises to 7.52, and that of the guinea pig rises from 7.29 to 7.42 The acid base regulating mechanism does not alter, for the variations of $NaHCO_3$ and $H_2CO_3$ are mutually balanced G G

Arterial tension and leucocytes. Action of acetylcholine. L Jung and P Collet *Compt rend soc biol* 103, 79–81(1930), *Physiol Abstracts* 15, 158 —The lowering of arterial pressure caused by injection of acetylcholine in dogs is accompanied by leucopenia A return to a normal leucocyte count accompanies the restoration to the normal of arterial pressure, but it is slower than the rise of pressure G G

Latent period of fluoride intoxication. H Cristiani *Compt rend soc biol* 103, 292–4(1930), *Physiol. Abstracts* 15, 126 —The bones of animals from districts where there are no factories emitting F contain very small quantities of this element in their compn., less than 0.05% The bones of animals from the neighborhood of Al works contain 0.379% Therefore, in regions where F is present, even in min quantity, there is a condition of latent fluorosis in the cattle G G

Strychnine-soap complexes. L Velluz *Compt rend soc biol* 103, 302–3 (1930), *Physiol Abstracts* 15, 124 —Soaps tend to neutralize the toxicity of alkaloids but to a less extent than that of toxins A mixture of oleate of Na and strychnine, boiled for 15 min on a water bath, may be injected into a guinea pig in 4 times the fatal dose of strychnine without harmful effect. Increase of the amt leads to the typical symptoms Repeated injections of the complex during a period of 2 months did not produce any immunity either to pure strychnine or to the complex, and it is obvious that immunization against crystalloid poisons cannot be effected by conferring colloidal characters on them G G.

Suprarenal capsules in hyperglucemia produced by decamethylenediguanidine. X. Chanovitch *Compt rend soc biol* 103, 328–30(1930), *Physiol Abstracts* 15, 117 —Synthalin produces hyperglucemia in the rabbit by its action on the suprarenal capsules Bilateral extirpation of the capsules prevents the hyperglucemia following injection of synthalin, extirpation of both suprarenal glands does not *per se* cause variations in the amt. of free sugar in the blood G G

Vascular effects of aconite. H Ekerfors *Compt rend soc biol* 103, 443–5 (1930), *Physiol Abstracts* 15, 124 —Aconitine exerts a double action on blood vessels—constrictor in small doses and vasodilator in large doses. The latter is the more common effect, the first being sometimes doubtful Atropine does not inhibit the action Aconitine inhibits the constrictor action of $BaCl_2$, and therefore may be supposed to act on the muscle G G

Alteration of the thyroid gland in fluoride intoxication. H Cristiani *Compt rend. soc biol* 103, 554–6(1930), *Physiol Abstracts* 15, 193 —Guinea pigs were given fluorides in small doses over long periods and their thyroid glands compared with those of controls In the glands of the former, lesions were common and marked The animals died after an av duration of 53 days G G

Macroscopic alterations of the hypophysis in fluoride intoxication. H Cristiani *Compt rend soc. biol.* 103, 556–7(1930), *Physiol. Abstracts* 15, 193 —Chronic poisoning

with fluorides causes diminution of vol of the hypophysis, which becomes flat in appearance The thickness in the guinea pig is reduced from about 2.25 to 1 7 mm. G G

Immediate hyperglucemia with use of insulin. F Rathery, R. Kourilsky and (Mlle ) Y Laurent *Compt rend soc biol* 103, 563–4(1930), *Physiol Abstracts* 15, 173 —Injection of insulin in the normal dog causes an immediate rise of the blood sugar, which is transient it is followed quickly by a fall This hyperglucemia is not const., but it is frequent The phenomenon seems to be independent of the nature of the insulin employed, the dose and the path of injection G G

Insulin hyperglucemia in different vascular regions. F Rathery, R Kourilsky and (Mlle ) Y Laurent *Compt rend soc biol* 103, 565–6(1930), *Physiol Abstracts* 15, 173 —The hyperglucemia immediately following the injection of insulin in the normal dog is more marked in certain parts than in others. It is especially pronounced in the hepatic circulation There is increased discharge of sugar into the hepatic vein and a notable increase of portal blood sugar G G

Cardiovascular effects of choline derivatives administered by the digestive tract. M Villaret, L Justin Besançon and R Cachera *Compt rend soc biol* 103, 583–4(1930) *Physiol Abstracts* 15, 190 —Methylacetylcholine introduced directly into an exposed loop of intestine of the dog causes a fall of blood pressure which is maximal in 1 min Absorption is extremely rapid • The arterial fall of pressure is very prolonged The heart is scarcely affected, the fall being due to dilatation of the arterioles Bromocholine used in the same way causes a fall of pressure which is less marked, but bradycardia sets in with respiratory trouble The animal dies in 50 min from a dose of 60 mg per kg G G

Utilization of pentoses by the animal organism. Action of intravenous injection of pentose on lactose secretion. I. I Nitzescu and M Benetato *Compt rend soc biol* 103, 1119–22(1930), *Physiol Abstracts* 15, 119–20 —After the intravenous injection of pentose the amt of sugar in the milk is increased. Injection of sucrose causes no change in the output of lactose. The lactose forming power of rhamnose is not as great as that of glucose, but it is equal to that of galactose G G

Acute mercury poisoning, its treatment and alterations in chlorine, water, nitrogen and acid-base relations during its course. A Landau, J Glass and I Beiles. *Wiener Arch inn Med* 20, 319–42(1930) —Acute Hg poisoning with Hg oxycyanate was treated by Bi therapy and by administration, after the period of anuria had passed, of NaCl by mouth, and rectal and subcutaneous injections of physiol NaCl soln A chem. study was made of the blood and urine during the 5 definite stages of the poisoning During the first period of anuria there was a retention of water without edema, a marked chloropenia of the plasma and blood corpuscles, a constantly increasing azotemia and a lowering of the alkali reserve, forming a complex which is typical for severe Hg poisoning The chloropenia is probably due to loss of Cl in vomiting and diarrhea, as in mild cases without these symptoms the chloremia remains normal The azotemia is very marked, it depends in part on the anuria and on a toxic breaking down of the cell proteins There is a retention of urea, uric acid, creatinine and other N-contg compds The azotemia continued to increase for a time after the administration of NaCl had begun Administration of NaCl at later stages did not increase the azotemia Usually in acidosis the Cl index of the blood corpuscles rises from increase in Cl content in the corpuscles Here, however, there is a marked decrease in alkali reserve without a shifting of the NaCl from plasma to blood corpuscles In spite of a decreased alkali reserve the urine remained alk Hyperventilation of the lung from toxic stimulation of the respiratory center by Hg or from toxic split products from cellular proteins, and the lowering of the $CO_2$ tension in the alveolar air bring about a decrease in alkali reserve of the plasma with excretion of basic substances by the kidneys. Harriet F. Holmes

Lymphadenoma produced by injection of coal tar. L. Mercier. *Compt. rend. soc. biol.* 103, 125–6(1930), *Physiol Abstracts* 15, 198 —Injection of coal tar in olive oil into the peritoneal cavity of the mouse caused generalized hypertrophy of the lymphatic glands, and splenic and pulmonary nodules In some of the descendants of an animal thus treated lymphadenoma appeared spontaneously. Injection of coal tar into the progeny of sensitized animals caused a rapid appearance of lymphoid growths with an increase in the no of pos. results. E. C. K

Reaction of thyroid gland to hypophyseal extract. M. Aron. *Compt rend. soc. biol.* 103, 145–7(1930), *Physiol. Abstracts* 15, 180.—Details are given of the histological changes which occur in the thyroid gland as a result of hypophyseal injection in the guinea pig. The vesicles become empty and the epithelial cells are enlarged. The

evidence of marked activity is more easily observed and less equivocal in the thyroid than in any other gland E C K

Blood-vessel wall changes produced by vigantol and their regression in animals ALICE SCHIFF. *Arch Path Anat* (Virchow's) 278, 62-83(1930) —Feeding vigantol (com. irradiated ergosterol) to cats and rabbits in daily doses of 2–4 mg for 1–3 months resulted in changes in the media of the arteries The changes included degeneration, proliferation and calcification Regression of the lesions could not be definitely established, on the other hand, there was some evidence of subsequent progression E R LONG

Initial stages of vigantol injury in rabbits. ERNST LAAS *Arch Path Anat* (Virchow's) 278, 316–61(1930) —Single doses of 30 mg vigantol per kg. animal weight produced in rabbits the following changes calcification in the media of arteries, beginning in the elastic fibers without a recognizable pre stage, and passing in the aorta from a localized nodular medial necrosis to a more diffuse degeneration, secondly, calcification in various organs, dependent in turn upon degeneration caused by injury to the vessels concerned in the local blood supply E R LONG

Sectioning of the splanchnic nerve and the effect of cholic acid on the creatinine excretion. AIJIRO TAKU *J. Biochem* (Japan) 12, 371-81(1930) —Subcutaneous injection of cholic acid causes a diminution in the creatinine excretion of the rabbit, but this effect disappears after sectioning of the splanchnic nerve The hypoglucemic influence of cholic acid is likewise removed by sectioning of the splanchnic All of this indicates that cholic acid exerts its action not peripherally but centrally. S MORGULIS

Influence of hyperglucemia and of extirpation of the adrenal bodies on the amylolytic power of saliva and blood. TULLIO GAYDA *Arch ital biol* 84, 55–66(1930) —See *C A* 25, 328, 338 S MORGULIS

Behavior and action of organic sulfur compounds in the organism of the dog. I. Action and fate of thiophene in the metabolism of the dog ANAST A. CHRISTOMANOS *Biochem Z* 229, 248–54(1930) —Thiophene is detd colorimetrically as follows To each of 2 test tubes are added 5 cc concd $H_2SO_4$ and 2 drops of satd $CuSO_4$ soln, then 0.05 cc *N* lactic acid This is thoroughly mixed and heated in boiling water exactly 3 min After cooling to about 10° a known amt of thiophene in alc soln is added to one and the unknown soln to the other test tube, this is mixed and left at room temp for 10 min when a color from rose to deep red develops, depending upon the concn of the thiophene The colors should be matched quickly in a colorimeter, and the results calcd by the formula $C = C_1 + S_1/S$, where $C_1$ = concn of known soln $S_1$ and $S$ are the colorimeter readings of the known and unknown solns As little as 0.013 mg still gives a recognizable color. When fed to dogs 5.7–12.2% of the thiophene are excreted in the urine as a conjugated product and part is assumed to change to $CH_3CH_2SH$ in the intermediate metabolism Thiophene does not depress the total N metabolism Thiophene causes a characteristic ataxy reaction in the dog S M

Influence of different foods on the amount of unsaturated fatty acids with four double bonds in the blood. N BEREND *Biochem Z* 229, 323–8(1930) —The amt of fatty acids with 4 double bonds in blood increases, after a preliminary drop, following the ingestion of fat This preliminary decrease does not occur if carbohydrate is fed together with the fat Carbohydrate or protein alone has no effect S M

Assimilability and toxicity of racemic lactic acid. OTTO FÜRTH AND PAUL ENGEL. *Biochem Z* 229, 381–96(1930) —The ingestion of fermentation lactic acid causes in man the loss of 20–30% in the urine The lactic acid is detd. in human urine by pptg the urine with phosphotungstic acid and removing from the filtrate the glucide like substances by pptn. with $Ca(OH)_2$ and $CuSO_4$ In rabbit urine lactic acid cannot be so detd, the long and difficult preliminary extn. with ether in a Lindt liquid extractor is necessary For the rabbit lactic acid administered orally proved much more toxic than previously supposed Although subcutaneously as much as 2.8–3.6 g per kg can be injected without any obvious harm rabbits died when fed 1.6 g and even as low as 0.6 g lactic acid per kg, also when that quantity was given over a period of 3 days For mice the lethal dose for subcutaneous injections of the Na lactate was 2–4 g per kg Rats, on the contrary, can withstand prolonged administration of 2 g or more per kg without any ill effects The high toxicity of the ingested *l*-lactic acid for rabbits and its poor assimilability also in man throw doubt upon its value as a food substance The use of small quantities of lactic acid in lemonades, fruit juices or confectionary is probably harmless Alkalosis induced by $NaHCO_3$ did not alter the effect of lactic acid in rabbits and mice Nor was the utilization of the lactic acid by the rabbit materially altered by adrenaline, phlorhizin or loading with sugar Mild

P intoxication caused in rabbits a large loss of lactic acid, followed, however, by increased retention when the intoxication passed off. *In vitro* expts on the catalytic oxidation of lactic acid on C surfaces fail to reveal any difference between the *d*- and *l* acid, as is observed in physiol expts. S. MORGULIS

**Does adrenaline exert a direct action on the base of the mid-brain?** R. H. KAHN AND E. RINDT. *Endokrinologie* 8, 1–4(1931).—Following the application of a 1:1000 adrenaline soln to the surface of the base of the mid brain there is no evidence of a sympathetic stimulation of end organs or of any injury. This indicates that the direct application of adrenaline to nerve tissue is without effect. On the contrary, a strong rise in blood pressure results promptly from the faradic stimulation of the base of the mid-brain. S. MORGULIS

**Effect of alkaline extracts of the anterior lobe of the hypophysis on the genitalia of female rats.** M. REISS, H. SELYE AND J. BÁLINT. *Endokrinologie* 8, 15–22(1931).—Alk. exts. from the anterior hypophysis exert an inhibiting effect on the hormone prepd. from the urines of pregnant women. This inhibiting action was especially manifested on the epithelium of the uterus. The striking changes produced by the injection of the sex hormone were absent if this was accompanied by an injection of the alk. ext. The uterus hypertrophy does not occur in animals treated with both exts. and the great hypertrophy of the ovary likewise fails to develop. S. MORGULIS

**Studies on relation of chemical constitution and biological action: amyostatic poisons.** TAKAOKI SASAKI AND ICHIRO OTSUKA. *J. Biochem.* (Japan) 12, 429–58(1930).—Synthetic products made from aminophenylalanine with glycine anhydride possess very interesting biol. actions. These compds., which are the HCl salts of 3-aminohydrocarbostyrils (3-Astyl), act specifically upon the brain stem and cause, in rabbits given subcutaneous injections disorganization of the myostatic and statokinetic responses resembling the decerebrate rigidity or the akinetic-rigidity syndrome observed in human pathology. The amyostatic action of local anesthetics like novocaine, tutocaine and acoine is similar to that of the 3-Astyl and its derivs., which also seem to have local anesthesia effects. The original must be consulted for a detailed account of the chem. prepn. of these various astyl compds. and their biol. effects. S. MORGULIS

**The cause of the diminished effect of the vagus on the heart under insulin.** C. F. RÄIHÄ AND P. MALM. *Skand. Arch. Physiol.* 61, 64–70(1931).—The diminished chronotropic effect of vagus stimulation upon the heart under the influence of insulin is attributable to a lowered sensitivity of the heart. There is some evidence to show that the depressing effect of the insulin on the response to vagus stimulation is associated with an increased K content of the heart. S. MORGULIS

**Copper studies.** C. G. SANTESSON. *Skand. Arch. Physiol.* 61, 79–112(1931).—Liver injury from Cu intoxication may arise in a variety of ways. In some instances of acute intoxication or intoxication for a long period with very large doses the blood is the seat of primary injury. Icterus with hematuria and hemoglobinuria, even hemorrhagic nephritis follow, and sometimes there is also evidence of methemoglobin formation. The disruption of red cells occasionally produces thrombosis of the liver blood capillaries which lead secondarily to necrosis of the parenchyma. However, the liver injury may also result from an altogether different cause. In the author's expts. with $CuSO_4$ the primary change in the liver was a strong capillary hyperemia with extensive bleeding which disrupted the liver parenchyma. The clotting of the blood takes place readily, leading to capillary thrombosis and thus to necrosis without primary blood alterations. The hyperemia is due to dilatation of the finest blood vessels and is common in all metal intoxication (Hg, Bi, Cu and especially As). The bleeding, at least in the case of As and P, results from injury of the vessel wall. S. never found icterus or cirrhosis of the liver, and thinks that possibly rabbits are not subject to icterus. A round cell infiltration was observed which might possibly have been an early stage of cirrhosis. The hyperemia from Cu intoxication extends also to the lung and frequently causes hemorrhage or pneumonia. Although intestinal changes have frequently been described, S. found little evidence in his expts. Likewise, the kidney was only slightly affected, although occasionally a little albumin appeared in the urine but never any bile pigment. Generally the intoxication with Cu or Bi has similar effects, but the former acts more upon the liver, whereas the latter acts on the large intestine and cecum and on the kidneys. S. MORGULIS

**Toxic action of dictamnin.** A. OGATA. *J. Pharm. Soc. Japan* 50, 1124–33(1930).—Thoms (*C. A.* 17, 2583) previously isolated dictamnin (I) from *Dictamnus albus* and studied its toxic action. O. repeated the study of the toxic action of I and found a slightly different toxic action. T. I. NAKAMURA

**The action of formaldehyde on neuro-muscular excitability.** D. BENNATI AND E.

HERZFELD *Compt rend*, 190, 1522-5(1930).—The injection of 0.1 cc of 2% $CH_2O$ in saline into the lymph sac of a 35 g frog produced no important changes in the chronaxia or rheobase of the sciatic nerve gastrocnemius. The injection of 0.5 cc of the same soln caused loss of excitability apart from an appreciable modification of the 2 characteristics of this excitability. Av. protocols are included. T. H. RIDER.

Physiological action of aminomethyl-(3,4-dihydroxyphenyl)-carbinol. RAYMOND-HAMET *Compt rend* 191, 869-71(1930); cf. Barger and Dale *C. A.* 5, 109.—*Aminomethyl (3,4-dihydroxyphenyl)-carbinol (artérénol)* (I) when injected prior to *d,l adrenaline HCl* (II) causes a greater hypertensive effect than the later injection of an equiv. dose of II. However, when II is injected it produces a greater hypertensive effect than a later injection of I. Loup (*C. A.* 7, 4016) has shown that the hypertensive effect diminishes with repeated equal doses of II or other like substances. The action of I proves a little greater than that of II; therefore, the mechanism of the action must be different. In a dog with a sufficient prior dose of *yohimbine* (III), to reverse the action of II, I still causes hypertension, accompanied, however, by renal dilation, whereas I administered without a prior dose of III causes renal constriction. The action of I is, therefore, similar to that of *ephedrine* (IV) (cf. R.-H. *C. A.* 22, 271). However, while strong doses of IV are hypotensive, fatal doses of I are still hypertensive. Similar to IV and contrary to II, the effects of I are not augmented by cocaine. T. H. R.

The chemistry of anesthesia. WILDER D. BANCROFT AND GEORGE H. RICHTER *J. Phys. Chem.* 35, 215-68(1931).—All types of anesthesia are considered explained satisfactorily by the theories of Binz and of Claude Bernard, that the reversible coagulation of the colloids of the sensory nerves produces anesthesia. The material offered by this paper, however, is limited to a discussion of general anesthesia, local anesthesia not being specifically included. A cursory criticism of other theories is followed by the development of the Binz-Bernard theory, and a discussion of the 3 basic criticisms directed against it, namely: (*a*) The concns. at which narcotics are active are much less than that required to flocculate the cell colloids. (*b*) Coagulation of the cell colloids represents the toxic effect of a narcotic and is irreversible, whereas narcosis is a reversible phenomenon. (*c*) The cases in which the dispersion of the colloids is decreased by narcotics are explained as being only apparent. In answer to (*a*) B. and R. call attention to the fact that the presence of electrolytes makes possible the flocculation of protein sols with a low concn. of EtOH, and the assumption that the colloidal systems of the cell may be so sensitized in life that a small quantity of a narcotic will flocculate them. (*b*) and (*c*) are answered by the fact that with sensitized protein sols reversible flocculation with low concns. of narcotics was accomplished *in vitro*, and that reversible flocculation was demonstrated in yeast cells. Facts which cannot be explained by other theories but which can be explained by the Binz-Bernard theory are stressed. The stimulation of general protoplasmic irritability produced by low concns. of narcotics is explained as dependent upon the decreased stability of the colloids caused by these low concns. while narcosis is caused by higher concns. Attention is called to the fact that typical stimulants, such as caffeine and strychnine, behave as narcotics in high concn. The stimulating after-effect of narcotics is explained as due to the same colloidal state, passed through again in the process of peptization. Anesthesia caused by water, salts, heat, cold, or elec. or mech. means may also be explained as due to the effect on the colloidal state of protoplasm. The conclusion is reached that there is no relation between chem. structure and physiol. action on the grounds that structure merely dets. the phys. properties, which in turn, together with concn., govern the physiol. action. All drugs are assumed to stimulate in some low concn. and to depress in higher concns. Synergism is explained as follows. A small concn. of a drug is adsorbed entirely upon the principal substrate. The addn. of a synergistic drug which is adsorbed upon the same substrate displaces a certain amt. of its predecessor which then affects the secondary substrates in the same manner as would a higher original concn. Antagonism would occur when the colloids of a cell are reversibly coagulated and the agent that caused the flocculation is displaced by a substance of weaker flocculation capacity for the given concn., in which case the bio-colloids will again be peptized by the electrolytes. NaBr and antipyrine which have a quieting effect on the nerves, produce a lowered irritability following upon *increased dispersion of the colloids*. *Narcotizing agents* are divided into 2 groups: direct narcotics, which coagulate the cell colloids by direct action ($Et_2O$, $CHCl_3$, EtOH) and indirect agents which interfere with some normal function of the cell, such as oxidation and the coagulation is produced by the accumulated waste products ($NO_2$, $C_2H_2$, HCN). T. H. RIDER.

Investigation into the distribution of lead in the organism on basis of a photographic (radiochemical) method. SVEND LOMHOLT. *J. Pharmacol.* 40, 235-45(1930).—A

soln of $PbCl_2$ contg a small amt of radium D was injected into mice and subsequently sections of the various organs, or the entire animal, were prepd and placed on photographic plates. When the plates were later developed the presence of the radioactive substance could be seen Pictures showed that Pb is deposited in greatest amt in the liver, in the cortex of the kidney, and in osseous tissue Very little was found in the brain C RITGEL

**The electrocardiogram of non-anesthetized dogs as modified by the intravenous injection of pitressin, atropine sulfate and vagus section.** CHARLES M GRUBER AND WM B KOUNTZ *J Pharmacol* 40, 253-73(1930) cf C A 25, 745.—The following cardiac changes were noted (1) a brief period of slowing, (2) a period of acceleration, (3) a prolonged period of slowing During the latter phase the electrocardiogram showed *shifting pacemaker, prolongation of auriculo-ventricular conduction time, sino-auricular block, partial auriculo-ventricular block, extra systoles, high T waves, high branching T waves and bigeminal pulse* After atropine or vagus section, the same changes were noted C R.

**A study of the effect of morphine upon the respiratory center** A H MALONEY AND A L TATUM *J Pharmacol* 40, 291-304(1930).—Depression of the respiratory mechanism is more marked after neonal phenobarbital or (to a less degree) amytal and ethyl α-methylbutylbarbituric acid, than after urethan chloral hydrate or avertine From observations on stimulation of the central end of the cut sciatic nerve, stimulation of the intact skin and the effect of increased or decreased intrapulmonic pressure on respiration after morphine in rabbits it is concluded that morphine reduces the responsiveness of the center to accelerator afferent nervous impulses and to $CO_2$, but increases the effectiveness of inhibitory vagal impulses C. R.

**Iodine prophylaxis and endemic goiter.** A T CAMERON *Can Pub Health J* 21, 495-500, 541-8(1930).—An extensive discussion and review of the literature on the distribution of I in nature and its correlation with thyroid diseases, particularly simple endemic goiter A close relationship between deficiency of I in the diet and simple goiter is indicated Other possible causes of endemic goiter are discussed There is strong evidence that in certain regions a water-borne infection is a factor, but this probably acts through an effect on I metabolism. It is concluded that iodized salt is the best medium for I prophylaxis The I content of Canadian iodized salt (1 part KI or NaI to 10 000) seems unnecessarily high, and is perhaps 10-20 times greater than required The evidence that iodized salt is potentially dangerous for adult (non-toxic) goitrous individuals is frequently open to criticism, and gravely exaggerated Further study of this aspect is desirable A bibliography of 60 references is appended. R. E THOMPSON

**Influence of externally applied preparations to promote growth of hair.** A FORSTER. *Arch. exptl Path Pharm.* 144, 363(1929), *Schweiz Apoth Ztg* 68, 545-7(1930).—Results of systematic expts. on cats with 6 classes of medicaments (19) do not support the belief that the normal growth of hair can be influenced by the external application of supposedly sp substances promoting growth, *e. g.*, cholesterol, chem. degradation products of hair or "proteolytic enzymes." Aside from the effect of substances producing excessive stimulation of the skin, or of too high concns., treatment with each of the substances examd., even white vaseline, or 50% alc., although widely different in chem and pharmacol characters, may produce an increase in the growth of hair. This fact must be ascribed to the effect of mechanical stimulation, an increased flushing with blood, and perhaps also a cleansing of the skin However the mechanical effect may be increased by the use of locally acting chem stimulants. S. WALDBOTT

**Poisoning by seeds of the castor oil plant.** P LIPTÁK *Ber Ungar pharm. Ges.* 1928, No. 5, *Med und pharm Rundschau, Schweiz Apoth Ztg* 68, 280-1(1930), cf. *C. A.* 15, 2936, 17, 1844, 19, 2533.—An account is given of 3 cases of poisoning by ricinus seed, 2 cases were fatal after, resp., 2½ and 5 seeds only had been eaten. S. WALDBOTT

**A study of the treatment of Sydenham chorea.** B WASMER *Thesis*, Lyon, 1929; *J. pharm. Alsace Lorraine* 57, 255(1930).—Arsylen has been found an efficient and innocuous remedy (cf *C. A.* 22, 813) S. WALDBOTT

**Distribution of hydrastine between the erythrocytes and the plasma.** R FABRE *J. pharm. chim.* [8], 12, 330-45(1930), cf *C A* 24, 4865.—Hydrastine-HCl was injected into a dog and 100-cc. samples of blood were taken after 1, 24, 48 and 72 hrs. Na citrate was added and plasma and erythrocytes were sepd by centrifuging From each sample the alkaloid was extd by the Stas-Otto-Ogier method, converted into fluorescent hydrastinine sulfate with $H_2SO_4$ and $H_2O_2$ and equal vols. of the solns. were photographed in Wood's light. Again, the erythrocytes proved to have a fixing power for

the alkaloid superior to that of the plasma Expts *in vitro*, however, showed no difference S WALDBOTT

**Bee and wasp poison.** DE VASCONCELLES *Rev Terap* 1930, No 9, *Therap Ber ; Schweiz Apoth - Ztg* 68, 561-3(1930) —Present knowledge of this poison and the methods of combating its effects on man are reviewed, cf Langer, 1876, *C A* 13, 2034, 14, 78, 15, 378 2127, 17, 2016, 3058, 18, 1534, 23, 906, etc Effective antidotes are an injection of 0 1% adrenaline soln (Samson), or of *racedrine* (racemic ephedrine) (Rubitschang) which prolongs the antidotal effect, or of *ephrine* which is a combination of both S WALDBOTT

The chemical examination of *Sida cordifolia*, Linn (GHOSH, DUTT) 17. Chloretone as a preservative (POLÁK) 17.

WOLFF-EISNER, A Handbuch der experimentellen Therapie, Serum- und Chemotherapie: Ein Handbuch für die ärztliche Praxis und Klinik. Munich J F. Lehmanns 236 pp M 18

## I—ZOOLOGY

R A GORTNER

**Insect oils and fats.** J TIMON DAVID *Bull soc chim biol* 12, 395-403(1930), cf *C A* 23, 3513 —The larvae of more than 2 dozen insects studied contain quantities of oil varying from 0 94 to 28 0% The I values of the oils vary from about 1 2 in the case of some Aphidians (these oils have a high sapon value) to 164 5 for *Saturnia pyri*, Sch The non drying oils are most largely represented The isolation of hexabromostearic acid by bromination of the acids from *Colaspidema atra*, Ol (m p 178 5°) confirms the presence of linolenic acid in the oil of this insect Oleic acid is widely distributed in insect oils The amt of unsaponifiable matter varies from 0 75% in the oil of *Ergates faber*, L to 12 5% in that of *Helvtaurus monticornis*, Reitt The oils of tropical insects have a lower I value than those of insects inhabiting cold countries Females generally are richer in fat than males Related species yield oils of a similar type B C A

**A study of the occurrence of trimethylamine in marine animals.** A STANLEY COOK *Can Chem Met* 15, 22-3(1931) —Trimethylamine oxide was isolated from the muscle of various species of fish A method is given for the quant estn of $(CH_3)_3NO$ in biol materials, based on the reduction to $(CH_3)_3NH$ and micro steam distn and titration of the liberated $(CH_3)_3NH$ W. H BOYNTON

**Occurrence of manganese in insects. II** A P VINOGRADOV AND M V. NEUSTRUEVA *Compt rend acad sci U R S S* 1930A, No 0, 127-32, cf *Compt rend acad Sci U R S S* 1929A, No 10, 227 —Mn was detd in a large no of insect species The av % of Mn based on live wt was $10^{-4}$, the extreme values being $2 \times 10^{-4}$ and $5\,2 \times 10^{-3}$ *Formica rufa* has the max content The amt of Mn depends somewhat on the character of the food, is independent of sex and varies inversely with the atm of gaseous exchange in the insect, those always in motion having the smallest Mn content. With regard to distribution in the body, in *Formica rufa* the head contains an av % of $2\,8 \times 10^{-3}$ middle portion $9 \times 10^{-4}$, posterio portion $3 \times 10^{-4}$ based on the dry wt The latter part of the insect contains the major portion of the alimentary tract and also the gland furnishing the poisonous secretion Its high Mn content is not due to food residues in the tract since the food of these insects contains less Mn and more Fe than the whole insect. As Mn plays a catalytic role in some fermentations and as $HCO_2H$ probably results from the action of an oxidative enzyme upon carbohydrate, the high Mn of the posterior part may be related to $HCO_2H$ production LEWIS W BUTZ

**Occurrence of vanadium in marine organisms** A P VINOGRADOV *Compt rend acad sci U R S S 1930A*, No 17, 465-7 —*Phallusia obliqua and Ciona intestinalis* contain V, *Molpadia affinis* and *Cucumaria frondosa* do not It would seem that all Ascidiidae have a V-contg blood pigment *Phallusia obliqua* contains 0 0302% of the live wt. The quant. method follows Fuse the ash with $Na_2CO_3$ and $KNO_3$, ppt Pb vanadate from the aq soln of the melt, dissolve the ppt and titrate the V, reduced by $SO_2$, with $KMnO_4$ LEWIS W BUTZ

**Molar concentration of snail blood, its factors and variations; influence of the state of activity of the animal** MARCEL DUVAL. *Ann physiol physicochim biol* 6, 346-64(1930) —There is no definite relation between the state of activity of *Helix pomatia* and the molar concn of its blood as tested by the depression of the f p NaCl constitutes 70-80% of the total The molar concn of the blood of the snail steadily

increases ($\Delta > -0.1°$) until rain or dew allows an imbibition of water. If this hydration does not occur, the animal dies when $\Delta$ reaches about 0.6°. The total blood $CO_2$ varies inversely with NaCl is a max during the state of activity and constitutes 20–30% of the total molar concn. NaCl and carbonates account for almost the entire molarity of snail blood. It contains only 2.3 mg. of mineral P per l. H. EAGLE

**Goldfish susceptible to hydrocyanic acid gas.** R. J. RYAN. Calif. Dept. Agr., *Monthly Bull.* 19, 728(1930). In 2 cases orchard fumigation with liquid HCN caused the death of goldfish colonies in ponds located about 100 ft. from the nearest tree. Cf. *C. A.* 14, 2051. C. R. FELLERS

**Metabolism of the honey-bee colony during winter.** C. L. CORKINS. Wyoming Agr. Expt. Sta. *Bull.* No. 175, 3–51(1930). As the external temps. decline below the clustering temp., the metabolic rate is not materially increased. C. R. FELLERS

**Cholesterol of decapod crustaceans.** A. FUILLE AND A. POLICARD. *Compt. rend. soc. biol.* 103, 823(1930). *Physiol. Abstracts* 15, 142. A method of extg. the cholesterol from certain crustaceans is described. The cholesterol is similar to that of higher animals but its rotatory power is somewhat higher. G. G.

**Influence of thyroxine on growth of embryos of the pond snail.** O. V. HYBBS. *Compt. rend. soc. biol.* 103, 611–3(1930). *Physiol. Abstracts* 15, 180.—Thyroxine has a depressing influence on the growth of the embryos of the pond snail (*Physa*). It alters the normal process of differentiation but has no direct influence on the duration of development. G. G.

**Ion action. IV. The influence of various ions on the rate of the toad heart.** SHUN HOSHIA. *Japan. J. Med. Sci.* 1, No. 3, 109–17(1929).—Expts. were conducted on the isolated toad heart perfused with oxygenated Ringer soln. The NaCl in it was replaced by salts contg. NaBr, NaI, etc., in various concns. It was found that rubber tubing must not be used in the work. Br and I ions show a positive chronotropic action. In weaker concns. this is not evident. Weak concns. of $NO_3$ ions show a positive chronotropic effect, but strong concns. are markedly negatively chronotropic. SCN ions are practically the same as $NO_3$ ions. $SO_4$ ions are very weak and chiefly negative. Anions in a given concn. are very different and the sensitivity of the heart beat for these anions shows a lyotropic series. Li shows a negative chronotropic action, and in concn. of 0.11 mols the heart is quickly stopped. An antagonism exists between Li and K. **V. The influence of various ions on the excitability of heart strips of the frog.** *Ibid.* 147–55.—Expts. on strips of heart muscle from *Rana nigromaculata* in a Ringer strip preparation in which various ions were interchanged showed certain changes in irritability when stimulated with direct current of const. duration. Br, I and SCN ions in weak concns. increase the irritability. In high concn. the irritability is more or less decreased. SCN shows the greatest effect. $SO_4$ produces a diminution, while $NO_3$ ions cause an increase. The concn. of each anion for max. increase in irritability also shows a lyotropic series. The influence of anions on contractility is independent of the irritability. G. H. W. LUCAS

**Intracellular oxidation-reduction studies. III. Permeability of echinoderm ova to indicators.** ROBERT CHAMBERS, BARNETT COHEN AND HERBERT POLLACK. *J. Expll. Biol.* 7, 1–8(1931).—Ova of the sandollar (*Echinarachnius parma*) and starfish (*Asterias rubens*) were fertilized and freed from jelly and membranes before they were immersed in solns. of indicators. Eggs that were unstained were injected with 1% $K_4Fe(CN)_6$ as a test for reduced, colorless indicator. Toxicity of the various stains was gaged by the subsequent development of the eggs. All indophenols studied penetrated the egg membranes except those with a sulfonate radical. Under aerobic conditions the indicators of the series studied down through methylene blue are reduced within the ova. Penetrating indicators are toxic. Except phenol blue sulfonate the indicators that failed to penetrate were non toxic. Upon cytolysis or tearing, the indicator is washed from the ovum and the reducing substances pass into the surrounding fluid but retain their activity. C. M. McCAY

**The effect of hydrogen-ion concentration on protozoa, as demonstrated by the rate of food vacuole formation in Colpidium.** SYLVIA M. MILES. *J. Expll. Biol.* 7, 17–29(1931).—Colpidium cultures (from hay infusion) were suspended in a series of buffer solns. and fed India ink suspensions. The rate of formation of food vacuoles indicates the feeding rate. This attains a max. at $p_H$ 6.0. The max. rate of movement also occurs at this $p_H$. The mucus produced for food collection has a max. viscosity at a $p_H$ of 8.0. This value lies in the zone of decreased food consumption and movement. C. M. McCAY

**The adaptation of Gunda ulvae to salinity. I. The environment.** C. F. A. PANTIN. *J. Expll. Biol.* 7, 63–72(1931).—*Gunda ulvae* occurs at the mouths of streams

flowing into the salt water of the ocean It must withstand changes from fresh water to undiluted sea water It may be exposed to either for periods of several hrs II. The water exchange. *Ibid* 73–81 —These worms immersed in dil sea water swell At great dilns the swelling is less than if they were covered with semi-permeable membranes In waters contg only small amts of inorg elements the worms swell and die If these fresh waters are rich in $CaCO_3$ the swelling is much less NaCl, $NaHCO_3$ or glycerol cannot be substituted for the $CaCO_3$ III. The electrolyte exchange. *Ibid* 82–94 —The loss of salts upon the transfer of the worms from sea water to fresh water was measured by elec cond Twenty-five % of the salts are lost as the worms imbibe water to double their vol In waters contg $CaCO_3$ in which the worms survive their internal salt concn is reduced to 6–10% of that of sea water Ca alone seems able to check this salt loss since it cannot be replaced by the other electrolytes studied and since salt loss is continuous in distd water up to the stage of cytolysis C M M

Researches on the interior medium of the marine lamprey (Petromyzon marinus)—its variations as the exterior medium is changed. Fontaine *Compt rend* 191, 680–2 (1930) —Lampreys were placed in fresh water which was progressively dild with sea water. After 21 hours' immersion in water of a given concn the Cl content and osmotic pressure of the blood were detd The Cl concn increased but the ratio of Cl to other ions in the blood decreased Mucous retards the appearance of pathol symptoms when the lamprey is placed in salt water J. G McNally

A comparison of the action of magnesium chloride on the respiratory activity and on the contractility of the frog ventricle. J. Leibowitz and A Schwritzer *Biochem Z* 229, 291–5(1930) —At the close of the seasonal hypersensitivity of the frog heart to $MgCl_2$ it is found that Mg salts exert an inhibitory effect upon tissue respiration which is parallel to the diminishing inhibition of the contractility The inhibiting action of small doses of Mg on the oxidation can be shown during the summer in the heart but not in the liver S Morgulis

Action at a distance and the development of the eggs of the sea urchin. New experiments. J Magrou and Mme M Magrou *Compt rend* 191, 802–4(1930), cf *Ibid* 186, 802(1921), 188, 733(1929), 189, 779(1929) —Eggs of the sea urchin (*Paracentrotus lividus*) are markedly affected at a distance by exposure to bacterial suspensions and chem mixts, although sepd therefrom by a quartz flask with a ground and hydraulically sealed stopper These expts were repeated with controls not exposed to the above agents, and slight irregularities of growth in the controls suggested that the larvae do not perfectly accommodate themselves to the sealed flask A new set of expts was therefore performed in which the active substances rather than the eggs were placed in the closed vessel The results confirmed the action at a distance effected by *B tumefaciens*, and glucose in an oxidizing medium. The open top of a tube contg the active substance may be bent down and introduced into a control tube without effect on the development of the larvae, thus showing that the action at a distance is not due to a substance capable of traveling through this tube T. H. Rider

Actions at a distance on fertilized eggs, sperm and virgin eggs of the sea urchin (Paracentrotus lividus Lk.). J Magrou and Mme M Magrou *Compt rend* 191, 963–5(1930), cf preceding abstr —Sperm of *Paracentrotus lividus* Lk exposed in quartz vessels to the same conditions as reported in the previous article, when used to fertilize normal virgin eggs, gave larvae which developed abnormally Virgin eggs likewise treated before fertilization gave abnormal larvae The exposure of eggs or sperm in the same manner to a soln of uranium nitrate too weak to affect a photographic plate in 24 hrs still produced abnormalities T. H Rider

Chemical processes of cellular division. Louis Rapkine *Compt rend* 191, 871–4(1930) —Accepting the hypothesis (Harris, *Proc Roy Soc (London) B94*, 428 (1923)) that cellular division is preceded by a denaturation of proteins accompanying a splitting of the cellular lipoid proteins, R investigated the occurrence of the SH radical (I) during the stages before and after the division of eggs of *Paracentrotus lividus* Lk Virgin eggs showed 35 mg I per 100 g eggs Thirty min after fertilization this figure dropped to 10 mg I, and 10–15 min before the first division increased to 46 mg I. Eggs exposed to the action of 0.00001 *M* $HgCl_2$ 20 min after fertilization for a period of 5 min then transferred to sea water or sea water contg PhNH, or cystine failed to develop Transferred to a 0.001 *M* soln. of cysteine in sea water, however, 70–90% developed Thus cellular division can be controlled by the removal or addn of I. T H R.

Variation in the response to light in Ameba proteus with special reference to the effects of salts and hydrogen-ion concentration. S O Mast and H R Hulpieu *Protoplasma* 11, 412–31(1930) —The rate of reaction is largely dependent upon age

size, etc., of the ameba. Under comparable conditions increase in HCl causes increase in reaction time. The reverse effect is obtained with $CO_2$. An increase in concn. of the chlorides of K, Mg and Ca causes a decrease in reaction time. In solns. of NaCl there is no consistent relation. M. H. SOULE

## 12—FOODS

F. C. BLANCK AND H. A. LEPPER

**Amendment to the Federal food and drugs act of June 30, 1906.** Food and Drug Administration, U. S. Dept. Agr., *Service and Regulatory Announcements, F. D.* No. 1, Suppl. 1 (1930).—The text of the amendment of July 8, 1930, to Section 8 of the act is given. The Secretary of Agriculture is authorized to promulgate, from time to time, such standards of quality, condition and (or) fill of container for *canned foods* as will in his judgment promote honesty and fair dealing with the consumer. Canned food coming within the jurisdiction of the act (except meat and meat food products subject to the Federal Meat Inspection Act, and canned milk) which fall below such standards is misbranded unless its package or label bears a plain and conspicuous form of statement promulgated by the Secretary, indicating that it falls below the standard. Canned food is defined as "all food which is in hermetically sealed containers and is sterilized by heat." It is provided that nothing in the amendment "shall be construed to authorize the manufacture, sale, shipment or transportation of adulterated or misbranded foods." H. A. LEPPER

**Definitions and standards for food products.** Food and Drug Administration, U. S. Dept. Agr., *Service and Regulatory Announcements, F. D.* No. 2, Suppl. 2, August, 1930.—Definitions and standards are adopted for *fruit juice, grape juice, orange juice* and *whole wheat flour*. The standard for *flour* has been revised. *Ibid.* Suppl. 3, January, 1931.—In the definitions and standards for food products adopted as a guide for officials of the department in enforcing the Federal food and drugs act the term "sugar," with or without the parenthetical expression "sucrose," as used to designate the sweetening agent in manufactured food products, is to be interpreted to include dextrose (pure refined corn sugar). This is in keeping with the announcement of the Department permitting the use of pure refined corn sugar as an ingredient of food in which sugar (sucrose) is a recognized element without declaration on the label of the product. The restrictions on the adulteration or imitation of any natural product, such as honey, by the addition of any sugar are not affected by the ruling. H. A. LEPPER

**Crude fiber determination with the aid of a filter of a new type.** K. FEIST AND E. KUNTZ. *Z. Untersuch. Lebensm.* 59, 480–3(1930).—An app. is described by which dependable results are obtained in min. time. C. R. FELLERS

**Detection of hard wheat grits.** E. BERLINER AND R. RÜTER. *Z. ges. Getreidew.* 16, 212–3(1929).—A criticism of Kühl's test (*C. A.* 24, 4557). B. C. A.

**Detection of hard wheat grits.** H. KÜHL. *Z. ges. Getreidew.* 16, 213–6(1929); cf. *C. A.* 24, 4557.—A reply to Berliner and Rüter (preceding abstract) and statement of exact conditions. B. C. A.

**Effect of harvesting in different stages of ripening on the valuable constituents of cereals.** F. BERENER AND W. SCHLIMM. *Landw. Jahrb.* 72, 269–91(1930).—Late harvested grain has greater weight per 1000 grains. There is a migration of the starch to the grain in the later stages of ripening and a rapid increase in the protein content between the "milky" stage and ripeness. GEORGE R. GREENBANK

**Biometric analysis of cereal-chemical data. I. Variation.** ALAN E. TRELOAR. *Cereal Chemistry* 8, 69–88(1931).—T. explains the fundamentals of statistical analysis. He gives several formulas which are used by the biometrician. Histograms are given with fitted curves superimposed. The significance of statistical consts. is explained. L. H. BAILEY

**Baking value of flour and possibility of determining it in the laboratory.** A. TASMAN. *Chem. Weekblad* 27, 138–43(1930).—An account is given of the attempts to correlate chem. and phys. consts., particularly viscosity and swelling power, with baking properties. Valuable information may be obtained by detns. of viscosity in the presence of regularly increasing quantities of acid, the differences in viscosity being plotted to form a curve. From the form of the curve for a given flour, rough estimates may be made of the ash content, gluten content and swelling power. B. C. A.

**The stability of leavening in self-rising flour.** PAUL LOGUE AND ELIZABETH MCKIM. *Cereal Chemistry* 8, 24–9(1931).—The consumption of self rising flour in

the U. S. is increasing more rapidly than the consumption of plain flour. The rate of premature decompn. of self rising flour varies directly as the moisture content. Self rising flours contg. less than 12.5% moisture are relatively stable. Self rising flours contg. more than 12.5% moisture decompose more rapidly and result in alk. baked products, unless this premature decompn. is compensated for in increased acid leavening agent. An explanation of the increased alky. accompanying premature decompn. *is offered in the mechanism of the reactions involved.* L. H. Bailey

**Relation of peptization of wheat flour protein to loaf volume.** R. H. Harris *Cereal Chemistry* 8, 47-63(1931).—A series of 11 experimentally milled flours was peptized by 3 methods and the percentage of total protein extd. was computed. The correlations between improver loaf vol. and percentage of total protein peptized were also computed. The quantity of protein removed increased quite rapidly at first, but no appreciable change was detected after the initial 30 min. Temp. did not appear to have any significant effect upon the quantity of protein extd. except in the water suspension, when a slight increase with rise in temp. was noticed. Forty four flours of 75% extn., milled from 1929 crop Saskatchewan Marquis wheat of contract grade, were peptized by 0.5 *N* soln. of KBr and $MgSO_4$, and the protein extd. was calcd. as percentage of the total protein, also as peptized and non peptized protein fractions of the flour. Correlations between the percentage of total protein peptized and improver loaf vol. were lower than those between total protein and improver loaf vol. and show less probability of forecasting loaf vol. The relationship between non peptized protein and improver loaf vol. is not significantly different from that involving total protein and improver loaf vol., and is of equal value in predicting baking strength. The corresponding correlations obtained with the basic loaf vol. were not so large, and are relatively of less practical importance. Twelve flours milled in a similar manner *from 1928 pure strain Marquis grown at various Saskatchewan points including grades* from No. 1 Northern to No. 6 gave a higher neg. correlation between the percentage of total protein peptized and improver loaf vol. than between the percentage of total protein peptized and basic loaf vol. L. H. Bailey

**Predetermining flour soundness.** D. A. Coleman *American Miller* 58, 434 (1930).—In an endeavor to find some method of detg. the soundness of flour without going through the time-consuming methods of milling and baking, it was observed that the acidity of the fat is much greater in unsound wheat than in normal wheat. It was also observed that the normal acidity of the different classes of wheats varies widely. Thus the acidity of the fat of sound hard red winter wheat does not exceed 8.5, hard red spring wheat, 5.5; soft red winter wheat, 8.0; Durum wheat, 4.0, and white wheat, 5.5. The acidity of the fat of certain types of damaged wheat was found to be: dank and wet wheat, 8.6–16; musty wheat, 9–15; sour wheat, 9–22; skin burned wheat, 21–38 and mahogany, bin burned wheat, 35–44. The method of testing the acidity consists in removing the fat from the material with petroleum ether, recovering the fat from the ether to det. the quantity present and dissolving the fat in a suitable solvent so that the free fatty acid can be detd. The acidity of the free fatty acids present is expressed per g. of fat. L. H. Bailey

**Wheat and flour studies. XVII. Factors influencing the viscosity of flour-water suspensions. 4. The *effect of extraction* with solutions of potassium and sodium halides.** Arnold H. Johnson *Cereal Chemistry* 8, 39–43(1931); cf. *C. A.* 24, 3287.—The viscosity of flour water suspensions extd. with 1.0 and 0.5 *N* solns. of the K and Na halides are higher than those of similar suspensions extd. with distd. water. The viscosities decrease according to the lyotropic series of the anions $I > Br > Cl > F$. Glutenin is not removed on extn. of a flour suspension with the halides of K and Na. L. H. Bailey

**The march of acidity in stored flour. II.** M. C. Markley and C. H. Bailey *Cereal Chemistry* 8, 29-38(1931); cf. *C. A.* 24, 897.—A higher correlation of ash content with acidity as detd. by the A. O. A. C. method was found in freshly milled flours than the ash content with acidity detd. by the Greek method. The difference between Greek acidity and A. O. A. C. acidity in freshly milled flours was highly correlated with the ash content. Earlier assumptions that the A. O. A. C. tentative method *for acidity indicated the relative rate of production of acid reacting substances during* the extn. with water received support from these recent studies. The rate of change in acidity of flours stored at 25° was highly correlated with ash content. It was estd. that flours contg. the percentages of ash included in the 4 grades or qualities described in the present Greek specifications will contain in excess of the max. limits of acidity after 43 to 52 days when stored at 25°. L. H. Bailey

**Recognition and determination of the polyfructoses. II. Determination of tri-**

**fructose anhydride for estimating the rye content of flour.** C I Kruisheer. *Rec. trav. chim* 50, 153-63(1931). cf *C A* 24, 4872.—Treat 12.5 g. of flour with 50 cc. of 70% alc. and shake vigorously for an hr. in a closed flask. Filter and transfer 25 cc. of filtrate to a centrifuge tube and treat with 5 cc. of *N* NaOH in 70% alc. Mix and allow to stand overnight. Centrifuge, pour off the liquid and wash the residue twice with 2 cc. portions of 70% alc. Dissolve the ppt. in 10 cc. of hot water and neutralize to methyl orange with 0.25 *N* $H_2SO_4$. Transfer the soln. together with 15 cc. more of water to a 50 cc. measuring flask, add 2.5 cc. of 9.5 *N* HCl and heat 10 min. at 68-70° to invert the sugar. After cooling, neutralizing and again cooling the soln. is mixed and in 10 cc. of the soln. the total reducing power ($F_1$) is detd. preferably by the method of Schoorl. To det. the fructose content ($F_2$) take 20 cc. of the inverted liquid and treat with hypoiodite. From the values $F_1$ and $F_2$ the content in trifructose anhydride ($T$) can be computed and also the saccharose obtained. Take the liquid poured off after the centrifugation described above, make neutral to methyl orange and evap. to a small vol. Transfer to a 50 cc. measuring flask, dil. to about 25 cc., add 2.5 cc. of 9.5 *N* HCl and invert 10 min. at 68-70°. Continue as described above to det. $F_1$ and $F_2$. The results in the analysis of about 40 samples are shown. In bolted rye meal 1.5-2% of a trifructose anhydride was obtained, but only 0.1-0.3% in wheat flour. On standing the content increases. On the basis of the above behavior the rye content of flour can be estd. to within about 10%. The necessary calcns. are described. W. T. H.

**Determination of butter fat.** E. Schweitzer and J. Grossfeld. *Z. Untersuch. Lebensm.* 59, 491-501(1930).—For 3 yrs. a large no. of samples of butter, mixts. of butter and margarine, and margarine were examd. for butyric acid and Reichert Meissl values. The mean % deviations from the normal values of 20.0 and 27.0 were ±7.4 and ±10.0, resp., for normal butter. The mean of the Reichert Meissl values for 37 samples was 28.7, which corresponds closely with the van Raalte value of 28.4. The ratio of the butyric acid value to the Reichert Meissl value was in excess of 0.66 in all cases (av. 0.713). Other relations are discussed. C. R. Fellers.

**Masking of the color reaction of margarine.** B. Hefner and S. Zalc. *Przemysl Chem.* 14, 412-5(1930).—Under some conditions the use of oil of sesame for distinguishing between butter and margarine is not satisfactory because of the difficulties encountered in the Baudouin reaction. It depends on the presence of sesamol in the oil of sesame which may be destroyed during refining either by acid reagents or high temp. (180°). Rancidity of the oil of sesame or of margarine produces under the influence of HCl an intensive coloration which masks the Baudouin reaction. This reaction was found unreliable in all cases of rancid margarine. KOH should be used for the removal of phenolic dyes used for coloring margarine when these mask the furfurol reaction. A. C. Zachlin.

**Determination of the milk proteins.** H. George M. Moir. *Analyst* 56, 73-8(1931). cf *C A* 25, 1004.—On the basis of the isoelec. point it is suggested that casein be defined as the material pptd. from cow milk at $p_H$ 4.6 by AcOH buffered with NaOAc. By digesting with *N* NaOH and detg. the increase of the formol titration and by studying the rate of oxidation, it is shown that the casein pptd. under the above conditions is identical with that pptd. by AcOH alone at $p_H$ 4.2. W. T. H.

**Number and character of bacteria and their subsequent development in pure and in contaminated milks.** Henri L. Bérard. *Sci. Agr.* 11, 369-77(1931).—Contamination of milk with manure or soil bacteria not only augments the initial nos. of organisms present, but these types develop in the milk during several days storage. Temp. increases during storage of contaminated milks cause great increases in soil and manure bacteria in milk. A contamination of approx. 0.1 g. of soil or manure per l. does not produce marked changes in the character of the milk flora if the temp. is held at about 60°F. If held below 50°F. there is a considerable increase in the no. of liquefiers and alkali producers; this is due principally to staphylococci. C. R. Fellers.

**Modification of the methylene blue reduction test and its comparative value in estimating keeping quality of milk.** C. K. Johns. *Sci. Agr.* 11, 171-90(1930).—The suggested modifications to the standard test are: preliminary incubation at 12.8° for 18 hrs. and mixing of contents of tubes not decolorized in 6 hrs. when subsequently incubated at 37.5°. These modifications shorten the reduction time, and the mixing reduces the variations between duplicate tubes. The chief advantages are greater convenience, improved accuracy on high grade milks, and closer correlation with keeping quality. In a study of 145 samples by the ordinary and the modified reduction tests, acidity increase, and plate and breed counts, the modified reduction test proved to be the method best suited to aid in ranking a series of samples according to keeping quality. C. R. Fellers.

Keeping quality of combined fat extraction, fixing and staining solution used in the direct microscopic technic for counting bacteria in milk. R. W. Newman. Calif Dept Agr., *Monthly Bull* 19, 607(1930).—*No deteriorative changes were apparent* after 3 yrs use The bottles were kept well stoppered C. R Fellers

Investigation of the occurrence of B. abortus (Bang) in the milk of English herds (county of Somerset). D R. Wood and E T. Illing *Analyst* 56, 105(1931).—The *deposit obtained by centrifuging 100 cc. of milk was injected subcutaneously into a* guinea pig After 4 weeks the pig was killed and cultures were made from the interior of the spleen on glucose, neutral red and vitamin agar in an atm of 10% $CO_2$ and 90% air at 37°. The glucose and neutral red show at once whether any growth obtained is *due to contamination with B coli B abortus was identified by its failure to grow* except under reduced $O_2$ tension and by agglutination with standard anti serum. The expts were carried out concurrently with the examn of the milk for tubercle bacilli (*C A* 24, 5387) *B. abortus* was found in the milk of 4 out of 379 herds tested W T H

Effect of the electropure process of treating milk upon bacterial endospores. A J Gelpi, Jr *Proc. Assoc Southern Agr. Workers, 31st Ann Convention* 162–7 (1930).—Although the cultures originally showed 80 to 90% sporulation no spore-*formers were found after the samples were subjected to the electropure process. Fur*ther expts. indicated that purification of milk by the electropure process is brought about by the aid of another factor besides heat K. D Jacob

Retained milk. Otakar Laxa *Ann falz* 23, 609–10(1930).—Four cows which *had been unmilked for 3 days furnished on milking only about 100 cc. of thick, brown*ish tinged, colostrum like milk, having an odor of burnt milk and the following compn. water 78.40, fat 10.15, casein 2.65, albumin and globulin 0 albumoses and peptones 2.02, amino acids 1.78, lactose 1.50, ash 1.10, undetd 1.50%. The ash contained 23.2% CaO *and* 16.76% Cl *A Partridge Couture*

Investigation of artificial whole-milk powder. P. Weinstein *Z Untersuch Lebensm* 59, 515–6(1930).—Microscopic examn of a powder showed a relatively high proportion of large fat globules. Extn. of the fat with light petroleum ether gave a *yield of* 18.0%. The *n and other consts* showed the oil to be largely olive oil *which* had been used for adulterating skim milk powder C. R Fellers

Studies concerning the daily yield and fat content of the milk of the half-wild yak in the Siberian Altai Mountains, together with a contribution to the investigation of milk and fat inheritance in primitive breeds. J. W. Amschler *Z Tierzucht. Zuchtungsbiol Tierernahr* 20, 293–308(1931).—Studies are reported of the yield and fat percentage of the milk of 116 yaks and 6 yak crosses with Altai cattle living on sparse pasture in Siberia The daily milk yield of the yak cows varied from 1.2 kg to 4.1 kg with a mean of 2.73 kg The fat varied from 4.23 to 8.50% with a mean of 6.09% The range of yield for the yak crosses was 2.4 to 4 kg with a mean of 3.20 The fat varied from 4.59 to 6.21% with a mean of 5.45% L. A Maynard

Non-acid Babcock method for determining fat in ice cream. O R. Overman and O F. Garrett Ill Agr Expt Sta., *Bull* No 360, 393–406(1930).—The method requires 2 reagents, *A* and *B* *A* is made by mixing 75 cc. of c p $NH_4OH$, 35 cc. of BuOH and 15 cc of 95% EtOH (denatured is satisfactory) Reagent *B* is made by dissolving with heat 200 g of $Na_3PO_4$ and 150 g of NaOAc in 1 l of water To make the test, weigh 9 g of the well mixed sample into a 8 or 10% milk test bottle (or a 20% ice cream test bottle), add exactly 2.5 cc of *A* and mix thoroughly Then add 9–10 cc of *B* and thoroughly mix Place the test bottle in a shallow water bath and heat to boiling, continuing the heating for several min During the heating shake the bottles several times The fat seps after 15–30 min and forms a clear yellow layer at the top of the liquid After the fat sepn is complete, place the test bottle in the centrifuge and whirl successively, as in the Babcock test, for 5, 2 and 1 min Add hot water, as in the Babcock test but do not acidify the water Then place the bottle in the hot water bath (130–40°F.) for 5 min In reading the results measure from the bottom of the fat column to the top of the upper meniscus. Comparisons were made with the Official Roese Gottlieb method Of the 54 samples tested, 64.82% came within ±0.1% of the R G values 24.07% fell within ±0.1–±0.2 and 11.11% between ±0.2 and ±0.3% The av difference for all samples was ±0.0673% The method is *fairly rapid*, inexpensive and sufficiently accurate *for com* use. *A* large no of detns can be made concurrently Twenty six references are cited C R Fellers

Standardization of milk with skim milk for the manufacture of Cheddar cheese. H C. Hansen and D R Theophilus Idaho Agr Expt. Sta., *Bull* 174, 3–16(1930).—*See C A 25, 360* C. R Fellers

**The detection of horse meat as an adulterant in sausage and other studies of the precipitin test.** P. M. Bolin. *J. Am. Vet. Med. Assoc.* 31, 163-70(1931).—A horse meat ext. antiserum was found better than horse serum antiserum for the detection of horse meat adulteration in sausage. Rabbits immunized to a cooked product had sp. precipitins for the uncooked sp. protein, and at the same time had nonsp. precipitins for cooked meats of different species. Meats heated at 15 lb. pressure for 10 min. were unsuitable as antigens for immunization purposes. Immature animals were unsatisfactory in the production of precipitins. Meats of closely related species were differentiated only by the length of time necessary for the reaction to occur.
Rachel Brown

**"Adulterated" olive oil in sardines.** H. Wewers. *Z. angew. Chem.* 43, 650 (1930). High I values of the oil used in prepg. sardines, thought to be due to adulteration of the olive oil, were found to be assocd. with the extn. from the sardines of a fat of very high I value by the pure oil.
B. C. A.

**Increase in the $p_H$ of the white and yolk of hen eggs.** Paul Francis Sharp and Charles Kelly Powell. *Ind. Eng. Chem.* 23, 105-9(1931). cf. C. A. 24, 4338.—The $p_H$ of eggs is an important factor in detg. their rate of deterioration. Eggs with a low $p_H$ deteriorate less rapidly. The $p_H$ of the white increases rapidly as the result of an escape of $CO_2$ gas. This may be delayed by storing at low temp. or by oil dipping. After 15-25 days' storage at high temp. the $p_H$ decreases. The $p_H$ changes of the yolk are smaller. In com. incubators the $p_H$ of the white after 2 days is 9.9-2, which may affect the developing embryo. A higher $CO_2$ pressure would remedy this.
Amy LeVrsconte

**Preservation of fruits and vegetables by freezing storage.** M. A. Joslyn. Calif. Agr. Expt. Sta., Circ. 320, 35 pp. (1930). cf. C. A. 23, 3480.—At temps. of 10°F., molding, fermentation and bacterial spoilage do not occur and the normal ripening and respiration processes are effectively arrested. The com. methods are outlined. Deteriorative changes due to oxidative enzymes go on slowly at freezing storage temps. and cause surface discoloration in some fruits. The usual ratio of fruit to sugar is 2 or 3 to 1. A syrup pack is preferred to a mixt. of fruit and dry sugar, as surface discoloration is thus greatly reduced and better distribution of the sugar is secured. After thawing, cold packed fruits keep from 3 to 7 days without actual spoilage. Vacuum packing of fruit for freezing possesses the advantage that nearly all the O is excluded from the container, thus decreasing oxidative changes in the frozen product. Fruit juices may be frozen without much injury to their flavor. Though most vegetables may be successfully stored in the frozen state, slight changes in flavor and the inability to keep for more than a few hours after thawing render frozen vegetables less suitable for com. exploitation than fruit.
C. R. Fellers

**Storing canned fruits at high temperatures injures quality.** E. F. Kohman. *Food Ind.* 3, 77(1931). cf. C. A. 24, 1079.—The hydrolysis of the anthocyanin pigments in red fruits is greatly increased at high storage temps. The color base separates from the glucoside base and is thrown out of soln. as a brown amorphous mass which no longer retains any of the original color. This mass causes some darkening of the fruit, but more important is the loss of bright natural color. Prompt and efficient cooling after the heat treatment, as well as subsequent cool storage, is strongly recommended as a means of better preserving the color of fruits.
C. R. Fellers

**Research answers (food) packing and bottling problems.** I. C. G. Hicks. *Glass Container* 10, No. 4, 8-9, 22-30(1931).—Animal feeding tests for vitamin C in tomato juices prepd. in various ways showed that for max. retention of vitamin C, complete air removal is necessary. Tomato juice packed without treatment to remove air was entirely devoid of vitamin C. Vacuum sealing of the container was ineffective, but vacuum treatment of the juice before bottling combined with vacuum sealing, proved most effective in conserving the vitamin C in the final product. By decreasing the particle size by homogenization, sepn. of the pulp and juice was largely prevented. 1 light-oz. bottles of tomato juice were effectively sterilized when subjected to a holding period of 15-20 min. in a water bath.
C. R. Fellers

**Disinfecting power of bleaching powder with special reference to its application to the disinfection of vegetables.** Ryji Banno and Hidekichi Habu. *J. Pub. Health Assoc. Japan* 6, No. 7, 3-6(1930). *U. S. Pub. Health Eng. Abstracts* 11, No. 2(Jan. 31, 1931).—The disinfection with bleaching powder of such vegetables as greens, radishes, turnips, spinach, etc., could not be satisfactorily accomplished, irrespective of the concn. of the soln., length of exposure, no. of bacteria attacked, or time elapsed after contamination of the vegetables.
C. R. Fellers

**Storage of potatoes.** N. D. Vyas. *Agr. J. India* 25, 408-16(1930).—Loss of

potatoes during storage for 32 weeks was reduced to 28–31% by wt by storage in cinders or charcoal as compared with a loss of 40–90% by storage in coarse sand Addn. of lime slightly lowered the preservative power of the storage media The preservative action of cinders and charcoal seems to be due to their ability to absorb moisture and gases given off during rotting of the potatoes, thus preventing infection of sound potatoes. Rotting of potatoes was increased by treating them with 5% $H_2SO_4$ for 3 hrs before storage. K. D JACOB

**Chemical studies on cannery peas.** ANON., *N Y. Agr Expt. Sta., 49th Annual Report*, 50–1(1930) —By means of a puncture tester the toughness of peas was found to increase regularly with size Varieties varied considerably in toughness but the toughness of the fresh pea coincided with that of the processed (canned) pea as judged by experts Chem analyses were made for reducing sugars, sucrose, starch, sol and insol N, ash, Ca and alc insol residue on a large no of samples The following tentative phys and chem criteria are established for high-quality canning peas The puncture value should not exceed 40 g per sq mm The starch sugar ratio shou'd not be over 1 0 The insol.-sol N ratio should not exceed 3 0 and the CaO content of the fresh skins should not be over 0 06% Sucrase, diastase and protease are very active in macerated peas and may cause some deterioration in quality Toughness and Ca content are correlated Effects of fertilizer treatment on quality are being studied C. R FELLERS

**Microscopy and histochemistry of certain fruits.** ANNELIESE NIETHAMMER. *Z Untersuch Lebensm* 59, 501–6(1930), cf *C A* 24, 4076, 5890 —The endocarp of oranges contains crystals of $CaC_2O_4$ which can be isolated and identified by treatment of the fruit with concd $H_3PO_4$ followed by sublimation under reduced pressure After storage for several weeks, slow resorption of the crystals occurs with concomitant formation of AcH Lemons and mandarins exhibit identical phenomena Pears contain characteristic inclusions, and in the ripe condition AcH, which is present in greatest abundance in over ripe fruit Upon sublimation, ripe pears give malic and citric acids, while over ripe pears contain $H_2C_2O_4$ in addn The AcH test is always pos in plums, and $CaC_2O_4$ can be detected From bananas in the ripening stage, malic acid can be sublimed, but after prolonged storage only traces of $H_2C_2O_4$ and tartaric acid can be detected. Unripe tomatoes contain considerable amts of malic acid with traces of tartaric acid and $H_2C_2O_4$, while ripe samples contain malic, citric and tartaric acids. AcH is present only in ripe tomatoes C R FELLERS

**Papaya culture in Hawaii.** W T POPE Hawaii Agr Expt. Sta., *Bull* 61, 40 pp (1930) —The *chem compn of the ripe and immature fruits* was detd Improved varieties gave the following av results total solids 13.39, ash 0 76, acid (as $H_2SO_4$) 0 132, protein 0 484, sucrose 10 14, total sugars 10 61, fat 0 105 and fiber 0 902 The green fruit contains practically no starch or sucrose and only a small amt. of reducing sugars The latter increase rapidly with approaching maturity *Papain*, a powerful digestive enzyme, is present in the milky juice. Meat rubbed with a slice of green juicy papaya becomes tender as a result of the action of the papain. Because of the size wt and delicate structure of the fruit great care is necessary in harvesting packing and shipping A bibliography is given C R FELLERS

**Isolation of quinic acid from fruits.** E. F. KOHMAN AND N H SANBORN *Ind Eng Chem* 23, 126(1931) —The *BzOH* content of prunes and cranberries is too low to explain their acid reaction after digestion. Quinic acid, which the authors have isolated from these fruits and have detected in grapes, is more probably the cause AMY LEVESCONTE

**Sampling of apples for arsenical spray residue determinations.** J R. NELLER. *Ind Eng Chem., Anal Ed* 2, 382–4(1930) —A statistical study of the sampling of apples that had been washed with dil. HCl showed that the av probable error of single samples of 6 apples each was 8.2%, while that of duplicate samples was 5 36% of the total arsenic on the fruit. The av probable error of analysis was 7 4% The error of sampling is considerably reduced by using duplicate rather than single samples but the rate of reduction is much less for triplicates, quadruplicates, etc. J R NELLER

**Artificial removal of astringency in kaki.** KINZIRO KAKESITA. *Proc Imp Acad* (Japan) 6, 397–8(1930) —The expressed juice of Japanese astringent persimmons (kakishibu) is coagulated at room temp by the addn of *AcH*(*HCHO* or *PtCHO* may also be used) It is believed that this action is caused by the polymerization of tannic substances in the fruits with the formation of insol. tannin-colloid and that the astringency in kaki is thereby removed C J WEST

**Dehydration of grapes.** P F NICHOLS AND A. W CHRISTIE Calif Agr Expt. Sta., *Bull* 500, 3–31(1930) —A new type of raisin grape called the "Golden Bleached

Thompson" is the principal variety which is dehydrated, though wine and juice grapes can also be advantageously dehydrated The grapes are dipped before dehydrating in a lye bath (0 5 1 0% NaOH) kept at 200–12° F In sulfuring the dehydrated product 2–4 lb of S must be burned for each ton of fruit, giving a $SO_2$ concn in the raisins of 200 1000 p p m The finishing temp should not exceed 165 70 F with a relative humidity of 25% or burning will result Dehydration offers improvement in quality and yield by making it safe to defer picking until full maturity is reached Special dips contg olive oil glycerol and mineral oil offer possibilities for improvement of color and keeping quality Sulfuring did not adversely affect insect infestation C R F

**Investigations on grape juice manufacture** ANON N Y Agr Expt. Sta., *49th Annual Report* 55(1930) The colloidal material in Concord grape juice affects adversely the color and clarity of the juice and delays the setting out of tartrate crystals By removal of the colloids, crystallization takes place in a much shorter time, thus allowing the juice to be bottled The colloidal matter in grape juice contains about 8% protein and 7% pectin the rest being polysaccharides of unknown nature C R FELLERS

**The preservation of fruit juices, sweet must, etc.** A MEHLITZ *Konserven Ind.* 1930, 742–4, 756 8 cf *C A* 25, 153 M describes further work on the preservation of fruit juices by centrifuging the juices through a De Laval separator, clarifying by digestion with an enzyme ext of *Aspergillus oryzae*, filtering through an asbestos pre filter and then through a Seitz I K germ filter It was necessary to reduce the active acidity of the red currant juice from *p*H 2 72 to 3 66, and of white currants from *p*H 2 89 to 4 15 to obtain better enzyme action In every instance the juice treated with *Aspergillus oryzae* filtered much more rapidly than the untreated juice After 4 months standing the filtered juices were clear and of good color and taste F P G

**Study of the factors affecting the jellation of fruit juices and pectin solutions.** P B MYERS AND G L BAKER Del Agr Expt Sta., *Bull* 167, Ann Rept of the Director 22–4(1930) —With lemon albedo as raw material 4 series of pectins were prepd., 2 series each at temps of 80° and 100° The yield jelly grade, jelly units, ash, methoxyl and *p*H of the pectins in each series were detd The yield of pectin increased with the temp of the extn., other conditions remaining const. This condition existed only when the *p*H of the extg medium was at 1 50 or above When below 1 50 the yield of pectin increased with the temp of the extn up to some temp below 100° and then decreased as the temp was increased to 100° For instance, when the extn was conducted at *p*H 0 8, the yield of pectin increased from 20 5% at 40° to 30 8% at 85°, and then decreased to 28% at 100° At some H ion concn between *p*H 1 5 and 0 8 and below, the hydrolysis of pectin to some alc.-sol. compds is faster than the hydrolysis of protopectin to pectin at temps below 100° The yield of pectin at any temp could not be increased to the optimum yield obtained at a temp above it by increasing the time of extn The optimum jelly grade of pectins, extd by heating 30 min while varying the *p*H of the extg medium, decreased as the temp of the extn increased Since the yield of pectin increased with the temp of the extn while the jelly grade decreased with increase in temp., the product of the 2 (jelly units) tends to remain const so that the great variation in jelly units with the temp. of the extn that was previously expected did not occur C. R FELLERS

**Determination of sorbitol in jams.** C F MUTTELET *Ann fals* 23, 602–5 (1930), cf *C A* 24, 3289 —Cherry juice was found to contain 0 290% sorbitol, red gooseberry and strawberry juices contained none Home made cherry jam contained 0 125%, while home made gooseberry jam and strawberry jam contained none Com so-called "pure fruit" gooseberry jam and "pure fruit" stawberry jam contained 0 135% and 0 075% sorbitol, resp., indicating the presence of apple juice, which was confirmed by the presence of malic acid Com compd cherry jam contained 0 025% sorbitol indicating that there was but little cherry (really only cherry fragments in sugar sirup which was jellied by addn of com pectin) A PAPINEAU COUTURE

**Determination of so-called crude fiber (cellulose) in cacao.** K KÜRSCHNER AND A HANAK. *Z Untersuch Lebensm* 59, 481–04(1930) —The method previously devised (Kürschner and Hoffer, *Tech Chem Papier- Zellstoffabrikation* 26, No 8-9(1929)) for the detn of cellulose in wood has been modified by the substitution of AcOH for EtOH in the mixt used for decomposing the noncellulose elements The sample of defatted cacao, approx 0 3 g., is intimately mixed with 15 cc of 80% AcOH and 1 5 cc of $HNO_3$ (d 1 4) in a flask fitted with a ground in air condenser The mixt is gently boiled for 15–25 min and then filtered through a large-pored porcelain or glass filter previously moistened with AcOH. The residue is washed successively with 7–10 cc of the hot mixt of $HNO_3$ and AcOH, hot water, a few drops of EtOH, 5–10 cc of

$Et_2O$, 1-2 cc. of the acid mixt. and finally hot water, until all traces of AcOH have been removed, the flask and walls of the filter being washed at each stage. The residue is dried at 105–8° and weighed. By this method, which gives most consistent results, white undegraded cellulose was extd. from cacao and the detn. required less than 1 hr.

C. R. Fellers

Determination of sulfur dioxide in foods containing sulfur-bearing volatile oils. Frank A. DiBello *Am. J. Pharm.* 103, 42–4(1931).—The following method was used for detg. the $SO_2$ content of prepd. horse-radish and prepd. mustard to which had been added 150 p. p. m. of $SO_2$. To 50 g. of the material in a 500-cc. flask add 200 cc. water, 5 cc. 10% $H_3PO_4$, and about 0.5 g. of tannin. Distil slowly in a current of $CO_2$ until 100 cc. is received in 20 cc. of soln. of $H_2O_2$. Det. sulfates with $BaCl_2$.

W. G. Gaessler

Mineral content of pastures research. Some notes on the work in 1929–30. B. C. Aston. *New Zealand J. Agr.* 41, 10–7, 90–6(1930).—An extensive investigation of the mineral content of N. Z. pasture grasses is being made in order to det., if possible, whether there is any relation between mineral deficiencies and various animal diseases which occur in specific areas. "Dopiness" in sheep seems to be connected with Ca deficiency in the Marton district, and it seems to be definitely established that "bush sickness" in cattle and sheep is caused by a deficiency of Fe in the pasture grasses of certain pumice soil areas. Deficiences of I and P have been established in several localities. Numerous analyses of N. Z. pasture grasses are tabulated. K. D. J.

Investigations into the intensive system of grassland management. I. The chemical composition of intensively treated pasture. A. W. Greenhill. *J. Agr. Sci.* 20, 573–96(1930).—The chem. compn. of the dry matter of herbage from pastures managed under the intensive system and representing 3–5 weeks' growth was closely comparable with that obtained by other workers from "pasture cuts" at 1- to 3-weekly intervals from unfertilized pastures. The dry matter is a good feeding stuff of narrow nutritive ratio and low fiber content. The nutritive ratio is somewhat wider in a dry than in a wet season, but the av. fiber content is not markedly different. During the growing season, drought or the early summer flush period produces some reduction in protein content and an increase in fiber content, with a recovery following cessation of the drought or the flush period. These variations are a reflection of the productivity and habit of growth of the herbage. An abundant growth of young leafy herbage has a higher nutritive value, wt. for wt. of dry matter, than the more stemmy growth of early summer or drought conditions. The protein content of the dry matter of herbage from pasture intensively fertilized (including N) was higher than that from untreated pastures. The higher milk producing power of the former pasture may be ascribed to improved compn. as well as to higher yield, of the herbage. P. R. Dawson

Nutritive value of pasture. VI. The utilization by sheep of mineral-deficient herbage. H. E. Woodman and R. E. Evans. *J. Agr. Sci.* 20, 587–617(1930); cf. *C. A.* 24, 5602.—A detailed study was made of the utilization by sheep of a sample of herbage deficient in total ash, particularly in respect to Ca and $P_2O_5$. Na was also low, but the percentages of K, Mg and Cl were similar to those of "normal" herbage. The results lead to the belief that the failure of stock to thrive on mineral-deficient pasturage cannot be explained by assuming that the low mineral content is responsible for lack of palatability and a consequent depression of appetite. There is no evidence that the shortage of minerals causes the herbage to be digested any less efficiently than "normal" cultivated herbage of similar maturity and org. compn. Malnutrition on pasturage of subnormal mineral content is due directly to failure of the diet to supply the necessary inorg. materials for constructional purposes and for maintaining the normal balance of minerals in the blood and tissues. P. R. Dawson

Photography as a help in the examination of cattle foods. W. L. Fielding and S. T. Parkinson. *J. South-Eastern Agr. Coll., Wye, Kent* No. 27, 43–77(1930); cf. *C. A.* 24, 2778.—Detailed directions are given for the microscopical identification of leguminous plants and oil seeds in cattle foods. E. D. Jacob

Determination of acids in silage by Wiegner's method. E. Geese. *Tierernährung* 1, 65–6 (1929).—A diagram permitting direct reading of the amts. of AcOH and butyric acid has been constructed. B. C. A.

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Polarimetric determination of starch in potatoes and the relation between potato dry substance and starch content (von Scheibe) 28. Composition [for treating containers for food] (Brit. pat. 325,559) 23. Emulsions of fatty substances [artificial cream] (Fr. pat. 660,242) 13.

WHITE *J State Med* 37, 559-70(1929); *cf C A.* 24, 5842.—Evidence is given to show that most of the difficulties in the understanding of occupational skin diseases are due to the overemphasis of allergy and lack of knowledge of the common skin diseases A L RAWLINS

**Domestic mechanical refrigeration in relation to public health.** ARNOLD H KEGEL. *Illinois Med J.* 58, 424-7(1930). *U. S Pub Health Eng Abstracts* 11, PHA, 1(Feb 7, 1931); *cf C A* 24, 4761.—In Chicago in less than 2 yrs there occurred 62 cases of poisoning with 10 deaths from the refrigerant gas MeCl The serious casualties were traced to the multiple type refrigerator contg 200 lb of gas The smaller household cabinets contain but 5 lb of gas Refrigerating systems using $NH_3$ or $SO_2$ furnish their own warning when gas is escaping, whereas MeCl, EtCl and similar gases are practically odorless and may cause unconsciousness Suggestions for safe installations are made C R FELLERS

**The measurement and regulation of humidity in industrial processes.** FR. LIENEWEG *Siemens Z* 11, 26-32(1931).—A review of modern practice C G F

**Temperature distribution in internally heated cylinders.** ALBERT B NEWMAN *Ind Eng Chem* 23, 29-32(1931).—A presentation of math theory of heat flow through walls of internally heated cylinders Theory is applied to dissipation of heat generated by an elec wire carrying a current and insulated by an external covering M C R

**Gases used in warfare.** TH MORFEL. *J. pharm Alsace Lorraine* 57, 332-9 (1930).—A review of the effects and chemistry of these gases and modes of protection S WALDBOTT

**A useful horizontal-tank chart.** W. F. SCHAPHORST *Ind Eng Chem* 23, 314-5 (1931).—A chart is included which gives the no of gallons of liquid in any horizontal tank G G

**Woods for insulation.** A R. DUNTON *Electrician* 106, 237-9(1931).—The varieties used methods of impregnation and breakdown voltages of treated woods are discussed Typical phys. properties of the varieties of hard wood employed in insulation are tabulated, as are typical values of moisture content and elec strength for various woods The woods are kiln-dried to a moisture content not exceeding 6% Tables also show some woods used for bakelized veneer ply construction with typical tensile strength values of products, compression strength test results on these, and a comparison of elec strengths of untreated and bakelized veneer ply The reliability of performance of all treated woods depends on their ability to withstand the penetration of moisture and it is therefore likely that thoroughly bakelized woods, impregnated in the form of thin veneers and built up into rods or boards, will prove popular W H BOYNTON

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The catalytic oxidation of CO (FRAZER) 2.

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*Annuario per le industrie chimiche e farmaceutiche Anno XI e XII. 1928-1929* Compiled by the Commissione per le industrie chimiche appointed by the Ministero delle Corporazione. 724 pp Paper, L. 100 Reviewed in *Chem Trade J.* 88, 128 (1931)

CHAPLET, A Dictionnaire des produits chimiques commerciaux et de la droguerie industrielle. Paris Dunod. 308 pp Paper, M 54, bound, F. 63 Reviewed in *Ann fals* 23, 616(1930)

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PAGNIELLO, A Disinfezione contro gli aggressivi chimici. Chimica di guerra Rome Instituto Santa Famiglia 8 pp Reviewed in *Chimie & industrie* 25, 269 (1931)

STOLTZENBERG, HUGO Anleitung zur Herstellung von Ultragiften. Hamburg Norwi-Druck 70 pp M 20

STOLTZENBERG-BERGIUS, M Was jeder vom Gaskampf und den chemischen Kampfstoffen wissen solte. Hamburg Chemische Fabrik Dr Hugo Stoltzenberg. 30 pp M 1

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**Adsorption of gases.** SOC. CHIM DE LA GRANDE PAROISSE (AZOTE ET PRODUITS CHIM.) Fr 693,278, June 17, 1929 In a process for sepg less volatile constituents

of a gas by solid adsorbent material, the gas is passed through the adsorbent under pressure and then expanded and the expansion is used through a heat exchanger to cool the gases being treated

**Separating mixtures of gases or vapors.** Soc de recherches et d'exploitations de procédés. Ger. 515,296, June 8, 1929. Mixts. of gases or vapors are passed through active C or other adsorbent and the adsorbed constituents recovered by means of steam after preheating the charged adsorbent. The improvement consists in preheating the adsorbent conductively, *e. g.*, by locally heating the adsorption app. so as to effect a circulation of the gases therein. App. is shown.

**Separating gases by liquefaction.** Ges. für Linde's Eismaschinen A.-G., F. Doerfler and H. Kahle. Brit. 335,509, June 20, 1929. Various details of app. and procedure are described, suitable for the sepn. of constituents of purified coke oven gas. Cf. C. A. 24, 2515.

**Separating gas mixtures by liquefaction.** Société l'Air liquide (Soc. anon. pour l'étude et l'exploitation des procédés Georges Claude). Ger. 513,182, Dec. 1, 1929. Addn. to 495,420. In the method of Ger. 495,420 (C. A. 24, 3292) the cold unliquefied compressed residue is further cooled before it is caused to flow countercurrent to the mixt. Cooling may be effected by the expanded residue. The app. is shown.

**Purifying liquefied gases.** N. V. Philips Gloeilampenfabrieken. Fr. 692,621, Mar. 24, 1930. Liquefied gases such as O are purified by bringing them in contact with an absorbent material such as charcoal or $SiO_2$ gel.

**Deoxygenating air, etc.** Siemens-Schuckertwerke A.-G. Ger. 515,133, Dec. 23, 1924. A mixt. of a metal and an electrolyte is used such that the metal, under the action of $O_2$, is converted into an oxidizable salt. A mixt. of Cu and $NH_4Cl$ is specified. Catalysts, *e. g.*, hexagular or active C and diluents may be included in the mixt. The method is intended particularly for eliminating O above the oil level of oil filled elec. transformers, switches, etc.

**Separation of solutions from precipitates.** H. Lawaree. Belg. 371,191, July 31, 1930. An immiscible liquid, inert toward the reagents used or liberated, and having a different d. from that of the solns. involved, is used for the sepn. of solns. and ppts., *e. g.*, $CCl_4$ is used for the sepn. of the solns. in the manuf. of $NaNO_3$ and $NH_4Cl$ from NaCl.

**The separation of chemical solutions and precipitates.** H. Lawaree. Belg. 371,580, Aug. 31, 1930. Solns. are sepd. from ppts. by means of a liquid which is inert toward the reagents used or liberated, immiscible with them and of different d. A fatty substance which can form a soap with the basic salts ppted. during the reactions is added to the liquid.

**Aerating liquids.** Ruhrn G. Stich. Ger. 507,294, Jan. 5, 1929. The air is delivered through perforated tubes encased in rubber, the latter having fine perforations which open only under the pressure of the air supplied.

**Testing viscosity of liquid materials.** Samuel T. Rogers. U. S. 1,790,918, Feb. 3. A buoyant body is released at the bottom of a column of the liquid under test, permitted to rise through the liquid and the time required for its rise is noted. App. is described.

**Obtaining pulverulent products from fused solids.** Chem. Fab. von Heyden A.-G. (Ernst Krumbiegel Inventor). Ger. 514,110, Mar. 2, 1928. The solid is heated and stirred in a pressure vessel with a liquid in which it is difficultly sol. to a temp. above the m. p. of the solid and above the b. p. of the liquid. The mixt. is then discharged into a second vessel in which it is rapidly cooled by contact with a further amt. of liquid kept in rapid motion. Examples describing the treatment of β-naphthylamine and benzonaphthol are given.

**Emulsions of fatty substances.** Rotuy Borthen. Fr. 693,242, April 3, 1930. Artificial cream and other emulsions rich in fatty substances are made by using coned. milk or other natural coned. soln. of phosphoprotein as protective colloid.

**Electric insulators.** London Cottrell, Ltd., and Metallors A.-G. Brit. 335,503, Feb. 18, 1930. For preventing moisture condensation on insulators such as those of *elec. gas-cleaning app.*, the insulator is heated from a suitable source of heat by a reflector which may be revolved around the insulator (suitably with transmission of the heat through ordinary or quartz glass).

# 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Liège water service (1830–1930). E. Thirlar *Tech. sanit. munic.* 25, 370–5 (1930).—An historical account. W. C. R. Fellers

Kankakee (Ill.) served by new plant. Geo. Hesse. *Water Works Eng.* 83, 498 (1930).—The new electrically equipped plant has a capacity of 6 million gals. daily while the present rate of consumption is 2 million gals. daily. River water is softened, clarified, carbonized, allowed to settle, filtered and made bacteriologically pure. Soda ash and lime reduce the hardness from an av. of 20 grains to about 4 or 5 grains per gal. The av. cost of chemicals will be about $2000 a month. C. H. Badger

How North Carolina develops its water works plant operators. H. E. Miller. *Water Works Eng.* 83, 423–4, 446–9 (1930).—The different acts and laws passed in N. C. pertaining to sanitation and water supplies are reviewed. Inexperienced but technically trained chemists and engineers are secured through the Bureau of Engineering for duty at small plants at a salary of $125 a month. Under the guidance of trained engineers these men are given thorough training in plant operation, serving a sort of internship for 2 yrs., until they can assume responsibility. In 1921 none of the 18 surface gravity supplies was chlorinated but in 1929, 19 out of 20 were. All filtered water supplies are now chlorinated. In 1921, 50 filter plants were deficient, 36 being obsolete, 10 requiring complete overhauling and 4 needing minor repairs. In 1929 all except 2 of the 78 filter plants were fully meeting modern practice. Only 1 plant was under technical supervision in 1921 while in 1929, 57 plants had complete chem. and bacteriol. control at the plant and 17 had simple lab. control of dosage. C. H. Badger

A limnological significance of free carbonic acid. E. Lindemann. *Naturwissenschaften* 18, 1113 (1930).—Evidence is advanced for the importance of the $CO_2$ content of water for the growth of *Peridinia* provided the $p_H$ is favorable. *B. J. C. v. d. H.*

Deciding type and layout for a small water system. G. B. Leonard. *Water Works Eng.* 83, 513 (1930).—The water works and the sewerage system in Salisbury, Md., became inadequate in 1924. Investigations of surface and ground supplies showed that shallow wells on low ground produced the only supply worth developing. Six concrete wells have been constructed on the site selected and the Schumaker pond, nearby, can be used as an emergency supply. Aeration, to remove $CO_2$, is the only treatment necessary for this water. The water works system is based on an av. daily consumption of 100 gal. per capita. The general layout of the distribution is described. Two pumping operations were required, a low service from the wells to the aerators superimposed over the 500,000 gal. covered concrete storage reservoir, and the other from the reservoir to the mains and to the two 200,000 gal. elevated storage tanks situated in opposite ends of the town. Elec. power is used. C. H. Badger

Utilizing marine gasoline engine as a water works (Oshawa, Canada) auxiliary unit. W. C. Smith. *Water Works Eng.* 83, 489–90, 522 (1930).—A detailed description is given of a unique installation used as a standby unit on auxiliary standby plant for a water works system supplying 2 million gals. daily. C. H. Badger

Building efficiency into an old purification plant. Martin E. Flentje and Clark Cramer. *Water Works Eng.* 83, 421–2, 450 (1930).—The reservoir capacity at Lexington, Ky. is 1765 million gals. The water shed area is 12.7 sq. miles. There are 10 wooden tub filters and 2 concrete units with a total rated capacity of 6.325 million gals. daily. Eight addnl. 1 million gals. daily concrete units will be constructed. The reservoir water is fairly constant in chem. compn. and has an av. hardness of 110 p. p. m. The bacteria count is low because of long storage and absence of polluting sources. Microörganisms grow abundantly in the shallow reservoirs in the summer and $CuSO_4$ treatment is given at least once a week. The sand in the wooden tub filters became badly incrusted because of lack of proper washing facilities. Cleaning with NaOH, $Na_2CO_3$, $Cl_2$ and $CuSO_4$ solns. was not effective. Since lab. expts. showed that some form of abrasion is necessary for cleaning the sand will be treated with 2% caustic soln. for 24–48 hrs., it should be agitated every 2 hrs. with air piped into the underdrain system. Four samples thus far collected monthly show progressive darkening and lack of luster. The portion sol. in HCl and the loss on ignition have increased. Whether bad incrustation will be prevented remains to be seen. C. H. Badger

Design and construction of additional filter units. Hugh R. Cramer and Arthur T. Clark. *Water Works Eng.* 83, 450–4 (1930).—The new filter units mentioned (cf. preceding abstr.) are of the general type. Addnl. features are the combining of

the filter effluents, wash water, air wash and rewash through a special fitting Their construction and operation are described in detail C H Badger

**Building small purification plant at a minimum cost in restricted area.** M P Hatcher *Water Works Eng* 83, 487-8 525(1930) —The water supply for Iola, Kan., is obtained from the Neosho River This river carries much suspended matter and is subject to considerable pollution from a well populated drainage area of 3600 sq miles above Iola About 50 to 75% of the hardness of 100–500 p p m is due to $Ca(HCO_3)_2$ Chlorides are usually less than 400 p p m but during low flow periods they run 500–700 p p m because of oil field pollution The present treatment includes only plain sedimentation and chlorination In the new treatment plant built on the same site, the raw water is to be pumped to a preliminary mixing chamber where lime will be added The treated water kept at a high velocity to prevent settling, will then pass to 2 similar reaction tanks for 30 min agitation with a centrifugal pump and in turn passes to either or both of a 2 5 million gal and a 3 5 million gal settling basins for a max retention period of 3 days The water is then pumped to the aerator and carbonating chamber Alum is dry fed to the suction of the auxiliary low service pumps The reaction proceeds through the carbonating chamber and the alum reaction chamber but the major portion of the floc will be carried to the 3 filter beds, each with a capacity of 2/3 million gal daily The filtered water passes in turn through the storage reservoirs situated below the filters, the secondary basins and the pump room Total storage capacity is 215,000 gal $Cl_2$ is applied at the entrance of the last reservoir C. H Badger

**Controlling microscopic organisms in public water supplies.** Frank E Hale. *Water Works Eng* 83, 353–4, 379–84(1930) —See *C A* 25, 367 C H Badger

**Fluorescence of water in filtered ultra-violet light as an indicator of pollution.** H Ivekovic *Z Hyg Infektionskrankh* 112, 54-61(1931) —The fluorescence of drinking waters was examd in the light from a quartz lamp passing through a black glass filter of NiO, and compared with gelatin standards Many waters showed a bluish white fluorescence whose intensity was proportional to the consumption of $MnO_4^-$ The org matter present is considered the cause of the fluorescence R. B.

**Unusual bacterial conditions encountered at the Williamson filtration plant.** Paul C Laux *Proc 5th Ann Conference on Water Purification*, W. Va Univ. Eng Expt Sta., *Tech Bull* No 3, 40–8(1930), *U S Pub Health Eng Abstracts* 10, W, 115(Oct 25, 1930) —Bacterial tests on 5 ten-cc samples are made daily at the filtration plant Of 5040 samples of filtered water, 85% gave neg gas production after 48 hrs Four types of gas-forming bacteria are described which produce gas but which are not fecal coli They are thought to originate in the soil or in animal or human feces. Excess chlorination and preammoniation have but little effect on these gas forming bacteria. C R Ellers

**Use of pre-ammoniation at the Springfield, Ill. plant.** Charles H. Spaulding. *Water Works Eng* 83, 514-8(1930) —The bacterial loads in the raw water have been excessively heavy Tabulations of lab expts. using added cultures of *B coli* with river water show that sterilization with 1 hr contact was greater when $NH_4OH$ was added just before chlorination but were less satisfactory even with a contact period up to 6 hrs when lime was also added After 8 hrs contact chlorinated samples, with or without lime and $NH_4OH$, showed practically the same percentage reduction of *B coli* Lime by itself is slow in comparison River water contg 1 2 p p b phenol is sufficient to cause a chlorophenol taste but $NH_4OH$ added in the portion of 1/2 lb $NH_4OH$ to 1 lb $Cl_2$ prevented chlorophenol tastes in boiled distd water contg 2 to 50 p p b phenol and lime to a $p_H$ of 9 6 The packing of the high service pump showed *B aerogenes* present, estd at 20 billion per lb $NH_4OH$ is now added at the rate of 0 7 lb per million gal of water at the inlet of the raw water dosing well where the detention is about 30 sec and $Cl_2$ is applied at the outlet of the dosing well The residual $Cl_2$ as a rule drops by the time the water has passed the filters and about 1 lb $Cl_2$ per million gal of water is sufficient to bring the residual $Cl_2$ up to 0 2–0 3 p p m Aqua $NH_4OH$ and anhyd $NH_4OH$ were less expensive to use than $NH_4OH$ salts C H Badger

**Unusual uses of chlorine in a water works system.** (Sterilization of new mains, new wells and flooded supplies.) R. W Kehr *Water Works Eng* 83, 458-61(1930) — K. cites the procedures for sterilization by $Cl_2$ of mains, etc., in New York, Chicago and Indianapolis The sterilization of newly laid mains in Kansas has not received much attention The av time for 9 new supplies to become free from contamination was 6 1/2 months Gravel used for gravel wells should be thoroughly treated with chlorinated lime water. All turbidity should be pumped from newly constructed wells Residual $Cl_2$ was soon shown by the *o*-tolidine test when chlorinators fed several

p p m $Cl_2$ to flooded supplies in Ottawa, Augusta and Eldorado The following directions are given for sterilizing small quantities of water Make a soln of 1 teaspoonful of chlorinated lime in a pint of water, stir 1 tablespoonful of this stock soln into 10 gal of water and let stand 30 min With very muddy waters double the dose To clarify muddy waters add 1 teaspoonful alum to 5 gal of water After mixing and settling, the decanted water is sterilized Boiling the drinking water was found to be impracticable during the Mississippi flood and $Cl_2$ sterilization was used almost entirely

C. H. Badger

**Problems of slow chemical reaction in cold weather.** C. T. Hough. *Water Works Eng* 83, 510(1930).—Lawrence, Kan obtains its water supply from the Kaw River The treatment includes plain settling, coagulation, softening, chlorination and filtration Alky varies from 125 p p m in summer to 300 p p m in winter and sulfate hardness likewise varies 60 to 125 p p m The slow reaction of lime in cold water produced the same effect as a reduced retention period in the basins Setting was not complete even when a dosage of 0.7 grain $Al_2(SO_4)_3$ per gal was applied to the lime basin influent, necessitating a large amt of wash water for the roughing filters Attempts during low temp to lower the alky to 50 p p m resulted in high carbonates and a heavy ppt. on the final filters, which showed on analysis nearly 50% $Al(OH)_3$ and the remainder $CaCO_3$ and $MgCO_3$ This ppt is probably due to the retarded reaction of $Al_2(SO_4)_3$ with a highly lime-treated water Reducing the lime treatment, thereby increasing the alky to 70–80 p p m, eliminated a large amt of the ppt and permitted satisfactory filter operation In Dec., 1926 bacterial analyses, even with daily increased $Cl_2$ dosage, began to show pos tests for the coli aerogenes group in the first 1½ miles of mains from the plant, but beyond this distance were neg This indicated that the reaction of $Cl_2$ in water at 38–40°F is slow and that there must be a sufficient contact period before distribution After unsuccessful results of applying addnl $Cl_2$ to the filter influent, 2½ lb per million gal of water was then added to the lime basin influent and bacterial analyses showed neg results More recent attempts during low temps to increase the lime dosage to give an alky of 60–70 p p m caused pos bacterial results immediately It is evident that increasing the *p*H value of the treated water decreases the effectiveness of $Cl_2$

C. H. Badger

**Use of permanganate at the Weirton, W. Va., city water works for the correction of chlorophenol tastes** L. L. Lasselle *Proc 5th Ann Conference on Water Purification* W Va Univ Eng Expt Sta, *Tech Bull* No 3, 37–9(1930), *U S Pub Health Eng Abstracts* 10, W 116(Oct 25, 1930).—$KMnO_4$, 1.45 p p m, applied between the sedimentation basin and filters was entirely successful in removing the phenol tastes and odors and its bactericidal effect was great enough to warrant discontinuance of chlorination

C. R. Fellers

**Operating results from well-arranged iron removal plant.** C. C. Foutz *Water Works Eng* 83, 557–8(1930). cf *C. A.* 24, 5902

C. H. Badger

**Arsenic content of the Choussy well water, La Bourboule, and fixation of this arsenic in the organism.** R. Cloghe, (Mlle.) A. Courtois and Cazala *Compt. rend* 190, 1133–4(1930).—Arsenic was detd by a modification of the Gribner-Léonardon method, the stain on the $HgCl_2$ paper being fixed by immersion in a 10% soln of KI and matched against standard stains prepd under the same conditions A slight excess of $KMnO_4$ was added to the sample to avoid evolution of $H_2S$ or $PH_3$ Arsenic contents of 5.8–6.5 mg per l are recorded for the season 1928–29 and analyses of tadpoles kept in the water at the well for 8–10 days showed As contents of $3.25 \times 10^{-3}$ mg of As per g ($1.58 \times 10^{-3}$ mg per g in ordinary water) Tadpoles in bottled Choussy water, or in synthetic water of similar compn, contained only 2.73 and $2.325 \times 10^{-4}$ mg per g resp

B. C. A.

**Determination of silicic acid in water.** W. Steffens. *Chem Ztg* 54, 996–7(1930).—The colorimetric method depending on the formation of a yellow silicomolybdate is described again, preference being given to $K_2CrO_4$ solns rather than picric acid solns as standards of color

W. T. H.

**Determination of the "chlorinity" of ocean waters.** Thomas G. Thompson and Richard Van Cleve *Intern Fisheries Commission Univ Wash (Seattle), Report* No 3, 5–14(1930).—An outline is given of the literature dealing with factors that may produce possible variations between the calcd and detd densities Modifications of Mohr's method which differ as to type of volumetric app used, size of sample and concn of $AgNO_3$ soln all give practically the same results Errors in direct detns were found to result from permitting an elapse of time between collection and analysis of the samples The detn of 'chlorinity' gives the best method for the calcn of the

most probably d *in situ* at atm pressure A table is given for converting "chlorinity" per l to chlorinity" per kg at 20° C R FELLERS

Determining protection of underground pipe through proper survey. P J RICHARDS *Water Works Eng* 83, 491–2, 525(1930) —Chem analyses of the soil and waters or aq ext of soil samples taken as required by means of an auger from the surface down to the bottom of the ditch will show the presence and the amt of all chemicals known to be corrosive non-corrosive, accelerators or inhibitors of corrosion The phys characteristics of the soil affect the rate of percolation of soil waters and will det the character of the contact between the metal and surrounding materials Heterogeneity of soils may lead to differences in potential within the soil itself and also between the soil and the buried material Differences in potential will probably accelerate corrosion proportionate to the current flow This knowledge will det whether the pipe will serve without protection or whether an expensive coating is justified Corrosion surveys have been made in Denver and Pueblo for the use of gas-distributing systems Strong alkalies are usually destructive Chlorides and sulfates seem to be the most harmful Sulfides are potentially dangerous and all soil acids must be considered corrosive Limestone is not only non-corrosive but seems to be an inhibitor when corrosive chemicals are present Coatings must be thick enough to protect the metal and wrapped coatings must be used where there may be severe abrasion It has been estd that over half of the coatings that have been applied to pipe lines might have been saved if some knowledge of the corrosiveness of the locations had been obtained beforehand and that half of the remainder was either misapplied or underprotected C H B

The corrosion-checking calcium carbonate-protective layers in water tubes. GERHARD SCHIKORR. *Z angew Chem* 44, 40–1(1931) —The resistance of iron water tubes to rusting is very strongly increased through a $CaCO_3$-protective layer For the formation of the layer, a definite quantity of O must be dissolved in the water The water must contain a sufficient quantity of dissolved $CaCO_3$ but must not contain too great an excess of $H_2CO_3$. The action of the O may be traced to an electrochem effect in contrast to the theory of Tillmans, Hirsch and Schilling (*C A* 23, 1973) In order to show that the formation of the protective layer is not the result of the adsorption of $H_2CO_3$ by $Fe(OH)_3$ but is a cathode reaction, a noble metal was used in place of Fe Expts. indicate that with suitable arrangements $CaCO_3$ can be pptd from a $Ca(HCO_3)_2$ soln on Pt with the aid of O ALLEN S SMITH

The continuous control of the salt content of boiler-feed water by means of a visual conductivity measurement. E. ROTHER AND G JANDER *Z angew Chem* 43, 952–4 (1930) —The chloride content of feed water is detd by leading the water through a specially designed tube contg Pt electrodes. The detns. are continuously recorded potentiometrically RUSSELL C FRB

Problems of a watershed sanitary inspector. S. F GLASS. *Water Works Eng* 83, 376 (1930) —Rural sewage-disposal problems and the disposition of dead animals in the Denver, Col., watershed area are briefly discussed. C. H BADGER

Performance of the Tenafly (N. J.) activated sludge plant. WILLEM RUDOLFS, H HEUKELEKIAN, I O LACY AND C. N HENDERSON N J Agr Expt Sta., *Bull* 502, *Ann Rept Dept Sewage Disposal* 1928–9, 12 7(1930) —Chem and bacteriol examns. made on the Tenafly activated sludge plant and covering a period of 36 hours' sampling show that a high degree of purification and clarification was obtained The av biochem. O demand reduction was 93 5% and the *B coli* reduction % was 99 99 C R. FELLERS

Some operating results of the Plainfield (N. J.) disposal plant. WILLEM RUDOLFS AND I. O LACY N J Agr Expt Sta., *Bull* 502, *Ann Rept Dept Sewage Disposal* 1928–9, 9–12(1930) —In spite of the staleness of the sewage and the comparatively short detention time, the settling tanks removed 53% of the total suspended solids in addn to 9–12% suspended solids removed by fine screens. The screened sewage averaged 737 p p m. total solids, 256 p p m suspended solids and 190 p p m. biochem. O demand. Total reduction in biochem. O demand for the settling tanks and sprinkling filters was 56.2%, ¼ of which was taken care of in the sprinkling filters. C. R. FELLERS

Effect of certain chemicals on the vacuum filtration and gravity drying of ripe sludge. WM. H. BAUMGARTNER. N. J Agr Expt Sta., *Bull* 502, *Ann Rept Dept. Sewage Disposal* 1928–9, 17–25(1930) —$FeCl_3$ was the most effective treating chemical for ripe sludge. $FeCl_3$ has a 3-fold effect in sludge drying and filtration: (1) discharge of the dispersed material, coalescence being caused, (2) change of the H ion concn., the isoelec. points where max. pptn. of the colloidal material takes place being thus approached; (3) liberation of $CO_2$, which makes the material porous and helps

in its flotation There are peaks in the filtration of $FeCl_3$-treated sludge which correspond to definite $p_H$ values These peaks are at a concn of 2 and 7 lb to the cu yd of sludge, resp, $FeCl_3$ increases the amt of drainage from sludge drying on beds and thus decreases the time for evapn Treated sludge has a porous nature which allows more surface for evapn Moisture is removed more rapidly by treating sludge with $FeCl_3$ C R Fellers

**Certain organic constituents of fresh and ripe sewage sludge.** H. Heukelekian N J Agr Expt Sta, *Bull* 502, *Ann Rept Dept Sewage Disposal* 1928-9, 31-6(1930) — The most abundant constituents of the org matter of fresh solids are fats and crude proteins Materials present in smaller percentages are water sol and alc-sol substances, hemicellulose, cellulose and lignin Fats and cellulose show the greatest decrease in ripe sludge Resistant substances like waxes and lignin are not decompd readily and are therefore present in the ripe sludge in larger percentage than in fresh sludge C. R Fellers

**Notes on drying fresh sewage solids.** Anthony J. Fischer N. J Agr. Expt Sta, *Bull* 502, *Ann Rept Dept Sewage Disposal* 1928-9, 29-31(1930) —Drying of fresh solids in the open is not feasible when treated with lime, alum, or a mixt of lime and alum on account of poor drainage, objectionable odors, or both C. R Fellers

**Sludge drying Relation between drainage and evaporation.** Willem Rudolfs and I O Lacy N J Agr Expt. Sta, *Bull* 502, *Ann Rept Dept Sewage Disposal* 1928-9, 26-9(1930) —Studies dealing with the relation between drainage and evapn of drying sludge indicate that up to a temp of 130°F, drainage is a more important factor than evapn The percentage of total moisture removed, resp, by drainage and by evapn at various temps are 43°F, 94 and 6, 74°, 86 and 14, 100°, 77 and 23 113°, 60 and 40, and 131°, 47 and 53 The practice of covering sludge beds with greenhouses is beneficial because rain is thus kept off the beds. C R Fellers

**Notes on stabilization in a sprinkling filter.** Willem Rudolfs N. J Agr Expt Sta, *Bull* 502, *Ann Rept Dept Sewage Disposal* 1928-9, 37.—A summary of chem results shows the amts of suspended solids, O consumed, $NH_3$, $NO_2$ $NO_3$, suspended org N, and sol org N present at different depths of the filter beds In general, the removal of $NH_3$ nitrogen is well correlated with the reduction on O consumed values $NO_2$ and $NO_3$ values are the only ones which increase with depth C R Fellers

**Determination of $p_H$ in the estimation of the productivity of carp ponds.** Louis Roule *Compt-rend acad agr France* 16, 1056-60(1930) —The $p_H$ of the water should be between 6 and 8 and care must be taken to maintain the water within these values Tests and adjustments of the water should always be made early in the morning and in the shade, as sunlight has a very marked effect on the chem reactions taking place J R Adams

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Colorimetric determination of the sulfate ion in water (Guarnieri) 7. Apparatus for extracting oils from sewage by solvents (U S pat 1,791,398) 27.

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Water purification H Groeck (to Groeck Wasserveredlung Ges.). Brit. 335,687, Nov 22, 1928 See Fr 680,106 (*C. A* 24, 3847)

Apparatus for deaerating water. George H Gibson (to Cochrane Corp) U. S 1,790,911, Feb 3 Structural features

Portable water filter. Lloyd E Rabjohn and Ralph W. Hollenberg (to Cool Spring Filters, Inc.) U S 1,790 947, Feb 3

Apparatus for softening water by the lime and soda process. Neckar Waterreiniger Maatschappij Fr 693,007, Mar 29, 1930

Variable-rate chemical feed pump suitable for water-softening plants. Albert B. Hodges (to General Zeolite Co) U. S 1,790,708, Feb 3

Activated sludge treatment of sewage. JOHN C. DALLAS and MALCOLM WILSON U. S. 1,790,975, Feb. 3. Various details of app. are described.

Deodorizing and producing fertilizer from sewage, etc. C. G. WIGLEY and C. POTTS. Brit. 335,682, Aug. 12, 1929. Sewage, sludge and the like are treated with a growth of the mycelium of fungi such as *Mucor* or *Rhizopus* developed under forced growth conditions, and under specified conditions of temp., moisture, limited access of air and under subdued light (in a described app.). A material suitable for sale as com. fertilizer may be obtained in 4 days.

*Apparatus for clarifying waste waters, etc.* DEUTSCHE ABWASSER-REINIGUNGS-GES. M. B. H., STÄDTEREINIGUNG. Fr. 693,040, Mar. 29, 1930.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Soils of Connecticut. M. F. MORGAN. Conn. Agr. Expt. Sta., *Bull.* 320, 829–911 (1930).—The ratio of N to org. matter (av. of 100 soils) is 1:20. No serious decline in N content has occurred in the cultivated soils of Conn. during the last 200 yrs. The av. N content of 21 forest soils is 0.205%, which is practically identical with the av. for agricultural soils. The av. percentage of P in the surface 8 in. of Conn. soils is 0.0919, an insufficient amt. for the profitable growing of most farm crops. The availability of the P in many of the soils is very low. K varies from 1.3 to 2.6% on cultivated land with an av. of 1.4%. Nearly all soils respond to potash fertilizers and lime. The av. $p_H$ of the soils is 5.3 and the lime requirement per acre approx. 1.3 tons. Numerous greenhouse expts. were conducted to det. the fertilizer requirements of the soils. C. R. FELLERS

The red soils and Bienhoa of Indochina. M. V. AGAFONOFF. *Soil Research* (Supp. to *Proc. Intern. Soc. Soil Sci.*) 2, No. 2, 184–96(1930), cf. *C. A.* 24, 2822.—The results of chem. and mineralogical studies on samples of soil from Indochina are reported. The soils differ from the basalt from which they are derived in the almost complete removal of Mg, gradual loss of Na, Ca and K, oxidation of FeO to $Fe_2O_3$ and content of twice the amt. of Al and Ti as the basalt. The alteration and formation of secondary minerals in the decompn. of basalt are described. The similarities between Bienhoa and laterite are pointed out. The sterility of certain soils could not be accounted for by deficiency of N, $P_2O_5$ and $K_2O$. Soils low in bases in general had poor structure. Data are reported on studies of the absorbing complex of the soils by the method of Gedroiz and on the amt. of $SiO_2$ and $Al_2O_3$ sol. in 5% KOH. I. A. D.

Adsorbed bases and unsaturation of Polish sandy soils. W. BUTOWSKI. *Rept. Polish Agr. Expt. Sta.* 2, 195(1928).—The proportion of adsorbed bases in the soils examd. varied with their mech. compn. and increased with the clay content. The plant covering of forest soils increased the adsorbed bases in the upper horizons. The amt. of adsorbed bases was less in the B-horizon than in the surface but increased at still greater depths approaching the parent rock. Variations in the degree of unsatn. were parallel with those of the base content and were greatest in the loams. The genesis of the soils is discussed. Podsolization is considered to take place in these soils. B. C. A.

Soils and soil treatments in Quebec. R. R. MCKIBBIN. *Sci. Agr.* 11, 361–8 (1931).—It is the final balance existing in the soil after the addn. of soil treatments that is important, rather than the use of balanced fertilizers. Sweeping conclusions that similar results may be obtained from the use of similar treatments on all light soils or on all heavy soils, are unwarranted. Fundamental soil conditions must be known before effective fertilizer practice can be established. A survey of Quebec's soils is given. C. R. FELLERS

Soils of Anatolia and eastern Thrace. F. GIESECKE. *Chem. Erde* 4, 551–97(1930).—A description is given of the various types of soils, with partial mech. and chem. analyses. A soil map of Anatolia is given. B. C. A.

Nitrate fluctuations in a South Australian soil. J. A. PRESCOTT AND G. R. PIPER. *J. Agr. Sci.* 20, 517–31(1930).—An investigation was conducted to det. the nature and importance of the fluctuations in the nitrate content of the soil during the season under typical conditions of cropping and fallowing. The rate of nitrification is governed primarily by the soil moisture conditions. During the characteristic summer drouth there is little evidence of change in nitrate, the quantities accumulated during the preceding period of activity remaining unchanged. The quantity of nitrate ac-

cumulated during fallowing, as observed over a succession of seasons, appears to approach a const. value of about 20 p p m of the 1st 18 in of soil, and the greater portion of this remains in the 1st few in of cultivated soil, sometimes attaining a remarkably high level It is not washed down until the advent of autumn rains. There is generally no leaching down below the root zone of the cereal crops At certain periods of the winter the soil moisture may be sufficiently high to result in disappearance of nitrate, when present in quantity, from the surface soil This depletion is not due to leaching, but possibly to an intake of nitrate by microörganisms Toward the end of the spring, the rapid nitrate accumulation in the cultivated layer may be due to a possible capillary redistribution caused by rise from the lower layer, or to particularly favorable moisture conditions immediately below the surface of the mulch or in the lower layers of the mulch itself During the biol active period of the year the rate of nitrification under fallow conditions is appreciably more rapid than under a crop Lab investigations showed that nitrate accumulation was favored by a rather broad range of temp conditions between 11° and 34°, with no sharp optimum temp There was, however a definite optimum moisture content (17%, calcd on the moist soil), with a rapid fall on the wetter side, leading to nitrate depletion at moisture contents above 19%. Nitrate accumulation occurred with relatively dry soil, although more slowly than under optimum conditions P R Dawson

The development of the soil profile in North Wales as illustrated by the character of the clay fraction. G W Robinson *J Agr Sci* 20, 618-39(1930).—A study was made of the variations in compn of the clay fraction in different horizons of some typical North Welsh soil profiles The changes in the mol. ratio of $SiO_2$ to sesquioxides ($SiO_2/(Al_2O_3 + Fe_2O_3)$) throughout a soil profile afford an indication of the nature of the eluviation which has affected the mineral portion of the soil The data for the soils studied indicate a general tendency to enrichment of the lower layers in sesquioxides, particularly $Fe_2O_3$, at the expense of the surface layers The $SiO_2$-sesquioxide ratio of the clay fraction is an important aid to series definition The soils of North Wales, particularly in the uplands, have probably been subjected to considerable erosion in the past. The profiles are therefore considered to be more or less truncated. The soil profile appears to be of the brown-earth type with podsol development in the uplands under heath vegetation The importance of the parent material is emphasized North Welsh soils are generally of a loam character The absence of light sandy soils in situations permitting profile development precludes the occurrence of typical podsols in the lowlands The high content of org matter, resulting from artificial grassland conditions results in affinities with prairie soils P R Dawson

The physical and chemical characteristics of certain American peat profiles. Irvin C Feustel and Horace G Byers U S Dept Agr *Tech Bull* 214, 1-26(1930).—Based on the data obtained from 38 peat samples, an attempt has been made to distinguish between the various types of peat according to botanical origin of peat material certain phys and chem tests and response to liming and fertilization. Methods which in many cases are modified standard methods are given for detg the apparent and true sp gr, moisture relations, max shrinkage, reactions fractional analysis of org matter elementary and proximate compn., mineral constituents of the ash and behavior of certain samples submerged under anaerobic conditions The max moisture

grade. O M Shedd Ky Agr Expt Sta, *Research Bull 308*, 447–71(1930).—*The* samples were selected from the crops of 1920, 1921 and 1924 Large variations in certain *mineral constituents were found in the 2 kinds* of tobacco The extremes for the Burley were 0.70 to 7.06% K 0.02 to 1.50 Cl and 0.09 to 0.81 sulfate S, while for the dark they were 0.70 to 4.72 K 0.04 to 2.99 Cl and 0.11 to 0.82 sulfate S Those samples which had an unusually high chloride or sulfate content did not generally have an abnormal amt of K In 78% of the comparisons of the Burley tobacco and in 62% of the dark tobacco, *more* K was *found* in the good grades than in the common In 58% of the comparisons of the Burley tobacco and in 48% of the dark tobacco, more Cl was in the good than in the common In 64% of the comparisons of the Burley tobacco and in 68% of the dark tobacco more sulfate S was found in the good than in the common The Cl was the same in several comparisons, and the sulfate S in a few *If the 4 Burley crops are combined the averages of the good grades show 21%* more K, 31% more Cl and 4% more sulfate S than the common A comparison of the Burley and dark crops of tobacco shows that the Burley carries 42% more K than the dark, whereas the latter has 106% more Cl and 11% more sulfate S than the Burley More K was present in the smoker grades of Burley tobacco than in the filler grades The K content of the *different grades of Burley* usually varied in proportion to market quality and price The same relation existed between the K content, quality and value of the dark tobacco Org K predominated in the better grades of Burley Furthermore, the smoker grades had more org K than the fillers Diseased leaves disturbed *the usual percentages of K, Cl and sulfate S present in the leaves The results indicate* that *in expts where fertilizers contg* K are used on tobacco, particularly of the smoking types, observations should be made of the effects of different amts and combinations of this constituent on the quality as well as the yield of the crop Bibliography

C R Fellers

**Impoverishment of forest soils by use of the litter.** A Němec *Forstarch* 1929, 497–503.—Low proportions of nutrients in many forest soils are attributed to the annual removal of mineral matter in the forest litter In this respect the available potash is least affected B C A

**"Single value" soil properties: a study of the significance of certain soil constants. V. On the changes produced in a soil by oven drying.** J R H Coutts. *J Agr. Sci* 20, 541–8(1930), cf *C A* 25, 159.—Results for the loss in wt of a soil on oven heating can be obtained to a very satisfactory degree of accuracy by an electrically controlled oven The results obtained by heating soils (brought to equil with atm at 50% relative humidity) to temps ranging from 50° to 250° give smooth curves connecting loss in wt with rise in temp, they lead to the conclusion that there is no sudden alteration in the structure of a soil when it is heated to 100° The air-dry moisture of a soil, as detd with sufficient accuracy by the usual methods, is a convenient empirical factor, but not a representation of any fundamental soil property Expts *show that the losses in wt on oven drying are greater than are the regains in wt* when the dried samples are brought to equil with an atm of 50% relative humidity As the drying temp is raised, the recoverable loss changes but slightly, while the total loss increases rapidly Strength is lent the supposition that the recoverable loss is due to removal of free and interstitial water while the irrecoverable loss is due partly to water bound adsorptively or chemically by soil colloids and partly by the destruction of org colloids At any given temp of drying both classes of losses play a role There is no justification for assuming that there is any sharp line dividing one class of water from the other or that in any process one of the classes of water will be removed while the others are unaffected P R Dawson

**The decomposition of urea in soils.** T Gibson *J Agr Sci* 20, 549–58(1930); cf *C A* 24, 4882.—Investigation of the decompn of urea in 59 soil samples of extremely varied character showed that the compd was decompd readily in all, and very rapidly *in most, of the cases* In mountain and heath soils decompn was generally active, especially in soil tests Strongly acid peat samples ($p_H$ 3.1–3.3) decompd from 0.44 to 0.86% of their own dry wts of urea in 24 hrs at 22–23° In soln and soil tests samples from permanent pastures produced a more rapid decompn than those from cultivated land In soil tests as high as 1% of the dry wt of soil was converted to $NH_3$ in 24 hrs at 22–23°. *Fertile arable soils produced a relatively slow* decompn in soil tests Forest soils were generally more active than cultivated soils Strongly alk soils showed comparatively little activity in soil tests, but greater activity in soln tests Although urea is not absorbed by soils, its rapid conversion to $NH_3$ will generally prevent losses by leaching P R Dawson

**Parent material as a factor in soil formation and as a criterion in soil classification.**

B POLYNOV *Soil Research* (Supp. to *Proc Intern Soc. Soil Sci*) 2, No 2, 165–77 (1930).—The "climatic soil type" is a very broad and general concept. Soils must be further subdivided according to the properties and compn of the rocks from which they are formed, since various rocks differ widely in their influence on soil formation.
I A DENISON

**A study of the pedogenic processes in an area of lower paleozoic shales.** G H GETHIN JONES *J South Eastern Agr. Coll., Wye, Kent* No 27, 229–47(1930).—A full account is given of a podsol soil occurring in North Wales. There is a definite acid leaching of the sesquioxides from the eluvial horizon, followed by their subsequent deposition in the illuvial horizon of accumulation immediately below. The nature and extent of some of the pedogenic processes are shown by partial and complete profile chem analyses of the sedentary soil, down to and including the parent rock. Welsh upland soils are in general very unsatd with respect to lime because of excessive acid leaching in a humid climate. These soils and parent rock contain a relatively high proportion of MgO, usually about 1%. In the podsolized regions the ratio of exchangeable CaO to org matter increases with depth, despite the poorer soil dispersion at the lower levels. This shows leaching from the upper layers, without evidence of a CaO horizon of accumulation. A profile study of $p_H$ values showed a continuous rise toward neutrality as the relative amt. of unsatd org matter decreased with depth. Soil analyses by 48-hr HCl extn do not give reliable information as to the abs chem compn. of soils differing in their mech and chem compn.
K. D JACOB

**The importance of rare elements in the nutrition of plants.** O C. BRYAN *Proc Assoc Southern Agr. Workers, 31st Ann Convention* 1930, 239–42.—A general discussion with particular reference to the use of Cu and Mn salts on the Florida Everglades soils.
K D JACOB

**Correlations between the specific conductivities of soil extracts, nitric nitrogen and soluble calcium.** C. H WRIGHT, *5th Ann. Bull Agr Dept., Nigeria* 1929, 104–9; cf *C. A.* 25, 761.—Periodical sampling and analysis of cropped soils show that the Ca and nitrate contents of 1 5 soil water exts. are closely correlated with their sp conductivities. Increased cond is evidence of biol activity in the soil.
B C. A

**Report of the committee on soil reaction measurements.** SECOND COMMISSION, INTERNAT SOC. SOIL SCI *Soil Research* (Supp to *Proc Intern Soc. Soil Sci*) 2, No 2, 141–52(1930).—The committee has already published (*Soil Research* 2, 77–139 (1930)) *the methods and results of its coöperative investigation on detn of the $p_H$ value* of soils. With few exceptions, $p_H$ values obtained by 4 independent methods showed satisfactory agreement. Of a total of 28 soils examd., 8 gave erroneous results by the quinhydrone method. *It is* recommended, therefore, that a preliminary detn. be made to ascertain whether the quinhydrone method is suitable for a given soil. Where the increase in apparent $p_H$ value from 10 to 60 sec is less then 0 2, the method may be considered suitable. The final measurement is made by shaking the soil and water 1 min., adding the quinhydron shaking again for 10 sec. and measuring the potential after 1 min. In the case of soils considered unsuitable for an exact detn of $p_H$ by this method an approx detn can be made on a new sample after 10 sec. In the detn. of $p_H$ by the H electrode a sintered glass crucible or funnel is recommended. The colorimetric method did not always agree with electrometric methods, although satisfactory agreement can be obtained with great care.
I A DENISON

**The relation between $p_H$ value and state of saturation of soils.** AMAR N PURI *Soil Research* (Supp to *Proc Intern Soc. Soil Sci*) 2, *No* 2, 181–4(1930).—The state of satn of the soil ($V$) is defined as the ratio of the amt. of absorbed bases in the soil ($S$) to the amt. of bases the soil is capable of absorbing ($T$), both values being expressed in equivs. Thus $V = 100S/T$. The value $(T - S)$ is detd by adding 100 cc 0.2 *N* $Ba(OH)_2$ to 10 g soil and 2 g $CaSO_4$ and titrating after several days against 0 1 *N* $H_2SO_4$ with phenolphthalein as indicator. $T$ is detd by removing all replaceable bases from 10 g soil with 0 05 *N* HCl, washing with water and titrating back after adding an excess of $Ba(OH)_2$ as described above. From the values $(T - S)$ and $T$, the $S$ and $V$ values are calcd. *A general relation between degree of satn and $p_H$* was noted in the case of 36 soils. The difference in the nature of the colloids present in different soils is shown by fact that the $T$ value per g of clay varies from 0.252 to 1 516.
I A DENISON

**Growing onions on the muck soils of New York.** J E. KNOTT Cornell Univ Agr Expt. Sta., *Bull* 510, 3–34(1930).—On muck soils that have been under cultivation less than 10 years, *increased quantities of N gave a neg correlation* with yield. P had little effect, but a fair response to K was apparent. On new, slightly acid mucks,

1000 lb. of 0-12-18 fertilizer is recommended, while for more acid mucks the formula is changed to 3-12-18. C. R. Fellers

**Lysimeter experiments. III. Records for tanks 3 to 12 during the years 1910 to 1924 inclusive.** T. L. Lyon, J. A. Bizzell, E. B. Wilson and J. W. Leland. Cornell Univ. Agr. Expt. Sta. *Memoir* 134, *b* 72(1930); cf. *C. A.* 16, 1121. The lysimeters are square concrete tanks with funnel-shaped bottoms each containing 3½ tons of Dunkirk silty clay loam soil. About ⅓ of the av. 32.5 in. rainfall percolated through the uncropped tanks; somewhat less than ⅓ percolated through the cropped soils. About 18% of the water was transpired by the plants on cropped tanks. Applications of lime had no appreciable effect on the proportion of rainfall that percolated through the soil. Liming did not increase the total quantity of N in the drainage water from the tanks in which only non-legumes were grown, nor did it have any effect on the quantity of N in the crops grown on these tanks. In the tanks with legumes, lime produced a decided increase in N both in the drainage water and in the crops. Where legumes were grown in succession with non-legumes the quantities of N contained in the latter were nearly as large as when the non-legumes were grown alone, in spite of the space occupied by the legumes and the nutrients they removed from the soil. There was less tendency for the N produced in the crops to decrease from year to year when the rotation contained legumes than when it did not. In the tanks where no legumes were grown, the drainage water alone of the unplanted tanks contained more N than did the drainage water and plants combined from the planted tanks. This is attributed to N synthesizing organisms which thrive better in the org. matter derived from the plant roots. Tanks in continuous grass lost less N than those planted to non-legume crops. The quantity of Ca in the drainage water from the unplanted soil was greater than that in the combined crops and drainage water from the planted tanks. Because of this, an annual conservation of 111 lb. of Ca per acre was effected by cropping the soil instead of leaving it bare. The larger removal of Ca in the drainage water from the unplanted soil than from the planted tanks was due chiefly to the much greater quantity of nitrates leached from the unplanted soil. Liming the soil was not accompanied by an increase in the quantity of Ca in the drainage water or in that of the crops produced. Its loss was decreased by cropping. To replace the yearly loss of Ca from an acre of cropped land requires approx. 500 lb. of $CaCO_3$. To recoup the loss from bare soil would require about 1000 lb. The quantity of Ca in drainage water was considerably greater where $K_2SO_4$ was applied than where it was not. There was less Mg present than Ca in both the plants and in the drainage. Like Ca its loss was decreased by cropping. Application of lime resulted in a liberation of Mg as indicated by its greater removal in the drainage water. Crops removed more K than did the drainage water. Liming did not increase the K in the drainage water or in the crops. Applications of $K_2SO_4$ did not result in a larger removal of K in the drainage water or in the crops. The removal of S was much larger by the drainage water than by the crops. Of the S added to the soil in the form of $K_2SO_4$ more than ½ was removed in the drainage water. Liming slightly increased the leaching of S in the drainage water. There was never more than a trace of P in any of the tanks. Liming slightly increased the P content of crops from the limed tanks. C. R. Fellers

**Microbiological analysis of soils.** T. Rayssoartell and H. Burnischon. *Landw. Jahrb.* 72, 259-68(1930).—The authors extend and confirm the results of their previous work (*C. A.* 24, 5000). By the use of Diejerinck's medium, cultures taken from soils contg. increasing amts. of K fertilizers show increasing development of *Azotobacter chroococcum*, and where heavy dressings of potash have been used there were large nos. of protozoa. Clement R. Gutenbank

**The value of the simplified Kappen method for determining absorbed bases.** D. V. Dmitrienin and Z. I. Stroganova. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 191-9(1930).—A series of tests was made on various soils comparing the Kappen and Bobko-Askinazi methods for detg. the absorbed bases. The methods checked very well. The authors suggest a rapid, approx. method. To 1 part of soil (25, 40 or 50 g.) 2.5 parts of 0.1 *N* HCl is added, the mixt. is shaken for 1 min., allowed to stand 5 min., filtered and an aliquot taken and titrated with methyl orange as indicator. Tests with 16 different soils showed that the method checked very well with those of K. and of B.-A. Just as in the other methods the new method works best on soils free from lime and Ca phosphate and with a low content of absorbed bases. J. S. J.

**The antimony electrode.** M. S. Du Toit. *South African J. Sci.* 27, 227-35 (1930).—The Sb and $H_2$ electrodes were compared in a large no. of soils and found to agree closely. In the potentiometric titration of Fe and Al solns. the Sb electrode proved highly satisfactory. Its temp. coeff. was found to be 0.0013 v. per degree in

soils of varying $p_H$ values. Trenkle and Williams' conversion formula was confirmed. The use of the Sb electrode was advocated for soil surveys. C. E. P. Jeffreys

**An approximate method of mechanical analysis of soils for field purposes.** P. Kamphuis. *Soil Research (Suppl. to Proc. Intern. Soc. Soil Sci.)* 2, No. 2, 172–84 (1930).—A rapid method is described. The soil is dispersed by means of a mortar and rubber pestle after treatment with Na oxalate. In the case of certain soils the sample is pretreated with 0.2 *N* HCl or 6% $H_2O_2$. After a suitable period of settling the clay fraction is estd. by detg. its sp. gr., and the sand fraction by decantation and measurement of its vol. I. A. Denison

**Neubauer analyses and field experiments.** Oberdorfer. *Superphosphat* 6, 83–6(1930).—*In 28 field expts. on deep loam soils the crop responses to potash and phosphate fertilizers generally were in good agreement with the potash and phosphate deficiencies in the soils as indicated by Neubauer tests.* K. D. Jacob

**The methods of determining the phosphorus requirement of the soil.** A. L. Maslova and O. M. Dobrotvorskaya. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 276–83(1930).—*Soils from 27 field expts. were tested out in the lab. by the method of titration curves and soly. of $P_2O_5$.* Into 100-cc. flasks 2, 4, 6, 9 and 12 cc. of 0.1 *N* HCl were introduced, 10 g. of soil was added and the whole made up to vol. After 24 hrs. the filtrates were analyzed for $p_H$ and $P_2O_5$. It was found that for 2 different soils the soly. of $P_2O_5$ with HCl might be the same, but the $p_H$ at which the same quantity of $P_2O_5$ is dissolved differs. Thus in chernozem soils the $p_H$ value varies from 3.36 to 4.45, whereas in the dark gray loams it is 2.97. A comparison of the crop yields from the expt'l. plots with the titration curves shows a certain correlation between the $p_H$ and response to P fertilization. J. S. Joffe

**Testing soil for available phosphoric acid by the Winogradsky method.** E. M. Norris. *Fertilizer Green Book* 12, No. 2, 30–1(1931).—Directions are given for carrying out the *Azotobacter* test for phosphate deficiencies in soils. K. D. Jacob

**Phosphoric acid and plant growth.** M. F. Morton. Calif. Dept. Agr., *Monthly Bull.* 19, 706–8(1930).—A general discussion. Most Calif. soils are deficient in P. C. R. Fellers

**Phosphorus-fixing compound in the soil.** A. H. Meyer. *Science* 71, 461(1930).—An Fe compd. existing as concretions in southern soils and responsible for the fixation of P has been discovered. The P is present as a basic ferrous phosphate of very low soly. B. C. A.

**Influence of phosphoric acid on the cropping power of seed potatoes.** Densch. *Superphosphat* 6, 120–3(1930).—Phosphate deficiency in soil not only reduces the crop yield of potatoes but lowers the seed value of the tubers, which in the subsequent season produce smaller crops of lower starch content. Moreover, the smaller crops in the 2nd season are not improved by phosphate fertilizing. B. C. A.

**Critical consideration of fertilizer practice and crop yields in German agriculture.** Allmeyer. *Superphosphat* 6, 115–20(1930). B. C. A.

**Chemistry and the fertilization of Italian soil.** N. Parravano. *Industria chimica* 5, 1339–46(1930).—A history of the development of the fertilizer industry in Italy. A. W. Contieri

**Factors in the production of synthetic and natural nitrates.** Lee Vanderlinden. *Fertilizer Green Book* 12, No. 2, 15–6(1931). K. D. Jacob

**Developments in the production and use of concentrated fertilizers.** C. H. Kunsman. *Fertilizer Green Book* 12, No. 2, 20–2(1931). K. D. Jacob

**Modern methods in fertilizer manufacture.** B. Leslie Emslie. *Sci. Agr.* 11, 205(1931).—A general discussion. C. R. Fellers

**New fertilizer mixer calculator.** E. L. Raynauld. *Sci. Agr.* 11, 159–61(1930).—A device is described. It is simple, inexpensive and fairly accurate. C. R. Fellers

**Development of knowledge of rational application of commercial fertilizers and new knowledge in this field.** O. Engels. *Kunstdünger u. Leim* 27, 331–6(1930).—*An account of the chem. methods and vegetation tests employed for estg. the fertilizer needs of the soil.* C. J. Schollenberger

**Possibilities of sulfur as a soil amendment.** G. S. Fraps. Tex. Agr. Expt. Sta., *Bull.* 414, 3–56(1930).—Field and pot expts. were conducted over a 4 yr. period. Chem. *analyses show that alfalfa, cabbage, cotton, onions and turnips take up much larger* quantities of S than corn, rice, oats and wheat. Some Texas soils are low in S. S is brought down by rain and also is supplied by irrigation water and in most com. fertilizers. The amt. brought down by rain in Texas averages 4 to 12 lb. a year on each acre, varying with different sections. Pot expts. show that S alone gave very poor results, but when *it was used to supplement a complete fertilizer in pots watered with distd. water which*

contained no S, it increased the yield of crops (in some cases) Addns of S did not increase the amts of N or K taken up by crops in pot expts, although they increased the S taken up and slightly increased the P There was a tendency for the S removed by crops to increase as the S content of the soil increased Oxidation of S had practically no effect upon the active P or active K in the soils tested, but increased the permeability of some of the soils to water S is not recommended as a fertilizer on soils in Texas, since a sufficient amt of S is present in the soils, or is supplied by rain or irrigation water or by com fertilizers S or $CaSO_4$ may be recommended in special cases on soils which run together under irrigation, or which contain black alkali It is possible that the use of concd com fertilizers contg little or no S may cause a deficiency of S in soils in some sections of the country, especially for crops which require comparatively large amts of S, such as alfalfa, cotton, cabbage and onions. C R Fellers

The effect of the admixture of magnesium with lime applications. O K. Zikiman Kedrov *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 186–9(1930).—CaO, $CaCO_3$ (C. P.) and two kinds of limestone, one contg 47% CaO and 23.3% MgO, the other 44.7% CaO and 25.2% MgO, were compared on podzol soils The results showed that the Mg limestone was even slightly more effective than the pure $CaCO_3$ Another series of expts. was conducted with pure CaO, MgO, $CaCO_3$ and $MgCO_3$ alone or in combinations. Again the $MgCO_3$ showed no injurious effects, and in combination with $CaCO_3$ it stimulated the effectiveness of the latter On some field plots the amt. of lime applied was almost equal to the hydrolytic acidity, and in every case the Mg-contg limestones were very effective It is concluded that limestones contg CaO and MgO in the ratio of 2 1 or even 1 1 are not injurious, on the contrary it might be more beneficial than pure $CaCO_3$. J. S. Joffe

The repressive effect of lime and magnesia upon soil and subsoil potash. W H. MacIntire, W. M Shaw and J. B. Young *J. Agr Sci.* 20, 499–510(1930).—Data are presented from 5 lysimeter studies conducted over a 15-yr. period at the Univ. of Tenn. Agr. Expt. Sta. A 12 yr. expt. shows that economic addns of CaO, MgO, limestone and dolomite, incorporated throughout the soil, depressed the soly. of native supplies of K. One-ton and 32-ton addns. of CaO and MgO produced the same repressive effect, even when supplemented by excessive quantities (added at once) of sulfates of Ca and Mg from $FeSO_4$ and progressive increments of the same salts from pyrite and S. A 15-yr study with excessive quantities of 7 forms of Ca and Mg showed a decided decrease in the soly. of K in the surface soil and a marked decrease in the subsoil as a result of the influx of bicarbonate-impregnated percolates. A 4-yr. study with "light" and "heavy" forms of MgO and $MgCO_3$ and cryst. $MgCO_3.3H_2O$ showed the same consistent depression in K soly. Surface zone incorporations of $Ca(OH)_2$, limestone and dolomite produced neutral-salt impregnated percolates that gave some indication of K liberation in an underlying unlimed zone of surface soil. Sub-surface zone incorporations produced the same repressive effect as the full depth incorporations. When K addns were made by means of red clover hay along with $Ca(OH)_2$, limestone and dolomite, a decided decrease in the outgo of the K resulted The results demonstrated that the liming of rock-derived soils under humid conditions will depress the hydrolytic disintegration of both the original K complex and that formed by fixation of added sol K salts. It is further shown that the protective, or buffering, effect becomes more pronounced with increase in concn of the bicarbonates of Ca and Mg P. R. Dawson

*Plant-food value of mixed and fertilizing materials.* Bruno Waeser. *Metallbörse* 20, 2021–2, 2077–8(1930).—A table shows ratios of N, $P_2O_5$ and $K_2O$ contents of a number of common plants grown in Germany The mean ratio for some 42 plants is $N:P_2O_5$ $K_2O$ = 1 0.47 1.42 A similar table shows the same constituents in natural manures. The mean ratio here is 1 0.46 1.32. By combining these facts with the av amts. of N, $P_2O_5$ and $K_2O$ removed by various crops from the soil, a fair idea can be gained in regard to fertilizer requirements in Germany The ratio of fertilizers actually used in Germany, in the case of 12 of the most important crops is $N.P_2O_5$ $K_2O$ *lime* = 1 0.449 1.256 0.66. Approx. the same ratio is found in artificial mixed fertilizers, such as $KNO_3$, N $K_2O$ = 1.1.56, Nitrophoska, N $P_2O_5$ $K_2O$ = 1 0.825 1.413; Am-Super, $N:P_2O_5$ = 1:1.55, Am-Sup-Ka, N $P_2O_5$ $K_2O$ = 1 1.35 1.53 A table shows the ratio of fertilizers applied to soil in some other European countries, also in Egypt and Japan The av. ratio in these countries is $N:P_2O_5$ $K_2O$ = 1·2 1.1 0.81. For the U. S., estimates are given for 3 ratio-types, $N.P_2O_5$ $K_2O$ = 1·3.3:1; 1.5.1; 1:3:1 S L. Madorsky

Recent experiments on the preparation of organic manure. Gilbert J. Fowler. *Agr. J India* 25, 363–85(1930).—Fermentation of org matter in the prepn. of artificial

manure is facilitated by chopping the material into small pieces The duration of fermentation is greatly diminished by the preliminary building up of a vigorously fermenting mass of material to serve as "activator," with which smaller quantities of less completely fermented materials are systematically mixed at suitable intervals Insect larvae are practically eliminated by completing the fermentation anaerobically in pits. The necessary fermentation organisms may be obtained from either cow dung, cattle urine or night soil, the latter always producing the most active fermentation I ungi play an important part in the fermentation process, and materials contg a high percentage of lignin cannot be rapidly fermented There is some evidence that N fixation occurs during the process of fermentation Data on the prepn of artificial manure from *prickly pear, leaves, town refuse, mahua flowers, banana waste, leguminous plants* and *shrubs, sunn hemp (Crotalaria juncea), weeds* and *green pea stalks* are tabulated

K D Jacobs

**Fermentation of compost and liquid manure** Franz Schachl. *Kunstdünger u Leim* 27, 301–8(1930).—Excessive fermentation induced by pumping liquid manure over solid stall manure can add nothing to the fertilizer value of the compost, the only advantage is in reduction of vol by evapn, but this is accompanied by loss of N by volatilization as $(NH_4)_2CO_3$ Addn of 18% superphosphate at the rate of 8–12 kg /cu m compost prevents loss by fixing $NH_3$ as nonvolatile phosphate C J S

**Factors that influence nitrogen fixation in soils** Thomas F Manns Del Agr Expt Sta., *Bull* 167, *Ann Repl Director* 44–52(1930).—Twenty years' expts (with a rotation of wheat, mixed hay, corn and soy beans) are reported on N fixation in limed and unlimed plots receiving various fertilizer treatments Conclusions The use of lime, unless accompanied by K, resulted in less N gain in 20 years than shown by the unlimed plots, and lime was not a marked factor in N fixation N losses from percolation in Del probably reach 20% of that removed in the crops. K and P in combination were the most active factors in stimulating N fixation K was the most active single element and the only mineral element that the crops removed in excess of that applied C R Fellers

**The absorption of ammonium and nitrate nitrogen by various plants at different stages of growth.** James A Naftel. *J Am Soc Agron* 23, 142–58(1931).—Ammonium and nitrate N are absorbed by seedlings in appreciable amts throughout all stages $(NH_4)_2SO_4$ and $Ca(NO_3)_2 4H_2O$ were used as sources of the N and similar results were obtained with all 3 plants (cotton, wheat and corn) The ammonium N is absorbed more rapidly in the early stages, after which the reverse is true The best growth and earliest fruiting are obtained when there are both forms of N present The easily sol N of the seed and sap at the time of sprouting is present practically entirely in the ammonium form, and the N in this form is utilized much more rapidly than the nitrate N The absorption of ammonium N increased as the acidity of the culture soln decreased, while the absorption of the nitrate N was very slightly affected The highest total N absorption usually occurred at $p_H$ 6.0 and when both forms of N were present A theoretical discussion of the observed phenomenon is included

J R Adams

**A comparison of various forms of nitrogen fertilizers.** E I Ratner *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 291–300(1930). cf *C A* 24, 1923.—The fertilizer values of $NaNO_3$, $(NH_4)_2SO_4$ $CO(NH_2)_2$ $CaCN_2$ and $NH_4HCO_3$ were tested in pot expts on podsolized sandy loam, loam, degraded chernozem deep chernozem dark chestnut brown, Turkestan loess and red soils (Roterde) with oats as the exptl plant None of the forms of N proved superior under all conditions. In the unsatd soils cyanamide was superior to any form of N On heavy loams $(NH_4)_2SO_4$ showed slightly higher effects It is of interest to note that wherever $(NH_4)_2SO_4$ was not efficient the cyanamide was It might be correlated with the different effects of these 2 forms of N on the reaction of the soil as shown in the tables presented On some of the podsolized soils the tests were repeated, but to one series lime was added The $(NH_4)_2SO_4$ was as good as the other forms of N on the limed soils Cyanamide was superior to the others, even with lime, provided acid phosphate was used as the source of P With pptd phosphate the cyanamide was inferior On freshly limed sandy loams (podsols) cyanamide was inferior, but on podsolized loams it was very efficient Tests were also conducted with various moisture contents, but the results were of no significance J S Joffe

**Effect of fertility on the carbohydrate-nitrogen relation in the soy bean** I A Welton and V H Morris *Plant Physiology* 5, 607–12(1930).—Soy beans grown in sand (3 parts of sand to 1 of Wooster silt loam) contained more dry matter and more total carbohydrates than did those grown in either soil (Wooster silt loam) or manure (3 parts of manure to 1 of Wooster silt loam) In general, the increase was due chiefly

to easily hydrolyzable carbohydrates, cellulose and lignin The increase in carbohydrates in the plants grown in the sand was not accompanied by a simultaneous decrease in N as has been found with certain non legumes (*C A* 14, 1725-6) The high N content of these plants, however, was assocd with the development of relatively large nos of nodules on the roots of the plants The stems of the plants grown in the sand were comparatively tough and rigid and not inclined to lodge WALTER THOMAS

"Kalkammonsalpeter." O NOLTE AND H MÜNZBERG *Mitt deut Landw Ges.* 45, 37(1930) —Comparison is made of the efficiency of "Kalkammonsalpeter," $(NH_4)_2SO_4$ and $NaNO_3$ in field trials In dry seasons $NaNO_3$ was particularly effective, but in wet summers, when leaching losses were considerable, $(NH_4)_2SO_4$ proved the more profitable "Kalkammonsalpeter" is preferable to either of the above for cereals and root crops. B C A

The production of superphosphate from Khibinsk apatite. S I VOLFKOVICH, L P BERLIN AND L B GRINSHPAN *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 300-12 (1930), cf *C A* 25, 763 —Enriched apatite obtained from nepheline apatite rock by fine grinding and sieving or flotation is used on a semifactory scale for the production of acid phosphate The quantity of $H_2SO_4$ to be used was based on the following equation $2Ca_3F_2(PO_4)_2 + 7H_2SO_4 + 17H_2O = 3CaH_4(PO_4)_2 \cdot H_2O + 7CaSO_4 \cdot 2H_2O + 2HF$ It was found that by using 88% of the rock milled to less than 0 1 mm a 40% $P_2O_5$ raw product was converted to acid phosphate of a good phys condition with 18% sol $P_2O_5$ With 83% milled to less than 0 1 mm the raw product contained 38 9% $P_2O_5$ and the final acid phosphate 16 2% $P_2O_5$. When the quantity of particles less than 0 1 mm fell below 28-34% $P_2O_5$ the phys condition of the final product was poor It was found possible to mix the high grade nepheline apatite with the Vyatka raw phosphate low in $P_2O_5$ (24 5% $P_2O_5$), half and half and still obtain a good product J S JOFFE

Fertilization trials with potassium ammonium superphosphate on root crop. DENSCH *Superphosphat* 5, 53(1929) —The efficiency of the N of "Kali-ammon-superphosphat" is similar to that of the simpler nitrogenous materials, and the fertilizer proved suitable for use on acid soils and for acid sensitive plants B C A

Changes in soil reaction produced by ammonium, potash and potash ammonium superphosphate. GERLACH. *Superphosphat* 5, 282(1929), cf *C A* 25, 104 —The increasing acidity of many German soils is more definitely attributable to the normal processes of cropping and leaching than to the use of physiologically acid fertilizers Systematic liming or marling is preferable to the withholding of valuable, if slightly acid, fertilizers B C A

Composition of ammoniated superphosphate. K. D. JACOB *Phosphorus Digest*, pp 5-6(Nov , 1930), *Fertilizer Green Book* 12, No 2, 10-1(1931) —The citrate-insol. $P_2O_5$ formed when superphosphate is treated with relatively large quantities of $NH_3$ is present principally as $Ca_3(PO_4)_2$ The phys and chem properties of $Ca_3(PO_4)_2$ are quite different from those of the P compds present in phosphate rock, which is composed principally of Ca fluophosphate having essentially the same constitution as fluorapatite, $3Ca_3(PO_4)_2 \cdot CaF_2$ Recent expts indicate that $Ca_3(PO_4)_2$ has approx. 75 to 80% of the fertilizer value of mono- and di Ca phosphates during the first growing season, while phosphate rock usually has a much lower value K. D. JACOB

The use of superphosphate on acid soils. H KAPPEN *Superphosphat* 6, 66-8(1930); cf *C A* 24, 4576 —The long-continued use of superphosphate on heavy clay and light sandy acid soils does not have a significant effect upon the $p_H$ values of such soils. When used continuously on limed soils superphosphate tends to further increase the $p_H$ values of the soils Basic slag and Rhenania phosphate have approx. the same value in reducing soil acidity, and it seems that with the quantities ordinarily used in actual practice neither of these materials reduces soil acidity to a significant extent. K. D. JACOB

Soil fertilization for sugar beets. JAMES TYSON AND M M. MCCOOL. Mich. Agr. Expt. Sta., *Special Bull.* 205, 3-31(1930) —Field expts. conducted on 3 of the most important sugar-beet soils in Mich. show the best fertilizer ratios to be 1 4 1 or 1 4 2 From 400 to 600 lb of 4-16-4 or 4-16-8 mixts gave most profitable returns. $NaNO_3$ when applied all at one time to the prepd. soil before sowing the seed was fully as effective as when the same amt. was applied in instalments. C. R. TELLERS

Fertilization and crop quality in root crops. KLEEBERGER. *Superphosphat* 5, 74-6 (1929).—The effect of unbalanced fertilization on the quality of sugar beet and potatoes is examd In this respect nitrogenous fertilizers are of first importance. The use of phosphate fertilizers in amts. based on Neubauer trials may be unsatisfactory, since this method of examn. allows of no consideration of quality. There is no foundation for the opinion that phosphate fertilizers are of minor importance for potatoes B. C. A.

Action of ammonium sulfate and of sodium nitrate on the yield and starch content of potatoes. O Engels *Fortschritte Landw* 5, 97(1930).—$(NH_4)_2SO_4$ produced higher crop increases and starch content of potatoes than did $NaNO_3$. With each *fertilizer there was an economic return* B C A

Sources of nitrogen for potato fertilizers in Aroostook County. B. E Brown, F. V. Owen and E R. Tobey Maine Agr Expt Sta., *Bull* 354, 38 pp (1930).—During 16 years' exptl. work $(NH_4)_2SO_4$ produced a higher av yield than $NaNO_3$, but comparable results depend primarily upon seasonal conditions The most important effects of seasonal variations are (1) leaching of $NaNO_3$ during periods of heavy rainfall and (2) unavailability of $(NH_4)_2SO_4$ during periods of drought, especially on very acid soils Although there is very little difference in the yields of potatoes following the use of inorg sources of N as compared with inorg N supplemented with org N, it is not recommended that the practice of adding some org. N be discontinued, though the amt *may be reduced From 5–6% of $NH_3$ (4–5% N) in the potato fertilizer mixt. gave the* best results on Caribou loam soil type N in potato fertilizers is an absolute necessity for high yields Leunasalpeter, $NH_4NO_3$, $NH_4Cl$, $(NH_4)_2PO_4$, $Ca(NO_3)_2$ and especially urea compared favorably with $(NH_4)_2SO_4$ and $NaNO_3$ as single sources of N Good results were also obtained with $CaCN_2$ when the amt did not exceed 60 lb per ton of mixed fertilizer The degree of acidity and alky of the soil and its ability to hold moisture are important factors in detg the effectiveness of various N materials C R Fellers

Effect of nitrogenous fertilizers on pastures. O Nolte, H Mevzberg and H Koch *Mitt deut Landw Ges* 44, 385(1929).—Results of meat and milk trials on *fertilized pastures are recorded* B C. A

Effect of various fertilizer treatments on the yield and chemical nature of permanent pasture sod in the Piedmont section. J P LaMaster. *Proc Assoc Southern Agr Workers, 31st Ann Convention,* 148-58(1930).—Application of either a complete fertilizer or a N fertilizer alone greatly stimulated pasture growth for a period of 2 to 3 months following the application A second and third application of a N fertilizer during the growing season greatly stimulated growth for a few weeks, the effect rapidly diminishing as the season advanced Potash and phosphate fertilizers alone had very little effect in promoting growth of pasture, and little difference in the rate of growth was noted on the limed and unlimed plots When superphosphate and lime were *applied at the same time, reduced yields of green material and total $P_2O_5$ were obtained.* On the basis of the whole season's growth, no significant differences in the percentages of N in the dry matter resulted from the various fertilizer treatments The Ca content of the grass on all plots was very similar and followed the same trend through the season on all plots, the percentages being highest during the early season and lowest during the latter part of the season. The P content of the grass on all plots was also very similar The percentages of P were high during the early growth period, low during midsummer and high again during the latter part of the growing period K. D J

Fertilizer work with cabbage. L. M Ware Miss. Agr Expt. Sta *Circ* 91, 2–4 (1930).—Two yrs' field expts showed N was the only element which when added alone gave an increase in yield The largest increase and net profit were obtained by the use of 532 lb of $NaNO_3$, 1250 lb of superphosphate and 100 lb of KCl per acre C R Fellers

Effects of certain soil conditions on the yield and quality of Burley tobacco. C A. Mooers Tenn Agr Expt Sta., *Circ* 33, 4 pp (1930).—Tenn tobacco fertilizers show an av content of 2 5% N, 9% $P_2O_5$ and 4% $K_2O$ Applications of from 500 to 1000 lb per acre were more profitable and gave higher yields than light applications of *from 100 to 450 lb per acre The use of manure also gave increased yields and profits* C R Fellers

Long-time fertilizer experiments (with peaches) in northeast Georgia. H M. McKay *Proc Assoc Southern Agr. Workers, 31st Ann Convention,* 318–25(1930).—Over a period of 10 years N-K fertilizers gave the greatest total wt of fruit and the greatest no of fruits per tree Applications of P fertilizers alone gave poorer results than those obtained on the check plots K fertilizers increased the yield of fruit, but to a less extent than N *fertilizers For the period of the expt the increase in the circumference of the trees was 33 to 50% greater when N was used in the fertilizer, and the terminal growth was also greater P hastened the maturity of the fruit while N retarded maturity to a marked extent* K. D Jacob

Cotton fertilizer experiments, 1930. Sources of nitrogen, supplements and time and method of application. G A Hale Ga. Agr. Expt. Sta., *Circ* 91, 4 pp (1930).—Field expts showed that the P in superphosphate or treble superphosphate (43%

$P_2O_5$) was somewhat more efficient than that in $(NH_4)_2HPO_4$ or $NH_4H_2PO_4$. A small amt. of cottonseed meal used with $NaNO_3$ caused the prod. ction of more cotton than the $NaNO_3$ alone. The ordinary complete fertilizers contg. N, P and K were improved by the addn. of small amts. of Mg and Ca. C. R. FELLERS

Chemistry and plant protection. A. CHWALA. *Österr. Chem. Ztg.* 32, No. 6, 45–8 (1930). C. reviews the chem. insecticide and fungicide materials, their classification, application and properties. He criticizes the crude methods used in chem. labs. for detg. the toxic effectiveness of these materials and points out the important influence of phys. factors, such as soly., dispersion, size of particles, surface tension, resistance to weather, wettability, etc., on the toxicity. S. L. MADORSKY

Ability of dry fungicides to adhere to seeds. A. SIMSKI. *Landwirtsch. Versuchs.* (*Fertilizers and Crops*) 2, 208–12 (1930). Into glass-stoppered jars of 100 cc. capacity 200 g. of grain is introduced and placed in cups of a revolving drum. The fungicide is added and the drum kept at a definite speed for different time periods. The seeds are taken out, passed over a 100-mesh sieve (100 openings per square cm.) and washed, and the amount of dusting material absorbed is detd. Wheat, oats and barley were used. Ca arsenate, Paris green, $CuCO_3$ and $CuSO_4$ dusts were washed with a weak soln. of HCl. It was found that $CuCO_3$ and anhyd. $CuSO_4$ adhere best to wheat and Ca arsenate to oats. The longer the seeds are mixed with the dusts the more is absorbed. J. S. JOFFE

Review of research on the control of wireworms. C. A. THOMAS. Penn. Agr. Expt. Sta., *Tech. Bull.* 259, 2–32 (1930). One of the most effective baits consists of 6 lb. of $Ca(CN)_2$ per 1000 ft. of crop row. The rows should previously be liberally baited with wheat, oats or corn so as to attract the wireworms. The use of $CS_2$ emulsions on limited areas as in greenhouses or gardens is also fairly effective. There are 12 pp. of bibliography, many of the references being briefly reviewed in the text. C. R. FELLERS

Possibility of a new insecticide for use on citrus. L. B. RIPLEY AND G. A. HERBURN. *Farming in S. Africa* 5, 240, 241 (1930). cf. *C. A.* 24, 3581.—$NaSiF_6$ has for the Natal fruit fly a killing power 16 times that of Pb arsenate. Preliminary expts. with strengths needed to kill the fly caused no damage to citrus foliage, but it is known that considerably higher concns. are capable of severe foliage burning, and the limit of concn. for safe spraying has not yet been detd. K. D. JACOB

The influence of antiseptics on the supply of nutrients in the soil. G. A. CHIGAREV AND N. B. MYAKINA. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 312–7 (1930).—By using $CS_2$ or polychlorides (a mixt. of chlorinated hydrocarbons of the benzene series, b. 130–200°, consisting primarily of the isomers of dichlorobenzene with some mono- and polychloro derivs.) as soil disinfectants it was found that the nitrates are inhibited to a great extent by the $CS_2$ but are stimulated by the polychlorides. $NH_3$ is stimulated by both disinfectants. Very little effect was noted on the P regime in the soil. J. S. JOFFE

Mango hoppers and mildew and their control. P. V. WAGLE. *Poona Agr. Coll. Mag.* 21, 170–5 (1929).—Mildew on mangoes is effectively controlled by dusting with S alone or with a mixt. of 6 parts of S and 1 part of $Ca(CN)_2$. S checks the activities of the mango hopper, but better control is obtained by dusting with the S-cyanide mixt. K. D. JACOB

The economics of pyrethrum. JOHN GLASSFORD. *J. Econ. Entomol.* 23, 874–7 (1930).—Japan now produces ⅘ of the world's pyrethrum flowers. Imports into the U. S. increased from 3 million lb. in 1923 to 9 million lb. in 1929. Av. consular invoice values decreased from 47c per lb. in 1923 to 18c per lb. in 1929. A pyrethrum spray contg. 0.04% of pyrethrum oleoresin and activated with soap costs 2.2c per gallon compared with 0.3c for a 1% lubricating oil spray, 1.2c for a Pb arsenate spray, 1.75c for a lime-sulfur spray and 1.84c for a nicotine spray contg. 0.04% alkaloid. C. H. RICHARDSON

Experiments with insecticides against cattle grubs (Hypoderma spp.). F. C. BISHOPP, E. W. LAAKE, R. W. WELLS AND H. S. PETERS. *J. Econ. Entomol.* 23, 850–63 (1930).—Single and repeated applications of various insecticides were made against cattle grubs in the backs of cattle. Special attention was given to insecticides in dust form. Ground derris root and dust carriers contg. derris ext. gave excellent results under varying conditions. Tobacco powder and dust contg. free nicotine and nicotine silicate also gave a high degree of control. C. H. RICHARDSON

A comparison of the toxicities of *p*-dichlorobenzene and naphthalene to the confused flour beetle (Tribolium confusum Duv.) (Coleoptera). RUSSELL S. LEHMAN. *J. Econ. Entomol.*, 23, 956–60 (1930).—Adults of *T. confusum* were exposed to a series

of comens of *p*-dichlorobenzene and naphthalene at 30° and 60–65% relative humidity. Air satd with *p*-dichlorobenzene is strongly anesthetic to this insect. Based upon the time required to kill 50% of the insects, naphthalene was 10–14 times more toxic than *p*-dichlorobenzene at the same concn. C H RICHARDSON

**Arsenical sometimes injures peach trees.** W. C. DUTTON. Mich. Agr. Expt. Sta., *Quart. Bull.* 13, 55–6(1930).—Pb arsenate used alone or in combination with other materials in the form of a spray or dust during the growing season may cause severe injury to leaves, wood and bark, often resulting in defoliation. Light applications and dil. concns. of sprays and dusts, as well as mixing of the Pb arsenate with lime, are recommended as precautionary measures. C. R. FELLERS

**A new fungicide for the control of both peach and apple diseases.** L. A. NIVEN. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 308–10(1930).—With the exception of bitter rot, CaS sprays gave better control of peach and apple diseases than lime-S and Bordeaux sprays, and did not burn the fruit or foliage even under adverse weather conditions. K. D. JACOB

**Influence of Bordeaux mixture on transpiration.** W. H. MARTIN AND E. S. CLARK. New Jersey Agr. Expt. Sta., *Fiftieth Ann. Report* 249–55(1929), *Rev. Applied Mycol.* 10, 46.—An increase in transpiration rates in potatoes was noted after application of 5-5-50 Bordeaux mixture. Increased water loss occurred during the night following spraying of potatoes with Bordeaux mixture in soils previously adjusted to 15, 30 and 50% water content. The loss was particularly noticeable in the soils of high water content. Increased losses were observed in the 50 and 30 but not in the 15% moisture series during the day. O. C. SHEPPARD

**Bunt of wheat in western Canada.** W. F. HANNA AND W. POPP. *Sci. Agr.* 11, 201–7(1930).—The $CH_2O$ treatment of seed even when badly infested with the *Tilletia* spores gives satisfactory control of this disease. One lb. of com. $CH_2O$ is used per bu. of seed. $CuSO_4$ and $CuCO_3$ are effective only when the seed is but slightly contaminated with spores. C. R. FELLERS

**Sulfur dusting for the prevention of a bacterial disease of wheat called black chaff.** T. J. GREANEY. *Sci. Agr.* 11, 274–80(1931), cf. *C. A.* 24, 5925.—The black chaff disease caused by *B. translucens* was largely prevented or controlled by frequent applications of S dust. The quality of the grain was also improved. C. R. FELLERS

**The influence of sulfur dusting on rubber production.** C. C. AMENT. *De Bergcultures* 4, 823–5(1930), *Rev. Applied Mycol.* 10, 55.—Dusting with S against mildew (*Oidium heveae*) on 2 out of 4 Hevea rubber estates in the Malang district of Java resulted in an increased yield of 22 and 14% over periods of 11 and 12 months, resp. The less productive parts of the estates were selected as controls in the expts., so the results should be accepted with reservations. ODEN T. SHEPPARD

**Sulfuring citrus trees.** W. A. ROLFE. *J. Dept. Agr. Victoria* 28, 732–3(1930).—Dusting citrus trees with powd. S at the rate of approx. 2 lb. per tree did not consistently increase the yield of fruit. K. D. JACOB

**Defoliation of gooseberries by sulfur-containing sprays.** HUBERT MARTIN. *J. South Eastern Agr. Coll., Wye, Kent* No. 27, 182–5(1930).—The Leveller variety of gooseberry is susceptible to defoliation when sprayed with either 1 in 60 lime-S, 3% dry mix S-lime or 0.4% colloidal S contg. 0.5% of soft soap. Addn. of $Al_2(SO_4)_3$ to the lime-S did not diminish the amt. of leaf fall. The expts. indicated that defoliation is caused by the action of elemental S and is not due to the presence of sol. sulfides. K. D. JACOB

**Nicotine in paint for woolly aphis control.** LEROY CHILDS. *J. Econ. Entomol.* 23, 883(1930).—The woolly aphis attacks the callus tissue of pruning wounds, predisposing it to perennial canker infection. It was found that nicotine sulfate added to tanglefoot and tree paint which are applied to the wounds acted as a repellent to the aphids and as a contact poison to the young aphids when they attempted to establish themselves on the callus tissue. C. H. RICHARDSON

**Neonicotine and certain other derivatives of the bipyridyls as insecticides.** C. R. SMITH, C. H. RICHARDSON AND H. H. SHEPHARD. *J. Econ. Entomol.* 23, 863–7(1930).—Twenty-five bipyridyl derivs. and related compds. not previously reported have been prepd. and examd. as contact insecticides. These include a no. of isomeric bipyridyls, bipiperidyls and pyridyl piperidines. Neonicotine (β-pyridyl α-piperidine) was the most toxic of these compds., comparing closely with nicotine, to which it is chemically similar. α-Pyridyl β-piperidine stands next in toxicity to neonicotine of the compds. investigated. In general, the compds. with the α,β and β,α groupings lead in toxicity over compds. with rings located in other positions. C. H. RICHARDSON

**Results of airplane dusting in the control of cotton boll worm (Heliothis obsoleta**

Fab.). FRANKLIN SHERMAN *J Econ Entomol* 23, 810–3(1930).—Large-scale airplane dusting operations with Ca arsenate in Texas showed that the cotton boll weevil might be controlled by the use of 5–6 lbs Ca arsenate per acre Cotton boll worms, however, were not controlled by this treatment, but increased in the dusted area during the season. Cotton boll worm damage was greater in treated than in untreated areas C H R.

**Laboratory tests of miscellaneous chemicals against the codling moth.** L. C. MCALLISTER AND E R VAN LEEUWEN *J Econ Entomol* 23, 907–22(1930).—This is a study of the toxicity of a large no of compds to the newly hatched larvae of the codling moth (*Carpocapsa pomonella*) Although no compd superior in practice to Pb arsenate was found, about 50 were sufficiently toxic to be selected for further trial Among these acetoacetanilide *diazoaminobenzene*, *dibromonaphthalene*, 2,4-dinitrophenol, 3,5-dinitro-*o*-cresol, nitronaphthylamine, veratrine and nicotine were highly toxic to the larvae C H RICHARDSON

**Further results with trap baits for capturing the codling moth.** M A YOTHERS. *J. Econ Entomol* 23, 923–9(1930), cf *C A* 24, 4351.—Tests with trap baits to capture adults of *Carpocapsa pomonella* were made in a heavily infested apple orchard The most promising baits were malt sirup, cane molasses, beet molasses, brown sugar and geraniol Variations in temp affected the no of moths captured more than did variations in dilu of the bait Geraniol increased the attractiveness of brown sugar and beet molasses baits The capture of moths per trap increased with the no of trees available from which to attract them, but not in direct ratio C H RICHARDSON

**Control of weeds by sodium and calcium chlorates.** J W DEEM *New Zealand J. Agr* 41, 1–3(1930).—$NaClO_3$ seems to give better control of weeds than $Ca(ClO_3)_2$, and it is cheaper and easier to handle. $Ca(ClO_3)_2$ readily absorbs moisture from the atm., but its fire risk is less than that of $NaClO_3$ Most soft weeds are killed by one application of either of these materials, while the harder weeds such as California thistle, blackberry, etc., are greatly weakened K D JACOB

**Eradicating perennial weeds with chlorates.** A C ARNY, R O BRIDGFORD AND R. S. DUNHAM Univ Minn., Agr Expt. Div., *Circ* 32, 4 pp (1930), cf *C A*. 24, 2538 C R FELLERS

**Rotenone as a contact insecticide.** W M DAVIDSON *J Econ Entomol* 23, 868–74(1930).—Rotenone, the most toxic ingredient in *Derris* and some other plants, was tested in aq suspension and in dust form (mixed with diatomaceous earth) against a no. of species of insects The aq suspensions were highly toxic to aphids, thrips, white fly larvae, leaf-hoppers, larvae of beetles, tent caterpillars, etc. Adult beetles, squash bugs, red spiders and mealy bugs were more resistant The dusts were effective against chicken lice, roaches and cabbage worms, but the results obtained against soft-bodied sucking insects were not so good C H RICHARDSON

**The relative value as contact insecticides of some constituents of Derris.** W. M. DAVIDSON. *J Econ Entomol* 23, 877–9(1930).—Aq suspensions of the 4 principal toxic constituents of *Derris* root, *i. e.*, rotenone, deguelin, tephrosin and toxicarol, were tested as contact insecticides against aphids, thrips, white fly larvae and red spider mites. Their relative toxic values to *Aphis rumicis* stand with rotenone first in the approx. ratio of 400 40 10 1 Rotenone and deguelin are more toxic than nicotine to *A rumicis* This study indicates that the toxicity of *Derris* prepns. is due very largely to their rotenone content C H RICHARDSON

**Petroleum insecticides.** C. W. WOODWORTH *J. Econ Entomol* 23, 848–51 (1930).—Kerosene emulsion has now been largely replaced by emulsions of the heavier petroleum oils Heavy oils are selective in toxicity, systemic in their poisonous effects and are absorbed through the tracheae Among the more than 100 com brands of heavy oils now on the market, control labs generally distinguish the following types: (1) *miscible oils* made with a cresol soap, (2) *soap emulsions* made with ordinary soaps; (3) the *nonsoap emulsions* commonly emulsified with alk caseinate. Three types of oil are distinguished. (1) *the kerosenes*, about 40° Bé., constituting about 2% of the trade; (2) *summer oils* about 30° Bé., (3) *crude* and *winter oils*, about 20° Bé The crude oils consist of a mixt. of oils varying widely in sp. gr. The winter oils are distillates from which the lighter and heavier fractions have been removed; some of them approach the summer oils in sp gr and refinement. Manufacturers often classify summer oils as heavy, medium and light, terms which are misnomers, as oils called heavy and light may have precisely the same sp gr. The terms *thick* and *thin* are proposed for heavy and light. The following specifications for oils are given (the values denote, resp., sp. gr in degrees Bé., Saybolt viscosity, percentage unsulfonatable residue, percentage distd. at 350° and 325°F. and, except in the first case, the percentage evapd after 2 and 24 hrs.). *winter oil*, 22° 110 sec., 68, 40, 15%; *thick oil*, 29° 110 sec., 97, 30, 10, 20,

55%, *medium oil*, 30° 80 sec., 95, 50, 20, 30, 65%, *thin oil*, 30° 60 sec., 93, 75, 25, 40, 85% It is conceivable that these phys characteristics have no real significance in detg the oils' efficiency as insecticides The asphalt base oils of California, which vary considerably in phys characteristics, exhibit remarkable insecticidal efficiency A tentative classification of the effect of oils on plants is outlined Two new terms are proposed *biolyte*, a general term for insecticides, fungicides etc., and *biolysis*, the killing of pests *Biolytology* is the science of economic poisons C H RICHARDSON

**Some physical properties of certain dormant oil emulsion-sulfur combinations.** M D FARRAR AND M A SMITH *J Econ Entomol* 23, 979-85(1930).—A petroleum oil emulsion for use in a dormant tree spray is described This emulsion mixes readily with flotation S to give an effective combination spray for San José scale (*Aspidiotus perniciosus*) and peach leaf curl The emulsion contains a vegetable gum emulsifier When the emulsion and the S are mixed directly, the phys properties are superior to the mixt in which excessive water is added at time of mixing Oils emulsified with a gum in combination with S were superior physically to those emulsions with K fish oil soap, K caseinate and petroleum soaps Size of the S particles is a minor factor in these mixts Flotation S contains small quantities of electrolytes which exert an important influence upon the oil emulsion mixt The most desirable phys properties of the mixt were obtained when 4-6 lb of flotation S was mixed with 1½ gals of the oil gum emulsion and diluted to 50 gals of water C H RICHARDSON

**A note on the relation between insecticidal action and the physical properties of soap solutions.** P A VAN DER MEULEN *J Econ Entomol* 23, 1011-2(1930).—This study is an effort to correlate certain phys properties of soaps with their toxicity to insects The adult Japanese beetle (*Popillia japonica*) was used as the test insect As wetting and penetration are greatly influenced by the surface tension of the soln., this property was detd with a Du Nouy surface tension app Surface tension was found to be very low and in all cases no definite relation existed between the surface tension of the soln and its toxicity The extent of penetration of a soap soln into the spiracles and tracheae of the beetle was not correlated with its toxicity There was also no correlation between the viscosity of a soln and its toxicity When the soaps were allowed to evap in the air on a glass surface, the surface became covered in most cases with a film of soap which differed greatly in strength with the different soaps With the K soap made from palm oil, which was of relatively high toxicity, a very tough film remained upon the glass The results show a relation between the toxicity to the insect and the tenacity of a film left after evapn Soaps which form the toughest and most adherent films are most highly toxic, those which form less tenacious and weaker films are less toxic, while those which leave no film at all do not kill the insects C H RICHARDSON

**Densities of mixtures of air and various fumigants.** R C ROARK AND O A NELSON *J Econ Entomol* 23, 985-7(1930).—The suitability of a compd for use as a gaseous insecticide depends upon its toxicity, its vapor pressure and its vapor density. The vapor densities (in mass of 1000 cu ft of satd mixt of air and gas at 760 mm Hg and 25°) and sp gr (air = 1) at 760 mm and 25° of 29 compds., which have been used as fumigants for insects, are given in tabular form Formulas for computing vapor density are also given C. H RICHARDSON

**The calibration of flow meters for the measurement of insecticide gases** LYMAN C CRAIG AND C H RICHARDSON *J Econ Entomol* 23, 988-91(1930).—The calibration of resistance-tube flow meters for both large and small flows of air is described and the app is illustrated C H RICHARDSON

**An additional statement concerning the tank-mixture method of using oil spray.** RALPH H SMITH *J Econ Entomol* 23, 1009-11(1930).—Criticism of S's previous paper (*C A* 24, 3594) has occasioned these remarks The tank mixt method probably has an important place in the spraying of citrus trees in S Calif whether it will be applicable to the spraying of deciduous fruit trees remains to be proved Mech mixts of oil and water were used prior to 1910, but modern spray equipment and recent knowledge concerning the functioning of oil sprays indicate that a return to the original method is justified The tank mixt method is based upon the use of an oil of given specification as to viscosity, distn range and sulfonation Insecticidal efficiency and injurious effect upon the plant depend entirely upon the amt of oil deposited during spraying The amt deposited can be governed by placing the emulsifying material directly in the water in the spray tank, adding the oil and maintaining a uniform mixt by means of agitators The stability of the emulsion and size of oil globules, factors which heretofore have been the focus of oil-spray investigators become relatively negligible The dependability of the tank mixt hinges upon the proper agitation

and proper kind of emulsifier. The term 'emulsifier' loses its significance when used in connection with the tank mixt. method because an emulsion in the ordinary sense is not produced. The term 'spreader' is perhaps more suitable. An investigation of spreaders for tank mixt. sprays has shown that powd. blood albumin is one of the most promising substances for this purpose. C. H. Richardson

**The efficiency of the air-blast type of sprayer for applying insecticides.** Oliver I. Snapp and James R. Thomson. *J. Econ. Entom.* 23, 861–5(1930).—The relative efficiency of com. air blast sprayers and power sprayer outfits in applying lubricating oil emulsions and lime sulfur soln. to deciduous fruit trees infested with San José scale (*Aspidiotus perniciosus*) was studied. No significant difference was found in the percent control with lubricating oil emulsion applied with the 2 types of sprayers. With lime sulfur soln. the power sprayer gave greater efficiency than the air blast type. C. H. Richardson

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Weathering of shell limestone and soil formation near Jena (Hoffr) 8. Decolorizing reducing fertilizer from sewage, etc. (Brit. pat. 335,182) 14. $SeS_2$ [fungicide or insecticide] (Fr. pat. 692,738) 18.

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**Ergebnisse der Agrikulturchemie, Band II, 1930.** Edited by F. Honcamp. Berlin: Verlag Chemie, G. m. b. H. 196 pp. M. 13; bound M. 14.

Gentner, J. **Die Chemie und das Praktikum für den Landwirt. Leitfaden für den Unterricht.** Würzburg: Bonitas Bauer. 135 pp. Linen, M. 3.80.

**Mededeelingen van de Landbouwhoogeschool te Wageningen. Dl. 34. Verhandeling. 7. I. Vergleichende mikroskopische, physikalische und chemische Untersuchungen von einem Kalkstein- und einem Löss-Bodenprofil aus den Niederlanden. II. Vergleichendes Studium von einem Kalksteinbodenprofil aus Java.** By A. van Wijchel, L. Mösler and C. van Aggelen. Edited by J. van Baren. Wageningen: H. Veenman & Zonen. 103 pp. Fl. 4.

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**Fertilizers.** I. G. Farbenind. A.-G. Brit. 335,175, June 15, 1929. Various granular fertilizers are prevented from caking by coating the granules with mineral oil or other oil insol. in water and non-volatile or but lightly volatile. Materials which may be thus treated include urea, KCl and $NH_4NO_3$ or their mixts. with $NH_4$ phosphate, $NH_4$ sulfate nitrate, mixts. of $NH_4NO_3$ with $CaCO_3$ and other mixed fertilizers contg. $NH_4$, K or Na nitrates.

**Fertilizers.** Louis Longchambon. Fr. 693,306, July 10, 1929. The fertilizing value of phosphorous slags is increased and the grinding thereof is facilitated by dropping the molten slag into water.

**Fertilizers.** Gesellsch. Lothringen. Fr. 693,528, April 8, 1930. A fertilizing, stimulating and parasiticidal mixt. to be applied to parts of plants above the ground is composed of Fe 25, Cu 5, Mn($MnO_2$) 2, K($K_2O$) 1, Mg(MgO) 3, Ca(CaO) 28, P($P_2O_5$) 1, S 8 and inert substances and water 27%.

**Fertilizers.** Soc. d'Études pour la Fabrication et l'Emploi des Engrais chimiques (Georges Chaudron and Henri Herlemont, inventors). Fr. 693,319, July 12, 1929. Natural phosphates are made soluble by treatment with HCl or $HNO_3$ and sepd. from $CaCl_2$ and $Ca(NO_3)_2$ by conversion into insol. compds., such as phosphates of Cu, Sn or Fe. The insol. compds. are afterward converted into sol. phosphates for use as fertilizers. Cf. *C. A.* 24, 3077.

**Fertilizer.** A. B. Lamb. Brit. 335,400, June 27, 1929. See Fr. 678,693 (*C. A.* 24, 3500).

**Fertilizer.** Edward W. Harvey (to The Barrett Co.). Can. 308,507, Feb. 10, 1931. A fertilizer is produced by treatment of $Ca(H_2PO_4)_2$ with atomized $NH_4OH$ soln.

**Fertilizers.** J. Van der Plaats. Belg. 371,208, July 31, 1930. Raw manganiferous Ca phosphates are roasted in an oxidizing atm. Cf. *C. A.* 24, 4888.

**Basic phosphate slags.** Eisen- und Stahlwerk Hoesch A.-G. and Friedrich Heinrich. Fr. 692,519, Mar. 21, 1930. A compost of basic phosphates is made (1) by decanting Thomas flour or other basic phosphate slags in water, adding an acid or acid salts, and evapg., (2) by wet grinding in the presence of acids or acid salt solns., (3) by disaggregation with acids under high pressure or (4) by the action of finely pulverized acids or acid salt solns. on the slags. Fr. 692,511 describes the selective elimination of CaO from basic slags by treatment with acids or acid salt solns. so as to leave unmodified the constituent called silicocarnotite which is the solv. vehicle in citric acid.

*Spray oils.* WALLACE J. YATES (*to Shell Development Co.*) Can 308,745, Feb. 17, 1931 A spraying liquid for insecticidal purposes consists of an emulsion in water of a petroleum spray oil, to which not over 1% of S has been added. Cf. *C. A.* 24, 5928

*Insecticide.* STANDARD OIL DEVELOPMENT CO. *Fr. 692,568* May 2, 1930 An insecticide is composed of a naphtha or petroleum distillate having a b. p. above 205°, preferably between 205° and 280°, to which may be added exts. of pyrethrum, etc. Cf. *C. A.* 25, 1325.

*Insecticide and fumigant containing ethylene oxide.* RUBIC C. ROARK and RICHARD T. COTTON (*to the Government and People of the U. S. A.*) U. S. 1,791,429, Feb. 3 A compn. suitable for fumigating foods, etc., comprises ethylene oxide as essential active agent.

*Fungicide and bactericide.* JOHN W. ROBERTS. U. S. 1,791,430, Feb. 3. A compn. suitable for combating fungi causing peach scab, etc., comprises a mixt. formed from $ZnSO_4$ 4 lbs., lime 3–4 lbs. and water 50 gals. Casein or alum may be added

*Fungicides for seeds.* I. G. FARBENIND. A.-G. (Wilhelm Schepss, Wilhelm Bonrath and Carl Taube, inventors) Ger. 515,075, Sept. 23, 1927 Compds. in which Hg is linked to an aromatic hydrocarbon radical are used alone or with other fungicides, wetting agents or diluents Among the compds. specified are PhHgOAc and $C_{10}H_7HgCl$. Cf. *C. A.* 24, 2539

*Fungicides for seeds.* WILLI LENZ. Ger. 515,098, June 7, 1925 Water-insol. Cu compds. are mixed with alkali carbonates or bicarbonates and with hygroscopic compds. Adhesives, diluents, etc., may be included, but water-sol. fungicides should not be present. A suitable compn. contains $Cu(OH)_2$ 170, $CaCl_2$ 30, $NaHCO_3$ 50 and talc 50 parts.

*Immunizing plants.* SOC. D'ÉTUDES SCIENTIFIQUES. *Fr. 693,723, July 18, 1929* Plants are immunized against the action of bacteria by the use of vaccines or artificial enzymes. Vegetable serums may be made by vaccinating plants and extg. and may be used in human and veterinary therapeutics

*Immunizing seed grain and preserving wood, glue, etc., from decay.* I. G. FARBENIND. A. G. Brit. 335,527, May 24, 1929 Fungicidal org. Hg compds. are used such as methoxyethylmercuric chloride or acetate, ethoxyethylmercuric chloride, methoxypropylmercuric acetate, phenoxyethylmercuric chloride, benzyloxyethylmercuric chloride, methoxyethylmercuric oxalate and methoxyethylmercuric hydroxide (details for the prepn. of some of which are given) and these compds. may be mixed with dry pulverulent diluents or with liquid vehicles Cf. *C. A.* 24, 2828

Mordants for seeds and for preserving and disinfecting grains, etc. I. G. FARBENIND. A. G. *Fr. 693,415, Apr. 5, 1930* Use is made of Hg compds. of the formula A (A) XHgCRRCRROR′, (B) XHgCRRCRR–, in which X is a hydroxyl or any group forming with Hg a salt or a complex salt (acetate, lactate, oxalate, sulfate, chloride, thiocyanate, etc.) R is H, alkyl, aralkyl or aryl and may be the same or different in each position, and R′ is an alkyl, aryl or the group B

Herbicides. I. G. FARBENIND. A.-G. Fr. 692,996, May 28, 1930 Weeds, etc., are destroyed by solns. of salts such as chlorates to which are added a soln. of a wetting agent such as an aromatic sulfonic acid, the amt. of wetting agent added being small relative to the amt. of herbicide

Weed killer. CHEM. FAB. LUDWIG MEYER. Ger. 515,414, Feb. 6, 1929 Addn. to 441,213 and 478,446 (*C. A.* 23, 4295) Solns. of heavy metal nitrates contg. free NO are used. Thus, 0.1–0.5% of NO in the form of $HNO_2$ or fuming $HNO_3$ may be added to a 1.5–7% soln. of $Cu(NO_3)_2$

Destroying beet worms. CHEM. FAB. VON HEYDEN A.-G. (Walther Baunacke, inventor) Ger. 515,346 and 515,347, July 10, 1928 Formic acid is used, *e. g.*, by applying to the soil a mixt. of HCOONa 1 and $KHSO_4$ 2 parts (515,346) Picric acid may also be used and may be applied to the soil mixed with diluents, fertilizers, etc., or liberated in the soil by using mixts. of picrates with acid compds. (515,347).

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

How much alcohol is produced by yeast? II. Checking of alcohol production. STAIGER AND GLAUBITZ. *Brennerei-Ztg.* 47, 127(1930); cf. *C. A.* 24, 4890.—Alc. was added to the original mash in various amts. (6, 8, 10 and 14%) and sugar was then added (75, 50, 25 and 0 g.) The alc. produced after 21 days was detd. The results were

10 6, 8 2, 6 0 and 2 2%, showing the the alc.-producing ability of the yeast is checked when a certain concn is attained III. *Ibid* 116–7.—Various amts. (25, 30, 35 and 40 g.) of distillery, beer and wine yeast were used as seed. The results showed that the alc. production did not increase in spite of the increasing amts of seed yeast, although the fermentation was completed sooner. S. Jozsa

Alcohol yields from corn and durra and from damaged raw material. Staigr. *Brennerei-Ztg* 47, 114–5(1930). Ten corn samples, 2 durra samples and 12 miscellaneous grain samples were analyzed and the results of yield of alc. are given. S. J.

The balance in the fourth form of fermentation in the cell-free yeast fermentation. Maria Kohl and Max Schpuler. *Biochem. Z.* 229, 238–47(1930).—In expts. in which dild. yeast maceration juice acted upon hexosediphosphate pyruvic acid was isolated which was equiv. to 70% of the carbohydrate used and actually 100% of the sugar transformed. S. Morgulis

Further studies on the formation of methylglyoxal and pyruvic acid by yeast under the influence of various plasmolytic substances. Carl Neuberg and Maria Kobel. *Biochem. Z.* 229, 255–62(1930). *cf. C. A.* 25, 123.—The formation of $CH_3.CO.CHO$ from hexosediphosphate can be easily demonstrated in the presence of various plasmolytic agents (toluene, bromobenzene, various alcs., $CHCl_3$, $CCl_4$ and urethan) or of a high concn. of the diphosphate itself. The accumulation of $CH_3.CO.CO_2H$ can also be brought about by these means. S. Morgulis

Decomposition of non-phosphorated sugar by yeast with the formation of glycerol and pyruvic acid. Carl Neuberg and Maria Kobel. *Biochem. Z.* 229, 410–51 (1930).—The fermentation of the Mg salt of fructose diphosphate as substrate, yields 100% of the theoretical amt. of glycerol and pyruvic acid. Both these substances are recovered, though in smaller quantities, even when a 10% glucose soln. contg. 0.125–0.75% $Mg_2(PO_4)_2$ is fermented by fresh press yeast. The $Mg_2(PO_4)_2$ can be replaced by $Na_2HPO_4$. However, since MgO acts just as well, the presence of the phosphate ion is not essential, nor is the Mg ion indispensible because the Mg salt can be replaced by $Na_2HPO_4$. The glycerol and pyruvic acid appear in equiv. amts. under conditions where no cell multiplication takes place (yeast juice or suspension preserved with antiseptics), but the equivalence disappears when one works with living yeast cells. Cf. *C. A.* 24, 1398, 3078. S. Morgulis

Formation and identification of acids produced by different strains of propionic acid bacteria. P. W. Wilson, E. B. Fred and W. H. Peterson. *Biochem. Z.* 229, 271–80(1930).—Eleven strains of propionic acid bacteria were examd. from the standpoint of their ability to ferment glucose, lactose and maltose, from which volatile acids were produced. In pure cultures sugar was used up only partially but in the presence of *L. casei* all the sugar was used up and 25–75% converted to volatile acids. The most active strains were employed in the fermentation of meal from malted corn, molasses or hydrolyzed starch, only the latter 2 being quickly fermented. The activity of the different strains varied, of course, but those fermenting pure sugar most effectively did so also with the natural sources of sugar. Yeast water or the residue in the distn. of acetone BuOH fermentation served well as the N sources. Acetic and propionic acids were isolated and identified as the volatile products, the latter constituting 65–70% of the total. S. Morgulis

Studies on slops. Staigr. *Brennerei-Ztg* 47, 142(1930).—The moisture, acidity and alc. content were detd. on 9 different samples of residual liquid from distn. of alc. liquors. The protein, fat, crude fiber, N-free ext. and ash were detd. on 3 rye slops. S. Jozsa

Slop and its significance in agriculture. K. G. Schulz. *Brennerei-Ztg.* 47, 162 (1930). S. Jozsa

Removing wood taste from wine brandies. C. Luckow. *Brennerei-Ztg* 47, 138 (1930).—Two samples of wine distillate were stored in wooden barrels and had a strong oak-wood taste. By using 10 g. gelatin per 100 l. distillate, or 1% skim milk, the undesirable taste was practically removed. S. Jozsa

Formic acid, a constituent of the volatile acids of wine, and its determination. W. Seifert and Marie Ulbrich. Expt. Sta. Klosterneuburg, *Denkschrift*, 70th anniversary, 148–63(1930). cf. Kreps, *C. A.* 5, 1305; Fincke, *C. A.* 5, 1300, 3705; 6, 1787; 7, 2258.—The method of F. for detg. HCOOH is very exact, but laborious; the $KMnO_4$ method of Lieben (1803) was here adopted, and the results of the examn. of 24 samples of Austrian and Hungarian wines are tabulated. Conclusions. (1) The content of free HCOOH varies from 0.023 to 0.080 g. per l.; the quantity bound as ester is greater or smaller; no regularity is apparent. (2) The ratio of free HCOOH to volatile acids shows very wide limits: 3.4–21.6% in grape wines; 5.2–9.5% in raisin wines; and 7.1–

10 5% in fermented fruit juices (3) The highest content of HCOOH is found in 1 of 2 Tokay wines examd. 0 089 g free, 0 214 g total per l K records for Tokay wines 0 173–0 517 g total HCOOH per l These wines are usually left on the lees for about 1 year, then are stored in incompletely filled barrels in order that the characteristic "bread" taste may form Yeast activity is thus renewed and volatile acids are formed In the decompn. of leucine of yeast, HCOOH is split off (P. Ehrlich, 1905) (4) Two raisin wines prepd by S and U contained only 0 108 and 0 091 g per l of total HCOOH, probably because 4 g tartaric acid per l had been added to exclude secondary fermentations Khoudabachian (1883) found in a raisin wine 0 94 g AcOH and 0.28 g HCOOH per l., probably caused by the presence of bacteria. (5) The undild juices of currants and raspberries fermented with pure yeast contained when examd fresh only 0 052 and 0 062 g total HCOOH, whereas K had observed in stored raspberry wine 0.323–0 542 g per l. The cause of this difference will be further studied Fruit juices apparently keep best when they are fermented with pure yeast, withdrawn from the sediment early and filtered. S Waldbott

*Determination of glycerol in wines and fermented beverages.* Lucien Semichon and Michel Flanzy *Ann fals* 23, 583–602(1930); cf *C A*. 24, 2231.—S and F recommend the following technic, which is a modification of that of Ferré and Bourges (*C A* 22, 4713) Place 20 cc of wine in a 100-cc. volumetric flask, make up to 100 cc with neutral 95% alc., add to 5 g BaO and triturate in a mortar for 2–3 min., return to the volumetric flask, let stand 30 min and filter (preferably through a Gooch crucible) Pass $CO_2$ for 2 min. through a 50-cc. aliquot in a 100-cc. Erlenmeyer flask, evap to about 10 cc., add 20 cc. water, evap to 15–20 cc., let cool, make up to 50 cc and filter Steam-distil 25 cc. (=5 cc. of original sample) under a partial vacuum of 30–40 cm of Hg, absorbing the distillate in a mixt of 10 cc $CrO_3$ (63 g per l) and 20 cc of 60° Be $H_2SO_4$. Immerse the tube contg the sample to be distd in a vaseline-oil bath heated to 115–20°, which also contains a coil for superheating the steam used for the distn., place the absorbing soln. in a 500-cc. Durand washing flask immersed in a boiling water bath After distg for 3 hrs., titrate the excess $CrO_3$ with $Fe(NH_4)_2(SO_4)_2$ soln (149 13 g per l), using $K_4Fe(CN)_6$ as outside indicator, 69 mg glycerol is completely oxidized by 350 mg $CrO_3$. Details are given of the investigation of the method, and data are furnished justifying the various steps of the technic. A. Papineau Couture

*Experiments toward determination of sorbitol according to Werder and Zach.* Rudolf Haid and Franz Popperger Expt. Sta. Klosterneuburg, *Denkschrift*, 70th anniversary, 90–3(1930), cf Werder, Zach and others, *C A* 23, 928, 4296, 24, 5105.—Heretofore, not much less than a 10% admixt. of fruit wine to grape wine could be detected by isolating dibenzalsorbitol (*A*) A 3% addn contg 7.5–39 mg sorbitol per 100 cc. (cf Fellenberg) should yield about 15–78 mg of *A*, of which only 5–10 mg is needed for the Tutin identification test. However, a 3% addn yields only 3–5 mg., water insol *A* To obtain a max yield of *A*, the temp must be kept at 0°, a min concn of 1 1 $H_2SO_4$ and a certain excess of BzH must be used, *e g*., 30 mg sorbitol, 0 65 cc $H_2SO_4$ (1.1) and 0 2 cc. BzH (6 drops) at 0° yielded 54 mg of *A* Slight deviations alter the yield considerably S Waldbott

Brewing as a branch of science. Arthur R. Ling *Brewers J* 66, 302–6(1930).—The biochem. processes involved in the brewing of beer are outlined P J F W

English barleys of 1929. H M Chubb *J Inst Brewing* 36, 221–4(1930).—In contradistinction to the heavy barley of the 1928 season, those of 1929 are light, the greater bulk reducing the malt house output by 5% Germination on the floor was good and regular Diastatic power and cold water exts of the malts were below normal Peter J F Weber

Foreign barleys of 1929 T R Sutcliffe *J Inst Brewing* 36, 225–6(1930).—California barley malted well and gave high to abnormally high exts, while Chile produced a barley of av quality The crops of other barley-growing countries were of inferior quality Peter J F Weber

Some recent advances in the chemistry of enzymes. R. H Hopkins *J Inst Brewing* 36, 189–94(1930).—See *C A* 24, 2764 (the vol. no given for *Chem News* is an error for *142*). Peter J F Weber

Cleaning and disinfecting agents (in the brewery). P Petit *Brasserie & malterie* 20, 337–42(1930).—A brief discussion of the proper method of cleaning and disinfecting piping and bottles A Papineau Couture

Attenuation. J de Clerck. *Bull assoc anciens eleves de Louvain*, March, 1930, *Brewers J*. 66, 293–4(1930).—The factors influencing attenuation of fermenting liquids are discussed. Peter J F Weber

The brewing value of hop tannin. A. A. D Comrie. *J Inst Brewing* 36, 307–11

(1930) —Research thus far indicates that boiling a malt wort renders part of the nitrogenous constituents insol The tannin of the hops accelerates pptn through the formation of tannin nitrogen compds, which however only become quite insol by conversion of the tannin into its deriv, phlobaphene The tannin nitrogen compds sometimes pass into the beer and can produce haze of two kinds reversible (when the soly is reduced by chilling) or irreversible (when the tannin is converted into the insol phlobaphene by heating, such as pasteurization) PETER J F WEBER

**The solubility of maize proteins in mashing. II.** R H HOPKINS. *J Inst. Brewing* 36, 297–304(1930) cf *C A* 24, 1929 —Lab fermentations of malt and malt maize worts having similar ds and contg approx 50 mg of assimilable N per 100 cc. justified the conclusion that the N derived from maize is almost wholly left in the beer after a single fermentation A second seeding of the fermented worts with yeast indicated that the maize N would be ultimately assimilable PETER J F WEBER

**Respiration and fermentation of top and bottom beer yeast.** KURT TRAUTWEIN AND JOSEPH WASSERMANN *Biochem Z* 229, 128–53(1930) —The rate of respiration of top yeast is on the av 77% higher than that of the bottom yeast The top yeasts rise to the surface during fermentation where they can easily find $O_2$ and thus become acclimated to an aerobic existence But here the increase in the respiration capacity is accompanied by a similar increase in the fermenting capacity so that the ratio between their rates remains const Both types of yeast, however, use up 2–3% of the total sugar undergoing dissimilation in the respiration and 98–97% in the fermentation If the energy value of both the respiratory and fermentative processes is calcd the total metabolism of the top yeast is found to be 42% higher than that of the bottom yeast. In the top yeast 40% of the total metabolism is respiratory and 60% fermentative, while for the bottom yeast these values are 32 and 68%, resp S MORGULIS

**Research work in the yeast field.** L H LAMPITT *J Inst. Brewing* 36, 250–60 (1930) —A review of results obtained, and of problems to be solved in the study of the life and activity of yeast PETER J F WEBER

**Alcohol losses in yeast manufacturing.** F WAGNER. *Brennerei-Ztg* 47, 162–3 (1930) —The losses on alc due to aeration were studied on 3 different molasses mashes diluted 8, 16 and 20 times, resp The amt of air per cu m liquid was 25, 70 and 70 cu m, resp The alc content of the air leaving the system was detd, and it was found that the losses of alc increased with stronger aeration, and decreased with lower alc. content S JÓZSA

**Losses of water-soluble phosphoric acid by the clarification of molasses under acid conditions and heat.** O HUMMER. *Brennerei-Ztg* 47, 142–3(1930) —The loss of water sol $P_2O_5$ increases rapidly with decreasing acidity S JÓZSA

**Korean koji (a kind of the so-called Chinese yeast).** HIROSUKE NAGANISHI. *Abstract from Repl Central Lab S Manchuria Railway Co* 1929, 41–2 —Thirty seven mold fungi, 9 yeasts and 4 bacteria were found in this prepn The diastatic powers of the molds are detd. V F. HARRINGTON

**Involution cultures of yeast I.** A T HENLEY *J. Inst Brewing* 36, 304–7(1930) — To obtain surface growths of yeast which shall be characteristic and help in the differentiation of species, specially prepd wort-carrigeen moss (*Chondrus chispus*) in Erlenmeyer flasks was inoculated with a wild yeast (*S pastorianus*) and a culture yeast (Dublin No. 1) The growths thus obtained were distinctly different from each other, since the colonies were able to grow freely along any individual lines they may have possessed and yet could not sink into the body of the media Under these conditions a high percentage of mycelial cells was formed and gave rise to the term *involution culture* The gel produced by the addn of carrigeen moss to wort was fragile, only a little agitation breaking it down Details of the method of prepn. are given P. J F. W.

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The use of microörganisms in certain commercial processes (HUBERT) 23. The preservation of sweet must (MEHLITZ) 12.

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VENTRE, J.: Traité de vinification pratique et rationnelle. Tome I. Le raisin et les vinifications. Paris Dunod. 490 pp. F. 50

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**Fermentation products.** ZELLSTOFFFABRIK WALDHOF and MAX GADE Fr 693,553, April 8, 1930 In the distn. of alc. from a fermented sulfite wort the first running contg aldehyde is directed to a fresh wort about to be fermented

**Dehydrating alcohol.** WM H. ENGELS (to Merck & Co.). U. S 1,790,907, Feb. 3. A hydrous alc. is mixed with comminuted CaO in relatively small excess as proportioned

to the amt of water to be removed, the mixt is heated and refluxed and the film of hydrated lime is continually removed as it forms upon the surface of the particles of oxide by the action of mech agitation, this operation is continued to completion of the dehydration and the treated alc is distd off under continued agitation A "com pure" hydrated lime is obtained as a by product

**Butanol and acetone.** Auguste Fernbach Fr 693,744, July 23, 1929. In the production of butanol and acetone by the fermentation of materials contg saccharose, inversion of the saccharose is obtained by the action of sucrase or invertase, yeast being used as the source of sucrase The medium is kept at a $p_H$ value of 4.3–4 5

**Lactic and acetic acids.** Wisconsin Alumni Research Foundation Brit. 335,596, June 20, 1929 Lactic and acetic acids are produced by fermentation of *pentoses and hexoses (such as those from wood, sawdust, straw, corncobs or the like)* by the action of a described microorganism obtained from fermenting plant material such as silage or sauerkraut Various details of procedure are described.

**Glycerol** Vereinigte Chem Werke A.-G Ger 514 395, June 22, 1926 In the manuf of glycerol by fermenting sugar in alk soln in the presence of $Na_2SO_3$, the volatile fermentation products are distd off, and the residual mash contg glycerol is fermented again after addn. of more sugar, these steps being repeated as required The yeast should preferably be filtered off before removing the volatile products. Examples are given

**Yeast.** Krausz Moskovits Vereinigte Industrie-Anlagen A.-G Fr 692,546, Mar 21, 1930 Yeast of high enzymic activity is prepd from yeast multiplied according to any known process, which is further developed in 2 working stages in such a manner that in the one stage, by assimilation, nitrogenous substances complete the plasma of the yeast cells with simultaneous inhibition of multiplication and in the other stage, by setting up a strong fermentation, the enzymes of the cells are caused to develop, the 2 stages being effected in either sequence

**Preparation of air yeast and other microbiological processes employing the passage of gas through the culture medium.** Hendrik C. Jansen Dutch 22,653, Sept 15, 1930 Substances which are to be added to the nutrient medium are mixed in with the gas passed through the medium Liquids or solids are sprayed into the gas

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

*The chemical examination of Sida cordifolia, Linn* Sudhamoy Ghosh and Ashutosh Dutt *J Indian Chem Soc* 7, 825–9(1930).—Berela (*S cordifolia* L.), regarded as a most valuable drug in the Ayurvedic system of medicine, and used as an aphrodisiac by the Mahomedan hakims, has not previously been examd systematically Assays of the entire plant by the U S P method for belladonna showed the presence of 0.085% total alkaloids, the seeds contg 4 times more alkaloid than the leaves, stems or roots Extn with petr ether, $Et_2O$, abs alc and $H_2O$ showed the presence of fatty oil, phytosterols, resins, resin acids, mucins, $KNO_3$ and alkaloids, but no tannin or glucoside The alc. ext contained the whole of the alkaloid content From 100 kg of the air-dried drug a crude alkaloid residue was extd., 1/4 of which was $CHCl_3$-sol The remainder gave a *cryst HCl salt*, m 215.5°, $\alpha_D^{32}$ —35.0, *chloroplatinate* m 190.5°, mol wt 165, mixed m p with ephedrine HCl from *Ephedra vulgaris* 215.5° (ephedrine-HCl, m 215–6°, $\alpha_D$ —32.5 mol wt 167) The $CHCl_3$ sol fraction was non-cryst. but appeared to contain alkaloids *related to ephedrine* Ppts. *with 11 alkaloidal reagents* and the violet color of the biuret reaction confirmed the identity of the alkaloid from *Berela with ephedrine* Pharmacologically, the alkaloid hydrochloride causes *marked* and persistent rise of blood pressure in the absence of ergotoxine, dilation of the bronchioles and inhibition of intestinal movements, these effects resemble those of sympathomimetic bases such as adrenaline or ephedrine C. R. Addinall

**The distillation of essential oils** V. I. Varentzev *J Chem Ind* (Moscow) 6, 1602–4(1929).—The extn. of essential oils from their seeds by steam distn can be expressed by the formula of an infinite decreasing geometrical progression $S = a/(1 - r)$ and $l = ar^{n-1}$ Thus, by experimentally establishing $a$ (the amt. of oil extd in the first hr.) and $r$ (the ratio of the amt of oil extd between 2 consecutive hrs.) the duration *of the distn of the oil content of the seeds can be easily calcd* The *validity* of this "distn law" is shown by numerous examples taken at random from the literature

E. Bielouss

**The seeds and oil of Sinapis dissecta Lag** N Belyaev. *Maslobono Zhirovoe Delo* 1929, No 6, 25–6 —This plant, found abundantly in the Saratov region, is a variety of the common *Sinapis alba* L The seeds contain moisture 8 80, oil 28 05, fiber 15 06, ash 4 48, total N 3 83, crude protein 23 90 and essential oil 0 00% The oil has d 0 9150, solidification point 15, $n_D^{20}$ 71 9, sapon no 172 4, I no (Hubl) 100 52 acid no 1 04 The fatty acids have I no 99 38, m 21°, solidify 18° The oil is thus similar to the oil of *Sinapis alba* F Birlouss

**Investigation of the essential oil from different kinds of fennel cultivated in the Krasnodar district.** N Sobyanin and S Smakov *Maslobono Zhirovoe Delo* 1929, No 6, 34 6 —Fennel oils of different origins vary in yield from 1 21 to 5 3%, in optical rotation from +5 to +20 3, in *n* from 1 528 to 1 5405, in solidification point from 3° to 12° F Birlouss

**Comparative value of metaphen in alcohol-acetone-aqueous solutions in the pre-operative disinfection of the skin.** Winfield W Scott and Konrad E Birkhang. *Ann Surgery* 93, 587 97(1931) —A 0 5% alc acetone aq soln of 4 nitro 5 hydroxy-mercuri *o*-cresol is a satisfactory pre-operative skin disinfectant Rachel Brown

**Note on the biological assay of tincture digitalis.** G A Grant and S G Alexander *Proc Trans Nova Scotian Inst Sci* 17, 211 7(1930) —The strength of several samples of Tr digitalis was detd by the biol assay outlined at the Geneva Conference The results obtained indicate that for the tinctures examd the max deviation from the U S P X standard is much less than that previously found and that the strength of the International powder is considerably above that of the present U S P X standard Rachel Brown

**The germicidal action of ethereal oils.** Siegfried L Malowan *Z Hyg. Infektionskrankh* 112, 93–4(1931) —The chem compn as well as the $H_2O$ soly affect the germicidal action of ethereal oils Oils contg aldehyde are most active and have a high soly , oils contg esters are less active than ales Rachel Brown

**Bulgarian Otto of Rose.** Ernest S Guenther and Robert Garnier *Am Perfumer* 25, 417–20, 479–82, 547–50, 621–4(1930) —An exhaustive review is given of the natural rose oil industry as practiced in Bulgaria, with illustrations W O E

**Leaf oil from Dacrydium franklini Hooker.** A R Penfold and J L Simonsen. *J Proc Roy Soc N S Wales* 63, 95–101(1930) —A renewed study of the hydrocarbon portion of the oil would indicate that the alleged dacrydene previously reported by Baker and Smith is in all probability identical with $\Delta^4$-carene, and should, therefore, be removed from the literature until evidence of its sep existence is forthcoming W O E.

**Essential oil of Eucalyptus rariflora.** A R Penfold C. B Radcliffe and W. F. Short *J. Proc Roy Soc N. S Wales* 64, 101–14(1930) —Distn of the leaves and terminal branchlets of this tree gave a reddish yellow to yellowish brown oil in 2 5% yield, possessing a pronounced phellandrene odor modified by the aromatic aldehydes present. The principal constituents so far identified are the terpenes $\Delta^4$-carene, $\beta$-phellandrene, *l*-$\alpha$-pinene, $\beta$ pinene, cymene, with cineole (about 10%), sesquiterpenes (principally aromadendrene), sesquiterpene ales , with small quantities of the aromatic aldehydes (cuminal, phellandral, cryptal), alkali sol compds (unidentified phenols and dehydroangustione ($\beta$ diketone)) The identification of $\Delta^4$ carene is noteworthy in that it is the first record of its occurrence in *Eucalyptus* oils W O E

**Oil of amber.** T. Tusting Cocking. *Perfumery Essential Oil Record* 21, 477–8 (1930) —An exptl study is reported of both the true and the com oils, notably of the consts obtained in the examn of the various oil fractions W O E

**Kalk-vizym.** Hermann Eschenbrenner *Pharm Presse, Wiss -prakt Heft*, 1930, 145–6 —A new vitamin-contg Ca phosphate prepn is described, in connection with a review of certain chem tests for the vitamins A, B and D alleged to be present in the above prepn.

**Quinine.** Karl Dopp. *Pharm. Presse, Wiss -prakt Heft* 1930, 167–8 —The history, production and importance of this alkaloid in medicine are discussed W. O E.

**Examination of pine needle extracts by capillary analysis.** H Eschenbrenner. *Pharm Presse, Wiss -prakt Heft* 1930, 177–8 —A discussion is given of the contaminants not infrequently encountered in com preps of pine needle exts in connection with a review of the method specified by the Supplement to the D A -B VI, as also that involving examn. of the capillary pictures obtained under the analytical quartz lamp W O E

**Relation of structure to action of morphine and its derivatives.** Rudolf Zipperer. *Pharm. Presse, Wiss -prakt. Heft* 1931, 1–2 —Attention is directed (by illustration) to

*important and valuable derivs of morphine obtained by means of certain relatively* simple changes in its mol structure W. O E

**Sickness and intoxication through benzene and its derivatives.** MAX GRÜNEWALD *Pharm Presse, Wiss prakt Heft* 1931, 2 5—A discussion is given of the intoxication effects of $C_6H_6$ and derivs on the animal economy, and of certain precautions to be observed in com operations with these products W. O L.

**Reaction of phenylum acetylo-salicylicum.** H SZANCER. *Pharm Zentralhalle* 72, 68–9(1931)—It is shown that this substance with $NaNO_2$ and concd $H_2SO_4$ yields the same color changes as salol W. O F

**Detection of juglone.** ROBERT FISCHER AND FRITZ STALDER. *Pharm Zentralhalle* 72, 97–100(1931)—In the microsublimation of *Folia Juglandis* via the D A B VI no yel low crystals result, in fact the official Ger procedure for the microsublimation of either fresh or stored leaves, or of 8-day old, long shredded pericarps, fails to yield juglone However, extn with $CHCl_3$ of fresh or 3 day old leaves, followed by suitable treatment of the resulting residue, detects the presence of juglone Similar results are obtained with 8-day old pericarps *Older* leaves are free from juglone *α Hydrojuglone* could not be detected in fresh pericarps It is shown that the yellowish needles reported by Tun mann as *α* hydrojuglone were in reality juglone *β* Hydrojuglone could not be de tected in any of the fruit available W O E

**Estimation of *p*-chlorophenol as such and in pharmaceutical preparations.** K. FEIST AND F KLATT *Pharm Ztg* 76, 112 3(1931)—The method is based on the procedure of Koppeschaar, involving conversion of the *p*-chlorophenol into chlorodibromophenol (by KBr and 0 1 *N* $KBrO_3$ soln + HCl) followed by treatment with KI, and final titration with 0 1 *N* $Na_2S_2O_3$ In mixts of *p*-chlorophenol and camphor (or menthol) the former is isolated by treatment with NaOH soln and then titrated as above W O F

**Chemistry of neodorm.** G KUHLMANN *Pharm Ztg* 76, 113(1931)—This prepn is *α* bromo-*α* isopropyl butyramide, it m 50–1°, resembles menthol and is sol in the usual org solvents and in oil It decomps if sterilized in aq soln, but not in oil W O F

***Adulteration of oil of cloves with benzyl alcohol.*** S. KROLL. *Pharm Ztg* 76, 128 (1931)—A sample of oil of cloves possessing apparently normal chem and phys properties, as stipulated in the Ger Pharm, was found on examn to contain considerable PhCH-OH as adulterant. The presence of this alc was demonstrated by the method of Thoms (cf Ber pharm Ges 1, 278(1891)) W O E

**United States Pharmacopeial Commission.** L. ROSENTHALER *Pharm Ztg* 76, 143–4(1931)—An address indicating the salutary manner in which the Commission operates in marked distinction to the rather secretive activities of similar European bodies W O E

**Manganous calcium hypochlorite.** O H KERSCHNER. *Pharm Ztg* 76, 184–6 (1931)—The reddish color noted from time to time in solns of Ca hypochlorite is shown to result from conversion of traces of Mn into permanganate. W O E

**Production of benzonaphthol and *p*-acetamidophenyl salicylate.** JULIUS SCHWYZER *Pharm Ztg* 76, 186–8(1931)—Detailed procedures are reported for the production of benzonaphthol and salophen in large scale operations, in connection with illustrations of *the app needed.* W O E

**New method for the preparation of isoeugenol from clove oil.** R. PRIESTER *Riechstoffind* 5, 83–5, 108–9(1930)—Eugenol is converted to isoeugenol (1) by heating with KOH, (2) by the action of KOH dissolved in $H_2O$, MeOH, EtOH or AmOH under normal or increased pressure, (3) by the action of K or Na amylate in AmOH soln under ordinary or increased pressure KOH functions purely as a catalyst According to the new method eugenol or oil of cloves 30 is heated for 35 min to about 180° and maintained there 15 min with $H_2O$ 30, KOH 15, glycerol 5, the mass poured into $H_2O$, $C_6H_6$ added, the KOH almost neutralized with dil $H_2SO_4$, *AcOH* added in slight excess, the $C_6H_6$ soln. withdrawn and washed to neutrality and finally fractionated *in vacuo*, Little or no resinification takes place under the above procedure W O E

**Acetoeugenol and its presence in clove oil.** J HEROLD *Riechstoffind* 5, 100–2 (1930)—The occurrence of acetoeugenol in oil of cloves, its probable fate during the process of distillation, in connection with the various methods for evaluation are discussed. W O F

**Composite or unitary perfumes.** ERNST SCHIFFAN *Riechstoffind* 5, 119–20 (1930)—The relative advantages of compns as compared with unitary chem substances or essential oils are discussed The decision must be left largely to the expert knowledge of the perfumer W O E

**Chemical and bomb gas baths.** W Peyer and H Ipfinger *Süddeutsche Apoth Ztg* 71, 77–8(1931) A general discussion of the essential differences in effect of O and $CO_2$ bath preps when developed from salts with suitable catalyzer directly in the water or indirectly from the capillaries of bombs It is shown that the former method is the preferable one because of the phys character of the developed gas W O F

**Native drug plants in the light of modern chemistry and therapy.** L Kroeber *Süddeutsche Apoth Ztg* 71, 93–5(1931) cf *C A* 24, 1931 An address W O F

**Problems of practical pharmacy.** Hermann Thoms *Süddeutsche Apoth-Ztg* 71, 110–3(1931), *Pharm Ztg* 76, 195–9 —An address W O E

**American medical plants of commercial importance** A P Sievers U S Dept Agr, *Misc Publ* 77, 1–74(1930) About 1580 plants of reputed medical value are described C R Fellers

**Assay of digitalis. II. Comparison of Mansfeld's sinus method with the six-hour frog or cat method.** A Stasiak and B Zboray *Magyar Gyógyszerésztud Társaság Értesítője* 5, 100–6(1929) cf *C A* 23, 4770 Further investigations were made by the method of Mansfeld Horn on spring frogs with powders of digitalis leaves An infusion made according to Mansfeld was used as standard Parallel detns on the same powder agreed well The differences between the results of the sinus method and those of the 6 hr frog or cat method are the same as those of the frog method and the cat method between each other S S de Finály

**Extractum filicis maris.** Z Csirke *Magyar Gyógyszerésztud Társaság Értesítője* 5, 125–38(1929), cf *C A* 23, 4769 —No correlation can be found between biol losses of value and quantity of active matter found by chem methods Results of the so-called "pure filicic acid" detns (Fromme, Kraft) are unreliable, since they do not show the presence of lower phlorogluecides which also have anthelmintic power A modification of the method of Kraft Boeehi Fromme has been worked out Shake out the ether soln of the ext twice with baryta water, and filter. Treat an aliquot part of this soln with ammoniacal $AgNO_3$ soln Let stand for 6–10 hrs in a dark place Filter out the reduced metallic silver, wash, dissolve in 20% $HNO_3$, and titrate with 0.1 *N* $NH_4SCN$ soln One cc of this soln equals 0.00217 g phlorogluetnol or 0.0196 g phlorobutyrophenone S S de Finály

**Biological evaluation of extracts of Filix mas.** Z. Csirke. *Magyar Gyógyszerésztud Társaság Értesítője* 6, 85–101(1930), cf preceding abstract —Chem evaluation alone is not reliable Biol tests can be made satisfactorily with *Hirudo medicinalis* and *H officinalis* An emulsion of the drug with 1% $NaHCO_3$ was used Exts kept closed from the air remain undecompd for years For the test 4 g of the ether ext is shaken carefully at 40°, and mixed with powd gum arabic and 1% aq $NaHCO_3$ to an emulsion This is dild with 1% $NaHCO_3$ to 2000 cc Of this dild soln 500 cc (equal to 1 g ext) is again dild with $NaHCO_3$ soln to 2000 cc The soln can be used after 2 hrs M l d is detd with three series of expts One series for orientation, the third for actual detn M l d found was 0.0028 in 100 cc The animals should be kept in motion under the detn by mechanical or elec means S S de Finály

**How to distinguish sulfonal from trional.** L. Ekkert. *Magyar Gyógyszerésztud. Társaság Értesítője* 6, 385–6(1930) —The substance to be tested is heated with resorcinol and concd $H_2SO_4$ until it shows a green color The liquid is dild and $NH_3$ added Sulfonal shows bright rose color, trional becomes brownish yellow or reddish brown S S de Finály

**Biological test of adrenaline in draft mixtures, especially in the presence of local anesthetics.** A Stasiak and L Rigó *Magyar Gyógyszerésztud Társaság Értesítője* 6, 389–95(1930) —The presence of adrenaline can easily be proved in mixed draughts, even in presence of local anesthetics, by means of surviving mouse uterus Adrenaline prevents the spontaneous contractions of the surviving uterus These contractions, however, reappear very quickly after the uterus is washed out with Locke's soln Thus the same uterus may be used for several detns By this method adrenaline can be detected in the presence of novocaine, β eucaine, holocaine, percaine, stovaine and tutocaine and in the presence of ext of posterior lobe of the hypophysis Novocaine increases the sensitiveness of surviving mouse uterus to adrenaline, β eucaine and stovaine diminish it Holocaine showed no influence on the sensitiveness S S de Finály

**Comparative studies on the tannic acid content of some drugs.** I Temesvary. *Magyar Gyógyszerésztud Társaság Értesítője* 6, 396–402(1930) —Of the methods studied, (1) international hide powder method, (2) Löwenthal method, (3) $SnCl_2$ method, (4) Wasicky method, (5) Schulte method and (6) tannoform method, (1) gives the most exact and reliable results However, this gives high values for cinchona bark (part of

alkaloids is dissolved and pptd by skin powder) and for *Rheum* (where much slime is attached to the hide powder) The tannoform method can usually be used when pyrocatechol tannic acid is present S S DE INALY

**Stability and attenuation of insulin.** H PUIGGARI. *Rev. soc argentina biol* 5, 677–84(1929), *Physiol Abstracts* 15, 239 —Attenuation is avoided by the concn of the alc acid exts of pancreas *in vacuo* at 35–40° Controls were made 200 days later, and no loss of pharmacol activity was found G G

**New assay method and identification tests for mild and strong silver proteinate.** J H INABINETTE *Am J Pharm* 103, 42(1931) —*Tanret's soln produces a flocculent* yellow ppt when added to an equal quantity of 1% soln of strong Ag proteinate With the mild Ag proteinate a flocculent grayish black ppt is given Nessler's reagent is even more distinctive when used under the same conditions A clear, golden brown soln is produced with the strong Ag proteinate and bluish black soln with the mild proteinate Both of these solns were satisfactory identifying agents for protargentum, protargol, Ag protein, Merck and P W R, argyrol, solargentum and argo nuclein (S K F Co) A new assay method, much more rapid than the present U S P X, is as follows Weigh 0 5 g of the Ag compd, dissolve in 20 cc $H_2O$, then add 20 cc concd $HNO_3$ and boil for 10 min Cool, dil to about 150 cc. and titrate with 0 1 *N* KCNS, using ferric alum as an indicator This method produced results identical with those obtained by the U S P X method W G GAESSLER

**Assay of solution of magnesium citrate.** HERMAN W HAUSSMANN *Am J. Pharm* 103, 44–5(1931) —The present method of the U S P X for Mg requires evapn *and ignition, a time-consuming operation and one in which error may arise* *The follow*ing modification of this gives slightly higher but more consistent results The material after detn of the free acid is evapd and ashed as usual The ash is then transferred to a porcelain dish with hot water *and 50 cc of 0 5 N* $H_2SO_4$ added *It is then boiled, cooled* and the excess of acid detd by titration against 0 5 *N* NaOH with Me orange as indicator W G GAESSLER

**Assay method for ointments containing mercury or its salts.** R O METZLER *Am J Pharm* 103, 45(1931) —For mercurical ointments the present method as outlined in the U S P X gives satisfactory and consistent results For calomel ointment weigh about 1 g of the ointment directly on a dense filter paper Fold and pass $CCl_4$ through until all fat is removed Place the paper in a glass stoppered flask, add 10 cc $CCl_4$, 30 cc 0 1 *N* I, 3 g KI and 10 cc. $H_2O$ Shake well, allow to stand 12 hrs and det excess 0 1 *N* I with 0 1 *N* $Na_2S_2O_3$ Twelve detns gave results varying from 30 09% to 30 5% calomel For yellow HgO ointment the following methods were used (1) Boil with $HNO_3$, add $H_2O$ and titrate with 0 1 *N* KCNS (2) The same as *No* 1 except fat is filtered off before titration (3) Treat as in No 2 and ppt Hg as sulfide (4) Destroy fat with concd $H_2SO_4$ and $KMnO_4$ and det Hg as sulfide None of these methods gave *results which were consistent or in agreement with the known compn of the specially* prepd yellow HgO ointment W G GAESSLER

**Determination of boric acid in ointment of boric acid U. S. P. X.** THEODORE BUDIN *Am J Pharm* 103, 46(1931) —*Place 25 cc* $CHCl_3$ *10 cc glycerol and 1 cc of* phenolphthalein test soln in a well stoppered container Shake, add 0 1 *N* alkali to faint pink color Then introduce about 1 g of boric acid ointment weighed on a wax paper, and add 25 cc of 0 1 *N* NaOH. Shake well and det excess of *NaOH* by titration with 0 1 *N* $H_2SO_4$. W G GAESSLER

**Investigation of calcium hypochlorite (65 percent available chlorine)** BERNARD MELEON *Am J Pharm* 103, 46(1931) —Analysis of a com supply of a product marketed under the trade title H T H by the Mathiesen Alkali Works Inc gave insol in $H_2O$ 8 40, $SiO_2$ 0.28, $Fe_2O_3$ 0 38, $Al_2O_3$ 1 76, CaO 32 17, available Cl 62 70% W G GAESSLER

**Assay of chloroform liniment.** JOHN C. BRANTLEY, JR. *Am J Pharm* 103, 46–7(1931) —The method of Willgerodt (*C A* 20, 92) was compared with a direct standard alkali sapon and titration of residual alkali Direct alkali sapon does not give correct results W G GAESSLER

**Development of pharmaceutical chemistry in Maryland.** A. G DUMEZ *J. Chem Education* 8, 471–84(1931) E H

**The hydroxylamine method for the determination of ketones. Carvone in caraway and dill oils.** C. T. BENNETT AND T. TUSTING COCKING *Analyst* 56, 79–82 (1931) —The method of Bennett and Salamon (*C A* 22, 1825) applied to various oils contg aldehydes and ketones does not give satisfactory results in all cases, the method *must be modified according to the particular ketone present* *The modified* method of the Essential Oil Sub-Committee for the detn of citral in oil of lemon (*C A* 24, 1934) is

of almost universal application for testing oils contg aldehydes, if a little benzene is added as solvent for the non aldehydic portion of the oil but this modified procedure was found to be quite unsuitable for the detn of ketones After considerable experimentation with dill oil, caraway oil, pennyroyal and piperitone, the following modification of the method was adopted for detg carvone in oils of dill and caraway Weigh 1.5 g of oil into each of 2 stoppered tubes add 10 cc of approx *N* $NH_2OH$ HCl reagent (6.95 g dissolved in 95 cc of 90% alc., 0.4 cc of 0.2% dimethyl yellow added and sufficient *N* KOH in alc to bring the soln to a full yellow), and heat in boiling water to about 75° The color of the soln changes from yellow to red as a result of liberation of HCl At 5-min intervals remove each tube from the water bath and neutralize with *N* KOH in alc using a sep buret for each sample Toward the end, the indicator becomes golden orange instead of red and it is hard to estimate the exact end point When it is thought that the end of the reaction has been reached add 0.5 cc more of KOH to one of the tubes to overstep the end point and add to the other sufficient NaOH to match the color in the other tube In the computation, 1 cc of *N* KOH = 0.1513 g of carvone The advantages of this method over that of the neutral sulfite method are that very little oil is required and less time The method has been applied to the detn of ketones in other oils (menthone in oil of peppermint and pulegone in oil of pennyroyal) but the end point was hard to see W T H

**Seventh report of the essential oil sub-committee on uniformity of analytical methods. Determination of solubilities.** J Allan *et al* *Analyst* 55, 389-(1930).—The tests should be carried out at 15.5°, unless stated otherwise The concn of alc should be given in % by vol and the following terms should be used as defined in the report sol., sol with opalescence, sol with turbidity Regarding the opalescence and turbidity, the adjectives *faintly, slightly* and *distinctly* should be used with reference to expts under stated conditions with AgCl (for opalescence) and with $BaSO_4$ (for turbidity) W T H

**Testing of Admiralty disinfectant fluid.** T. C. Patterson and Robert C Frederick. *Analyst* 56, 93-104(1931).—Two disinfectant fluids were divided into 2 series of identical samples and the phenol coeff by the Rideal Walker method was detd in 13 different labs. The values obtained for one sample ranged from 6.0 to 11.5 and on the other from 6.0 to 17.4 To avoid such discrepancies, the Admiralty method is described in great detail The method consists in prepg a 1% dilu of the fluid with artificial sea water, allowing this to stand 24 hrs and then comparing its action in the presence of org matter against a particular strain of *B. typhosus* with similar expts with pure phenol used as reference A bibliography of 10 titles is appended W T H

**Chloretone as a preservative.** B. Polák. *Bratislav Bekarske Listy* 9, 281-4 (1929).—Chloretone ($Cl_3CCMe_2OH$), which is used as a preservative of org substances, is injurious to the circulation by its paralyzing effect on the heart muscle and motor cardiac centers William J Hess

**Distillation of essential oils.** V. G. Patwardhan *Poona Agr. Coll Mag* 21, 31-3 (1929).—An app for the small scale distn of essential oils from grasses, etc., is described and illustrated Two to 5 lb of material, depending upon its nature, can be distd at one time K D Jacob

**Merthiolate as a germicide.** H. M Powell and W. A. Jamieson *Am J. Hyg* 13, 296-310(1931).—*Merthiolate* (I) is *Na ethylmercurithiosalicylate*, $EtHgSC_6H_4CO_2Na$, a study was made of the general properties, germicidal and inhibition properties and toxicity for animal tissues I is a white, orthorhombic cryst compd., readily sol in water and physiol salt soln Solns of germicidal strength are stable under ordinary conditions of light and temp., are colorless and do not stain tissues or fabrics The aq solns are miscible with soap and maintain their germicidal property. I does not amalgamate with metals In soln it is so slightly ionized that there is no immediate pptn of Hg with either alk hydroxides or $(NH_4)_2S$ Dry I or aq I can be mixed in various proportions up to 25% with undild serum without causing pptn., I is pptd by the salts of heavy metals and by acids. Many germicidal tests were made and are reported, from these tests it appears to be a very promising germicide with certain unusual properties which make it well adapted to tissue antisepsis N. A Lange

**Estrogenic substances. II. Analysis of plant sources.** Burnham S. Walker and James C Janney. *Endocrinology* 14, 389-92(1930), cf *C. A* 24, 3809.—A relatively high concn of estrogenic material occurs in plants associated with green pigmentation Roots, tubers and fruits are neg Estrogenic substances in yeast are an exception. Pos extracts are obtained from plants while their growth is most rapid Mary E Lyar

**Chemical analysis of the cortex of Aspidosperma polyneuron Muell. Arg.** Louis

FLORIANI *Ann Farm Bioquim* 1, 135-9(1930).—F. made a modification of the procedure of Arata and with its aid found that the cortex of *Aspidosperma polyneuron* Muell Arg contained 2% of alkaloid The nature of the alkaloid is under study B S LEVINE

**Studies on the Vitali reaction for the detection of atropine. I. The extent of its applicability.** SANTIAGO A CELSI *Ann Farm Bioquim* 1, 140-9(1930).—A study of the Vitali reaction as applied to atropine HCl or sulfate, hyoscyamine, scopolamine, isatropylcocaine homatropine and other alkaloids The relation between the reaction and the chemical constitution of the reacting substances is discussed The Vitali and Arnold reactions are compared B S LEVINE

**Physiological styptics.** OSKAR BEYER *Chem.-Ztg* 54, 1007(1930).—A review of the various styptic agents is made It is suggested that a rational means of stopping bleeding is to strengthen artificially by catalytic agents, the formation of thrombin A prepn of this type would be useful in hemophilia and in patients suffering from jaundice and liver damage Such a prepn is made from cow liver Finely ground fresh cow liver 300 g is placed in a 2 l flask, one l of 96% alc is added and the contents are extd for 30 min at about 60° on a water bath The bright yellow liquid is rapidly filtered off on a porcelain suction filter The filtrate treated with 4 portions of pure ether is allowed to stand 8–12 hrs at room temp The ether soln is decanted, leaving a yellowish brown mass adhering to the walls of the vessel The flask is heated to about 30° and the ether removed *in vacuo* The residue, about 25 g., is taken up in 300 cc sterile water, filtered, and 5 cc put in sterile glass ampules The ampules, after sealing, are sterilized in steam at about 95° for ½ hr The soln is assayed for clotting power The substance contains N, peptones, amino acids purine bases and carbohydrates G H W LUCAS

**Constitution of amino alcohols as local anesthetics. (Supplement.)** S KANAO AND K SHINOZUKA *J Pharm Soc Japan* 50, 1152–62(1930), German abstr 148–52, cf *C A* 24, 3832.—In previous papers K reported on the type I, RCH(OH)CHR'-(NR"R"') The present paper deals with the type II, RR'C(OH)CH$_2$NH$_2$ The local anesthetic action is neg if R and R' are both Me, Et or Pr, it is pos if R and R' are both Bu, Me$_2$CHCH$_2$CH$_2$, Ph or PhCH$_2$, or if R is Bu or cyclohexyl and R' is Ph The methods of prepn of these amino alcohols are also given F I NAKAMURA

**Semen contra pills.** J MANEU AND J CHARTIER. *Ann falsi* 23, 613–4, *J. pharm chim* [8], 12, 301–3(1930), cf *C A* 21, 2961.—Examn of 4 samples for alkaloids, heavy metals, cyanogenetic glucosides and santonin gave neg results, and the seed contained in each pill had all the morphological and anatomical characteristics of lucern A PAPINEAU COUTURE

**Pyrethrum flowers from Kenya and Cyprus.** ANON *Bull Imp Inst* 28, 425–9 (1930).—Samples of pyrethrum grown in Kenya and in Cyprus were found to be of nearly as good quality as the best Dalmatian pyrethrum A PAPINEAU COUTURE

**Tetrapone** H BAGGESGAARD-RASMUSSEN *Archiv Pharm Chemi* 38, 29–37 (1931).—Mixts of alkaloid hydrochlorides have come into use in Danish hospitals One contains morphine 50, narcotine 19.4, codeine 3.2, papaverine 4.5, thebaine 1.7 and narceine 0.8% In another one thebaine and narceine are omitted and the narcotine is increased to 22% The names "hexapone" and "tetrapone" are recommended for these as in line with Roche's "pantopone" A R ROSE

**Tinctura Quillajae and Liquor carbonis detergens** K A KARSMARK AND L KOPLER *Svensk Farm Tids* 34, 706–14(1930)(in German).—The tincture made with 62% alc contained 5 times more saponin than that made with 86% Quillajae tincture with 42% alc contained less sediment than the 62% prepn The 62% alc prepn is to be preferred in making Liq carbonis detergens Percolation is better than trituration A R ROSE

**Sublimated or synthetic benzoic acid in preparing mucilago gummi arabici and sebum salicylatum.** HUGO WASTENSON *Svensk Farm Tids* 34, 714–5(1930).—The next edition of the pharmacopoeia should specify synthetic PhCOOH where it now specifies sublimated A R ROSE

**The constitution and constants of sandal oil.** R CAJOLA *Rivista ital essenze profumi* 12, XXI(1930).—This essence is obtained by distg *Santalum album* wood It is a yellow limpid liquid with an agreeable persistent odor and an irritating acrid resin taste it has sp gr 0.975–0.985 and boils and distils at 275–300° The oil is sol in all proportions in 90° alc., and has 90–98% of *a*- and *b* santalol, with *a* and *b* santalene ($C_{15}H_{24}$), santene ($C_9H_{14}$), santenone ($C_9H_{14}O$), santenone alc ($C_9H_{16}O$) and traces of santalic acid ($C_{11}H_{12}O_2$) and terebantalic acid ($C_{10}H_{12}O_2$) and a santal aldehyde ($C_{15}H_{22}O$) Sandal oil is used in medicine in mixt with other sedative and antiseptic substances, and

constitutes the principal curing element in many pharmaceutical compds It is used in doses of 1.5–2 g per day for initiating the cure of Hemorrhagin when other antiseptics cannot be used in irrigations because of the irritation of the mucose It is also useful in bronchial complications as it is eliminated with the urine and during breathing
R SANSONI

**The composition and properties of sassafras and its essential oil.** R CAJOLA *Rivista ital essenze profumi* 12, XXII(1930) The wood of the sassafras plant contains the coloring principle sassafride and tannic acid Its medicinal uses are listed The roots contain balsamic resin wax, sebaceous matter, tannic acid coloring matter gum albumin, starch and 2.5% of a yellow essential oil This oil is very little sol in alc it contains safrene ($C_{11}H_{14}$), an alc., safrole and a volatile phenol like substance
R SANSONE

**The properties and composition of mustard seed.** R CAJOLA *Rivista ital essenze profumi* 12, XXII–XXIII(1930) Mustard seeds contain 20% of mucilage and 30% of a sweet fatty oil, the alkaloid sinapine, the enzyme myrosin and sinigrin Powd mustard seeds, when beaten with lukewarm water develop a chem action between the myrosin and sinigrin producing glucose, $KHSO_4$ and allyl isothiocyanate With boiling water the reaction does not take place The uses of mustard seed oil are listed
R SANSONE

**A study of the treatment for insomnia.** HENRI FAVIER *Thesis*, Montpellier, 1929, *J pharm Alsace Lorraine* 57, 200(1930) A monograph on the hypnotic action of sedormid (cf *C A* 22, 3029)
S WALDBOTT

**Pharmacy in Syria.** C. LADAKIS *Bull Sud-Ouest et du Centre, J pharm Alsace Lorraine* 57, 213–4(1930).—An account of present conditions under French administration.
S WALDBOTT

**"Virtual adrenaline" in relation to inactivation of adrenaline by formol.** MARCEL PAGET AND CHARLES P LEBLOND *J pharm chim* [8], 12, 531–6(1930), cf *C A* 24, 3323–4 —When the :NH function of adrenaline (*A*) is blocked by means of formol, the Denigès reaction becomes neg., but the reactions which are sp for the pyrocatechol nucleus (Vulpian, Tolin, P., cf *C A* 25, 532) remain pos Blocking the NH function diminishes considerably the mydriatic power of *A* without destroying it entirely It sheds no light on the nature of "virtual *A*", work on this subject is in prepn S. W.

**Oxidation of official castor oil by potassium permanganate. Study of triazelain.** G SCHUSTER *J pharm chim* [8], 13, 5–12(1931) —The principle of the Hilditch method is applied (cf *C. A* 22, 944, 2177, 3792, etc) By $KMnO_4$ oxidation in acetone soln. of official castor oil, 63.58% triazelain (*A*) was formed After sapon of crude *A*, neither stearic nor dihydroxystearic acid was obtained The results of Heiduschka and Kirsten (*C A* 24, 1933) indicated these compds were present. The same oil to which 3% of stearic acid was added yielded this quantity after oxidation; hence the sample examd contained no glycerides of satd acids *A* was also synthesized by the action of epichlorohydrin of glycerol upon acid Na azelate ($CO_2H(CH_2)_7CO_2Na$) in sealed tubes at 135–140°. With a neutral 2% soln of the Na salt of *A*, $AgNO_3$ forms a brick red ppt. not altered by light; solns of $BaCl_2$, $Bi(NO_3)_3$, $CdSO_4$ and $Sr(NO_3)_2$ give a chamois-yellow, $CuSO_4$ gives a green ppt., $MgCl_2$ produces a chamois-yellow ppt while Mg azelate is $H_2O$ sol By means of this reaction, *A* was purified
S WALDBOTT

**Herba equiseti, a saponin-bearing drug.** P. CASPARIS AND K. HAAS *Pharm. Acta Helv* 5, 62–3(1930) —The presence of saponin in the herb was proved by foam no expts on a 10% chlorophyll free decoction and a 10% aq soln of a purified MeOH dry ext., and also by the hemolytic effect of 1% of the latter soln
S WALDBOTT

**Senegin and its decomposition products.** O DAFERT AND E KALMAN. *Pharm Acta Helv* 5, 71–7(1930) —By extg senega root repeatedly with 96% alc and evapg to a small bulk, crude neutral saponin (senegin) is pptd (yield 10%) By repeated pptn from soln in 80, 90 and 96% alc., 3–4% pure $H_2O$ sol senegin contg C 52.29%, H 7.17% is obtained It is hemolytic in dilu of 1:66,000 Hydrolysis with 5% $H_2SO_4$ and then 5% alc. $H_2SO_4$ for 30 hrs yielded a substance identical with that examd by Wedekind and Krecke (*C A* 18, 3362) Other products of hydrolysis are dextrose (41.09%), which seps at first, then methylpentose (11.12%) and arabinose (11.06%) are split off (cf Winterstein and Maxim, *C A* 13, 1213) A list of 21 references is added
S WALDBOTT

**The evaluation of tribromophenol bismuth gauze.** RUD G. MARDER. *Pharm Acta Helv* 5, 112–6, 151(1930) —Weigh 4–5 g of gauze exactly, add 20 cc of 25% HCl, knead the gauze with a glass rod, add 50 cc hot $H_2O$, knead again, transfer the soln into a 200 cc flask and repeat the extn with 5 × 30 cc hot $H_2O$ Cool, filter off the sepd $C_6H_2(OH)Br_3$ and in the filtrate ppt Bi with $H_2S$ Collect the $Bi_2S_3$ on a small filter,

wash with 2 × 10 cc $H_2O$ and dissolve the ppt. on the filter by adding, drop by drop, 15 cc $HNO_3$ (d 1 4) Wash the filter with 3 × 10 cc $H_2O$ and warm on a steam bath to expel $H_2S$ completely Cool, then add in small portions 25 cc $NH_4OH$ (20-25%), collect the $Bi(OH)_3$ on an ash free filter wash well, dry at 103-105° and ash in a porcelain crucible When cool, add a few drops of fuming $HNO_3$, evap on a water bath, then heat slowly with a flame, finally to red heat, cool in a desiccator and weigh Multiply the wt of $Bi_2O_3$ by 2 to obtain the wt. of "*xeroform*" in the gauze (com xeroform yielded 49 6 and 55 2% $Bi_2O_3$ 50% is the standard adopted) In 5 com samples of gauze, marked 20%, 10, 10, 5, 5%, the method showed 18 0% 6 4, 6 6, 4 37 and 2 95%, resp Deviations from statements on the label must not exceed ±10% S Waldbott

**Pilulae ferratae Blaudii.** J B Lang *Pharm Acta Helv* 5, 121-3(1930); cf. *C A* 24, 5110 —The pharmacol results of Starkenstein (*C A* 21, 1494) confirm L's contention that Blaud's pills should be as free as possible from ferric salt The following modification of the previous test is given Triturate 1 pill with 0 3 g $BaCl_2$, mix with 20 cc $H_2O$ and filter Divide the clear filtrate into 2 equal parts, to 1 add 5 drops of $K_4Fe(CN)_6$ soln , a deep blue ppt is formed at once To the other add 5 drops of $K_4Fe(CN)_6$ soln , at most a light blue coloration may appear This test does not apply to pills consisting mostly of $FeCO_3$ S Waldbott

**Note on the Pharm. Ned. V. test for codeine in papaverine hydrochloride.** E Anneler *Pharm Acta Helv* 5, 124(1930) —The following requirement of Pharm Ned V is probably based on error "The soln of 10 mg papaverine-HCl in 1 cc $H_2SO_4$ shall be colorless or at most faintly yellowish, upon adding 1 drop of $FeCl_3$ soln and warming on the water bath, no violet color must form (codeine)" The violet color which at first is pale green is produced with papaverine itself, this fact was proved with samples of known purity, and with papaverine prepd synthetically S Waldbott

**Determination of polysulfide and preparation of calcium sulfuratum solutum (Vlemingkx solution).** J Bœhm *Pharm Acta Helv* 5, 124-32(1930) —The exact and rapid method of Schulek for the detn of polysulfides (*C A* 19, 1829) is adopted in the new Pharm Helv V This method enables a much needed control of the compn of Vlemingkx soln (*A*) When prepd according to the directions of different pharmacopeias including Pharm Helv IV, *A* will contain very variable quantities of polysulfides To prep *A* of const compn , the formula adopted by Pharm Helv V is recommended Slake 1 part CaO with 5 parts $H_2O$, then add 2 parts of washed S and 10 parts $H_2O$ Boil the mixt for 1 hr under reflux (to exclude the air), cool, decant and pour through cotton. The sp gr of *A* thus prepd is 1 12-1 14, the content of polysulfide S is 60-65 g per l A list of 8 references is added S. Waldbott

**The galenical preparations of Pharmacopeia Helvetica V.** K Siegfried *Pharm. Acta Helv* 5, 255-70(1930) —An address Among novel requirements demanded by the Pharm of Swiss pharmacies are a standardized thermometer, an app for evapg exts under reduced pressure, special vessels to keep drugs and exts over lime, a polarimeter and a polarization attachment to the microscope Certain emulsions, *e g*, of P, must be prepd with stabilized, *i e*, enzyme free gum arabic The new features of all galenical prepns , *e g*, the various exts., infusa, injectabilia, tinctures, ointments, etc , are discussed S Waldbott

**The examination of alkaloids for purity in the Swiss pharmacopeia.** R. Eder, E Bürgi and H T Liem *Pharm Acta Helv* 5, 276-85(1930), cf *C A* 24, 5424 —An address The various pharmacopeias should agree on a uniform definition of alkaloids, *e g*, in quinine sulfate. The reaction of alkaloidal salt solns should be measured by detg the $p_H$ value by means of colorimetric indicators A list of 25 such salt solns has been arranged into 6 groups of varying $p_H$ values (2.8-7 0). S Waldbott

**The use of *p*-hydroxybenzoic esters in sterilization and disinfection.** Th Sabalitschka *Pharm Acta Helv* 5, 286-8(1930), cf *C A* 22, 2029 23, 2733, 24, 160, 3285, 4834, 5886, 25, 1031 —The antiseptic and sterilizing effect of 0 05% of *nipasol* (*A*), the Pr ester of *p*-$OHC_6H_4CO_2H$, exceeds that of a 0 25% PhOH soln E Leschke found 0 04% of *A* or 0 2% of the sol. Na compd completely non toxic and non irritating in injections The 0 2% soln is recommended for sterilizing instruments, and to keep medicaments sterile for internal therapy *A* and the similar esters may also be used for disinfecting powders, *e g*, $B(OH)_3$ talcum, warming with 1-3% Me ester, or 2-6% mixed esters to 70°, renders these powders germ free for at least 2 5 yrs Addn of these esters enhances the antiseptic effect of $B(OH)_3$ materially S Waldbott

**A comparison of certain suspending agents.** F. R. C. Bateson *Pharm J* 126, 52-3(1931) —Shake a suspension of 2 g prepd chalk in 100 cc water for 30 min with (*a*) 12 5 cc. of mucilage of gum acacia (*Brit Pharm*), (*b*) 12 5 cc. of mucilage of tragacanth, (*c*) 2.22 g of compd powder of tragacanth, (*d*) 3 33 g of the same, then pour off

50 cc of the suspensions and det $CaCO_3$ in each suspension and residue It is found that the most efficient suspending agent for insol powders is *compd powder of tragacanth* (*Brit Pharm*) The (above) proportion of 10 grains is but slightly less effective than 15 grains per fluid ounce, but as in the latter case the mixt is very viscous, the weaker proportion is preferable The 2 mucilages (*a* and *b*) are not nearly so effective as suspending agents S WALDBOTT

**The leaf oils of Washington conifers. Introduction.** ARNOLD J LEHMAN AND F V LANE *J Am Pharm Assoc* 19, 840-3(1930) — Botanists list 21 species of conifers in the state The oils from 8 have been studied previously by others The introduction contains a review of the literature and bibliography L F WARREN

**Physiological potency of commercial ergot preparations.** W T MCCLOSKY, M R THOMPSON AND N G BARBELLA *J Am Pharm Assoc* 19, 844-7(1930) A survey was made of the market supply of fluidext of ergot and other ergot prepns The prepns were tested by the cockscomb method but if the results were not concordant checks were run by the Brown Clark method as modified by Pattee and Nelson The fluidexts assayed 0–400% of the U S P requirements The other prepns many of which were in ampoule form, assayed from 0 to about 120% of the labeled amts. The assay methods used are capable of detg the specific alkaloidal activity within ±20% Therefore those prepns assaying 80-120% of the U S P X potency may be considered as satisfactory Of 79 com fluidexts 35% were substandard, 20% were of U S P potency and 45% were superstandard Many of the substandard prepns had been repackaged before final marketing Probably some of the superstandard prepns had been assayed by the U S P method immediately after making and the non specific amine interference had instituted an error in standardization Such errors in standardization may be avoided by aging the prepns in filled containers for several months before final standardization Com ergot prepns should bear an expiration date L L WARREN

**Oleonaphtha as absorber of ethereal oils from distillation water.** V I VARENTZEV *J Chem Ind* (Russia) 6, 906-7(1929) — Instead of following the usual procedure of returning the condensed distd water holding droplets of ethereal oils back to the distg app the condensate collecting in the traps is made to pass through a layer of oleonaphtha, which retains the ethereal oils. A saving of 1.77% of the product was accomplished by this innovation This method was also successfully applied to the recovery of *terpineol* from condensate, increasing the recovered product by 3.33% A C. Z.

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Ambergris and how to recognize it (MORRISON) 27. Analysis and preparation of medicated soaps (MATOLESY) 27. The economics of pyrethrum (GLASSFORD) 15. Pyrazolone derivatives [intermediates for drugs] (Ger pat 514,421) 25. Immunizing plants [vegetable serums for human and veterinary therapeutics] (Fr. pat 693,723) 15. Creams, etc. (Fr pat 692,454) 27.

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GILDEMEISTER, E., AND HOFFMANN, FR Die Ätherischen Öle. Band III. 3rd ed., revised by E. GILDEMEISTER. Miltitz bei Leipzig Verlag der Schimmel & Co Akt M. 36, half leather, M. 40 Cf *C A* 24, 690

TRUTTWIN, HANS' Grundriss der kosmetischen Chemie. Brunswick Vieweg 152 pp. M. 9.75.

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**Synthetic drugs.** I. G FARBENIND A G (Erich Bartholomäus, inventor). Ger. 514,418, Apr 28, 1928. Anthelmintics of a basic character are prepd by treating ketotetrahydronaphthalenes with $CH_2O$ and a secondary amine Thus, an alc. soln of 1 ketotetrahydronaphthalene, paraformaldehyde and $Me_2NH$ HCl, boiled under reflux for 1 hr., yields *2-dimethylaminomethyl 1-ketotetrahydronaphthalene-HCl*, m 158-9° Other examples are given also

**Synthetic drugs.** I. G FARBENIND. A.-G. (Hans Schmidt, inventor). Ger. 515,206, Nov. 7, 1928. Sol complex org compds of Sb are prepd by the reaction of aromatic *o*-dihydroxy compds. contg acid salt-forming substituents or their salts, with oxygenated compds. of quinquevalent Sb Thus, an aq soln of K catecholdisulfonate may be treated with an excess of antimonic acid and the soln filtered and neutralized, the product is pptd by pouring into MeOH Other examples are given also

**Synthetic drugs.** I. G FARBENIND A.-G (Karl Streitwolf, Alfred Fehrle and Hubert Oesterlin, inventors). Ger. 515,207, Aug. 28, 1929 Addn to 510,451 (*C. A.* 25, 1036). The method of prepg arsenobenzenes having aromatic hydroxyacylamino groups described in Brit. 318,491 (*C. A.* 24, 2241), is modified by condensing one component in the form of its arsine with the other component in the form of its arsine oxide

or the corresponding dichloroarsine Thus, 4 glycolylaminobenzenearsine oxide in alc. HCl soln may react with 3 amino-4 hydroxyphenylarsine Other examples are given also

Synthetic drugs. I G Farbenind A.-G (Fritz Mietzsch and Heinrich Klös, inventors) Ger 515,466, Jan 30, 1929 New products effective against blood parasites are prepd by acylating 4 (ω aminoalkyl)aminobenzenearsonic acids which may or may not be substituted in the 2 position The initial materials may be prepd as described in Ger 501,088 (*C A* 24, 4588-9) Examples are given

Synthetic drugs. Schering-Kahlbaum A.-G (Adolf Feldt, Walter Schoeller and Erich Borgwardt, inventors) *Ger 513,709, May 6, 1928 Addn to 511,303* The method of Ger 511,303 (*C A* 25, 1335) is extended to the conversion of aminometal mercaptosulfonic acids generally into the corresponding ω sulfomethylamino compds The initial materials in two of the examples given are Na β amino α auromercaptoethanesulfonate and Na 3 amino-4 auromercaptobenzenesulfonate

Synthetic drugs. Schering-Kahlbaum A.-G (Walter Schoeller and Erich Borgwardt, inventors) Ger 514,506, Feb 12, 1926 Addn to 506,443 The method of prepg auromercapto acids described in Ger 506,443 (*C A* 25, 381) is modified by using acid or neutral sulfite in place of $H_2SO_3$ Examples are given

Synthetic drugs. Karl Lödecke Ger 515,002, Sept 11, 1928 Salts of choline with negatively substituted aromatic arsonic acids are prepd by the customary salt-forming methods The products are cryst and non hygroscopic Examples are given describing the prepn of the choline salts of, *inter alia*, 4 iodo-3 nitrobenzenearsonic acid, 3 5-dinitro-4 aminobenzenearsonic acid, and 4-carboxybenzenearsonic acid

Extraction and concentration of vitamins. G Dubois Belg 372,102, Aug 31, 1930 Ground fish ovaries and livers are treated in strong alc The oily liquid obtained on pressing is sapond with an alc alkali soln, and the soap is treated with $Me_2CO$ and $Et_2O$ *to obtain vitamin A and with superheated steam to obtain vitamin D*

Medicinal silver preparation. Physiologisch-chemisches Laboratorium Hugo Rosenberg Ger 515 061, Oct 18, 1927 An ammoniacal soln of $Ag_2O$ is heated with an excess of starch until the oxide is wholly or partly reduced An example is given

Antiseptic solution The Pepsodent Co Fr 693,083, Mar 31, 1930 An antiseptic and disinfectant soln contains, *e g*, chlorothymol 0 1, glycerol 7 5, EtOH 25, AcOH (of 36%) 1 and water 64 4%

Creams, pomades, etc. Compagnie française pour l'exploitation des procédés Thomson-Houston Fr 692,757, Mar 26, 1930 A protective pomade or cream contains soap 10, gum arabic 4, lanolin 2, glycerol 1 and water 74 parts Gum arabic may be replaced by dextrin and lanolin by other oily substances

Perfumes J D Riedel-E de Haën A.-G Ger 515 332, Dec 8, 1926 Ethers of 3,4 dihydroxybenzyl alc are used as fixing agents or solvents for perfumes The prepn of the dimethyl, methyl ethyl and diethyl ethers is described

Essence d'Orient. Joseph Jacobson Fr 693,735, July 22, 1929 Pure Essence d Orient is obtained by emulsifying the org materials mixed with it by peralcohol which permits a rapid decantation from the crystals

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E M Symmes

Causes of the intoxications produced in the cleaning of sulfuric acid tanks and tank cars. Leymann and Weber *Zentr Gewerbehyg Unfallverhütung* 17, 154–9 (1930), *Chimie & industrie* 24, 832–3 (1930) —From a study of a large no of cases it is concluded that the intoxication is due to $AsH_3$ Against this were the suppositions that the action of $H_2SO_4$ on metallic Fe in the presence of reducible As compds does not produce $AsH_3$, and that, as com $H_2SO_4$ (except contact process $H_2SO_4$) contains $HNO_3$, $AsH_3$ gas cannot form Lab expts showed that when crude dil $H_2SO_4$ acts on Fe in the presence of reducible As compds, $AsH_3$ can be evolved, even at atm temp, at higher temps, even when very dil, $H_2SO_4$ can still give rise to evolution of $AsH_3$ under similar conditions, finally, the small quantities of $HNO_3$ present in technical $H_2SO_4$ do not prevent the reaction When cleaning out the tanks or cars, the $H_2SO_4$ which sats the sludge heats up on being dild, attacks the Fe and ultimately causes evolution of $AsH_3$ To prevent the intoxications, cleaning outlets should be provided in the bottom of the tanks, or the washing should be carried out with a large amt of water, which is continuously siphoned off A Papineau Couture

Lime in 1929. A. T. Coons. *Bur. Mines, Mineral Resources of the U. S.* 1929, Pt. II, 267–98 (preprint No. 20 published January 14, 1931). F. H.

**Density of sulfuric acid solutions of copper sulfate.** G. Charlot, C. Charmetant and A. Rame. *Chimie & industrie* 24, 791–6 (1930). Control of the manuf. of $CuSO_4$-$SH_2O$ requires frequent detns. of the compn. of the solns. to maintain the acidity within relatively narrow limits. As the detn. of acidity is relatively long to carry out, curves of the compns. of solns. at different densities were established and plotted on triangular coördinates, the sides of the triangle representing CuO, $SO_3$ and $H_2O$, respectively. From them the crystn. curve was obtained. By anamorphosis the crystn. curve was transposed to rectangular coördinates. The diagrams permit obtaining the compn. of $H_2SO_4$, $CuSO_4$ solns. from the densities and CuO contents. For the curves and method of using them the original article should be consulted. A. Papineau-Couture.

**The sulfates in industry: a review of the water-soluble products. IV. Magnesium sulfate. V. Iron sulfates. VI. Zinc sulfate. VII. Copper sulfate.** Chas. H. Burgess. *Chem. Trade J.* 88, 125–6 (1931); cf. *C. A.* 25, 1637.—An outline of characteristics required of these sulfates in the industries. W. H. Boynton.

**The problem of the drying of salt.** R. Duckaert. *Chimie & industrie* 24, 805–8 (1930). A brief discussion is given of various types of app. for drying salt from a moisture content of 5.8% down to 0.5%, together with approx. figures on the cost of the drying. A. Papineau-Couture.

**Studies on fundamental synthesis of calcium aluminates and their hydration. VII.** Shoichiro Nagai and Ryuichi Naito. *J. Soc. Chem. Ind. Japan* 33, Suppl. Binding, 313–8 (1930); cf. *C. A.* 24, 4370.—Tests show that gehlenite ($2CaO.Al_2O_3.SiO_2$) can be obtained by heating appropriate mixts. of CaO, $Al_2O_3$ and $SiO_2$ above 1300° or for a longer time at 1150°. In eutectic mixts. between $Ca_3Al_2O_6$ and $Ca_2SiO_4$ the combination of CaO and $Al_2O_3$ or $SiO_2$ is completed instantly by heating at a little higher temp. than 1300°. Compression tests on the synthesized products of alite and gehlenite and of eutectic mixts. show that the alite has a small value at short curing times, but the strength increases gradually on longer curing in water. The gehlenite has no perceivable strength, but its strength increases remarkably when 5–10% of CaO is added. H. C. Parish.

**Anhydrous aluminum chloride: its uses and manufacture.** C. Simon. *Chimie & industrie* 24, 1317–21 (1930).—A brief review is given of the more important uses of $AlCl_3$ with an outline of the chief processes of manuf., more particularly a comparison of the MacAfee and Hagglund processes. A. Papineau-Couture.

**Chile's attempt to modernize and make profitable the production of nitrate.** L. Neubergk. *Ausländer* 4 *Inst.* 27, 349 (1930).—Statistics. C. J. S.

**Annual review number.** *Eng. Mining J.* 131, 97–183 (1931). Gold. Robert J. Grant. *Ibid.* 97 (1931).—Increase in mining typifies the period of economic adversity. Silver. H. M. Bratter. *Ibid.* 98–9.—The by-product output of the metal makes its future uncertain. Precious stones. George F. Kunz. *Ibid.* 99. Lead. Clinton H. Crane. *Ibid.* 100–1.—Abnormal refined metal stocks are on hand. Asbestos. Norman R. Fisher. *Ibid.* 101–2.—Russian output has rapidly increased, while that of the U. S. A. and the Union of South Africa has fallen markedly. Cobalt. G. C. Ratzman. *Ibid.* 102.—The ceramic industry consumes about 40% of the output, but increased use in Co-alloys is noticed. Aluminum. C. I. Mantell. *Ibid.* 102.—The Al industry has held its own, with an outlook for further expansion in 1931. "Copper. Arthur Notman. *Ibid.* 103–4.—"Opposition to law of supply and demand has again proved futile." Graphite. Benjamin L. Miller. *Ibid.* 104. Zinc. Julian D. Conover. *Ibid.* 105–6. Nickel. Thomas W. Gibson. *Ibid.* 106. Iron. Edwin C. Eckel. *Ibid.* 107. Tin. E. Raymond Scott. *Ibid.* 108–9. Sulfur and pyrites. Raymond P. Bacon. *Ibid.* 109. Quicksilver. H. W. Gould. *Ibid.* 110. Minor metals. Paul M. Tyler. *Ibid.* 111–4.—Economic figures for Sb, chromite, bauxite, Mn, Mo, W, Ur, Ra, V and Ta are discussed. Non-metallics. Oliver Bowles. *Ibid.* 115–8.—Sales of construction materials led the decline in the depression period. Barytes, feldspar, fluorspar, gypsum, kaolin, magnesite, phosphate, mica, talc and soapstone and silica are discussed. Platinum. H. W. Boynton. *Ibid.* 118.—The decline in price during 1930 was due more to increased production than to marked decrease in consumption. Increased consumption was evident in the essential industries. Uncommon ores and metals. H. C. Meyer. *Ibid.* 119–20. Elements discussed are: Be, Cs, Ru, Os, Se, Te, Th, Ti and Zr. World potash industry prospers. J. W. Turrentine. *Ibid.* 121. Mining in the United States. S. D. Strauss. *Ibid.* 121–4. Canadian output of metal expands. S. J. Cook. *Ibid.* 125–6. Mining in South Africa and Rhodesia. Owen Letcher. *Ibid.* 126–7. Mining in Latin America in 1930. S. D. Strauss.

*Ibid* 128-30 Europe, Siberia, Far East and India. DONALD J. FARQUHARSON *Ibid* 131-2 The mining industry of the U. S. S. R. V. KARMASHOV. *Ibid* 132-3. Mining in Australasia in 1930. PETER G TAIT. *Ibid* 133. Japan. HIRONAO NISHIHARA. W. H BOYNTON *Ibid* 134.

A study on agar-agar. II. TETSUNOSUKE YANAGAWA AND Y. NISHIDA. *Repts Imp Ind Research Inst., Osaka, Japan* 11, No 14(1930), *cf C A.* 23, 4538.—Constituents of *Gelidium amansii* Lamx and the phys. properties of agar-agar are given F I NAKAMURA

Study of the conditions of cooking of gum tragacanth. A T LOMANOVITCH AND VENETZKAIA *Izv Tekstiln Promychl* 9, No 3, 71-3(1930) *Chimie & industrie* 24, 947(1930).—From a study of the various factors involved, the following procedure is recommended swell the finely divided gum in 30 parts of water at 50° for 12-15 hrs with continuous stirring, heat for 2 hrs. in an open kettle and cool with stirring for 6-8 hrs., at which point max viscosity is attained A. PAPINEAU-COUTURE

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The production of superphosphate from Khibinsk apatite (VOL'FKOVICH, *et al*) 15.

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British Plastics Year Book, 1931. London: The British Plastics Moulding Trade Assocn 229 pp

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Hydrocyanic acid. IMPERIAL CHEMICAL INDUSTRIES, LTD., T S WHEELER, J MCALLAY, W B FLETCHER and H A T MILLS Brit. 335,585, March 27, 1929 Fr 692,542, March 21, 1930 Reaction between a hydrocarbon gas (such as $CH_4$, $C_2H_4$, and various natural and artificial industrial gases contg hydrocarbons) and $NH_3$, to produce HCN and H is effected by passing a mixt of the hydrocarbon material with more than one mol proportion of $NH_3$ for each at. proportion of C, at a temp of at least 1150°, rapidly through an unpacked reaction chamber H or water vapor may be present, the gas mixt may be preheated to 900° or higher, and the reaction chamber is preferably formed with smooth internal surfaces such as glazed silica or sillimanite S compds and $CO_2$ may be removed from the gases by passing them through aq or liquid $NH_3$.

Hydrocyanic acid. IMPERIAL CHEMICAL INDUSTRIES, LTD Fr 692,543, March 21, 1930 HCN is produced as described in the preceding patent, but the $NH_3$ is not used in excess Instead an appreciable amt of a diluent such as H or N is used The hydrocarbon may be coke furnace gas, and it may be purified and at the same time mixed with $NH_3$ by bringing it into contact with liquid $NH_3$

Phosphoric anhydride. LUCIEN COPPÉE Belg 372,292, Aug 31, 1930 Phosphates, to which may have been added a substance capable of reducing the reaction temp., *e. g.*, $Al_2O_3$, are heated in presence of $SiO_2$

Phosphoric acid. H LAWARRÉE Belg 370,074, June 30, 1930 Pb oxychloride or hydroxide is used in a closed cycle to isolate phosphoric acid as Pb phosphate in a salt soln contg phosphoric acid

Phosphoric acid; hydrogen. BAYERISCHE STICKSTOFFWERKE A.-G. (Vladimir N Ipat'ev, inventor) Ger 514,173, Mar 1, 1929 See Fr 670,338 (*C A* 24, 1941)

Phosphoric acid and aluminum compounds. I G FARBENIND A G Fr 693,818, Apr 12, 1930 Al is pptd as $AlCl_3$ by HCl gas from a hydrochloric acid soln of substances contg Al and $H_3PO_4$, and the $H_3PO_4$ is recovered after elimination of the Al An example is given of the treatment of natural Al phosphate

Silicic acid. RICHARD WILLSTÄTTER, KARL LOBINGER and HEINRICH KRAUT Ger 514,414, Nov 3 1928 Stable solns contg silicic acid as simple mols are prepd by decompg an alkali silicate soln with an acid, or by the reaction of a silicon halide with an aq suspension of $Ag_2O$ or other suitable base, and acidifying the soln so obtained until the hydrion concn lies between $p_H$ 1.5 and 3.5 Examples are given

Apparatus for effecting gas reactions such as catalytic production of sulfuric acid, ammonia or methanol. LUIGI CASALE U S 1,790,853, Feb 3 Various details are described of an app with baffle plates and partitions arranged for heat-exchange between products of reaction and gases supplied for the reaction

Removing arsenic from acids. METALLGES A.-G Fr 692,595, Mar 24, 1930 As is removed from a concd. acid such as $H_2SO_4$ of 60° Bé by the addn of the exact amt of $H_2S$ necessary to convert the As to sulfide

Purifying acids or acid salts. PAUL BOESSNECK. Ger 514,493, Sept 26, 1929 Solns of acids or acid salts obtained by treating solns. of Ca salts with $H_2SO_4$ are freed from dissolved $CaSO_4$ by addn. of HF.

Salts of cyanic acid. Deutsche Gold- und Silber-Scheideanstalt vorm Roessler. Fr 692,481, Mar 21, 1930 Salts of cyanic acid are prepd by heating, in the absence of solvents, urea with alk. earth compds. *such as* CaO, $Ca(OH)_2$, $CaC_2$ *or* alkali compds. such as $Na_2CO_3$ or $K_2CO_3$.

Synthesis of ammonia in presence of inert gases. Ammoniaque synthétique et dérivés, soc. anon *Belg* 372,057, *Aug* 31, 1930 *After* having been freed from $NH_3$, the gases are partly returned to the same tower along with the gas from the preceding tower (or the fresh gas in the case of the 1st tower), and partly sent to the next tower (or the gas discharge in the case of the last tower)

Synthesis of ammonia. Soc. chim de la Grande Paroisse (Azote et produits chim.) Fr 693,712, July 9, 1929 Small quantities of $CO_2$ in the gases for the synthesis of $NH_3$ are removed by the action of the $CO_2$, $NH_3$ and steam to form $(NH_4)_2CO_3$, sufficient steam being left in the gas, so that during the final condensation it carries down the $(NH_4)_2CO_3$.

Gaseous syntheses. Universitäts-Institut für Physikalische Grundlagen der Medizin Fr 693,641 Feb 28, 1930 In gaseous syntheses of surface reaction type by means of elec. discharges, the reaction chamber in which the elec. discharges are passed through the gas is heated to above the critical temp of the gas to be prepd. Examples mentioned are the *preps of* $NH_3$ and $C_2H_2$

Oxidation of ammonia. E I du Pont de Nemours & Co Fr 692,824, Mar. 27, 1930. $NH_3$ is oxidized to oxides of N by passing a mixt. contg $NH_3$ and O in contact with a catalyst of the Pt group, the exposed surface of which per unit section of the gaseous current is more than 4 thicknesses of gauze of 23–63 mesh per linear cc., formed of threads of 127–25 thousandths of a mm. in diam

Oxidizing ammonia. E. I du Pont de Nemours & Co. Fr 693,559, April 8, 1930 $NH_3$ is oxidized to oxides of N by passing a mixt. of $NH_3$ and O over catalysts and rapidly cooling the reaction mixt. to below 500°. An app is described.

Oxidizing ammonia with oxygen. Frans G Liljenroth. Ger 514,392, Sept. 9, 1926. See Swed. 65,260 (*C A*, 24, 1473)

Alkali ferrocyanides. Hamburger Gaswerke G m b H Fr 692,868, Mar. 28, 1930. Alkali ferrocyanides are prepd during the extn. of HCN from coal gas by washing, by means of bivalent compds. of Fe suspended in an alk. lye contg an excess of alkali. The excess of alkali depends in amt. and concn. on the content of HCN in the coal gas, so that only sol. ferrocyanides are produced, and this excess after being transformed into carbonate or bicarbonate by the $CO_2$ in the gas is neutralized.

Alkali chromates. Mutual Chemical Co. of America. Fr 692,614, March 24, 1930. See U. S. 1,752,863 (*C A* 24, 2553).

Alkali *or alkaline earth salts from the corresponding chlorides.* H. Lawarrée Belg. 370,808, July 31, 1930. The acid is brought into contact, in aq medium, with the chloride in presence of an oxide, hydroxide or basic mercurous or mercuric salt which can combine with the Cl ion. The $HgCl_2$ or $Hg_2Cl_2$ produced is treated with a base to regenerate the oxide or other mercurous or mercuric salt. Cf *C A* 25, 779

Chromium compounds. Gino Panebianco and Virginio A. de Libera. Fr 692,786, Mar. 26, 1930. Industrially pure Cr compds. particularly a mixt. of $Cr_2O_3$ and $H_2Cr_2O_4$ or its salts, are obtained from crude materials such as Cr ores or slags, by mixing the crude material with substances contg pure or combined C and submitting the mixt. to the catalytic action of Cl in the presence of free or combined O

Alkali metal phosphates. Metallges. A.-G *Brit.* 333,492, Oct. 17, 1929 Phosphates such as $Na_3PO_4$ and $K_3PO_4$ are produced by fusing (suitably at a temp of about 1150–1250°) a mixt. of alkali metal sulfate and a metal P alloy such as ferro-P, P-Cu or P-Mn (*preferably in the form of powder or small lumps*) in a elec. resistance furnace. Various details of procedure for avoiding atm. oxidation, etc., are described The reaction product is leached with water, and metal sulfide is obtained as a by-product.

Phosphates. Phosphate Recovery Corp Fr 692,731, Mar. 25, 1930 Phosphatic material contg. particles of phosphate and particles of gang is concd. by treatment with alkali and with oil and sepn. by a surface flotation. An app. is described. Cf *C. A.*, 24, 1473.

Phosphates. Soc. d'études pour la fabrication et l'emploi des engrais chimiques (Etienne T. de Boismilon, inventor) Fr 693,736, July 22, 1929 A Ca phosphate having a content of citrate-sol. $P_2O_5$ of at least 35% of the dry product is obtained by adding the ground natural phosphate very slowly to the HCl soln. (contg not more than 70 g HCl per l) at a temp. of about 30°

Phosphotungstates. Joseph F. Darling (to E I du Pont de Nemours & Co)

U S 1,790,905, Feb 3 For purifying phosphotungstates such as Na phosphotungstate *in a mother liquor the crude tungstate liquor is acidified (suitably with HCl), an aromatic amine* such as dimethylaniline is added, the repptd. phosphotungstate formed is removed, *the ppt is treated with an alk. substance such as NaOH and the amine is* steam distd off

*Metal carbonyls.* I. G FARBENIND A.-G (*Leo Schlecht and Emil Keunecke*, inventors) Ger 515,464, Aug. 19, 1928. See Fr. 679,542 (*C. A.* 24, 2865).

*Manufacture of ammonium sulfate from the spent gases of coke ovens and synthetic-ammonia plants.* R LEDENT Belg 370,942, July 31, 1930. $FeSO_4$ is used in the neutralizers instead of $H_2SO_4$. The pptd $Fe(OH)_2$ is air-dried and used as Fe ore The concd $(NH_4)_2SO_4$ soln is crystd.

Utilizing dilute sulfuric acid for the manufacture of ammonium sulfate. Soc. GÉNÉRALE DE FOURS À COKE (SYSTÈMES LECOCQ) Fr 692,789, Mar 26, 1930 See Belg 350,553 (*C A* 24, 950)

Aluminum chloride. I G FARBENIND A -G (Johannes Brode and Carl Wurster, inventors) Ger 515 033, June 2, 1929 Anhyd $AlCl_3$ free from Fe is prepd by fusing the crude salt with a reducing agent, *e g*, Al, and sepg Fe from the melt by electromagnetic means, *e g*, by suspending an electromagnet in the melt

*Magnesium chloride.* ELISA LACELL NÉE VANDER-VORD Fr 693,232, April 3 1930 Carnolite or $MgCl_2$ is dehydrated by adding gradually to a relatively large anhyd *mass of $MgCl_2$ or $MgCl_2$ and KCl relatively small quantities of the salt to be dehydrated*, to cause a rapid evapn of the water and prevent the formation of oxides

*Potassium nitrate.* KALI FORSCHUNGS-ANSTALT G M. B H Fr 693,181, April 2, 1930 A mixt. of $Al(NO_3)_3$ and KCl is heated until no more nitrous gases or Cl sep , and the $KNO_3$ is dissolved in water or in $KNO_3$ solns The $Al_2O_3$ is reconverted to $Al(NO_3)_3$ by $HNO_3$, the nitrous gases being used as well. Cf *C A*. 24, 3091

*Potash and alumina.* FELIX JOURDAN Fr 693,074, Mar 31, 1930 KOH and $Al_2O_3$ are obtained from leucite by heating limestone with leucite and a suitable flux to the m p , cooling, grinding and leaching with a soln of $K_2CO_3$ to neutralize the CaO and ppt. it as $CaCO_3$.

*Selenium sulfide.* COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON HOUSTON Fr 692,758, Mar 26, 1930 Stable active $SeS_2$ of definite compn is made by satg a soln of $AlCl_3$ with $H_2SO_4$ and adding a soln of $H_2SeO_3$ with continued addn of $H_2SO_4$. A yellowish sol is first formed which is converted to a yellow flocculent ppt. A temporary and moderate excess of acid gives a sol The ppt. is washed and dried $BaCl_2$ may be used instead of $AlCl_3$. Another method consists in mixing S and Se in the theoretical proportions and heating to 225° The plastic product obtained slowly changes and becomes fragile and hard The $SeS_2$ may be combined with a hydrophile medium such as bentonite by heating the 2° to 125–150° The *product may be used for the vulcanization of rubber* or in aq suspension as a *fungicide* or *insecticide*

*Sodium cyanide.* S COTTLIER Belg 372,147, Aug 31, 1930 A mixt of carbonaceous material, alkali salts and catalyst is treated with hot N, with addn of a quantity of Na salts equiv to the quantity of NaCN required. After sepn of NaCN, the mass is treated with steam under pressure to produce formates and $NH_3$. Cf *C A* 25, 385

*Recovery of sodium carbonate from "tails salts."* HARRY W MORSE U S 1,791,281, Feb 3 "Tails salts" contg $Na_2CO_3$, such as those produced from Searles Lake brine, are washed with water at a temp of 20–40° in order to dissolve out $Na_2CO_3$

*Sodium chromate, alumina.* I. G FARBENIND A -G (F Wissing, inventor) Ger 513,942, Feb 5, 1930 Addn to 505,318 In the method of Ger 505,318 (*C A* 24, 5049), the extn. of the sol. portion is effected by heating the melt with water under pressure to a temp above 100°, *e g*, to 230°. The ext. thus obtained is relatively free from $SiO_2$

*Sodium fluoride.* E V. BRITZKE, W. I BREMPELL and M E JAKUBOWITZ Brit 335,703, Aug 29, 1929 NaF (neutral, acid or mixed) is obtained by the action of gaseous HF on solid calcined soda at an elevated temp (suitably 70°), and the acid fluoride formed may be further neutralized with calcined soda. App is described.

*Acid disodium pyrophosphate.* METALLGES. A.-G Brit. 335,501, May 17, 1929 This compd. is obtained by evapg *in vacuo* (suitably at 180–200°) a soln contg $H_3PO_4$ (which may be that obtained by decompg crude phosphates with $H_2SO_4$) and a proper proportion of NaCl.

*Bleaching powder.* I G FARBENIND. A.-G Ger. 514,390, May 24, 1928. Ground $Ca(OH)_2$ is suspended in an inert liquid, *e g*, $CCl_4$, and treated with Cl at a temp. above

40°, the mixt. being rapidly cooled below 20° when the reaction is completed. The product is dried *in vacuo* at a low temp

Mixtures of hydrogen and carbon oxides. British Celanese, Ltd., W Bader and E F Stimson Brit. 345,632, July 2, 1929 Mixts of $CO_2$ and H such as those obtained by releasing the pressure upon wash waters used in treating industrial CO and H mixts., have their H content reduced or eliminated by treatment with chromite above 700° (preferably at 800–900°) which increases the CO content of the mixt. so that it may be used for CO production by drying and passing it over hot coke or charcoal

Animal black. Balch & Sons Co Fr 693,239, April 3, 1930 See Ger 512,484 (*C A* 25, 1045)

Roasting sulfur ores. Saurefabrik Schweizerhall Fr 692,569, Mar 22, 1930 S ores or other materials contg S are roasted in mech furnaces of several floors in countercurrent to air the ore, etc., passing over intermediate floors to which only part of the air has access to prevent premature cooling by the air

Condensation products. I G Farbenind A-G Fr 693,750, April 11, 1930 Condensation products are obtained as a fine powder without odor by the reaction of aliphatic aldehydes, or their mixts with bases of the naphthalene series in the presence of acids in ales sol in water and treatment of the products with water Examples are given

Condensation products of urea and formaldehyde. Martin Luther and Claus Heleck (to I G Farbenind A G) U S 1,791,062, Feb 3 Condensation is effected with an aq soln of urea and $CH_2O$ in which a $p_H$ of 4 to 7 is maintained by addn of buffer compds, and there is added to the condensation product, prior to hardening, a substance such as $MgCl_2$ or formamide which is capable of forming acid in the liquid condensation product during the heat treatment employed for the hardening

Resitols. Aug Nowack A.-G and Richard Hessen Fr 693,004, Mar 29, 1930 The initial sol and fusible condensation products (resols) from phenols and $CH_2O$, if necessary with the addn of accelerators or the polymers or homologs of, $CH_2O$, are heated in thin layers for a short time, preferably repeated, until the whole or a greater part of the volatile constituents are eliminated and the resitol formed contains the desired amt. of resol for the final treatment of the resulting resitol

Cyanamide-formaldehyde condensation products. Hans Schmidt (to I G Farbenind. A G) U S 1,791,433, Feb 3 Formaldehyde is caused to act on cyanamide in aq soln contg a "strong" inorg acid such as dil HCl, while heating (suitably at a temp of the water bath) until the condensation product seps. in an amorphous condition U S 1,791,434 also relates to effecting reaction between cyanamide and $CH_2O$, as by heating in dil alk aq soln

Plastic materials. Compagnie française d'accumulateurs électriques Fr 692,565, Mar. 22, 1930 A plastic material for molding hard elastic products, particularly suitable for molding accumulator vats, contains a mixt of cotton-oil tar from the residues obtained in purifying cotton oils with $H_2SO_4$, petroleum tar, fibrous materials and a mineral charge An example contains cotton-oil tar 40 petroleum tar 20, kiesel guhr 30 and asbestos or jute 10%

Molding casein. Adalbert Zsigmondy Ger 515,376, Dec 4, 1926 See Brit 298,815 (*C A*, 23, 3061).

Composition for use in modeling, sculpture, pottery, etc. Karl F Höller and Stefan Schless Ger 515,442, Dec 28, 1928 See Austrian 119,622 (*C A* 25, 784)

Stabilization of dispersions of substances little soluble in water. N. V Bataafsche Petroleum Maatschappij and Hyman Limburg Dutch 23,111, Dec 15, 1930 Aq emulsions or suspensions of water insol substances, oils, tar, asphalt, rubber, etc., are stabilized by the addn of small quantities of sulfonic acids The latter are derived from petroleum products (lubricating oil fractions) by repeated sulfonation with 10% oleum (20% $SO_3$) at 50° The acid sludge from the 4th or 5th sulfonation is neutralized, and the sulfonic acids are dissolved in water In a 5% alkali sulfonate soln 160% of asphalt can be dispersed to a stable emulsion The active sulfonic acids have a mun mol wt of 500, are insol. in xylene and $CCl_4$, and are not pptd by $CaCl_2$ Cf *C A* 24, 444

Adhesive for belts and the like. A Plonskier Belg 369,970, June 30, 1930 The product is a mixt of lanolin, wax (*e g*, paraffin) and fish oil (*e g*, cod liver oil)

Adhesive. William B. Wescott (to The Rubber Latex Research Corp) Can 308,567, Feb 10, 1931. A plastic adhesive for laminated articles comprises heat-coagulated hemoglobin, rubber and a vulcanizing agent. It is used for securing rubber and rubber compns to metal, bakelite, wood, etc Cf *C A* 24, 2257

Wetting, etc., agents. H Th Böhme A G Fr. 692,862, Mar 28, 1930 Wetting

# 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Glass, its composition and properties. GEO. W. MOREY *J. Chem. Education* 8, 421–41(1931).—A review. I. H.

The theory of the composition of glass. E. ZSCHIMMER *J. Soc. Glass Tech.* 14, 229–49T(1930).—Graphic methods of representation of the compn. of glass as a quaternary system are discussed. H. F. K.

Effect of alumina and silica on some properties of glass. M. A. BESBORODOV *Glashütte* 60, 5–9(1930).—An increase in the $Al_2O_3$ and $SiO_2$ contents retarded the devitrification of a $B_2O_3$–$SiO_2$–$Al_2O_3$–CaO potash–soda glass, and increased the resistance toward water and $Na_2CO_3$. The resistance toward NaOH and $H_2SO_4$ rises with an increase in the $SiO_2$ content but falls with an increase in that of $Al_2O_3$. B. C. A.

The influence of manganese oxide on some properties of glass. A. A. CHILDS, VIOLET DIMBLEBY, F. WINKS AND W. E. S. TURNER *Ceramic Industry* 15, 292(1930).—The replacement of $Na_2O$ by MnO in 3 series of glass batches resulted in lowering the working temp. and the coeff. of thermal expansion; it raised the annealing temp. and improved the chem. stability. M. A. F.

Feldspar, its effect in glass. C. W. KOENIG *Ceramic Age* 16, 150–2(1930); *Glass Ind.* 11, 264–6.—Feldspar in the glass batch is considered from the standpoint of the beneficial effects of alumina. Feldspar causes no mech. or chem. disturbance in the batch, is non-corrosive to tank blocks, and hinders surface sepn. of silica. It should be added at intervals in small quantities to avoid producing glasses of different compns. in the same tank. A bibliography of 19 titles is given. M. A. E.

Plea for uniformity of glass-making materials. R. L. FRINK. *Natl. Glass Budget* 46, No. 26, 3, 13, 16, 20–1, 24(1930).—F. discusses at length the undesirable effects of variation of Fe content and moisture content, also of the presence of extraneous reducing agents in the raw materials of the batch, sometimes including not only tar and soot, but also catsup, sirups and fruit juices introduced with bottle cullet. Checks and seeds as well as unsatisfactory color, brittleness, and lack of homogeneity in glass may all be traced to such variations in materials. M. A. E.

Effect of various radiations on the coloring of glasses. P. GILARD AND AD. LECRENIER. *Chimie & industrie* 24, 1035–51(1930); cf. *C. A.* 21, 3434, 25, 1049.—A large no. of glasses of known compn. were exposed for several weeks to the light of a Hg-vapor arc. The same and other glasses were exposed to the action of Ra rays for 29 days, and also samples of minerals and of a no. of pure chem. compds. The absorption spectra of the irradiated glasses were measured by the method of G. and Swings (*C. A.* 24, 5235). From the results G. and L. are inclined to the belief, contrary to Przibram and coworkers, that the action of the Ra rays is like that of the ultra-violet rays in that it affects the mol. rather than the atom. A. PAPINEAU-COUTURE.

Note on the influence of different radiations on the coloring of glass. AD. LECRENIER AND P. GILARD. *Rev. universelle mines* 4, 349–62(1930); cf. *C. A.* 25, 1049.—The ultra-violet ray has a marked influence on the intimate compn. of glass. It provokes reactions that may modify the aspect of the glass. The fact that certain glass seems unaltered does not mean, necessarily, a lack of internal reactions; the existence of these can be established only through sensible phenomena, such as colorations. In glass containing Cr or other elements existing in several states of oxidation, the action of the ultra-violet ray is clearly shown by displacement of color. The color obtained varies essentially with the compn. of the glass. Because of the lack of permeability of glass to ultra-violet rays, the color is at first superficial and only with time reaches the deep layers and the center of the mass. The color obtained disappears under the action of heat near the softening temp. of the glass. The heat causes reactions that are the reverse of those produced by the ultra-violet ray and destroys the mol. structure the latter has established. The ultra-violet ray acts only chemically and modifies only the mol. structures of bodies. The Ra ray causes deeper disintegrations and attacks the atoms; however, it is possible that under the action of Ra rays there is produced a modification in the relative positions of atoms in the mol. Tests with Ra rays have shown that all glass contg. $K_2O$ gives yellowish green shades while that contg. Na gives shades of brown, the coloring varying with the compn. of the glass, often near the softening temp. Glasses contg. Cu and Fe scarcely seem to be affected by the Ra ray. Ni and Co glasses, on the contrary, are changed in a very perceptible manner. C. W. OWINGS.

**The making of mirrors by the deposition of metal on glass.** ANON *Bur Standards Circ* No 389, 17 pp (1931) —This publication supersedes *Letter Circ.* No 32 and deals principally with the methods for producing mirrors by the chem decompn of Ag on glass The Brashear, Rochelle salt, and formaldehyde formulas are given, also a detailed discussion of the precautions necessary to avoid danger, and the technic necessary to obtain the most satisfactory results. Reflecting films are produced on glass by the chem decompn of Cu, Pt or PbS, by cathode sputtering and by condensation of vaporized metals W. H. BOYNTON

**Preparation of mirrors by sputtering metals on to glass surfaces** A C G BEACH *J Sci Instruments* 7, 193-5(1930) —Expt details are given for the prepn of mirrors of Ag and Ni by sputtering B C. A

**Specifications for tank blocks** W. J REES *J. Soc Glass Tech* 14, 124-30P (1930) See *C. A.* 25, 1051. H. F. K.

**The corrosion of tank blocks by opal glasses.** C J UHLMANN AND S. M SLATER *J Am Ceram Soc* 13, 931-4(1930) —More opacifier must be used in batches for day tanks than for closed pots The glass used was: $SiO_2$ 65, $B_2O_3$ 1 5, $Al_2O_3$ 5 5, CaO 11 5, $K_2O$ 6 5 and $Na_2O$ 10 0% During a tank failure a fluid of lower viscosity ran out before the glass came through A similar vitreous substance was found between the glass and the bottom block Apparently certain of the corrosive ingredients melt out first and percolate through the batch to the bottom Cooling the blocks and filling in 3 sep charges decreased block stones and increased tank life C H KERR

**Mechanical handling of raw and manufactured material under the conditions obtained in glass works.** T. C DIMBLEBY *J Soc Glass Tech* 14, 263-75T(1930) H F K.

**Some experiments on the cascade method of melting glass.** T C MOORSHEAD AND E. A COAD-PRYOR *J Soc Glass Tech* 14, 249-60T(1930) H F K.

**Efficiency of tank furnaces for glass melting.** Proposals for the standardization of its nomenclature and methods for its measurement. W FRIEDMANN *J Soc. Glass Tech* 14, 91-102P(1930) H. F. K.

**Notes on the effect of load on the fuel consumption of a glass tank furnace.** C A COAD-PRYOR *J Soc Glass Tech* 14, 88-90P(1930) —For each 10% increase in the load over a range of 10-100% the increase in the fuel consumption was about 1 9%. H F. K

**Effect of factory organization and size of pots on the production from pot furnaces** W W WARREN *J Soc Glass Tech* 14 103-6P(1930) H F K

**Manufacture of working life of glasshouse pots** O BARTSCH *J Soc Glass Tech* 14, 107-18P(1930) —A comparison of pots contg the siliceous clays like the Grossalmerode clay and those of higher $Al_2O_3$ content like the Rakonitz clay showed the siliceous bodies to have higher expansion up to 800°, lower contraction after 1400°, less resistance to thermal shock at temps below 600°, a higher softening temp but a lower temp of complete collapse, and a lower resistance to glass corrosion, though the glass produced was of better quality than that in the more aluminous pots. H F K.

**Manufacture of glasshouse pots in England.** G V EVERS *J Soc Glass Tech* 14, 119-23P(1930) —Very good results are obtained with the Old Mine Stourbridge fireclay which contains up to 72% $SiO_2$ (ignited basis) and about 25% grog of the same material H F K

**Contribution of technical education to ceramic progress.** EDWARD ORTON, JR *Trans Ceram Soc* 29, 415-36(1930) H. F K

**Color changes in pastes** G MILANI *Corriere ceram* 11, 453 7(1930) —The color changes are generally due to Fe Ti, and V Under oxidizing conditions the color caused by the Fe may vary from yellow to brown, depending on the amount of Ca present S in the fuel reduces the decoloring power of the Ca, the S combines with the Ca with the formation of white and yellowish colored spots. Sol salts tend to conc. on the surface during drying, where they cause stains of insol sulfates by taking up the S from the gases of combustion R D BUMBACHER

**Shaft furnaces for calcining clays and silica.** ALBERT HIRT *Ceramique* 33, 272-80(1930) A J MONACK

**Thermal expansion of silica bricks** BERNARD LONG *Ceramique* 33, 268-72 (1930) —The results are expressed graphically A J MONACK

**The influence of atmosphere on the load-bearing capacities of fire bricks.** S C H SWALLOW *Refractories J* 6, 85-94(1930) —Load tests were made on specimens from 5 types of fire bricks. All samples showed increased deformation rates in a reducing atm The effect was greatest on samples with a high Fe content A change from re-

ducing back to oxidizing conditions restored the original rate of deformation. The effect of steam was negligible M A. EDDY

**Comparative effects of glass batch, cullet, soda and sulfate on fireclay bricks.** P. P BUDNIKOV. *Feuerfest* 5, 181–3(1929).—Ten bricks of Russian manuf of the type used for the bottom and sides of glass tanks were studied. The chem. compn., the refractoriness under load, and the porosity were detd , the chem. resistance was studied on small cubes in which circular cavities had been bored. The cavities were filled with the reagents, and the specimens were then heated in an elec furnace and held at 1430° for 2 hrs. The glass-batch mixt. was slightly more active than the cullet, but in neither case was corrosion very marked The sulfate showed the most corrosive action, especially in the presence of C, since the Na-S formed reacted vigorously with the refractory material. Soda also proved a powerful corrosive. In every case the degree of corrosion was dependent on the porosity of the material B C. A.

Progress in klinker (brick) construction in South Germany. A LANG *Ziegelwelt* 61, 511–4(1930) H F K

German klinker. W ANGUS MCINTYRE *Trans Ceram Soc* 29, 472–6(1930) — German plant processes in the manuf of "Klinker" are described The term covers a no of hard burned, all-clay bricks, with a variety of colors, produced by maintaining alternately oxidizing and reducing atms. in the kiln. H. F K

*Factors in the manufacture of porcelain.* MARC LARCHEVÊQUE *Ceramique* 33, 221–4(1930) A J MONACK

Manufacture of roof tile. MILDE *Ziegelwelt* 61, 545–8(1930) H F K.

*Roof tile continuous drier with a horizontal alternating draft.* E GROSZKINSKY *Ziegelwelt* 61, 560–1(1930) H F. K.

Artificial kaolin. JAROSLAV MILBAUER *Chem Obzor* 5, 236(1930) —From chem analysis, checked by x ray spectrographic tests, the so-called "artificial kaolin" was found to be a waste from the chem. treatment of bauxites by alk. process. It contains only 20% $SiO_2$ and is apparently an amorphous mixt. of $Al(OH)_3$ and $SiO_2$ J K.

Influence of high temperature on Prosyanaya kaolin. V V YERGANOV AND M. V ZUSMANOVICH *Trans Ceramic Research Inst* (Moscow) 1929, No 21, 28–55(in German 56–7) —At a burning temp of 880° reagents cause no changes in kaolin differing from those caused in similar materials. At this temp. kaolinic acid anhydride (metakaolin) apparently exists. At 980° kaolinite decomposes into free $SiO_2$ and the difficultly sol. form of clay and shows the first sign of formation of one or more Al silicates At 1050–1100° there is little change except further combination of free $SiO_2$ and $Al_2O_3$ No sillimanite was found. At 1200° the difficultly sol. residue increases: it has the compn $5Al_2O_3 \cdot 4SiO_2$ At 1320° the ratio is $Al_2O_3 \cdot SiO_2$ = 2.70 2, or $4Al_2O_3 \cdot 3SiO_2$. Kaolin burned at 1400° shows some crystals when examd in thin layers, increasing at 1470°. At 1400° and above, $Al_2O_3$ $SiO_2$ = 3·2 (approx ). E M. SYMMES

Ceramic investigations of Tshasoff-Jar clays. K. KÖHLER *Trans Ceramic Research Inst* (Moscow) 1929, No 20, 88–150(in German 187–92) —Great care was taken to obtain a representative sample from agitated slime Improper expulsion of free and combined water is discussed, and examples and tables are given. Plasticity is detd. by a method based on the Brongiart principle Tensile strength is shown in tables. Bonding value is detd by a special app Clays are grouped according to rate of drying Total shrinkage was detd at 400–1410° and plotted in curves Porosity was detd on samples burned at the above temps and shown in curves The character of porosity was detd by microstructure, sp. gr. and wt. *vs* vol. Up to 900° the samples have the same porosity as before burning; above 900° secondary pores form, increasing in no and size with temp rise At 900° there are mainly open pores, but above this temp there is sintering At 1200° the clay is completely sintered, the secondary pores closing Above this temp the gas trapped in the pores enlarges them. Refractoriness was detd by comparison with Seger cones A rational classification of clays is proposed E. M SYMMES

**Use in the ceramic industry of the sandy Tshasoff-Jar clay called "Balyki."** P. N KAVOKIN. *Trans Ceramic Research Inst* (Moscow) 1929, No 20, 172–81(in German 194–5) —"Balyki" is a sandy clay, removed as overburden and discarded hitherto Two samples fired at 1250° showed a total shrinkage of 7–10%, water absorption 1.12%, porosity up to 2.3%. Such clays can be used to make stoneware. About 60–65% of fireclay can be added to them, then fired at 1200° to make fire brick having 4% total shrinkage. Repeated firing causes no after-shrinkage Resistance to abrupt temp change is satisfactory. Water absorption is only 5%, and tensile strength 400–500 kg /sq cm. A table shows deformation under load. Such bricks will not withstand furnace temp above 1200°. E. M. SYMMES

Feldspar. I J. Fairchild, George K. Burgess and R. P. Lamont *Bur Standards Commercial Standard C S* 23–30, 18 pp (1930).—Classification is based on particle size and chem compn *Chem. classification is in 3 groups* (1) includes ceramic grades based on percentage of $SiO_2$ and alkali ratio, and contg less than 4% $Na_2O$, (2) includes spars used for glazing, based on percentage of $Na_2O$, and contg 3% or more $Na_2O$ *(3) includes spars used for glass making* based on $SiO_2$ $Al_2O_3$ and re contents Tables are given with grades and specifications. *Standard methods of phys* and chem tests are given in detail. Chem methods include analysis for $SiO_2$, "$R_2O_3$" $Al_2O_3$, $Fe_2O_3$, CaO, MgO, $K_2O$, $Na_2O$ and ignition loss. Acceptors of this standard are listed The effective date for *production* under this classification is Sept. 1, 1930

Alice W Epperson

Ceramic bodies described according to their mineral compositions and as silicates *Josef Woldt Sprechsaal* 63, 929–31(1930).—A supplement to similar work by W appearing in *C. A.* 22, 852 *C. H Lorig*

Refractory materials for electric furnaces. I. The melting of lead and its alloys. Alfred B Searle *Metal Ind* (London) 38, 3–4(1931).—The max temp attained in an elec furnace *when melting* Pb or Pb alloys is about 1000°, and generally much lower Elec furnaces are the most suitable for melting this class of alloys The properties of various refractory bricks are outlined Magnesia brick is suitable for parts of a Pb *furnace* in contact with slag For most induction furnaces dead burned magnesia is best with pitch or colloidal MgO as binding material. A melted mixt. of *PbO* and clay applied as a paste affords protection to the refractories in high frequency furnaces for these fusible alloys. Silica bricks are used in the roofs Most refractory materials are good conductors *of electricity* at red heat, this often results in serious leakage of current and may cause a serious defect in the furnace W. H Boynton

The vitreous enameling of cast iron. J H D. Bradshaw *Foundry Trade J.* 44, 123–4 129(1931), cf *C A* 24, 2201.—A review E. H

The microscopic structure investigation in service in the enamel technic. Fritz Kraze and Viktor Lindt *Sprechsaal* 64, 1–4(1931).—Metallographic methods show defects appearing between the ground coat, cover coat and the iron C. H L.

*Use of nepheline for* enamels. A I Zhilin. *Keram i Steklo* 6, 485–8(1930).—Tests showed that nepheline from the Ural mountains can be used with success instead of feldspar in ground or white enamels. M V. Kondoidy

The effect of furnace gases on the quality of enamels for sheet steel. Andrew I Andrews and Emanuel A Hertzell. Univ Ill Eng Expt. Sta., *Bull* No 214, 29 pp (1930); cf *C A* 24, 5957.—Small quantities of $SO_2$ such as are sometimes found in the atm of industrial districts may be deleterious in enamel baking through its etching or pock *marking action* H L. Olin

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Ashes and the remains of fuel found by the excavation of ruins of a seventeenth century glass factory near the Keizergracht at Amsterdam(Kreulen) 2.

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Taschenbuch für Keramiker, 1931. Band I. Textband. Fritz H Zschacke Glas. H J Karmaus Email. 248 pp Band II Alph. Führer durch der Keramik, *Glas- und Emaillindustrie mit Bezugsquellen. 178 pp Berlin: Verlag Keramische* Rundschau. Linen, M 4

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Glass making. Soc. anon des manufactures des glaces et produits chim de Saint Gobain, Chauny & Cirey Fr 692,032 June 28, 1929 Means for controlling the temp of app used for rolling glass

Apparatus for feeding mold charges of molten glass. Everett S Greer (to *Hazel Atlas Glass Co*) U S. 1,790,984, *Feb 3 Structural features*

Glass tank Karl G Kutchka U S 1,790,820, Feb 3

Anchoring device for use in drawing sheet glass. Arthur E Spinasse U. S 1,790,774, Feb 3 Structural features

Apparatus for making sheets of glass Mississippi Glass Co Fr 693 889 April 14, 1930

Apparatus for rolling glass. Claude Locreille Fr 692,500, Mar 21,1930

*Apparatus for annealing glass.* Soc anon des manufactures des glaces et produits chim de Saint Gobain, Chauny & Cirey. Fr 692,971, July 5, 1929

Treating frosted glass articles. Rowland D Smith (to Corning Glass Works). U S 1,791,066, Feb 3 Articles such as lamp bulbs are washed in an aq soln of a simple Al salt of an aliphatic org acid such as *Al* tartrate in order to prevent or lessen weakening Cf *C A.* 24, 5124

Wire glass production. GEORGE AURIEN (to Mississippi Glass Co). U. S. 1,791,260, Feb 3 Mech. features

Apparatus for treating sheets of reënforced glass. DUPLATE CORP Fr 693,395, April 5, 1930

Laminated glass. JAMES F WALSH and JOHN H STEVENS (to Celluloid Corp) Can. 308,522, Feb 10 1931 Sheets of glass have interposed therein a pyroxylin sheet contg cellulose nitrate having a N content of 10 5–11 5% 35–50 parts of camphor to 100 parts of cellulose nitrate, urea, a residual solvent comprising volatile alc and a coloring matter opposed to yellowness

Safety glass. (Miss) M SCHMIDT. Belg 371,036, Aug 31, 1930 One or more sheets of cellulosic material are placed between two or more sheets of glass without interposition of adhesive The combined sheets are immersed into one or more baths which transform the surface of the cellulosic material into a film which can adhere to glass The baths are composed of glycol monochlorohydrin, BuOAc, etc

"Splinterless" glass sheets. JOHN JEFFRAY Fr 693,127, April 1, 1930 See Brit. 327,949(*C. A.* 24, 5124)

Mixing clay and chamotte. W LOTHES NACHFOLGER MAX STEPHAN Ger 515, 171, Jan 18, 1925 The chamotte is sprayed with water in a screw conveyor which delivers it to a wet mixer The clay is fed to the mixer by another conveyor

Bricks. ALFRED PAUL, JR U S 1,791,372. Feb 3 A highly porous light material such as volcanic ash is broken into small particles and 85–90% of this material is mixed with 15–10% of unslaked lime and water is added and the materials are agitated together in a closed space in which the steam generated is retained under pressure the material is molded into bricks and the latter are subjected to the action of steam under pressure.

Piling brick for burning. ARTHUR J. THERRIEN (to National Brick Co) U S 1,790,882, Feb. 3. Mech and structural features

Tile and similar products. DAVIS A. CABLE (to U S Quarry Tile Co) U S 1,791,234, Feb 3. A block of moist material is dried to beyond the plastic limit, trued and then burned. An arrangement of app is described.

Ceramic vessels. MAX HAUSER U. S 1,790,918, Feb 3 Ceramic vessels of good toughness and heat cond are made by shaping and firing a mixt. of a ceramic raw material and a Cr alloy such as ferro-Cr and Si

Decorating ceramic objects. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM ROESSLER Fr. 692,562, Mar. 22, 1930 Ceramic objects are decorated with Au to which Ag, Cu or Bi may be added, the baking of the powder being effected in the presence of metals capable of increasing the resistance of the Au to the fire, such as Rh, Cr, U and like metals Cf *C. A.* 24, 215

Decorating pottery. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Brit. 335,788, Nov. 9, 1928. The process of decorating described in Brit 308,226 (*C. A.* 24, 215) is modified by the use of ceramic enamel colors, and thus veins of a darker shade than the groundwork, or of variegated shades, can be produced. Various details and formulas of coloring compns are given Brit 335,789 relates to the use of similar processes for coloring *metal* surfaces such as Al

Apparatus for the continuous baking of ceramic products. FOURMENT ET LADURÉE (S A R L.). Fr. 692,643, June 22, 1929

Abrasive. BAKELITE CORP. Fr. 692,733, Mar. 25, 1930 An abrasive is made by mixing abrasive grains, a finely divided substance and a resinoid capable of being hardened The mixt. is molded and heated until the resinoid hardens. Cf. *C. A.* 24, 2569

Abrasives. NORTON CO. Fr. 692,738, Mar 25, 1930. An abrasive consists of a cryst *α-alumina* free from non-aluminous impurities and *β* alumina Cf *C A* 24, 2854.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J C. WITT

*Studies on calcium ferrites and iron cements. IV.* SHOICHIRO NAGAI AND KATSUHIKO ASAOKA. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding, 256–7(1930); cf. *C. A.* 24, 4605.—Analyses of mixts. of the 3-component system, $SiO_2$–$Fe_2O_3$–CaO, after heating at increasing temps showed that Ca ferrite formed first, and later $SiO_2$ and CaO combined to $CaO\,SiO_2$ and then to $2CaO\,SiO_2$ and $3CaO\,SiO_2$ V. *Ibid* 312–5.—The combination in Fe cements is hardly completed at 1450–1500°, which is higher than the sintering temps. of ordinary portland cement mixts. and nearly 100–

150° higher than those of Kuehlzement raw mixt. Compression tests on the synthetic mixts used in these expts show somewhat smaller strengths than those of ordinary and special portland cements owing to the large contents of $2CaO\,Fe_2O_3$ and small contents of $3CaO\,SiO_2$ H G PARISH

**Examination of road material with small samples.** R. GRENGG *Mikrochemie* [N S] 2, 281-92(1930).—At the Technische Hochschule at Vienna it has sometimes been desirable to test small samples of materials used in road construction or of the pavement itself In this paper some interesting information is given concerning grain size after pulverizing, and 2 instruments are shown a ram for prepg and testing small samples and a machine for testing small samples under pressure and under bending strain W T. H

**Report of Committee XVII on wood preservation.** F. C. SHEPHERD, *et al Proc Am Ry Eng Assoc* 1930, 669-770.—*Revision of manual*.—Tables prepd by the Bureau of Standards for correcting the vol and sp gr of creosote oils for different temps are presented for adoption as standard *Definitions* used in wood preservation: A final revision of the list of important terms in the industry is presented *Service records*.—Data of completed service tests of ties, supplementing previous tables, are given, the annual table for tie renewals has been extended to include 27 railroads to 1928, reports on special test tracks on 7 large trunk lines are submitted *Piling for marine construction*.—Progress reports of exposure tests of treated and untreated wood specimens for resistance against marine borers are submitted *Creosote-petroleum treatments*.—Inspection of creosote petroleum and zinc petroleum ties on the Atchison, Topeka and Santa Fé R R is reported *Termite destruction*.—An extensive report is given, with comprehensive bibliography, on termite injury to wood in railway structures and on methods of prevention *Loss of preservative in treated ties due to oil burning weed destroyers*.—Preliminary tests indicate very small loss from ordinary operation of such machines, no final conclusions are drawn ALFRED L KAMMERER

**Report on work on protection of timber during the year 1929-30.** GEORGE BARGER Dept Sci Ind Research, *11th (interim) Rept Comm Inst Civil Eng* Deterioration of Structures in Sea Water, 1930, 13-5, cf *C A* 24, 3876.—Several of the tests of treated timbers exposed to marine borer attack at Colombo and Singapore have been completed, the remainder being still under observation The conclusions to date are: Creosote to which D M (chlorodihydrophenarsazine) has been added shows no advantage over creosote alone with the EtOH solns of 4 arsenical compds 2% (and in most cases 0.6%) of D M gives protection in the treated portions of the wood, with less active poisons and lower D M conens there is serious attack; fuel oil as a vehicle yields unsatisfactory penetration Pintsch gas tar gives excellent penetration and is suggested as a vehicle for toxics ALFRED L. KAMMERER

**Impregnation of the ninth series of timber test pieces for exposure at Kilindini and Mauritius and experiments on the impregnation of incised timber.** S M DIXON Dept Sci Ind Research *11th (interim) Rept Comm Inst Civil Eng* Deterioration of Structures in Sea Water, 1930, 16-8, cf. *C. A* 24, 3876.—Swedish fir blocks were treated with naphthalene alone and in various combinations with creosote by the Bethell process and exposed to borer attack at Kilindini and Mauritius. Tests with incising Oregon fir timbers to a depth of $^3/_4$ in in staggered rows 1.5 in apart center to center showed a very considerable increase in penetration of creosote with little reduction in strength ALFRED L KAMMERER

**Termites and termite damage with preliminary recommendations for prevention and control.** S F LIGHT, MERLE RANDALL AND FRANK G WHITE Calif Agr Expt Sta., *Circ* 318, 3-64(1930).—Coal tar creosote or $ZnCl_2$ used thoroughly to impregnate wood will protect lumber, posts, ties etc., effectively against termites Cyanide fumigation is not a satisfactory control measure *o*-Dichlorobenzene is fairly effective and does not constitute a fire hazard When a 10% soln of $Na_2HAsO_3$ is liberally used on soil or in masonry foundations, termites are effectively controlled A nontoxic ground treatment consists of a 10% soln of $CuSO_4$ or $ZnCl_2$ C R FELLERS

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Determination of Mg in portland cement (REDMOND, BRIGHT) 7. Natural weathering and a comparison of chemical and natural weathering of building stones (KAISER) 8. Improved asphalt extractor (STANTON) 22. Kiln for preheating and clinkering of cement material (U S pat 1,791,165) 18. Preserving wood, glue, etc (Brit pat 335,527) 15.

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**Cement and Concrete; A General Reference Book.** Chicago Portland Cement Assocn 64 pp

KNUCHEL, HERMANN **Untersuchungen über den Einfluss der Fällzeit auf die Eigenschaften des Fichten- und Tannenholzes. Tl. I. Der Einfluss der Fällzeit auf einige physik. und gewerbl. Eigenschaften der Holzes.** Bern: Büchler. 127 pp. F 5

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**Cement.** ARTHUR ANKER. Fr. 693,552, April 8, 1930. The crude materials used for making cement by heating to the commencement of fusion are stored for a certain time, with or without exposure to steam, in ripening silos heated or insulated from the cold.

**Portland cement.** THE ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD. Fr. 693,206, Apr. 2, 1930. A white portland cement is obtained from colored raw materials by treating the cement during or immediately after the calcination and before the cement has cooled with a reducing agent, after which the cement is rapidly cooled to a temp. preventing fresh oxidation. The reduction may be carried out by projecting finely divided coal on to the cement as it leaves the furnace or by emptying the red hot cement on to a surface covered with a film of paraffin.

**Manufacture of artificial portland cement and similar products.** R. POURBAIX. Belg. 371,579, Aug. 31, 1930. The paste or slurry to be burned is introduced at or near the top of the stack through which the gases from the kiln are discharged, so as to recover the heat of the gases and prep. the paste for the burning. Grates or perforated plates are provided in the stack to distribute the material uniformly.

**High-alumina cement from phosphate rock and alunite.** HERBERT H. MEYERS (to Armour Fertilizer Works). U. S. 1,791,103, Feb. 3. A mixt. of finely ground phosphate rock and finely ground alunite is calcined, and the calcined product is treated with $NH_3$, water and $CO_2$, the solid residue is sepd. from the soln., and the sepd. residue is burned to produce a cement of the high alumina quick-hardening type. Cf. *C. A.* 24, 5965.

**Color composition for cementitious products.** HERBERT E. BEDWELL. Can. 308,454, Feb. 10, 1931. A coloring compn. for cementitious material comprises 30 lb. carbon black, 4 lb. Fe oxide and 100 lb. of water to form a paste capable of retaining the color suspended evenly throughout the mass. One lb. of oil of pine is preferably added.

**Process for the regeneration of stones, marbles and concrete products.** F. RICHIR. Belg. 371,673, Aug. 31, 1930. The material is impregnated with a metal fluosilicate contg. a slight excess of acid.

**Apparatus for slaking the excess of lime in cement or clinker.** ARTURO MALIGNANI and CAMILLO MALIGNANI. Ger. 514,474, April 3, 1928.

**Rotary kiln for burning cement, ores, etc.** LIONEL D. PARKER (to Vickers, Ltd.). U. S. 1,791,282, Feb. 3.

**Concrete.** VLADISLAV DVRYNK. Fr. 693,446, April 7, 1930. A silicate concrete is made by mixing a powd. basic silicate rock with a sol. glass and sand to make a mortar which is mixed with water and ground, and then broken stones or gravel are added.

**Concrete grindstones for wood-pulp manufacture.** F. RUHLEMANN. Brit. 335,521, June 21, 1929. The external temp. surrounding the stone is made equal to the internal temp. of the stone during its manuf. in order to avoid unequal stresses developing during the setting and hardening. Various details of manuf. are described.

**Bituminous materials.** ALUMINIUMERZ BERGBAU UND INDUSTRIE A.-G. Fr. 693,867, Apr. 14, 1930. Bituminous materials, particularly for roads, are made by incorporating finely divided bauxite with bitumen, etc. Other substances such as clay, schist, limestone or sand may also be added.

**Road-surfacing material.** SOUTH METROPOLITAN GAS CO., H. PICKARD and H. STANIER. Brit. 335,668, July 23, 1929. Coal, 1–10 lb., is dispersed in tar, 100 lb., (which may contain up to 10% of added pitch) at 250–300°, and 30–60% of dried and warm finely divided mineral matter is added and admixed.

**Road-building aggregate.** LESTER WITTENBERG (to Barrett Co.). U. S. 1,791,109, Feb. 3. Stone and bitumen are mixed while the bitumen is fluid and the stone has a temp. approx. equal to that at which the bitumen will set. An arrangement of app. is described.

**Tar macadam.** J. F. WAKE. Brit. 335,525, April 24, 1929. Aggregate is first coated with bituminous material and then with tar or a tar compn. comprising 20–75% of the total material in the 2 coatings, and a third coating of oil or low-viscosity tar also may be applied. The tar material used contains about 0.5% tar acids and 2% of naphthalene.

**Roofing.** G. F. JAULET and O. PARDOEN. Belg. 372,317, Aug. 31, 1930. Asbestos

is mixed and worked up with a vegetable oil together with a binder for the oxidizing substances, so that the asbestos fibers will be enveloped in completely hardened and oxidized oil

Material suitable for shingles formed of cement and fibrous material. John W. Ledeboer (to Ambler Asbestos Shingle & Sheathing Co.). U. S. 1,700,822, Feb. 3. A material which may be formed mainly of cement and fibrous material is provided on its surface with a plurality of variably overlapping streaks comprising powdery coloring matter of different hues and cement irregularly distributed

Drying stand for wood. Olof Engelbrektson. Ger. 515,459, Jan. 7, 1928.

## 21—FUELS, GAS, TAR AND COKE

A. C. Fieldner and Alden H. Emery

Fuel utilization in 1930. Fuel Research Inst. *J. Fuel Soc. Japan* 10, 4–36(1931). English abstr. 1–6.—A review. F. I. Nakamura

The utilization of Brazilian fuel. Frédéric W. Freise. *Chaleur et ind.* 11, 320–6(1930).—The utilization of coal, coal washing and briquetting, powdered coal, carbonization, manuf. of metallurgical coke, gas manuf., and low temp. carbonization in Brazil are generally treated. Lignites, bituminous schists and peat in Brazil are briefly mentioned. Liquid and gaseous fuels are also briefly treated. A bibliography of 15 references is given. S. L. B. Tuberton

Fuels and their combustion. Roger Martin. *Chaleur et ind.* 10, 149, 206–12(1929). S. L. B. Tuberton

Some factors affecting the problem of smoke prevention. W. E. Gibbs. *J. Inst. Fuel* 3, 361–8(1930).—A theoretical discussion of the formation of smoke and its elimination by (1) gravity sepn., (2) pptn. by centrifugal force, (3) washing and (4) electrostatic sepn. D. A. Reynolds

The relative merits of coal and oil in the mercantile marine. W. M. Meijer. *J. Inst. Fuel* 4, 54–8(1930).—A discussion. D. A. Reynolds

Fuel problems in the mercantile marine. Sterry B. Freeman. *J. Inst. Fuel* 4, 48–53(1930). D. A. Reynolds

Fuel problems in the mercantile marine. W. J. Muller. *J. Inst. Fuel* 4, 59–63(1930). D. A. Reynolds

Diesel-engine developments. Maximilian Gercke. *J. Inst. Fuel* 4, 16–20(1930). D. A. Reynolds

Two important physical properties of fuels pertaining to the formation of mixtures in carburetor engines. Wawrziniok. *Automobiltech. Z.* 33, 292–4, 317–8, 364–6, 408–10, 478–80(1930).—The suitability of fuel such as gasoline, benzene, alc., etc., and their mixts., for carburetor engines is detd. by the "evaporation no." which is obtained by exposing the fuel to a temp. of 45° and a pressure of 80 mm., adding the time (in min.) required to evap. 5, 10, 15, 20, 25–95% of fuel and dividing by the number of time readings, *i. e.*, by 19. An app. constructed for this detn. by the author is described in detail. A. A. Boerlage

The utilization of gas oil in motor trucks. A. Grebel. *Chaleur et ind.* 11, 277–85, 333–43(1930).—G. gives an account of Chilowsky's app. for oil gas. This gas contains $CO_2$ 4.8, CO 13.8, $H_2$ 8.6, $CH_4$ 9.1, $C_2H_4$ 4.4 and $N_2$ 59.3%, and the thermal yield is 70%. The gas is fed to a four-cylinder motor and its performance is analyzed. The prepn. of gas oil by "the chemical carburetor" is described with sketches and data, and a general summary is added. S. L. B. Tuberton

Methane as motor fuel. J. Bronn. *Brennstoff-Chem.* 12, 27–9, 45–7(1931).—Uses for the large amts. of coke-oven gas which have been freed of H, etc., for various industrial purposes are discussed from practical and economic viewpoints. Direct use as fuel for internal-combustion engines is proposed, previous attempts thus to employ gaseous fuels are reviewed. The combustion of $CH_4$ and homologs is examd., and analytical data for the exhaust gases from fuel contg. 80% $CH_4$ are given. Several months' road test indicates that 0.85 cu. m. $CH_4$ ≈ 1.0 l. $C_2H_4$ that the motor is not injured and that less lubricating oil is required. Cost data are given for the use of various types of steel cylinders and high pressure piping from plants to population centers. F. W. Juno

Recent experiments on the pyrolysis of methane. R. V. Wheeler and W. L. Word. *Fuel in Science & Practice* 9, 567–74(1930).—Addnl. expti. work on the pyrolysis of $CH_4$ is described (cf. *C. A.* 24, 5715). Two types of expts. were made, (1) in which

$CH_4$ was heated in a quartz bulb of 60 cc capacity at different temps., pressure changes being observed by manometer readings and (2) in which large vols of $CH_4$ were passed through heated tubes of different materials, the products of decompn being collected and analyzed. The rapid initial decompn of $CH_4$ is chiefly a surface effect, but the decompn. does not proceed to an equil. state by surface reaction because of the formation of a protective layer of adsorbed H on the silica surface, which leads to a false state of equil. Fe has no effect on the decompn of $CH_4$ but at higher temps. it has a marked catalytic effect on the pyrolysis. Tars and $C_2H_4$ are produced during $CH_4$ decompn., hence the reaction is complex. When $CH_4$ is decompd. by prolonged heating, C and H are the principal products. As the duration of heating is decreased, more of the decompd. $CH_4$ is converted into higher hydrocarbons; for periods of heating of 0.3 sec. at 1050° in a silica tube, 84% of the decompd. $CH_4$ produced higher hydrocarbons. The shortest periods of heating favor the formation of mols. of 2 C atoms, whereas on increase in the duration of heating these diminish, and aromatic compds. are formed. $C_2H_4$ and $C_2H_2$ were not detected among the decompn. products. $CH_4$ flowing through an Fe tube was completely decompd. into its elements at comparatively low temps., yielding a C deposit quite different from that deposited in tubes of $SiO_2$ or chrome-Fe. D. A. Reynolds

Liquefaction of methane according to recent investigations. Jozef Dubois. *Przemysl Chem.* 14, 302–9(1930).—This is a review dealing principally with liquefaction of methane and production of motor benzines. It contains numerous patent and periodical literature references. A. C. Z.

Purification of acetylene. S. Kakutani and A. Yamada. *Repts. Imp. Ind. Research Inst., Osaka, Japan* 11, No. 11, 78 pp. (1930).—A review on the method of removing impurities such as $PH_3$, $H_2S$ and $NH_3$ in acetylene and some exptl. data are given. T. I. Nakamura

Calculation of the heating value of solid fuels. T. Schuster. *Glückauf* 67, 232–5 (1931).—Proposed formulas, based on proximate and ultimate analysis and on air required for combustion, are reviewed and tested on typical coals, the detd. heating values being known. Formulas based on air required and on the proximate analysis give only roughly approx. results. Vondracek's formula, $H_0 = 81C + 342.5H + 22.5S - 36.6O$ Cal./kg., and that of S., $H_0 = (25.4 + 0.355O)[C/3 + H - (O-S)/8]$ Cal./kg., give results within 2% of the detd. value. The tests covered bituminous coals, brown coals, peat and wood. J. D. Davis

Softening of ash of solid fuel. H. A. J. Pieters. *Chem. Weekblad* 27, 331–4 (1930).—A modified app. for detg. the softening point of ash is described, and a large no. of results are recorded. Three classes are distinguished, with softening temps., resp., below 1250°, and above 1250°, the 3rd class showing softening but not melting above 1250°. The relationship between softening temp. and chem. compn. is discussed. B. C. A.

Powdered fuel, with special reference to Lancashire boilers. H. J. Hill. *Trans. Inst. Mining Eng.* (London) 80, 158–79(1930–31).—The max. fineness possible is the aim in prepg. pulverized fuel; however, 75–85% through 200-mesh is the usual size used. Air-float anthracite dust burned more freely than dust from a pulverizer. A microscopic examn. showed that the dust from the pulverizer was rounded whereas the float dust was angular and hence exposed more surface during combustion. Present-day burners for boilers and furnaces are designed to obtain max. turbulence and in most cases the shortest possible length of flame. The operation of 2 Lancashire boilers has been entirely satisfactory. C. W. Owings

Pulverized fuel for the small unit-shell type boiler, metallurgical and chemical processes. H. W. Hollands and E. C. Lowndes. *J. Inst. Fuel* 3, 225–30(1930).—Pulverized coal is compared to oil and gas as a fuel in cement plants, road tar plants and for evapn. in the manuf. of NaOH. D. A. Reynolds

Tests of a Ljungström air preheater with a chain grate stoker. W. Schultes. *Glückauf* 66, 11–7(1930).—Comparative tests were made on a Babcock and Wilcox water tube boiler of 122 sq. m. heating surface with and without the air preheater (regenerative) which was located at the rear of the boiler in the flue-gas canal. The fuel used was low grade being a 1:1 mixt. of fine coal and coal of a medium grade. The mixt. gave 14–27% ash, about 14% $H_2O$ and 5400 to 5700 cal. Mech. imperfections of the preheater caused considerable trouble. The main advantages were increased capacity and easy kindling of the low-grade fuel. It did not enhance clinker trouble. The operation of the preheater was not interfered with by dust (ash) in the flue gas. Complete test data are given. J. D. Davis

Low-temperature carbonization and the production of electricity in Germany.

P Rosin *J Inst Fuel* 3, 189–98(1930), cf *C A*. 24, 223.—A review is given of the present trend in Germany toward the coupling of carbonization plant, power station and gas works. D A Reynolds

The x-ray stereoscopic examination of coal. Arthur N Wilson *J Inst Fuel* 3, 433, 4, 64–5(1930), cf *C A* 24, 5969 D A Reynolds

The history and present position of coal investigation by oxidation. W. Fuchs. *Fuel in Science & Practice* 9, 581–6(1930).—A review D A Reynolds

Rational sampling of coal for chemical analysis. K. Kling and J Pfanhauser. *Przemysl Chem.* 15, 12–6(1931).—Directions and care to be exercised in taking samples of coal from geologic deposits, cars, classifiers, storage, etc., are given, and the method of prepg and cutting down the large sample is described in detail. A C. Zachlin

Apparatus for sampling powdered coal. D J W. Kreulen. *Chem Weekblad* 28, 66(1931).—Sampling of a carload of powd coal with a shovel is inaccurate. A sampler is described made up from a can. A small hole in the bottom makes it possible to see if the can is full. E Schotte

Constant factors for the calculation of the calorific value of Cape Breton coals from proximate analysis data. J L Bowlby *Trans Can Inst Mining Met* 32, 489–90 (1929).—A comparison of various formulas. The expression preferred is $Vx + 145.5C + 40.5S = B$ t u per lb., where $V$ is the volatile matter, $C$ the fixed C and $S$ the S per centage, and $x$ is an arbitrary const. depending on the colliery. B C. A.

Apparatus for determining the tendency of coal and other materials toward spontaneous combustion. D J W Kreulen. *Chem Weekblad* 27, 690–4(1930).—See *C A* 25, 394 E Schotte

Determination of the expansion pressure of coal. H Nedelmann *Brennstoff-Chem* 12, 42–3(1931).—The app of Baum and Heuser (cf *Glückauf* 66, 1497–1502, 1538–44(1930)) has been improved to include hydraulic pressure measurement and other simplifications in recording, etc. The importance of coal moisture content, particle size and uniformity in filling the apparatus is stressed. Data are given to show the duplicability of results in tests. F. W. Jung

The washing of coal on the Hoyois washer. Arthur Grounds *Fuel Economist* 5, 561–4, 665–9(1930).—The Hoyois washer is based on a combination of the trough washer and the upward-current classifier. Leslie B Bragg

Incombustibles in coal and slag formation. Reinhard Schulze. *Die Wärme* 54, 81–5(1931).—Results of expts. are presented which indicate that in spite of practically the same ash content and heating value of the fuel, the combustion characteristics and especially the slag formation in large measure depend on the mineral chem compn of the incombustible matter and on the particle size, d and reaction velocity as well as on the kind of atm in the burning charge Greater $Fe_2O_3$ and CaO contents lower the slag m. p of the fuel with the simultaneous presence of a mixed atm. and lead to the formation of a vitreous pasty slag Coke in coarse granules can be burned without difficulty with a high output, while in smaller granules the same coke is almost unserviceable. Allen S. Smith

Calorimetric investigations of slag A I. Korelin *Izvestiya Teplotekh Inst* (*Trans Thermo Tech Inst Russia*) 1930, No 1, 22–8.—Calorimetric investigations of slag can be carried out in a bomb, a minimum of 15% of combustible material is required for an accurate detn The combustion should be effected with an admixt. of an air-dry material low in ash and sulfur. Such material may be hard coal, anthracite, coke or wood charcoal. The bomb should be charged up to 40 atm. with O, and the slag should be moistened with mineral oil, crude oil, fuel oil, etc. Combustion in the presence of a mixt. of benzoic and salicylic acids or sugar generally does not give satisfactory results The presence of some inorg compds., such as a high percentage of carbonates, may affect the combustion values considerably. When burning a mixt. of slag and coal in the calorimeter, an excessive rise in temp should be avoided. This would require a large amount of charging material, while working with small amounts produces sufficiently accurate results. A A. Boehtlingk

Petrographic investigation of bituminous coal briquets. H Bode. *Brennstoff-Chem* 11, 476–8(1930), 12, 7–9(1931).—The briquetting of fine coals is discussed from the viewpoint of constitution, *i. e.*, the durain, vitrain and fusain contents. Briquets were made (*a*) from equal mixts. of high volatile and low volatile coals of various particle sizes, and (*b*) from a mixt. of the high-volatile and a pressed, low volatile coal, the same amount of pitch was used in each case. Abrasion tests, as detd. in a tumbler, gave 22.5% of < 3 mm. size for the first mixt. and 15.5% of > 5 mm. size for the second. The effect of fusain content upon the pitch required is discussed at length, a contrast being noted with its effect upon the briquetting of brown coal Distinction in fusain

effect is made for particle size, < 0.12 mm. requiring an unnecessarily greater amount of binder pitch. Air cleaning does not satisfactorily reduce fusain content by removing undesired dust. For the various coal particle sizes of > 6 mm. to 0.088 mm. for the three coals used, analytical screen data are tabulated for fusain, vitrain, durain and mineral matter to demonstrate the increasing contents of the first two with increasing fineness. Magnified sections show the distribution of the aggregate in the briquets made. F. W. JUNG

Studies in the development of Dakota lignite. IV. Critical oxidation temperature of lignite. W. C. EATON, G. A. BRADY, A. W. GAUGER, IRVIN LAVINE AND C. A. MANN. *Ind. Eng. Chem.* 23, 87–93(1931).—The authors describe a method used in the detn. of the $CO_2$ index and "critical oxidation temp." (C. O. T.) of lignite. The results of the expts. indicate (1) in a comparison of lignite with other coals, an increase in indexes and C. O. T. with the rank of the coal, (2) a decrease in index and C. O. T. with a decrease in the water content of lignite, (3) a decrease in C. O. T. and an increase in index with decrease in particle size, (4) an increase in C. O. T. and index as gases are changed from $O_2$ to air, to $N_2$ and to no gas, (5) a decrease in both index and C. O. T. with increase in gas flow, (6) 80° to 90° as the temp. at which, under the conditions used, dry lignite begins to self heat sufficiently to burn spontaneously, (7) no greater change in index and C. O. T. after processing by the Heissner method than would be expected. M. C. ROGERS

Carbonizing and briquetting Saskatchewan lignite. W. G. HUNTINSTALL. *Trans. Can. Inst. Mining Met.* 32, 39–401(1929).—A detailed description of the use of the Lurgi process for lignite contg. 30% of moisture. B. C. A.

Fusain. S. W. PARR, H. C. HOPKINS AND D. R. MITCHELL. *Ind. Eng. Chem. Anal. Ed.* 3, 64–5(1931).—The modes of occurrence of fusain in Illinois coals are described. In selected lumps of freshly mined Ill. coals 2 kinds of fusain, "hard" and "soft," were noted. Proximate analyses on moisture-free basis of 11 samples of fusain from 3 different beds of Ill. coal and of face samples of coal from the same mines, and calcd. values for "unit volatile matter" of the fusains are tabulated. The most striking feature noted was the fairly consistent character, especially in B. t. u. values, of the fusain from all parts of the state. The high porosity of fusain was shown by its air-drying to 0.5–2% moisture, while coals from the same beds retained 2–6% moisture. This porosity of fusain accounts for the large absorption of water by some bituminous coals even though they do not slack. The av. "unit volatile matter" for the fusain was 20.44, which would appear to refute completely the forest fire theory of its formation. W. W. HODGE

X-ray study of vitrains. C. MAHADEVAN. *Indian J. Physics* 5, 525–41(1930); *Fuel in Science & Practice* 9, 574–80; cf. *C. A.* 24, 5982.—Paleozoic and Tertiary vitrains of varying compn. were examd. by x-ray diffraction methods. The halo spacings for the former were 3.37 A. U. for the inner and 2.12 A. U. for the outer halo. For the latter, the values 3.50 A. U. and 2.21 A. U. were obtained. The intensity of general scattering between the direct spot and the halos depends somewhat on the moisture content and volatile matter of the vitrains. A calcn. of the size of the diffracting particles indicates that they are of colloidal dimensions and that the mineral matter present is in a colloidal state. MALCOLM DOLE

Natural gas in 1929. G. R. HOPKINS AND H. BACKUS. Bur. of Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 319–40 (preprint No. 22, published February 3, 1931). E. H.

Progress in the gas industry in 1930. HAROLD E. COPP. *Gas Eng.* 48, 79, 80 (1931). E. H.

The manufactured-gas industry: its trend and problems. R. B. LECKIE. *Gas Age-Record* 66, 546–51(1930).—A review. LESLIE B. BRAGG

The trends of the natural gas industry. WRIGHT L. FELT. *Gas Age-Record* 66, 549–51, 558, 562, 595(1930).—A review. LESLIE B. BRAGG

Proposed table of standards for technical fuel gases. J. KRZYZKIEWICZ. *Przemysl Chem.* 14, 345–53(1930).—The 2 sheets of this table are reproduced and discussed. The first sheet shows the principle on which the gases are classified with respect to their origin, group, kinds and varieties, methods of prepn., brief descriptions of the varieties of the gases, and limits of their heat values. The second sheet covers addnl. technical names of industrial gases. A. C. ZACHLIN

The utilization of town gas as a fuel in heat-treatment furnaces. C. M. WALTER. *J. Inst. Fuel* 3, 408–18(1930). D. A. REYNOLDS

Instruments aid in operating gas producers economically. JAY S. MCCLIMON. *Steel* 87, 15, 54, 56, 58(1930). LESLIE B. BRAGG

Up-to-date methods for purifying illuminating gas before delivery to the consumers. A V Sivolobov. *Izvestiya Teplotekh Inst* (*Trans Thermo-Tech Inst Russia*) (*Repts of the 5th All Russian Thermo-Tech Congress*) 1930, No 3, 73–100.—A general description of known methods A A Boehtlingk

The Feld processes for the extraction of ammonia and hydrogen sulfide from coal gas. A Parker *Gas Eng* 47, 694–5(1930).—P discusses briefly Feld's processes for removing $H_2S$ and $NH_3$ from city gas The first process, consisting in the oxidation of $H_2S$ by $SO_2$, was not successful because of the slow rate of the reaction In the second process $ZnSO_3$ (from ZnO and $SO_2$) was used to oxidize the $H_2S$, the products (ZnS, S and water) could be treated with $SO_2$ to form $ZnS_2O_3$ and the mixt again used to treat the gas This process was unsatisfactory because of side reactions The third process involved the removal of both $H_2S$ and $NH_3$ by reaction with $FeSO_4$ to form $(NH_4)_2SO_4$, and further treatment producing Fe polythionates which decompose in the presence of water and $NH_3$ The difficulties with the above processes resulted in the development of a process using $NH_4$ polythionates for removing $H_2S$ and $NH_3$ simultaneously Also in *Inst Gas Eng*, *Communication* No 19, 4–8(1930). M C Rogers

Determination of carbon monoxide in illuminating gas. Jozef Dubois *Przemysl Chem* 14, 313–8(1930).—From a crit examn of the common methods of analysis D finds those using Cu salts to be the best suited The acid soln of $Cu_2Cl_2$ absorbs CO rapidly but incompletely, while the ammoniacal soln absorbs it completely though slowly The best results are obtained by combining the 2 kinds of absorptions, allowing the acid soln to take up 80% of the total CO content and removing the remainder in the ammoniacal soln. The method consists in first shaking the sample 2 min with each of 2 successive 10 cc quantities of the acid reagent, and then for 2 min with each of 3 successive 5 cc portions of the ammoniacal reagent A complete absorption of CO takes place The Damiens reagent was adopted for a complete and rapid absorption of CO over Hg Three cc of the reagent is introduced into the Hg pipet and shaken lightly for 9–10 min Methods of prepg the solns. are given A C Z

Atomizing and wick odorizers for natural gas. Philip E Beckman *Gas Age Record* 66, 859–64, 886(1930).—A Venturi type atomizer and a wick odorizer for odorizing natural gas are described in detail Considerable exptl work led to the choice of the present types of app Leslie B Bragg

New aspects of the gum problem. W L Shively *Gas Age Record* 66, 577–8, 584(1930).—Gum troubles have recently been noted with coal gas in pilot needle valves and thermostats The gum is carried to the point of deposition as suspended particles of very small size Preventive measures have been successfully applied but differ for individual situations Leslie B Bragg

Gum formation in town gas. L. H Sensicle *Gas Eng* 47, 625–7(1930).—Gum forms in small droplets, continuous impacts against pipe walls and fittings assist these to deposit and form large drops Volatilization of the lighter components causes the gum to become less fluid with increase in time Gum deposits on valves in meters and deteriorates meter leathers. It stops up orifices in burners Causes of gum formation and requirements of effective inhibitors are discussed M C Rogers

Flue-gas testing H D Brasch *Die Wärme* 54, 57–9(1931).—A mech Orsat type of continuous flue gas analyzer is described The percentages of $CO_2$ and combustible gases are indicated and are recorded on a strip chart. Details of the construction of the instrument and of its installation are given Allen S Smith

Combustion temperature and flue-gas composition; their determination with regard to dissociation Roman Selikin *Die Wärme* 54, 51–3(1931).—A method of detg the flue-gas compn and combustion temp of any gas mixt by means of the chem equil const is discussed When the gas contains no $CH_4$, the calcns are simple If $CH_4$ is present, the method is applicable if the fact is taken into consideration that $CH_4$ is not stable at high temps, but dissociates into its constituents which burn to $CO_2$ and $H_2O$ The combustion of an illuminating gas with $^3/_4$ the theoretically required air is used as an example Allen S Smith

Determination of viscosity on small samples of tar. F M Potter and J. S Sach *Roads* 8, 231–2(1930).—The app described by Mallison (*C A* 15, 1231) is shown to provide a rapid means of checking the viscosities of tars, and the precautions necessary to obtain consistent results are discussed. B C A

The thermal decomposition of the low-temperature tar of Fushun coal. I. Tadashi Mizoshita *Abstracts from Repts Central Lab S Manchuria Ry. Co* 1929, 33–5.—A yield of 13 5% anti knock gasoline is obtained by cracking at 430° and 25–30 atm V. F. Harrington

The utilization of high-temperature coal-tar pitch. I. Preparation of creosote-oil substitute from pitch. MUNENARI TANAKA, KIYOSHI MORIKAWA AND ISAO MORIKAWA. *Abstracts from Repts Central Lab S Manchuria Ry Co* 1929, 29–32.—Gasoline solvent naphtha mixts (1:1) dissolve 46% of the pitch. This ext. mixed with creosote oil is used as a creosote-oil substitute. II. The preparation of active carbon from the extraction residue of high-temperature pitch. SUSUMU WATANABE. *Ibid* 32–3. Calcining with $K_2SO_4$ gives a C more active than any commercial product. V. F. HARRINGTON

The desulfurization of brown coal tar oils with brown coal low-temperature coke. C. STAEGMEIER. *Brennstoff Chem.* 12, 43–5(1931).—Methods proposed and developed during the past year are reviewed. Attempts were made to desulfurize a generator light oil of 0.46% S, its distillate of 0.42% S, and a "yellow" oil of 0.72% S by distn. over dried coke of 3–4 mm. size in an electrically heated tube furnace. While the $H_2S$ from S compds. decomposed at the higher temps. was removed completely, the S removed was consistently small with a max. of less than 40% of the total S. Distn. in a stream of air or H had no effect. Pretreatment of the coke with HCl did not effect removal of the S, but it discolored the distillate with colloidal matter. Pptn. of $CaCO_3$ in the coke increased the S removal to 50% but is not believed practical. F. W. J.

The agglutination of coal and the activation of its surface during coke formation, considered as two complementary phenomena. W. SWIETOSLAWSKI. *Fuel in Science & Practice* 9, 564–6(1930).—The necessity of thorough impregnation of an inert material with caking material if the agglutinating ingredients of the latter are to be used effectively is stressed. The formation of structured surfaces on the stable products of dry distn. is held to be a converse process to that of the production of well-cemented coke. D. A. REYNOLDS

A comparison of methods for testing the caking properties of coal. L. SLATER. *Fuel in Science & Practice* 9, 586–91(1930).—See *C. A.* 24, 3325. D. A. REYNOLDS

Coking a banded bituminous coal: the part played by each band. C. P. FINN. *Trans Inst Mining Eng* (London) 80, 283–302(1931).—Expt. results show that different samples of clarain, which forms the largest percentage of the banded ingredients present in coking slack, may vary considerably in their coking properties but yield a comparatively poor coke that is much fissured and breaks easily. Evidence available indicates that vitrain is proportionately more valuable than clarain in a coking slack. Durain appears to exert little effect. Fusain, although itself non-coking, has been shown to be valuable when uniformly admixed with the remainder of the coking slack in amts. < 5%. An increase in the amt. of fusain middlings does not have any beneficial effect, and there is an indication from the tests that their complete removal may be advantageous. The presence of free dirt is deleterious to the quality of the coke obtained. C. W. OWINGS

Production of low-sulfur coke in the Ekaterinov ore area. V. M. STAKHOVSKII AND R. M. IL'EVA RATNER. *J. Chem. Ind.* (Moscow) 6, 734–5(1929).—Crushed coal from the Almaz vein graded on a 3 mm. screen was found to show lower ash and S contents in the fines than in the coarse material. A. C. ZACHLIN

The dry cooling of coke. JENS RUDE. *Engineering* 130, 543–4(1930).—The thermal advantages of dry-cooling coke are outlined, and it is calcd. that the recoverable sensible heat is slightly less than 4% of the B. t. u. of the coke taken as 11,000 B. t. u. per lb. Section diagrams of the Sulzer dry coke-cooling plant are given. In this process inert combustion gases circulate through the hot coke and to a steam generator all in a closed system. Cooling time varies from 3.5–4 hrs. for a large capacity plant to 1.5 hrs. for small gas works where the car of coke (1.5 tons) is wheeled directly into the cooling chamber. The essential features of the Collin dry-cooling plant are also outlined. The advantages of dry coke-cooling are, better quality coke, no water to evap. when the coke is burned, a smaller amt. of fines and breeze and recovery of the sensible heat of the coke. The chief objection is the high cost for a plant of the large dimensions required because of the comparatively low temp. gradients existing throughout the process. A set of curves is given showing the relative heat-transfer rates from coke to boiler water. Apparently a saving of approx. 1/3 in the cost of the plant could be secured by cooling the coke to only 450–500°, but some 20% less steam would be produced than by cooling to about 300° as is now done. Two systems using steam (*C. A.* 24, 5466) in place of the inert gases are outlined and their relative advantages discussed. W. W. HODGE

Determination of volatile matter in coke. A. P. SHAKHNO AND M. D. ZHUKOVSKAYA. *Izvestiya Teplotekh Inst* (*Trans Thermo-Tech Inst. Russia*) 1930, No. 2, 17–26; cf. *C. A.* 24, 1721.—Results obtained by the use of alc., gas and elec. heating equipment are compared. A. A. BOSHTLINGK

*The use of anhydrite (calcium sulfate) in the production of ammonium sulfate.* P PARRISH *Gas Eng* 47, 695-6(1930), cf *C A*. 22, 4768.—P discusses the production of $(NH_4)_2SO_4$ by the action of $(NH_4)_2CO_3$ on $CaSO_4$. The carbonation and reaction with $CaSO_4$ must be carried out in sep vessels. This increases the reaction rate and prevents side reactions. Four vessels in series are required. Also in *Inst Gas Eng., Communication* No 19, 9-24(1930). M C ROGERS

**Rapid method for determination of benzene and phenol in ammoniacal and waste liquors.** W MÜNZ *Brennstoff-Chem* 12, 3-4(1931).—To det $C_6H_6$, pass upward through a vertical tube, 30 cm long and 5 cm in diam., contg 100-150 g activated charcoal, 10 l of the liquor to be tested in 1 hour's time. Drain the charcoal, recover the $C_6H_6$ by means of superheated steam by the method of Kattwinkel (cf *C A* 24, 1252) and det. *to 200° by the usual procedure. This method is accurate only up to a char*coal absorption of 15% $C_6H_6$ by wt. To det PhOH measure into a 250-cc distn flask 25 cc of the filtered liquor. Add ammoniacal $CuSO_4$ soln (prepd by adding concd $NH_4OH$ in excess to cold satd $CuSO_4$ soln) in excess of pptn and then 5 cc *40% NaOH* soln. Boil over a free flame with shaking until $NH_3$ vapors are no longer evident, connect the flask to a condenser and pass $CO_2$ through the soln at the rate of 2-3 bubbles per sec. The neutralization should be complete after some 5 min. Distil to dryness with a slow stream of $CO_2$. Rinse the condenser, adapter, etc., into the 250-cc volumetric flask used as receiver and make up the distillate to vol. For titration, 25 or 50 cc of this is used in the case of $NH_3$ liquors, but with waste liquors the whole may be necessary. To this in a stoppered Erlenmeyer flask add 25 cc. of 0.1 *N* KBr-$KBrO_3$ *soln and then* 15 cc 15% $H_2SO_4$. *After* ½ hr add 10 cc of 10% KI soln., let stand ¼ hr., and titrate the excess using starch indicator, with 0.1 *N* $Na_2S_2O_3$ soln. F W JUNG

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The selection of coke for foundry purposes (HUPPERT) 9. Ashes and the remains of fuel found by the excavation of ruins of a seventeenth century glass factory near the *Keizergracht at Amsterdam* (KREULEN) 2. *Colorimetric determination of the sulfate* ion in coal (GUARNIERI) 7. Geological aspects of the formation of coal (TOX) 8. Development of Dakota lignite (HARRIS, *et al*.) 8. Alkali ferrocyanides [preparation during extraction of HCN *from* coal gas by washing] (*Fr pat 692,868*) 18. *Separating* gases by liquefaction (Brit pat 335,599) 13.

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RIEGER, FLORIAN. Die Kohle, ihre Entstehung und ihre Verwertung. Prachatice: Schramm. 15 pp. Kč 3.

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**Fuel briquets.** H J M WASTEELS. Belg 371,152, July 31, 1930. The coal is placed in iron or steel molds which are then placed in the distg retorts. After distn *the balls, briquets or blocks of coke are demolded.*

**Fuel briquets.** LUDWIG WEBER. U S 1,791,077, Feb 3. Particles to be briquetted such as fuels, ores or flue dust are mixed with very finely divided clay of great plasticity and this mixt., before briquetting is moistened with *sulfite waste liquor*.

**Production of agglomerates without the addition of pitch.** H HARDY. Belg 370,410, June 30, 1930. Coal or lignite is prepd in a globular state with a view to soln in solvents acting successively, *e g*., the globular coal is treated with heavy oils, solvent naphtha and benzene, either in the above or reverse order, the coal can be carbonized at low temp., to obtain a powdered fuel, or it can be first pressed to agglomerate it and then carbonized for the production of semi-coke. Cf *C A* 24, 4615.

**Plant for the manufacture of smokeless fuel.** COMPAGNIE DES MINES DE VICOIGNE NOEUX ET DROCOURT. Fr 693,273, May 30, 1929.

**Fuel for internal-combustion engines.** JOHANN W MICHEEL. Ger 515,076, Jan 9, 1929. Soot from solid, liquid or gaseous fuels is compressed into briquets and then finely ground.

**Motor fuel.** I G FARBENIND A.-G. Fr 692,594, Mar 24, 1930. When starting liquid fuel of high vapor tension is fed to explosion motors by mech. pressure on spongy material contg the fuel.

**Gasifying wet bituminous fuels.** HERMANN HILLEBRAND. U S 1,791,411, Feb 3. Alternately operated regenerative chambers are heated by burning a portion of *recirculated gas, a mixt of recirculated gas and steam is superheated in one* of the heated regenerative chambers and thence passed upwardly into a gasification zone of a fuel bed to form water gas, a portion of the water gas and recirculated gas is passed through *a superposed distn zone of the fuel bed, effecting distn. of gases and vapors from the* fuel, another portion of the water gas and recirculated gas is passed in heat exchange

with the wet fuel and to a collecting main, and the distn gases and vapors are recirculated through the regenerative chamber App is described

**Low-temperature carbonization of bituminous carbonaceous materials.** I G FARBENIND A.-G. Brit 335,740, Sept. 30, 1929 In a process such as described in Brit 301,975 (*C A* 23, 4329) in which hot gases are blown through fuel so that it is maintained in active motion on the grate, to effect carbonization without combustion or gasification, impact devices are arranged over the fuel bed to limit the upward movement of the fuel Various details of app are described Cf *C A* 24, 489

**Low-temperature carbonization of powdered fuel.** F L. DUFFIELD Brit 335,643, July 5, 1929 In the use of a horizontal retort using steam as the carrying medium, the retort is locally heated to a high temp, and steam is admitted tangentially to the heated surface Various details of structure of the app and of its operation are described

**Process and oven for the distillation or low-temperature carbonization of coal and other carbonaceous materials.** C HONNAY Belg 370,266, June 30, 1930 Constructional features

**Vertical retort for low-temperature carbonization of fuel.** CHARLES TURNER Ger 515,388, Mar 20, 1928 See Brit 295,461 (*C A* 23, 2276)

**Distilling solid fuels.** FRANK E HOBSON Ger 515,380 and 515,387, Feb 3, 1927 See Brit. 277,214 and 277,215 (*C A* 22, 2155)

**Distilling solid carbonaceous materials in oil.** IMPERIAL CHEMICAL INDUSTRIES, LTD Ger. 515,389, Oct 28, 1928 See Brit 305,741 (*C. A* 23, 5032-3)

**Furnace for the low-temperature distillation of carbonaceous materials.** CHARLES HONNAY. Fr 693,038, Mar 29, 1930

**Rotatable retorts for the low-temperature distillation of coal.** THE CARBOCITE CO Fr 692,881, Mar 28, 1930

**Apparatus for distilling coal for the production of coke.** BABCOCK & WILCOX, LTD Fr. 692,529, Mar 21, 1930

**Apparatus for carbonizing comminuted coal and for enriching water gas with distillation products.** EDWARD A. DIETTRLE U S 1,790,745, Feb 3 Structural features

**Destructive hydrogenation of coals, tars, etc.** N.-V DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Brit. 335,543, June 24, 1929 Various carbonaceous materials, which may be mixed with phenolic substances or like O contg compds are first treated with CO or gases contg CO at elevated temps and preferably under pressure to effect removal of most of the O present, and are then subjected to a treatment with H Water present in the initial material may react with the CO to form H and effect partial hydrogenation Various details of procedure, catalysts used, etc, are given Cf *C A* 25, 1362

**Purifying gas.** HUMPHREYS & GLASGOW, LTD Fr 693,106, April 1, 1930. Gases are freed from S by bringing the gases into contact with a heated catalyst formed of ZnO with or without an activating agent, whereby the org S compds are decomposed forming $H_2S$ which is eliminated The undecomposed org S compds are removed by $H_2SO_4$ Cf *C. A* 24, 1726

**Desulfurizing gases.** RICHARD BRANDT Ger 514,666, Dec 15, 1927. Addn to 503,118 In removing $H_2S$ from gases by means of $K_4Fe(CN)_6$ soln which is regenerated as described in Ger. 503,118 (*C A* 24, 4091), the desulfurizing soln is used in a continuous cycle without filtering off the free S liberated from the gases, the cycle including a settling vessel in which the agglomerated portion of the originally colloidal S is sepd

**Dehydrating fuel gas.** FREDERICK W. SPERR, JR (to Koppers Co) U. S 1,701,056, Feb 5. Gas such as coke-oven or water gas is compressed, cooled by direct contact with water at substantially atm temp so that a portion of the moisture carried by the gas is removed, and the compressed and cooled gas is then treated with a hygroscopic material such as $CaCl_2$ or $H_2SO_4$ for further removal of moisture An arrangement of app is described

**Gases containing hydrogen.** I. G FARBENIND. A.-G. Brit. 335,524, April 24, 1929 In the conversion of carbonaceous materials such as $CH_4$, coal distn. gases, tars, mineral oils, etc., into gases consisting mainly of H and CO or of these gases and N, by treatment with air, O or $CO_2$ (with or without steam) in an elec arc furnace, devices such as narrow exit openings produce eddies which cause all parts of the gas mixt. to attain a temp of at least 1400°. Various details of app and procedure are described

Oil gas. Constantin Chilowsky. Ger. 514,487, Mar 25, 1926 See Fr. 679 107 (*C A* 24, 3888)

Mixed oil gas and water gas H G Terzian (to Humphreys & Glasgow, Ltd ). Brit 335 495, July 11, 1929 In a process in which oil gas is passed through an ignited fuel bed and the deposited C is consumed in the water gas reaction, steam is generated in the tar washer by the passage of hot oil gas, and the steam thus formed is used in the generator to form water gas Various details of app and procedure are described Cf *C* 1 25, 1063

Water gas Humphreys & Glasgow, Ltd Fr 693,105, April 1, 1930 Water gas is made by passing steam upwardly through a mass of incandescent fuel from a point situated sufficiently above the base of the mass to leave an annular zone of incandescent fuel A part of the gas produced is raised through a superposed layer of fresh fuel to eliminate hydrocarbons, another part is passed into a carburetor where it is mixed with a hydrocarbon, and the mixt is introduced at the center of the lower part of fresh fuel

Water gas Power Gas Corporation, Ltd , and Niels E. Rambush. Fr. 693,514, Apr 8, 1930 Means is described for superheating the steam, which is passed alternatively in an ascending and in a descending direction through the fuel Cf. *C. A.* 24, 3888

Water gas Henry O Loebell (to Henry L. Doherty). U. S 1,700,824, Feb 3. Fuel is passed downwardly in an unobstructed column of circular cross section through a gas generating zone in which high temps are maintained by periodically blasting air in a substantially radial direction through incandescent fuel in the zone Steam is passed through incandescent fuel in the high temp zone during periods following the air blasting, and hot water gas thus formed is passed through fuel above the blast zone App is described Cf *C A* 25, 582

*Apparatus for manufacture of water gas* Henry O Loebell (to Henry L Doherty) U S 1,700,823, Feb 3 Structural features

*Water-gas producer.* Soc anon la Carbonite. Fr 693,289, July 8, 1929

Device permitting of the use of high-volatile or mixed high- and low-volatile coal fines in gas producers E Donet Belg 370,238, June 30, 1930 A circular rotating plate is placed above the producer The fuel is fed on to this plate and allowed to stay there sufficiently long to become agglomerated before it is fed into the producer The gases given off from the coal while on the plate are mixed with the producer gas

Apparatus for producing coal gas and water gas from coal dust. Karl Meitzler Ger 514,486, Sept 4, 1925

Ovens for producing gas and coke. Stettiner Chamotte Fabrik A G vorm. Didier Ger 515 385, Dec 11, 1928 Constructional features are described

"Waterless" gas holder R & J Dempster, Ltd , J W Scott and Waterless Gasholder Co , Ltd Brit 335,502, Feb 15, 1930

Purification and desulfurization of benzene. C Petit Belg 371,908, Aug 31, 1930 The benzene vapors are bubbled through liquors such as $H_2SO_4$, NaOH or $Na_2CO_3$, which may be made to flow over the trays of a benzene rectifying column or of a column placed after the rectifying column

Storing acetylene. F Roffey and Imperial Chemical Industries, Ltd Brit. 335,820, Nov 28 1929 $C_2H_2$ is stored in cylinders or other containers contg a solid absorbent material impregnated with an $C_2H_2$-solvent comprising a relatively non-volatile ether, ester or ether-ester of a polyhydric alc such as glycol diethyl ether, glycerol triethyl ether, glycol diacetate, glycerol triacetate, β-ethoxyethyl acetate, β γ diethoxy n propyl acetate, glycol monoacetate, glycerol diacetate, glycol monoethyl ether and glycerol diethyl ether or mixts of these Before storing, the $C_2H_2$ is preferably dried as by passing over $CaCl_2$ before and after compression Some other suitable solvents are also mentioned

Phenols. Huiles, goudrons et dérivés and Georges Suprin Fr. 693,734 July 22, 1929 Phenols obtained in phenolic oils and tars are extd by solns of alkali carbonates at a high temp under pressure, means being provided to remove the $CO_2$ formed This $CO_2$ is used for acidification of the phenolates obtained to reform carbonates

Tar refining. Jean H Bregi (to Compagnie Technique des Petroles). U. S 1,701,052, Feb 3 See Fr 689,204 (*C A*. 25, 1064).

Apparatus for distilling tar, oils, etc. Compagnies réunies de gaz et d'électricité. Fr 693 681, April 10, 1930

Coking pitch. C. Otto & Co G m b H. Ger 514,478, Feb 19, 1928 A finely

ground mixt of pitch and pitch coke is coked in an oven of refractory material, the walls of which are coated with pitch coke to prevent penetration by the pitch

Coke oven and door. CARL STILL. U. S. 1,790,775, Feb. 3. Structural features.

Method and plant for dry-cooling coke. WILHELM KLEISSER. Ger. 514,410, Nov. 19, 1925.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

**Municipal regulation of oil storage.** ROBERT S. MOULTON. *Quart. Nat'l. Fire Protect. Assocn.* 24, 255-76(1931). A thorough review of the fire hazards of petroleum products and their control in cities, accompanied by a list of N. F. P. A. publications bearing on the subject. C. L. JONES.

***Catalytic reactions of sulfur compounds present in petroleum.*** I. **High-sulfur naphthas in contact with nickel and iron catalysts.** J. C. ELGIN, G. H. WILDER AND H. S. TAYLOR. *Ind. Eng. Chem.* 22, 1284-90(1930). Reduced Ni removed S from naphthas in both the liquid and the vapor states. The catalyst was most effective in its action upon the first of the naphtha vapor passed over it. Its activity then dropped off till a "steady state" was reached and its effect was almost const. for the remainder of the run. The S content of the naphthas was reduced still more if $H_2$ was passed with the naphtha vapor over the Ni. The action of reduced Fe was similar to that of Ni but less pronounced. II. **Pure sulfur compounds in hydrocarbon materials in contact with nickel catalysts.** J. C. ELGIN. *Ibid.* 1290-3.—Solns. of BuSH, iso-BuSH, $Pr_2S$, $(iso\text{-}Bu)_2S$ and thiophene in naphtha were passed in vapor form over reduced Ni catalysts at 300°. The mercaptans readily decomposed giving up S as $H_2S$. The sulfides reacted less readily. Thiophene was not affected after the catalyst had reached the steady state unless $H_2$ was passed with the naphtha vapor. Thiophene is formed in the thermal decompn. of mercaptans and sulfides, hence the removal of S from cracked naphthas is likely to be more difficult than from straight run. EMMA E. CRANDAL.

**Refining of light petroleum distillates.** H. P. RUF AND RALPH H. ESPACH. Bur. Mines, *Bull.* 333, 111 pp. (1930).—Proper fractionation of the gasoline from a pressure *distillate will decrease the amt. of chem. treatment necessary to make the gasoline meet* trade requirements. To get the max. benefits of fractionation on the chem. treatment, a good degree of sepn. is necessary; there should be no overlaps in distn. range. In fractionation units, a reflux (closed-coil or open-spray) at the top of the bubble tower is necessary to control the top temp. When a closed coil reflux is used, incoming charging stock may be preheated by pumping it through the coil. When an open spray is used, the refluxing medium should be the material that is taken overhead as a vapor. The present methods of treating light distillates are described in detail. The influence of time, temp. and thoroughness of contact in treating with $H_2SO_4$ is considered. The effects of acid treatment on C deposits, distn. range, gravity and color are shown. The use of alkali is discussed. Studies with S and S compounds dissolved in gasoline are described. The effect of fractionation on color and gum formation is discussed.

ALDEN H. EMERY.

**Refining cracked distillates.** JACQUE C. MORRELL. *Nat'l. Petroleum News* 22, No. 51, 61-6, No. 52, 49-54, No. 53, 46-8(1930); 23, No. 1, 63-72, No. 2, 57-8, No. 3, 51, 54, 58, 60(1931).—The following are discussed: the desulfurization of cracked distillates by different methods; theory of gum formation, use of gum inhibitors for gasoline to be stored; $H_2SO_4$ treatment, split plumbite treatment; refining by sludge acid, recovery of spent chemicals at the refinery; acid and "doctor" soln.; rerunning acid treated distillates, soap washes, vapor-phase treating, treatment of end point cracked distillates without rerunning; continuous treating plants, mixing devices, settling tanks and sepg. devices; gasoline treating plants; distn. equipment, operation of shell stills; operation of shell still rerun units, pipe still rerunning, operating precautions, chem. factors in distn.; future possibilities. R. W. KELLY.

**The occurrence of higher fatty acids in mineral oil distillates.** E. HOLZMANN AND STANISLAUS VON PILAT. *Brennstoff-Chem.* 12, 41-2(1931).—The cryst. material previously (cf. *C. A.* 25, 584) sepd. from the phenol free naphthenic acid fraction of petroleum has been identified as higher fatty acids, although work by others indicated their absence in Polish oils. More of this material was prepd. from a Borysław machine oil by dehydrating and distg. the acidified $Na_2CO_3$ washings to 275-40° at 12-15 mm. Hg in a

new Burstin Winkler app , shown schematically, and sepg the distillate into the acids, phenols and hydrocarbons The first fraction yielded the fatty acids upon cooling After removal by centrifuging, recrystn from MeOH and then from acetone, white crystals were obtained. A mixed m p identified them as arachic acid This characterization was confirmed by the neutralization no , the mol wt. by m p depression and the elementary analysis Additional fatty acids sepd from the mother liquor as Li salts give a total of 0 0013% for the crude petroleum They are being investigated further F. W. JUNG

*Present-day tendencies in oil-fuel burning.* JOHN L. STREVENS *Fuel Economist* 5, 569–72, 623–4(1930) —A review LESLIE B BRAGG

The value of ash determinations of mineral and fatty oils. W SCHARFER *Seifensieder-Ztg* 57, 878–9(1930) —The org S in oils usually enters the ash on burning, indicating the presence of sulfates or sulfides in the oil An extn with $H_2O$ or acid does not furnish evidence of the presence of these compds P. ESCHER

Crystallization of paraffin wax. E KATZ *J. Inst Petroleum Tech* 16, 870–88 (1930) —*The cryst form of Polish and Asiatic wax crystd from various solvents is* shown by a microscopic study to be fundamentally a six sided plate Sixty two photographs illustrate the variations of this form L. W T CUMMINGS

Evaluation of anti-knock properties of fuels. L AUER *Automobiltech Z. 33*, 538–9(1930) —A review. A A BOEHTLINGK

Velocity of propagation of flame and pressure wave: thermodynamic consideration of motors and the phenomenon of detonation. E. VARETON AND U. RE *Ann scuola ing Padova* 4, 226–40(1928) —*A review of the literature and of the work done, chiefly* by American and English workers S L B ETHERTON

Experiments to determine velocities of flame propagation in a side valve gasoline engine H S GLYDE *J Inst Petroleum Tech 16*, 756–82(1930).—*It is known that* small head clearance in an explosion engine tends to reduce detonation and that differences of head clearance cause variations of turbulence The possible relation of velocity of flame travel to head clearance and to turbulence forms the subject of this study Measurements of the velocity of flame movement were taken in an engine with side-valve low turbulence combustion chamber, and in 3 turbulent type Ricardo engines with head clearances of *0 022, 0 084* and *0 272* in Castings of the several combustion chambers used could be bolted down to a single cylinder block Six sight holes in a straight line were made in the top of each combustion chamber and fitted with glass windows A disk 16 in in diam revolved in a horizontal plane over the combustion chamber, on a vertical shaft connected with the ignition timing shaft. Its radius was such that the line of holes cut in it from center to circumference would coincide with the line of openings into the combustion chamber Its timing was adjustable by a screw With the engine running, the usual readings of speed, torque, fuel consumption, ignition advance and jacket temps were made at the same time as the observations through the stroboscopic disk By the use of the adjusting screw, the time at which the flame passed each window could be known in terms of crankshaft degrees before or after the top dead center Pressure indicator diagrams were made All runs were at 900 r p m Max velocity of the flame was reached in all cases within 7° and 10° after the top dead center This was also the zone of max rate of pressure rise The smaller the head clearance, the more rapidly the velocity of the flame fell off after reaching it. This was attributed to the higher surface-vol ratio by which the flame was cooled and its travel impeded The same cause raised the H U C R also The mean velocities in the 4 heads were proportional to the rate of pressure rise, which is taken as the measure of turbulence The max. velocities were nearly proportional, with the exception of that in Head No 2 The velocity with which the flame spread from the spark to the first window was also proportional to the rate of pressure rise or turbulence EMMA E CRANDAL

*Synthetic lubricating oils.* A W NASH, H M STANLEY AND A R BOWEN *J Inst Petroleum Tech* 16, 830–69(1930) —Expts are reported on the polymerization of $C_2H_4$ to light and heavy oils by heating in an autoclave at pressures up to 60 atm Without a catalyst the polymerization occurred only above 325° The temp was lowered to 230–275° with $ZnCl_2$ as a catalyst and to 180° with $AlCl_3$ which was the principal catalyst studied The product consisted of free oil (I) and hydrocarbon associated with the $AlCl_3$ (II) (I) contained from 10 to 45 C atoms and was of a satd character, while (II) contained 10 to 50 C atoms per mol and was unsatd The products were distilled and some of the properties of the fractions reported· b p , Br no , d , viscosity, and change of d on oxidation The heavier fractions had practically the

same characteristics as com lubricants, except that they were more readily oxidizable
L W T CUMMINGS

**Recent examinations of friction and lubrication.** J E SOUTHCOMBE *Teknisk Ukeblad* 75, 351-8(1928) —A review with subsequent discussion C A ROHAK

**About germ process oil.** SVERRE LAUNY *Teknisk Ukeblad* 75, 388-9(1928) —A reply to Southcombe (see preceding abstract) Since the fatty acids which are used to make germ process oil attack metals slightly with the formation of soaps, L asks for more detailed information, particularly in regard to the variation of the coeff of friction with time C A ROHAK

**The stability of germ-process oils.** JAMES B SOUTHCOMBE *Teknisk Ukeblad* 75, 507-8(1928) —A reply to Launy (cf preceding abstr) The fatty acids used for germ process oil in amts of about 0.7-1.0% are very pure, and accordingly have only a very small chem activity The standard test for germ oil is to heat 200 g of oil to 80° for 36 hrs in contact with steel plates No change in color or wt of the metal takes place Comparative tests with germ oil and mineral oil carried out by heating both to 80° with Cu foil for 36 hrs, show that the wt of the Cu foil is reduced a little more in germ oil than in pure mineral oil The reduction is still higher in compound marine oil contg rapeseed oil, which has been used extensively in ships for more than 25 years
C A ROHAK

**The stability of germ oils** SVERRE LAUNY *Teknisk Ukeblad* 76, 10-1(1929) —A reply to Southcombe (cf preceding abstr) Even the tables given by Southcombe show that the addn of "germ" to an oil always increases the corrosive action of the oil The amt. of Cu dissolved was increased by 58 and 50% in 2 expts C A R

**Dielectric losses of oils.** A GEMANT *Z. tech. Physik* 11, 544-5(1930) —By recent articles of G (*Wiss. Veröffentlich. Siemens Konzern*, in press) and of Ornstein and Willemse (*C. A.* 25, 9), it is shown that the loss curves for transformers oils consist of 2 super-imposed parts (loss angle, $\vartheta$, *versus* frequency) For high frequency the Debye losses are most important, but at low frequency the Wagner effect preponderates
B J C VAN DER HORVEN

**Determination of the drop point by means of the Ubbelohde apparatus, especially for high-temperature lubricants.** P. SCHWARZ *Seifensieder-Ztg* 57, 877(1930) —The detn of the drop point for greases and solid lubricants by means of the Ubbelohde app may give values that differ by 25°, due to differences in the diam or length of the glass tubing and to the depth to which the thermometer bulb is immersed The rate of heating and moisture in the high-temp lubricants also influences the results
P FISCHER

**Improved asphalt extractor.** T. E STANTON. *Eng News-Record* 106, 38(1931) —A new type of extractor is described in which the solvent is passed through an alundum filter stone 1 in thick with the aid of 90 lb air pressure The max variation between the asphalt content used and extd from 11 prepd samples contg a high % of 200-mesh material and asphaltic cement was 0.2%, the av variation being less than 0.03% The solvent used is $CHCl_3$, approx 85% of it being recovered The cost of solvent per sample is about 13¢ The time of extn with oil or asphaltic concrete mixts is 15-30 min R E THOMPSON

**Filtration of asphaltic precipitates by suction, permitting rapid determinations.** PAUL WOOG AND JEAN GIVAUDON *Bull soc chim* [4], 47, 1419-20(1930) —Powd glass that passes through a sieve of 0.058 mm mesh is used in a crucible with sintered-glass bottom for filtering asphalt The process is rapid and gives const results
G M MURPHY

**A study of gum turpentines.** (MISS) MARCELLE BARRAUD *Bull. inst. pin* 1930, 217-21 —The yield of spirit of turpentine from gum produced by pines of the same species or of species yielding spirit of turpentine having approx the same compn is fairly uniform, provided that the trees are situated in the most favorable conditions for growth Spirit of turpentine consisting of pinene and nopinene can be obtained in yields exceeding 25%, but usually 22-23% Spirit of turpentine contg other terpenes than pinene and nopinene is obtained in somewhat lower yields (20% or less). The first gatherings of gum contain more spirit of turpentine than the later ones Trees of large diam tend to give more gum contg a higher proportion of spirit of turpentine than small trees Analysis of 300 samples, each representing at least 1 tank-car of spirit of turpentine from Bordeaux pine, gave $\alpha_J$ —28.98° to —32°; spirit of turpentine from Austrian black pine had $\alpha_J$ —15.83° to —33.27°. $\alpha_J$ was for Austrian pine and maritime pine, resp., —17.50° to —37.14°, +10.12° to —38.86° By fractionation of highly *l* rotatory maritime pine spirits of turpentine in a 2 m Lebel column, pinene was sepd having $[\alpha]$ —51.13°, while the highest values previously reported by Dupont

were +50.92° for pinene from Aleppo pine and —48.70° for pinene from maritime pine. A similar study of spirits of turpentine from Aleppo pine would probably yield a pinene having [α] higher than +50.92° A. PAPINEAU COUTURE

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*Two important physical properties of fuels, pertaining to the formation of mixtures* in carburetor engines (WAWRZINIOK) 21. Petroleum insecticides (WOODWORTH) 15. Limestone oil reservoirs of the northeastern United States and of Ontario, Canada (MURRAY) 8. *Some properties of limestone as a reservoir rock* (HOWARD, LOVE) 8. Study of the black shale overlying the cap rock of the Cromwell sand in relation to the origin of the Cromwell oil dome, Oklahoma (GRAWE) 8. Some chemical aspects of the origin of petroleum (LIND) 8. Hydrocarbons (Fr. pat. 693,054) 10.

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**Treating cold petroleum oils with sulfuric acid.** HORACE B. SETZLER and MERT C. MCDONALD (to National Refining Co.) U. S. 1,791,329, Feb. 3. The temp. of the oil is reduced to about 5° and the oil, during continued agitation, is subjected to the action of $H_2SO_4$, and clarified oil and sludge are sepd. App. is described.

**Cracking petroleum oils.** DAVID G. BRANDT (to Doherty Research Co.) U. S. 1,791,114, Feb. 3. In cracking oil under pressure, charging stock is passed in heat interchange relation to, but out of contact with, vapors in a dephlegmator so that a reflux condensate is produced, this condensate is passed through a heater under pressure to produce highly heated oil and vapors. The highly heated vapors and oil are sepd. in a sepg. zone, and the highly heated vapors are passed under pressure into a body of oil to crack the latter, residuum is withdrawn from the body of oil last mentioned and is distd. and the resulting distillate is independently heated under pressure to a high temp. and is passed into the sepg. zone. App. is described. Cf. *C. A.* 25, 411.

**Cracking crude petroleum.** GENERAL TECHNICAL CO., LTD. Fr. 693,280, July 4, 1929. The asphaltic residues obtained in cracking crude petroleum are heated with a chem. reagent such as baryta and Fe perchloride to about 300° under a pressure below 6 kg., and the products are returned to the cracking operation to be converted into gasoline.

**Cracking and destructively hydrogenating hydrocarbons.** I. G. FARBENIND. A.-G. Brit. 335,522, April 23, 1929. The process described in Brit. 290,700 (*C. A.* 23, 2555) *is modified by subjecting the carbonaceous material to a mild cracking process in which* extensive formation of benzine is avoided, followed by sepn. of any benzine formed and destructive hydrogenation of the remaining material. Catalysts may be employed in both these stages, if catalysts having a splitting action such as bauxite, silica gel, active charcoal or alumina are used for the initial stage. Numerous details and modifications of procedure are described, and an example of the process as applied to gas oil treatment is given.

**Cracking hydrocarbons.** JEAN F. A. BRUZAC. Fr. 693,281, June 22, 1929. Heavy hydrocarbons are converted to lighter hydrocarbons in 2 operations. (1) *The hydrocarbons* are distd. in contact with neutral metals such as Fe, Cu or Ni and condensed by cooling, the temp. never being above 500°. (2) The hydrocarbons from the first are submitted to the action of O or ozone to remove excess of C and S.

**Cracking hydrocarbons.** OWEN D. LUCAS. Fr. 692,549, Mar. 21, 1930. In converting heavy oils to light oils the temp. of the oil to be treated is raised to the final temp. required for cracking or conversion by communicating the necessary heat to the oil by indirect contact with biphenyl or phenyl ether in the liquid state in a heat exchanger, this compd. being contained in a closed-circuit app. to which the heat is furnished apart from the heat exchanger. Before entering the heat exchanger the oil is heated directly to a temp. below that at which appreciable cracking takes place.

*Hydrocarbons of low molecular weight from those of high molecular weight.* N. V. BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Dutch 22,573, Sept. 15, 1930. The reaction is accelerated by metal carbides (Ca, U, Mo, Al). The temp. is between 300° and 700°, increased pressure may be used. No $H_2$, $H_2O$ or H-contg. vapors are used.

**Cleavage of hydrocarbons boiling up to 40°.** N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Dutch 22,574, Sept. 15, 1930. Low boiling hydrocarbons propane, butane, etc., are cracked in the presence of a small quantity of catalyzer (org. or inorg. halide, as HCl, $CHI_3$, $CCl_4$, $POCl_3$, etc.) with or without activator (Cu, Fe). Temps. of around 600° are used.

**Distilling heavy hydrocarbon oils.** ROGER D. HUNNEMAN, FRANCIS M. ROGERS and ROBERT E. WILSON (to Standard Oil Co. of Ind.) U. S. 1,791,209, Feb. 3. Oil such as residual oil is heated to about 355–405° and steam at a like temp. in the pro-

portion of 3-10 lb per gal. of final oil distillate is supplied Equilibrium is established between the oil and steam while maintaining an absolute pressure not over 75 mm., and the unvaporized oil and vapors are sepd App is described Cf *C. A.* 24, 3353

**Gasoline by fractional condensation.** David G Brandt (to Doherty Research Co.) U S 1,791,113 Feb 3 Hydrocarbon vapors contg gasoline constituents, such as vapors produced by distg and cracking petroleum are passed under superatm pressure through a series of condensing zones, the last of which is maintained at substantially the normal atm temp while preceding zones are maintained at a higher temp., and condensates obtained in the preceding zones are individually cooled to substantially normal atm temp and a body of cooled condensate having a higher mean b p than that of the condensate obtained in the last condensing zone is maintained and mixed with the condensate from the last condensing zone An arrangement of app is described

**Gasoline from fuel oil.** L. de Potter and F Rasquin. Belg 370,471, June 30, 1930 Fuel oil is treated under pressure in a closed vessel with a compressed gas. The mixt thus obtained is purified in filtering app arranged in a closed circuit

**Apparatus for producing gas from gasoline.** James T Jones (to Norman A Way, Carley Zelmenovitz and Ashton Burford) U S. 1,791,213, Feb 3

**Filter for gasoline, etc.** Amalgamated Carburetters, Ltd., and C Brown Brit 335,693 Aug 20 1929 Structural features

**Filter for gasoline, etc.** Wm J Villavaso U S 1,791,333, Feb 3 Structural features.

**Filter for oil of internal-combustion engines.** Ernest J. Sweetland U S 1,791,040, Feb 3 Structural features

**Apparatus for dehydrating oil.** Leonard D Grisbaum (to Railway Service and Supply Corp.) Can 308,563 Feb 10, 1931

**Solutions of lower mercaptan compounds.** Gerald L. Wendt (to Standard Oil Co. of Ind.) U S. 1,791,179, Feb 3 A soln of lower mercaptan compds which is suitable for removing S from gasoline, etc., is prepd by washing petroleum naphtha with a NaOH soln and adding to the resulting soln a Ca compd., such as lime or Ca hydrosulfide, which reacts with the Na sulfide present to ppt the sulfide radical.

**Bituminous emulsions.** Bitumuls Kaltasphalt A.-G. (C. A. Braun, inventor). Ger 514,485, Mar 22, 1925 Stable emulsions of asphalt and other bituminous materials and ceresin are prepd by supplying the material to be emulsified, together with alk water contg less than 1% of alkali, to a mixing vessel contg. a pre-formed emulsion of the material The amt. of emulsion that can be so prepd. from the batch of pre-formed emulsion is stated to be practically unlimited Examples are given. Cf *C. A.* 24, 4627

**Reclaiming journal box lubricating oil from waste.** Leonard D Grisbaum (to *Railway Service & Supply Corp.*). *U. S. 1,791,473, Feb. 3* Contaminated emulsified oil is treated with an alk soln such as NaOH of sufficient strength to break the emulsion and react with contaminations including lint, at a temp above 75° (preferably about 100°), the mixt is agitated with air, mixed with water, further agitated with air and the oil is sepd App is described U S 1,791,474 describes app. and detail of procedure for treating the contaminated oil with NaOH soln. and projecting water on the surface of the oil after subsidence of the mixt., to travel downwardly. Cf. *C. A.* 24, 6001.

## 23—CELLULOSE AND PAPER

CARLETON E CURRAN

**Determination of alpha cellulose.** H Pincass. *Kunstseide* 12, 282-3(1930).—Cellulose materials analyzed for alpha cellulose by 3 different methods gave different values The differences in the results are due mainly to differences in the preliminary drying of the sample and to differences in the methods of washing out the alkali and drying the alpha cellulose Frederick C Hahn

**Measuring the viscosity of cellulose and its application to the manufacture of plastics.** L. Laisney and H. Reclus. *Rev. gén. mat. plastiques* 7, 3-15(1931).—After a brief review of previous work on the viscosity of cellulose, a technic for its detn. is described in detail The method is simple and easy to use in a com lab., and is sufficiently accurate for ordinary purposes. The cuprammonium soln is prepd via Joyner (*C. A.* 16, 3543) but the $NH_4OH$ is strengthened to about 250 g $NH_3$ per l before soln of the Cu and again after soln of the Cu is completed The cellulose is dissolved in the

presence of $H_2$, and the soln is forced by pressure of $H_2$ into a $H_2$-filled tube, where the viscosity is detd by the falling sphere method (a 3 mm. sphere falling 50 cm.) The concn of the soln should be such as to give a viscosity of 5–100 sec. The viscosity at various concns. was found to be: 0%, 2 sec.; 1%, 10 sec.; 2%, 140 sec.; 3%, 1000 sec. These values practically correspond to the equation $\log V = 1.01\,C + 0.035$

A. Papineau-Couture

*Production of ammonium copper oxide cellulose solutions.* E. Schurz. *Kunstseide* 12, 283–5(1930). *Jentgen's Rayon Review* 2, 248–9(1930).—A detailed discussion of the prepn of cellulose cuprammonium solns. involving the following steps: pptn of $Cu(OH)_2$, mixing of the $Cu(OH)_2$ with cellulose, extn of the blue liquor, soln of the $Cu(OH)_2$-cellulose mixt. in ammonia, filtration of the resulting soln., and removal of air bubbles therefrom. The mixing of dry cellulose with solid $Cu(OH)_2$ results in a much better control of the spinning soln.

Frederick C. Hahn

**Nitrates of cellulose benzoate.** M. Sendo and J. Kondo. *Cellulose Ind.* (Tokyo) 6, 150–5(1930).—Cellulose monobenzoate was treated at 18–20° with mixed acids of the following percentage compn., resp., $H_2SO_4$, $HNO_3$, $HNO_2$, and water: (1) 71.14, 20.81, 0.13, 7.92; (2) 65.0, 18.1, 0.15, 16.15; and (3) 59.58, 21.39, 0.23, 18.8. Cellulose dinitrate mononitrobenzoate $[C_6H_7O_2(NO_3)_2CO\text{-}C_6H_4NO_2]$ was obtained by means of acids (1) and (2) and the mononitrate $[C_6H_8O_2(NO_3)CO_2C_6H_4NO_2]$ by acid (3). The explosive properties of these nitrates are similar to those of the normal cellulose nitrates, but, compared with equally nitrated normal cellulose, these mixed esters are more stable, less hygroscopic and less soluble in ether-alc. and burn at a slower rate.

B. C. A.

**Acid adsorption and stability of nitrocellulose.** D. R. Wiggam. *J. Phys. Chem.* 35, 536–9(1931).—$HNO_3$ and $H_2SO_4$ are adsorbed by nitrocellulose of high N content; other acids are adsorbed somewhat less. The stability of the nitrocellulose is lowered to a degree depending upon the amt. of acid adsorbed.

Malcolm Dole

**Phenomena of the lattice transformations of nitrocellulose. Their generality in cellulose compounds.** J. J. Trillat. *Compt. rend.* 191, 1441–3(1931).—Trogus, Hess and Katz (*C. A.* 24, 2877) have shown that the x-ray interference pattern of ramie fibers, nitrated to a max., is changed if the fibers are swelled by certain liquids. The altered pattern reverts reversibly to that of the original fiber as the liquid evaporates from the fiber. Cotton, nitrated to 12.95% N (nearly trinitrocellulose), gave a cryst. diagram corresponding to trinitrocellulose. Some of this nitrated cotton was then completely dispersed, instead of merely being swelled, by dissolving it in acetone, and was then recovered in the form of a film by evapn. of the acetone. The films showed a cryst. structure having a new lattice spacing of 9.31 A. U. and differing slightly in other respects from that of the undispersed cotton. It is uncertain whether this modification of the structure of the lattice corresponds to a new cryst. form of trinitrocellulose, or arises from a combination of the trinitrocellulose with the solvent. The film retains about 1% of acetone very tenaciously. The new diagram appears to be a mixture of that of the original trinitrocellulose with that of a new product. If the degree of nitration of the cotton is less (10–12%), the fibers show a cryst. structure, although more feebly as the degree of nitration is less. The corresponding films, however, show only halos corresponding to an amorphous structure. This difference between the films from cotton nitrated to 12.95% and to 12% is quite sharp. It appears that only trinitrocellulose is a well-defined compd. capable of crystallizing in a second form as the result of passing through the disperse phase. The presence of an ill-defined compd. such as "dinitrocellulose" hinders the process and gives rise to an amorphous structure. Similarly, cellophane is cryst. and has a structure different from that of the initial cotton. In general, it follows that the compd. of cellulose and native cellulose both can assume different cryst. forms after being passed through a state of swelling followed by dispersion.

R. H. Lombard

**α,β-Lignin.** Peter Klason. *Svensk Kem. Tids.* 42, 259–63(1930).—Reply to Hägglund's contention that there is only one lignin in wood (cf. *C. A.* 24, 5152, 6007).

A. R. Rose

**Utilization of hardwoods for mechanical and chemical pulp.** H. S. Hill. *J. Forestry* 28, 1146–52(1930).—As spruce becomes more expensive, hardwoods become more important as pulp raw material. That the pulping qualities of hardwoods have already been investigated and found to be satisfactory for a variety of pulp products is evident from the literature reviewed by H. The future use of hardwoods for pulp is essentially a matter of economics.

Alfred L. Kammerer

**Wood fibers.** G. J. Ritter. *J. Forestry* 28, 533–41(1930); cf. *C. A.* 22, 4149, 23, 976, 1931.—The results of an investigation of the microstructure of the fibers of 10 species of wood are presented. Two types of lignin are distinguished. Fiber cell walls

are made up of layers, capable of being sepd into fibrils by chem and mech means Fibrils in turn can be chemically sepd into fusiform bodies Cellulose and lignin from wood can be distinguished by their optical properties in polarized light A L K

**Composition of Cassia siamea, L.** Y Shinoda. *Cellulose Ind* (Tokyo) 6, 155–6 (1930) —The following percentage compn has been found moisture 11 2, alc benzene ext 18 2, lignin (König) 37 3 (on the extd , dry product), ash 0 3, impure cellulose 40 3, hydrolysis value (Ost) 92 8 and pentosan content (Tollens Kruger) 15 6% Before chlorination the wood meal was steeped in 10% NaOH soln for 48 hrs and its cellulose content redetd , when the value 33 8%, of purity 100%, was found Xylose and mannose were found in the hydrolysis liquor, but no galactose was present B C A

**Bamboo. I. Fine structure of the bamboo fiber.** K. Sisido *Cellulose Ind* (Tokyo) 6, 148–50(1930) —A theoretical discussion of the results of previous workers B C A

**The use of microörganisms in certain commercial processes** E E Hubert *J Forestry* 28, 542 5(1930) —A résumé is given of making com products with the aid of molds, bacteria yeasts, etc with bibliography Expts have shown that spruce and balsam fir attacked by the group of fungi causing white rots may produce relatively large yields of pulp by the sulfite process This finding has possibilities in the future development of pulp manuf It is carrying out expts on the action of a blue stain fungus on western yellow pine, the resulting by-product of which has com possibilities Alfred L Kammerer

**Removal of hemicelluloses from wood by use of sodium hydroxide.** O Horn *Cellulosechemie* 11, 151–2(1930) —Mineral acids and 5% NaOH have been used to remove hemicelluloses, undesirable impurities in wood investigations In the presence of NaOH, lignin may be oxidized or its components may be split off, perhaps through sapon and the balance may be altered Beechwood sawdust, after extn with benzene ethanol, 1:1, was degummed with 5% NaOH by 4 treatments at room temp for 36 and for 48 hrs , the ext. after each treatment being removed and new alkali used The av wt loss for 4 detns was 23% If no lignin is removed, a lignin content of 24 1% before degumming must rise to 29 6%, whereas experimentally, it was found to be a little over 27% Methoxyl content for the wood before degumming was 6 25%, equiv to 7 7% for degummed wood, whereas experimentally only about 6 3% was found Each alkali treatment was followed by washing with cold water, dil AcOH and hot water until the filtrate was colorless, the results in all expts being fundamentally the same. Conclusion: The method for degumming by use of 5% NaOH is a suitable one because, in addn to hemicelluloses, a part of the lignin is also removed C A Brautlecht

**Quality of technical caustic soda employed in the manufacture of viscose silk.** V. I. Sharkov. *J Chem Ind* (Moscow) 6, 1027–9(1929) —The purity of NaOH for use in viscose silk manuf is of the utmost importance. Practical experience has shown that the presence of NaCl + $Na_2CO_3$ in NaOH in greater concns than 3 5–4% is harmful, although very low concns are not markedly bad These 2 salts exert about an equal depressing effect on the swelling of the fiber of sulfite cellulose A C Zachlin

**Cellulose acetate rayon.** Krüger *Kunstseide* 12, 262–7(1930) —A review of recent scientific works related to the prepn of cellulose acetate, discussion of these results in the light of present practice in the manuf of cellulose acetate rayon, and a comparison of this rayon with other types of rayon from various standpoints Frederick C. Hahn

**Dry spinning of acetate rayon.** Fritz Ohl. *Kunstseide* 12, 279–81(1930), *Jentgen's Rayon Review* 2, 245–7(1930).—Numerous factors influencing the production and quality of acetate rayon are discussed A cellulose acetate should be chosen with the smallest possible structure of the cellulose molecule; it should be sol in proper solvents, free from impurities, of uniform viscosity and should not contain over 0 05% $H_2SO_4$ The spinning soln. must be prepd under the strictest conditions A cellulose acetate of fixed moisture content must be used, it should be uniformly dissolved with a min period of stirring to avoid warming the mixt. and loss of solvent. A no. of filtrations are required and all bubbles must be removed from the soln prior to spinning. Exptl. data are presented showing the importance of the foregoing factors In the dry spinning process a careful control of the quantity and temp of the air is important. F. C Hahn

**Strengthening of rayon.** Tatsumi Yamada. *Repts. Imp. Ind. Research Lab., Osaka, Japan* 11, No. 10(1930).—Absorption of water by cellulose depends upon the presence of a free OH group and by replacing it with $NO_2$ or AcO groups it is possible to increase the resistivity toward water. A similar result is obtained by treating rayon with formalin Y. found the following conditions necessary to treat rayon with formalin:

*ps* 1.2–2.0 time of immersion 12 hrs., time of beating 5 hrs. at 50–70° and concn. of soln. 4–10%. F. I. NAKAMURA

Mechanical advances in the artificial silk industry. HANS SCHMIDT. *Chem. App.* 17, 205–7, 220–2(1930). —*A review.* M. C. ROGERS

Beating of [paper] pulp. XI. A characteristic of vegetable fibers as paper-making materials. M. NAKANO *Cellulose Ind.* (Tokyo) 6, 144–7(1930); cf. *C. A.* 24, 5431.—Wool silk, asbestos and vegetable fibers were beaten, and their paper forming properties compared. Wool cannot be split longitudinally but is reduced to short lengths showing no fibrillation, from which it is impossible to form a sheet. Silk and asbestos split up into fibrils, but the sheets formed from the products are weak because of the slippage of the fibers. *It follows, therefore, that fibrillation is not necessarily accompanied by the development of the adhesive properties which are essential for the production of satisfactory sheets.* Only vegetable fibers have these characteristic properties, which are due to the colloidal state of the surface of the fibrils, and their felting capacity is of secondary importance. B. C. A.

Beating of [paper] pulp. XII. Improvement of absorbency of blotting paper. M. NAKANO *Cellulose Ind.* (Tokyo) 6, 164–7, *Abstracts* 29(1930), cf. preceding abstract.—Blotting papers of high absorbency are obtained by the use of pulps treated with concd. NaOH solns., and the absorbing velocity of such products is, on the av., about 40% higher than that of paper made from untreated pulp. Hence pulps can be transformed into "freer" states than their natural ones, and this effect is the reverse of that obtained by beating. B. C. A.

The utilization of kaoliang stalk. III. Industrial experiments on the manufacture of soda pulp and paper. RYUJI YAMAMOTO *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 26–7.—70% kaoliang pulp is used to make white or Manila paper. V. F. HARRINGTON

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The Spierer lens and what it reveals in cellulose (SEIFRIZ) 11A. Constitution of cellulose xanthate (LIESER) 10. *Lignin and cellulose* (FREUDENBERG, *et al.*) 10. Methylated tri- and tetra-saccharides from cellulose and starch (FREUDENBERG, FRIEDRICH) 10. Concrete grindstones for wood pulp manufacture (Brit. pat. 335,521) 20. Artificial threads, films, etc. (Fr. pat. 633,240) 25. Treating cellulose material (Fr. pat. 632,726) 25.

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LEJEUNE-JUNG, PAUL. Aus dem Werdegang der deutschen Zellstoff-Industrie 1880–1930. Festschrift zum 50 jährigen Bestehen des Vereins deutscher Zellstoff-Fabrikanten e. V. Berlin: Selbstverlag d. Vereins. 112 pp. M. 10.

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Cellulose. ERIK HAGGLUND Ger. 515,018, June 10, 1927. In the manuf. of cellulose by digesting wood with NaOH soln., a part of the black liquor by-product is returned to the digester, without causticizing, after its org. constituents have been destroyed by heating it to about 350° under 200 atm. pressure.

Cellulose. ERNST MEZEY Ger. 514,466, Feb. 20, 1930. A pure, highly voluminous cellulose is prepd. by heating com. cellulose for 3–4 hrs. at 3–5 atm. pressure with a dihydric aliphatic alc. or a deriv. thereof, particularly a mono- or di-alkyl ether or an acetate or chloride. A small quantity of a weak alkali, *e. g.*, borax or soap, may also be present. Thus washed sulfite cellulose may be heated as above with ethylene glycol monoethyl ether 2 and $NH_3$ 0.5%, and the product washed and bleached.

Cellulose. HANS KAMMERL. Fr. 633,005, Mar. 29, 1930. A valuable cellulose is obtained from soiled plant fibers, particularly cotton waste such as linters, by treating the fibers mechanically to remove the greater part of the impurities in a centrifuge without a screen, after which the pectins, waxes and greases burned in the structure of the fiber are removed by leaching or light boiling.

*Drying cellulose.* GUSTAV NEUMANN. Fr. 633,014, Mar. 29, 1930. Cellulose is dried by means of liquid $SO_2$ which is then extd. by lowering the pressure. The dried cellulose is particularly suitable for acetylation or to be transformed into viscose.

Acidulation of cellulose. SOC. ANON. POUR L'IND. CHIM. A BALE Fr. 633,800, Apr. 12, 1930. Cellulose is acidulated by treating it first with concd. solns. of neutral salts such as $CaCl_2$, $MgCl_2$, $ZnCl_2$ or thiocyanates of K, Ca, etc., and then with anhydrides of aliphatic acids. Cf. *C. A.* 24, 3112.

Nitrating cellulose, etc. I. G. FARBENIND. A.-G. (Franz Becker and Hans Zepter, inventors) Ger. 515,108, Oct. 20, 1927. A small addn. of urea is made to the nitrating mixt. in order to eliminate or reduce the amt. of $N_2O_3$. The process is particularly useful in nitrating cellulose with relatively dil. nitrating mixts.

**Cellulose esters.** I. G. FARBENIND. A.-G. (Max Hagedorn and Georg Hingst, inventors) Ger. 515,106, Jan 7, 1927 Sol cellulose esters of higher fatty acids are prepd by treating unpretreated cellulose with chlorides of the acids in the presence of pyridine, quinoline or like base at a temp above 100°, *e g*, 110–140° Diluents may be present An example is given

**Cellulose esters.** I G FARBENIND A -G (Max Hagedorn and Georg Hingst, inventors) Ger 515,107, Jan 28, 1927 Insol or difficultly sol cellulose esters of higher fatty acids are converted into sol esters by treatment in a liquid medium at a raised temp not exceeding 200° with an org or inorg acid, acid anhydrideor acid salt, or mixts of these Thus, insol cellulose tristearate gives a clear soln when heated in $C_6H_2Cl_4$ with $Cl_3CCOOH$ to 145°, and the ester isolated by pouring the soln into EtOH, is sol in $C_6H_6$, $CHCl_3$ and AcOAm Other examples are given also Cf *C A* 25, 1379

**Cellulose esters.** Soc KODAK-PATHÉ (SOC ANON FRANÇAISE) Fr 693,189, Apr 2 1930 Cellulose esters of fatty acids are made by heating esterifiable cellulosic material in vapors of a fatty acid having more than one and less than 8C atoms, at a temp above 100° but below 200° in the absence of O and catalysts producing a degradation of the cellulose, until the acyl group in the ester thus produced has reached at least 4%, the said vapors being the sole acylating agent The ester may be esterified afresh with addnl acyl groups

**Benzylcelluloses.** JOSEPH BOUCHET Fr. 693,318, July 12, 1929 Aralkylcelluloses, and particularly dibenzylcellulose, are obtained by treating alkali cellulose prepd with a concd NaOH lye with $C_6H_5CH_2Cl$ at 70–100° without pressure and with or without a diluent

**Cellulose acetate.** OSWALD SILBERRAD and HARRY BLEASDALE Fr 693,568, Apr 9, 1930 The AcOH is recovered from the acetylation mixt by adding to this mixt an amt of water greater than that necessary to destroy all the anhydride remaining, *e g*, an addn of 6–8% of water. The mixt. is allowed to stand at 30–35° until the cellulose acetate has become sol in acetone then transferred to a distg app and finely ground AcONa is intimately mixed with it, and the AcOH distd off Fr 693,569 describes the manuf of cellulose acetate in which the cellulose acetate is pptd from an acid product and collected as a porous opaque substance by dilg the acid product with water in amt. almost sufficient to start the pptn and afterward bringing the acid product thus treated into contact with water so that from the moment of contact the product is submerged in an excess of water

**Cellulose acetate.** Soc KODAK-PATHÉ (SOC ANON FRANÇAISE) Fr 693,132, Apr. 1, 1930 Cellulose acetate is prepd by treating a cellulosic material with $Ac_2O$ and a catalyst in the presence of a mixt which dissolves the cellulose acetate produced, the mixt. contg an amt of AcOH insufficient, by itself, to dissolve the acetate and an org volatile liquid not miscible with water and inert with regard to $Ac_2O$, *e g*, $C_2H_4Cl_2$ The cellulose acetate is pptd in an aq bath at a temp above the b p. of the volatile liquid, which is collected and condensed. Fr 693,133 describes the recovery of cellulose acetate from soln. in AcOH by mixing the soln with an aq pptn bath contg at the beginning at least 20% by wt of AcOH and capable of pptg the acetate

**Cellulose acetate compositions.** Soc. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr 693,131, Apr 1, 1930. A compn suitable for making films is made by dissolving cellulose acetate sol. in acetone in a volatile solvent mixt composed of AcOMe 50, AcOEt 10–40 and acetone 40–10 parts This soln contains about 30% of cellulose acetate

**Apparatus for circulating and storing colloidal solutions of cellulose.** SOC. INDUSTRIELLE DE MOIJ Fr 692,647, June 24, 1929 The app is constructed so that the cellulose is brought in a perfectly homogeneous state to the spinning nozzles for making *artificial silk*

**Saccharification of cellulose.** MAURICE JUNIEN. Fr 693,277, June 14, 1929. Cellulosic materials are heated under pressure to remove free O and then hydrolyzed with hot dil $H_2SO_4$ in the presence of excess of water to obtain fermentable sugars An app is described with means for keeping the acid in rapid movement during the hydrolysis.

**Carbohydrate esters.** I G FARBENIND A -G (Max Hagedorn, inventor). Ger 515,109, Feb 11, 1928 See Fr 668,686 (*C A* 24, 1650)

**Nitrocellulose solutions, etc.** JOSEPH G. DAVIDSON (to Carbide and Carbon Chemicals Corp) U. S 1,791,301, Feb 3 Nitrocellulose or a like cellulose deriv is used with a solvent comprising the acetate of the monoethyl ether of ethylene glycol or other solvent of the same type

**Felted cellulose fiber products.** GEORGE L. SCHWARTZ (to E I. du Pont de Nemours & Co) U. S 1,791,248, Feb 3 In forming products such as those suitable for

manuf of "artificial leather," shoe box toes, etc., continuous bands of cellulose fibers are gelatinized with caustic alkali, the gelatinized fibrous material is subjected to heat and pressure and washed App is described

**Plastic compositions comprising cellulose esters and polymerized vinyl compounds.** CELLULOID CORP Brit 335,582, March 23, 1928 Cellulose acetate or other cellulose esters are used with polymerized vinyl compds such as polymerized vinyl acetate propionate phthalate, phosphate, chloride or bromide, styrene or the products obtained by dehalogenating vinyl halides as by use of Zn, with or without various plasticizers or softening agents, fillers, pigments, gums, resins, etc., or anti acid substances such as urea or Ca lactate or volatile solvents

**Plastic masses.** I G FARBENIND A.-G. Fr. 693,496, April 7, 1930 Plastic masses are composed of derivs of cellulose such as acetylcellulose in combination with a gelatinizing or plastifying agent formed of one or more esters of phosphoric acid, the org constituent of which consists of monoalkyl or monoaryl glycolic ethers of the ethyleneglycol, propyleneglycol or butyleneglycol series such as dimethylglycolbutylglycol phosphate or dipropylglycolbutylglycolphosphate Several examples are given

**Pyroxylin sheets.** THE FIBERLOID CORP. Fr. 693,186, April 2, 1930 Smooth sheets of pyroxylin are made by transforming a gel of pyroxylin into a sheet while still plastic, and modifying the phys state of the surface of the sheet while drawing The sheets may be extended and submitted to a tension while extending and a part at least of the solvent is removed by warm air

**Molding celluloid sheets and articles.** H. DE HEN Belg 309,941, June 30, 1930 Previously heated and softened celluloid sheets are simultaneously pressed and subjected to the action of chemicals and of evapn until they have acquired the desired shape and such a consistency that they can be removed from the press without being cooled

**Viscose.** LEON LILIENFELD. U. S 1,790,990, Feb. 3 Cellulosic material such as cotton or wood-cellulose is treated at least once with a caustic alkali soln contg not less than 15% caustic alkali (calcd as NaOH), washed, converted into alkali cellulose, and the alkali cellulose is converted into viscose *Cf. C. A.* 24, 2292

**Nontransparent and glossy capsule of regenerated cellulose.** KALLE & CO A.-G (Julius Voss and Otto Schnecko, inventors) Ger 515,377, Nov 7, 1925. See U. S 1,778,096 (*C. A.* 24, 6014)

**Artificial silk from viscose.** ZELLSTOFFFABRIK WALDHOF and A BERNSTEIN. Brit. 335,605, June 27, 1929 In a noncontinuous process of the type in which the thread, after coagulation and fixing, is collected on spools, acid is removed by passing the threads immediately after coagulation through a hot water bath, and the threads are then spooled The coagulating bath may be formed of water 70, $Na_2SO_4$ 13, $H_2SO_4$ 10 and glucose 7%, and formalin may be added to the hot water bath

**Artificial silk from viscose.** I. G. FARBENIND A.-G Brit. 335,675, Nov 8, 1928 Viscose made from unripened alkali cellulose and contg excess of alkali as compared with its content of cellulose is spun into a soln of an $NH_4$ salt such as $(NH_4)_2SO_4$ to which acid and other $NH_4$ salts such as the acetate or formate may also be added, as may also other neutral salts such as $Na_2SO_4$, NaCl, NaOAc or Na lactate, etc. For subsequent coagulation the formed threads are passed through an acid bath of low concn such as a 6% $H_2SO_4$ soln and the freshly pptd threads may be subjected to stretching The viscose is made from unripened cellulose at temps above 0°. *Cf. C. A.* 25, 814

**Artificial silk.** COMPTOIR DES TEXTILES ARTIFICIELS. Brit. 335,613, June 28, 1929 In forming filaments such as those from viscose spun into an acid salt bath, the partly coagulated filaments after leaving the coagulation bath are stretched by passage through a narrow tube through which flows a current of liquid (which may be the same as, or different from, the coagulation bath) offering resistance to the forward movement of the filaments as they are drawn by rollers or other devices App is described

**Artificial silk.** ZELLSTOFFFABRIK WALDHOF and A BERNSTEIN Brit. 335,606, June 27, 1929 While passing from a twisting spool to a reel, the material is allowed to fall into a liquid bath preferably contg a material such as a wax-oil emulsion which forms a protective coating on the filament. The app. is described Precipitants which do not crystallize out are preferably used in the spinning process.

**Artificial silk.** BENNO BORZYKOWSKI. Fr. 693,700, April 11, 1930 See Ger 492,279 (*C. A.* 25, 415)

**Artificial silk.** N. V HOLLANDSCHE KUNSTZIJDE INDUSTRIE Fr 693,411, April 5, 1930 Artificial silk of a dull luster is made by introducing into the spinning soln. terpenes or terpenic alcs or mixts. thereof An emulsifying agent such as sulfonated castor oil is also added

**Artificial silk.** NOVASETA A. G ARBON Fr. 691,749, Mar 11, 1930 Artificial

silk on leaving the spinning nozzles is given a preliminary coagulation in a coagulating bath and then caused to pass in a direction not deviating much from the vertical through at least one subsequent vessel traversed by a pptg liquid to obtain a final coagulation

**Apparatus for drawing artificial silk in the moist state.** FRANZ J GAHLERT Fr 693,574, April 9, 1930

**Twisting and collecting artificial silk, etc.** WM. P DREAPER U S 1,790,979, Feb 3 Mech features

**Artificial threads.** MICHEL J DASSONVILLE Fr 692,665, June 26, 1929 Cellulose threads having a structure and qualities comparable to those of natural wool are obtained by varying the section of the thread from the spinning nozzle by a corresponding variation of the flow or of the pressure of the cellulose soln about to be spun

**Artificial filaments.** ALGEMEENE KUNSTZIJDE UNIE N. V. Ger 514,400, Aug 24, 1927 Artificial filaments of dull luster are prepd from solns of cellulose acetate or other cellulose ester or ether by dry spinning these in a spinning cell into which water or water vapor is introduced The spinning soln may be anhyd or not Examples are given

**Luminous artificial filaments.** HENRY A GARDNER U S 1,791,199, Feb 3 Artificial filaments such as those formed from cellulose acetate or viscose contain a compd of Ti such as the oxide and a small proportion of a radioactive substance, such as $RaB_1$

**Removal of hydrogen sulfide from air of viscose-silk factories.** N V NEDERLANDSCHE KUNSTZIJDE FABRIEK Dutch 23,233, Dec 15, 1930 The surplus alk liquor from the prepn of cellulose is used, dild to 4%, for absorption of $H_2S$ from the foul air catalyzers such as Ni, Cr and Mn salts (1%), are added for oxidation of the $H_2S$ Cf *C A* 24, 4633

**Fiber from wood.** GEORGE A RICHTER and MILTON O SCHUR (to Brown Co) U S 1,790 838, Feb 3 Chipped wood such as jack pine is digested under pressure and with heating, in a saponaceous alk liquor such as a NaOH soln contg 0 3 0 4% of soap Cf *C A* 25, 414

**Wood pulp.** GUSTAF HAGLUND (to Patentaktiebolaget Gröndal Ramen) U. S 1,791,476, Feb 3 Wood chips, before cooking with a liquor such as a sulfite soln, are preliminarily soaked in a cooking liquor produced in the usual manner without any addn of waste liquors from previous cooking operations, and, after removal of part of the cooking liquor, the chips are cooked with a cooking liquor mixed with waste liquor from a previous cooking operation or with such liquor from a cooking app still in action

**Cellulose pulp web.** GEORGE A RICHTER (to Brown Co) U S 1,790,839, Feb 3 A web which is highly absorptive of impregnating substances comprises gelatinized cellulose and loosely felted, substantially uncompacted fibers in unbeaten condition

**Cooking cellulose.** ALB E NIELSEN Norw 46,601, June 17, 1929 The cooking is carried out by indirect steam heating with circulation of the liquor through an app outside the digester During the cooking process the liquor is subjected to a successive evapn in the circulation app in order to increase the heat value of the waste liquor, reduce the consumption of fuel and raw material and increase the output of pulp

**Pulp beater ("pulping engine").** S MILNE Brit 335,671, July 26, 1929

**Apparatus for continuous beating and brushing of paper-making stock.** THOMAS J. MULLEN U S 1,790,830, Feb 3 Structural features

**Washing paper-making pulp.** OTTO MANTIUS U S 1,790,714, Feb 3 App and various details of app and operations are described

**Paper.** FRIEDRICH K WICKEL. Ger 515,186, Mar 27, 1928 Impervious transparent paper is prepd from sulfite cellulose paper by impregnating this, as completely as possible, with anhyd glycerol, and then coating it on both sides with an aq soln of albumin, preferably egg albumin, to which addns such as hardening agents may be made A soft and non adhesive product is obtained after drying Cf *C A* 24, 1741

**Unbleached paper, cardboard, etc.** VALDEMAR W D'OBRY. U. S. 1,791,092, Feb 3 A grass is moistened and steamed under pressure while preventing escape of substantially all the constituents of the grass, and the material is then mech disintegrated for making paper, cardboard or the like Cf *C A* 24, 1981

**Paper-making apparatus.** DEE L. SHEAFOR (to Black Clawson Co). U. S 1,791,384, Feb 3 Structural features

**Paper-making apparatus.** NILS A JACOBSEN U. S. 1,791,412, Feb 3 A device is provided, actuated by the wt of torn off paper, for automatically dividing the paper web on the wire cloth in 2 or more parallel strips in case tearing of the paper web should be started because part of the paper is carried along with the wire cloth about the couch roller

**Suction box for paper-making apparatus.** EARL E. BERRY (to Beloit Iron Works). U. S. 1,790,852, Feb 3. Suction boxes are made of comparatively thin wall material composed of a Cr alloy such as "stainless steel" having a high modulus of elasticity and resistant to corrosion by the liquids with which it comes into contact.

**Waterproofing paper.** WM H RICHARDSON (to Richardson Co.). U. S. 1,791,040, Feb 3. In making waterproof cartons, a blank is printed and sprayed with paraffin on the printed side, and afterward is calendered with calender rolls. *App is described*

**Composition for waterproofing paper, millboard, papier maché articles, etc.** DUNLOP RUBBER CO., LTD., D F TWISS and G GORHAM Brit. 335,559, June 25, 1929 A material suitable for treating *containers for food* consists of an aq emulsion or dispersion of rubber, gutta percha, balata or the like, in admixt. with an aq dispersion of a mineral or vegetable wax or mixt. of waxes, *e. g.*, paraffin, in which the wax content may amount to 20–95% of the "dry rubber wax content." The compn may also be used for sealing the lids of the containers

**Dyeing paper and paper pulp** SOC ANON. POUR L'IND CHIM À BÂLE Fr. 693,172, April 2, 1930 *A unilaterally mono- or di acylated diamine such as oleyldiethylethylenediamine is used as adjuvant in dyeing paper or paper pulp*

**Recovery of paste from printed paper, and chiefly wood paste** LOUIS GRENAUDIER U. S. 1,791,445, Feb 3 Materials such as old newspapers are soaked in water and then treated with an alk bath such as $Na_2CO_3$ to form an alk soap with the fatty matter of the ink, and a substance such as NaCl is used which renders the soap insol so that the ink-contg soap rises to the top of the bath and does not mix with the paste in the bottom of the bath

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E MUNROE AND C. G STORM

**Drying powder and explosive materials in vacuum.** I BODEWIG *Chem App* 17, 253–4, 279–80(1930).—*B reviews the difficulties encountered in drying powder and tells of improvements in the app* M C. ROGERS

**High brisance studies on explosive effect and chemical constitution. I. Tetranitromethane and its mixtures with toluene.** ALFRED STETTBACHER *Z ges Schiess Sprengstoffw* 25, 439–41(1930).—S describes the prepn of $C(NO_2)_4$ from $(CH_3CO)_2O$ and $HNO_3$ in lab app Because of the time required for the reaction (10–12 days) and poor yield (76%) the product has no industrial application Its properties are described When properly neutralized and dried it is apparently quite stable A mixt. of *100 parts* $C(NO_2)_4$ *and 15.66 parts* $C_6H_5CH_3$ *has a heat of explosion of 1701 Cal./kg* The sensitiveness of this mixt. is greater than that of nitroglycerin, and its brisance as indicated by Fe plate tests is even greater than that of gelatin penthrinit (*C. A.* 24, 6017, 25, 818) C. G STORM

**High brisance studies. II. Mannitol hexanitrate (nitromannitol) and pentaerythritol tetranitrate (Penthrit).** ALFRED STETTBACHER *Z. ges Schiess- Sprengstoffw.* 25, 461–2(1930).—*In comparative tests of nitromannitol and "Penthrit," alone and in mixts S again attributes the greater explosive strength of the "Penthrit" to its mol structure about a central C atom* (*C. A.* 24, 6017) Approx 30 g samples were detonated in heavy Fe crucibles on brass or Fe plates, these being preferred to Pb plates because of their greater hardness Among other mixts. tested, one contg nitromannitol 37.5%, nitroglycerin 56.2% TNT 6.3% was compared with "Penthrit" 34%, nitroglycerin 51% nitrocellulose 2.15%, $NH_4NO_3$ 12.9%, both mixts having an exact O-balance *The latter mixt gave slightly superior results A frozen mixt of 60%* "Penthrit" and 40% nitroglycerin (60/40 "Penthrinit") is claimed to have the highest rate of detonation of known explosives—9500 m./sec., as against 9000 m./sec for frozen nitroglycerin C. G STORM

**The preparation of nitrocellulose with maximum nitrogen content.** F LENZE AND E RUBENS *Z. ges Schiess- Sprengstoffw* 26, 4(1931).—Nitrating expts were made with cotton linters and mixts. of $HNO_3$ with $H_2SO_4$, $SO_3$, $(CH_3CO)_2O$ $N_2O_4$ and $P_2O_5$ in *varying proportions A max N content of approx 14% was obtained with a nitrating* mixt. of $HNO_3$ and $P_2O_5$. The product was only slightly sol. in $Et_2O$–EtOH mixt Further expts. are in progress C. G STORM

**The properties of the nitroglycerin isomers.** A A. DSERSHKOVICH AND K. K. ANDREEV *Z. ges Schiess Sprengstoffw* 25, 353–6, 400–3(1930).—The literature of the subject is reviewed. D and A compared liquid nitroglycerin (*A*) with the frozen labile

(*B*) and stable (*C*) forms, as regards brisance and rate of detonation The Pb block test method of Hess showed (*C*) to have much greater brisance than either (*A*) or (*B*), and also to be more sensitive to detonation The same relation was confirmed by the Kast method (compression of Cu cylinders), although this method gave discordant results. Rate of detonation tests were made by the Dautriche method in glass tubes 22 mm inside diam. with 2 mm walls, picric acid detonating fuse having a rate of 7000 m /sec was used (*C*) gave the remarkably high rate of 9150 m /sec (av of 3), (*A*) gave 1165 m /sec. (*B*) failed to detonate completely with No 8 detonators, but gave a rate of 9100 m /sec when a booster of 20 g tetryl was used Similarly, (*A*) gave a rate of 8750 m /sec when a booster of 10–15 g (*C*) was used Contrary to the rate of detonation results (*B*) gave the highest Trauzl block test (560 cc), (*A*), 518 cc, (*C*), 390 cc In this test the insensitiveness of (*B*) was probably overcome by the confinement afforded by the sand stemming No appreciable difference was found as regards sensitiveness to impact When properly protected from contamination, (*B*) remained unchanged for periods as long as 70 days The linear conversion velocity and crystn velocity of the isomers were detd It is suggested that the loss of sensitiveness of gelatin dynamites during storage is the result of gradual conversion of (*A*) to (*B*)

C G Storm

Researches on coal-mining explosives at the Safety in Mines Research Station, Buxton. W Payman *Trans Inst Mining Eng* 80, 11–23(1930 1931) —Tests are made to det the safety of explosives in dusty and gassy coal mines. These tests include the number of cartridges in a shot-hole, the position of the detonator, the character of the stemming, the safety in the presence of coal dust and of methane. Ignitions of gas have been obtained with as little as 2 oz. of a permitted explosive with no stemming, but 1 in. of noncombustible stemming will prevent ignition of gas with 28 oz of a similar explosive. The presence of an inhibitor to prevent ignition of gas by explosives has been considered but this method has not been found practical Expts on the effect of compression of gas have indicated that, up to at least 11 atm., as the pressure of the air and methane is increased the ignition point is lowered When the pressure is reduced the ignition point of methane and air is reduced even more rapidly than under increased pressure. A max temp is reached in the case of methane under about 1/3 of an atm The greatest amt. of work is done when a detonator is placed in the cartridge next to the stemming and pointing inward

C W. Owings

Explosive limits of fire damp. E Kirst *Glückauf* 67, 50–7(1931) —Results of recent investigations were discussed

J D Davis

A review of some recent dust explosions. D J Price and H R Brown *Quart Natl Fire Protect Assoc* 24, 307–29(1930) —A comprehensive report is given on dust explosions at Western Maryland Grain Elevator, Hogan Mill Feed Co, L F Carlston Elevator Co, Tobacco Byproducts and Chem Corp and Staley Manufacturing Co All these dust explosions occurred during August and September, 1930, resulting in a gross loss of approx $500,000 Analysis of all that is known of the causes further emphasizes the necessity of cleanliness in industries producing flammable dusts, importance of controlling equipment design to minimize the likelihood of stirring up dusts or igniting them, and the value of inert gases as a method of preventing dust explosions in grinding equipment

C. L Jones

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Nitrates of cellulose benzoate (Sendo, Kondo) 23. Acid adsorption and stability of nitrocellulose (Wiggam) 23.

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Sachsse, Fritz Die Bekämpfung der Schlagwetter- und Kohlenstaubgefahr. Berlin: Phönix-Verlag C Siwinna 32 pp M 2 40

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Explosives. Dynamit A.-G vorm Alfred Nobel & Co (Ph Naoúm and H Ulrich, inventors) Ger 513,653, Mar 28, 1930 Addn to 500,407. The invention of Ger. 500,407 (*C. A.* 24, 4397) is extended to cover the nitrates of homologs and of *N*-alkyl derivs of monoethanolamine and diethanolamine Cf *C A* 25, 1383

Gunpowder blasting squibs for electrical ignition. Imperial Chemical Industries, Ltd, and W McGhie Brit. 335,607, June 27, 1929 Structural features

# 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Standard colors and fewer dyes would benefit textile industry. ALOIS MARRZ. *Textile World* 79, 428–30(1931) RUBY K. WORNER

Color measuring and color standards. M. J. SCHOEN *Chem. Weekblad* 28, 105–6 (1931) G. G.

Photoelectric cell has definite place in color measurement. WALTER M. SCOTT *Textile World* 79, 856–9(1931).—A résumé is given of the accomplishments to date along the line of color measurements, together with a warning to textile manufacturers "that they must not look for an immediate millenium in this field." The applicability, limitations and future possibilities of the photoelec. cell for color measurement are discussed. The following color analyzers that use this device are briefly described: the T. C. B. *Photocolorimeter*, designed by Toussaint, the *photoelec. spectrophotometer* developed by the American Photoelec. Corp. marketed by Eimer & Amend; the portable recording and indicating color analyzer developed by P. J. Mulder and J. Rasek, marketed by the Burgess-Parr Co.; the *Colorscope*, developed by H. H. Sheldon, New York Univ.; and the recording *photoelec. color analyzer* developed by A. C. Hardy, manufactured by General Elec. Co. The fallacies of the following claims are pointed out: that the photoelectric cell introduces a distinctly new method of color measurement; that it entirely eliminates the human eye and therefore greatly increases the accuracy of the measurement by doing away with the variable human factor; and that photoelec. instruments are so simple to operate that no previous specialized training is necessary. R. K. W.

Relation between structure and affinity of dyes for plant fibers. MIECZYSŁAW DOMINIKIEWICZ. *Przemysł Chem.* 14, 222–48(1930).—See *C. A.* 24, 5501. A. C. Z.

The vat colors from a cotton piece dyers' point of view. GEO. H. HARRIS. *Dyer, Calico Printer* 64, 643–4(1930).—A brief discussion based on practical experience is given of the difficulties involved in the use of vat colors. The selection of a suitable dyestuff, and the importance of such factors as the quality of the water, the temp. of the dye bath, the method of handling the goods in running them through the dye bath, etc., are considered. RUBY K. WORNER

Pectographic studies of solutions of dyestuffs. PAUL BARY. *Rev. gén. colloïdes* 8, 62–8(1930); cf. *C. A.* 24, 3417.—The similarly constituted compds. parafuchsin and fuchsin AB in aq. solns. give the same sort of pectographs in dil. and concd. solns., with crystn. being retarded in dil. soln. Methyl violet does not give crystals. Safranine T gives crystals at all concns., while safranine MN gives amorphous bands but yields crystals at 0.025% concn. Hence, in safranines, dilu. aids crystn. and impedes it in the triphenylmethane derivs. The choice of solvent modifies completely the pectographs obtained in almost all cases. Picric acid in acetone gives clear unique crystals while in alc. it gives a gel impregnated with crystals. Safranine MN, which in water gives an unstable gel and crystals, in acetone yields fine lines as also do safranine T, methyl violet, parafuchsin, crystal violet and Induline scarlet. Ultramicroscopic examn. of these solns. show that all those which give a pectograph of fine parallel lines contain visible granules while those which give a gel deposit are optically void. F. W. L.

Action of nitrous acid on animal fibers, and reactions of the products formed with azo components. M. J. VAN TUSSENBROEK. *Chem. Weekblad* 28, 62–5(1931).—The question is reviewed whether $HNO_2$ forms reactive diazonium compds. with amino acids of the fiber, or whether it is merely absorbed, leading, on development, to nitrosophenols and their dye derivs. Formation of $HOC_6H_2N_2O_3$ from PhOH and $N_2O_3$ in excess (Morel and Sisley *C. A.* 22, 4515) was confirmed in this particular instance only. When $N_2O_3$ was conducted into an $Et_2O$ soln. of *p*-cresol and tyrosine, $HO(O_2N)_2C_6H_2Me$ was formed, but no diazo compd. Light fastness of dyes developed on the fiber is very good, especially upon afterchroming. Shades are decidedly changed (deepened) and acid and alkali fastness improved by chroming. Diazotized fibers show light sensitivity. Photographs may be printed out on silk. K. H. ENGEL

Rapid identification of dyes on fibers. RAYMOND LEVÉ. *Tība* 9, 11–7(1931).—A scheme of analysis is presented for the rapid identification of the class of dye used on a given sample. The various tests (treatment with HClO, boiling with $Na_2CO_3$, reduction with $SnCl_2$ and with alk. hyposulfite) are carried out by adding the reagents to the dyed fibers in test tubes. A. PAPINEAU-COUTURE

The dyeing of cotton warp during sizing. A. POTTIER *Tība* 8, 1447–9(1930).—The dyeing of cotton warp in the sizing bath and before sizing is described and a no. of formulas for each process are given. A. PAPINEAU-COUTURE

**Chemical finishing treatments of cotton.** C Thibaud *Teba* 8, 1457-63(1930), 9, 35-41(1931) The treatments, other than mercerization and bleaching, which effect a considerable modification in the phys aspect of cotton are described A P-C

**Dyeing and finishing cotton corduroys** L MacKirdy *Textile Recorder* 48, No 575, 57 9(1931) A detailed description is given of the processing of this type of fabric from the time it comes from the loom in the grey to the final folding and boxing of the finished article Rudy K Worner

**Continuous bleaching challenges the chemist.** Winn W Chase *Textile World* 79, 636 7(1931) The need of chem developments to keep pace with the mech improvements is stressed Rudy K Worner

**Practical suggestions for better handling of acetate yarns** Stewart H Gibson *Textile World* 79, 131 3(1931) Suggestions are given for modifications and adjustments of the machinery used in winding twisting and tinting cellulose acetate yarn Rudy K Worner

**Preparation of fabrics made of, or containing, acetate rayon, prior to dyeing.** J Callaghan *Russ* 5, 1871, 1873(1930) A Palmbaum Couture

**Dyeing of acetate rayon** Herbert Brandenburger *Kunstseide* 12, 207-72 (1930) cf *C A* 25, 200 Photochemical decomposition of the dyes The fading of dyes on acetate rayon fabrics is discussed in the light of oxidation, reduction and enzyme theories Most of the cases discussed are explained on the basis of oxidation According to this theory the dyestuff forms a peroxide which oxidizes the constituents of the dye The dyeing of cellulose acetate is viewed as a soln process and not as an adsorption process The dye is present in a more finely divided state than on cotton textiles and therefore a greater surface of the dye is exposed to oxidation On this basis is explained the poor fastness of basic dyes and acid (wool) dyes on acetate rayon The fastness of various diazo colors and its relation to their constitution are discussed *Ibid* 305-10 A retrospect and an outlook in the future of acetate rayon developments with regard to the dyeing of this type of rayon and its mixts with cotton, viscose rayon, wool and silk Frederick C Hahn

**Dyeing acetate rayon black.** Juan Paul Sisley *Teba* 9, 17-24(1931) —A review of the various dyes and processes which have been proposed A Palmbaum Couture

**Practical viscose dyeing.** Hans Lenel *Kunstseide* 12, 200-2(1930); *Jentgen's Rayon Review* 2, 275 6(1930) —Blotchily dyed viscose rayon is as a rule caused by unsuitable preliminary washing and improper handling during dyeing, and, less frequently, to the choice of dyestuff Streakiness in the dyeing is due to abnormal viscose The foregoing difficulty may be obviated by the use of dyes of the Rigan type, or mixts thereof with other direct dyes which are known to equalize well F C H.

**The structure of rayon in relation to aniline-black dyeing.** A J. Hall *Silk J.* 7, No 77, 37-8, No 78, 33, 41(1930), cf *C A* 24, 6021 —Because of the greater absorbent properties of the regenerated rayons they give a better black than cotton Acetate rayon shows a selective absorbency for basic compds, and will not absorb salts Aniline and other amines are absorbed but the oxidant ($NaClO_3$) is not It is suggested that acetate rayons might be treated with aniline first and then oxidized in a fresh bath At present aniline black has not been satisfactorily dyed on acetate rayons A R Macormac

**Preparation, dyeing and finishing of rayon crepes.** A. Crisen *Russa* 5, 60-63 (1931). A Palmbaum Couture

**Printing of fast-color rayon crepes requires careful attention to details.** Harold B Sturtevant. *Textile World* 79, 378 4(1931) Rudy K. Worner

**Sizing and finishing of rayon.** W A Dyas *Kunstseide* 12, 303-6, 310-2(1930); cf. *C A*. 24, 1080 —A discussion of the prepn, testing and required properties of starch pastes for the sizing and finishing of rayon Frederick C. Hahn

**The coloration of silk stockings.** S R Trotman *Dyer, Calico Printer* 65, 23-4 (1931); cf *C A* 24, 1085 The various processes are described with particular emphasis on the difficulties involved The water used, the preliminary soaking, the app. used for dyeing, the degumming process, the dyeing of pure silk and silk cotton stockings, the selection of suitable dyestuffs for each type, etc, are discussed Rudy K. Worner

**Hosiery redyeing made easier.** Herbert C. Roberts *Textile World* 79, 315 (1931) —Before stripping a preliminary bath composed of 1 3% soda ash and 1½-1¾% sol pine oil is recommended The advantages of the use of the sol pine oil are: It penetrates and opens up the fibers without injuring them It removes part of the color, but does not start the resist colors in the picot edge or clock It reduces the amt of hyposulfite or sulfoxylate needed It reduces the stripping time, thereby reducing also the danger of mech. injury to the goods Rudy K. Worner

The preparation of tussah silk and schappe silk prior to dyeing J Braconnot. *Russia* 5, 1867–71, 2043–7(1930), 6, 41–5(1931) —A review A P C

The printing of wool and silk using the Neolan colors. Vernon D Freedland *Dyer, Calico Printer* 64, 646–7(1930) —The Neolan dyes used for printing are divided into those which require the addn. of Cr acetate to the printing paste and those which do not require it Recipes are given for each type A list of the solubilities of these dyestuffs in $H_2O$ at 212°F is also given Ruby K. Worner

Plate printing on silk. J Clarou *Russia* 5, 1705–9(1930) —Practical operating hints, with a no of formulas A Papineau-Couture

The dyeing and finishing of union wool-silk goods. L Bonnet *Russia* 5, 2047–57 (1930) —This is a general description, dealing more particularly with the various types of machines available for the handling of the goods A Papineau Couture

Dyeing wool with indigo in fermentation vats E Dutoit *Tiba* 8, 1309–19 (1930) —The principles and technic of the process are described A P C

The treatment of lace curtains. C L Fishwick *Tiba* 8, 1435–41(1930) —Methods of bleaching, dyeing and finishing of lace curtains, at present in use in various European countries, are described A Papineau Couture

Dyeing and finishing curl cloths. Douglas Kermode *Dyer, Calico Printer* 65, 139–40(1931), cf *C A* 24, 6022 —Curl cloths consist of a worsted or worsted mohair pile in loop form, knitted into a cotton backing As a rule its manuf is a work for specialists Dyestuffs which have been found suitable for this type of fabric are listed and methods of applying them are described Ruby K Worner

The dyeing of wool-felt and hair-felt hats. E Dutoit *Tiba* 8, 1441–7(1930) —Practical operating hints with a no of formulas are given A Papineau Couture

Dyeing vegetable-ivory buttons Karl Hahn *Dyer, Calico Printer* 64, 399–400 (1931).—See *C A* 24, 5502 Ruby K Worner

Bleaching and dyeing leaves and grasses. F Grove-Palmer *Dyer, Calico Printer* 64, 707–8(1930), cf *C A* 25, 561 —The basic dyes are generally used for these materials because of their brightness, cheapness and high tinctorial power Cellulose enamels in various colors may be sprayed on with an air pistol Metal leaves can be obtained by spraying on bronze powder in a clear cellulose medium, or better still by electroplating with metals Ruby K Worner

Kaoliang starch as a finishing material for textiles. Jusaburo Kawamata *Abstract from Rept Central Lab S Manchuria Railway Co* 1929, 27–9 —In respect to its value as a sizing material kaoliang starch occupies a position between wheat starch and corn starch V F Harrington

Noteworthy machinery development of recent years marches unretarded through 1930 into 1931. Edwin D Fowle *Textile World* 79, 604–7(1931) —A review of new machinery developed for bleaching, dyeing and finishing Ruby K Worner

A new use for textiles Geo Rice *Dyer, Calico Printer* 65, 28–9(1931) —Cotton stationery is described with particular reference to the processes used for stiffening, coating weighting and glossing the fabric. The requirements of this material are that its stiffness shall be such that it can be written upon with a pen or printed upon with a typewriter, that the interstices shall be filled, and the finish smooth, so that the impression of the pen or the typewriter will be even that the handle shall be satisfactory, that the writing shall be retained even when wet and that the fabric must permit erasures Ruby K Worner

Washing cotton and linen. Yngve Dalström *Svensk Kem Tids* 42, 263–77 (1930) —A crit review is given of the conflicting laundry technology literature A R Rose

Future textile-laboratory practice. Geo B Haven *Am Dyestuff Reptr.* 19, 757–61(1930), *Textile World* 78, 3028–30(1930), 79, 42–4(1931), *Melliand* 2, 1319–28 (1931) —New avenues are suggested for directing the future work of the Textiles Committee of the Am Soc for Testing Materials Illustrated descriptions are given of app for measuring yarn balance, corkscrew in yarns crimp and yarn slippage, all of which are properties of the yarn, and for measuring porosity, absorbing power for liquids, bursting strength precise thickness, abrasion, heat flow and resilience of fabrics R K W

Influence of laundering and exposure to light upon some washable silks. Marion Griffith Ohio Agr Expt. Sta., *Bimonthly Bull* 147, 179–81(1930) —Only pure dye branded silks were used All 12 samples showed a very decided fading upon exposure to light and during the laundering process Blue and green colors faded most, while peach and yellow were least affected by light exposure The highest priced silk contained less than $^1/_4$ the amt. of finishing materials present in the least expensive silk The breaking strength varied from 31–69% of the original when exposed 48 hrs to light The de-

crease in strength resulting from 15 launderings varied from 15–17% The silks lost 25–42% of their original elasticity as a result of exposure to light for 48 hrs The expts. are being continued along chem lines C R. Fellers

**A cloth-wear testing machine.** J. A Matthew *J Textile Inst* 21, 540–60T (1930) —The design of machines for testing cloth wear is discussed and a new machine is described Its principle is that a sample under a definite tension is rubbed with a Carborundum surface The no of rubs necessary to produce fracture is taken as a measure of the resistance of the cloth to wear Results are given to show the effect of varying the rubbing conditions for a cloth and also to show the comparative resistance to wear of a no of cloths under fixed rubbing conditions It is shown that wear tests and tensile strength tests bear little relation to each other Ruby K Worner

**Relation of cotton to synthetic fibers.** C D Mullin *Jentgen's Rayon Review* 2, 231 8(1930) —See *C A* 24, 5483 Frederick C Hahn

**Fiber cross-section.** H L Barthelemy *Kunstseide* 12, 316–7(1930) —An improved method of making rayon cross sections is described A slit is made lengthwise in a small cork to a depth ⅔ of the diam A single thread of rayon is placed in the slit parallel to the axis of the cork and then disks are cut therefrom with a razor This method is an advantage over the Herzog method in that the individual filaments can be distinguished and counted Frederick C Hahn

**Fiber cross-section of acetate rayon** H Staudinger *Jentgen's Rayon Review* 2, 240–3(1930), *Kunstseide* 12, 310–3(1930) —The two general types of acetate rayon cross sections, "ribbon like" (I) and "cloverleaf" (II) are discussed, and microphotographs are given of the cross sections of various com acetate rayons Earlier acetate rayons were of the type I but present-day rayons are of type II. Type II are superior as regard to lower gloss and higher wet and dry strengths Frederick C Hahn

**Physicochemical studies on the structure of wool hair after treatment with alkali, acids and chlorine** Ernst Tanzer. *Wiss Arch Landw, Abt B, Tierernähr Tierzucht* 4, 297–346(1930) —Wool from several breeds of sheep was treated with HCl, $H_2SO_4$, $HNO_3$, AcOH, Cl water and chloral hydrate the wool was then investigated as to histological changes, change in wt, fineness, flattening, hygroscopic properties, tensile strength, elasticity, polarization, reaction with methylene blue, biuret test, reaction with Millon's reagent and Allwördens reaction Many references are appended W Gordon Rose

**Rotenone as a moth-proofing agent.** E A Back, R T Cotton and R C. Roark *J Econ Entomol* 23, 1014(1930) —Rotenone, the insecticidal constituent of derris root, cubé root and some other tropical plants is effective as a moth proofing agent From 1 to 2% of rotenone is dissolved in acetone and the soln is used to impregnate woolen goods The impregnated goods appears to be highly resistant to attack of the clothes moth, *Tineola bisselliella*, and of the beetles, *Anthrenus verax* and *Attagenus piceus* Acetone solns contg as low as 0.05% rotenone gave excellent protection from these insects The rotenone treatment appears to be equal to that of other propietary moth-proofing solns now on the market Application for a public service patent has been filed C H Richardson

**Note on a little-known fireproofing process.** E Dutoit *Tiba* 9, 33(1931).—Perkin's method consists in impregnating flannel with a 26° Bé Na stannate soln, draining, drying between heated Cu rolls, treating with a 10° Bé $(NH_4)_2SO_4$ soln to ppt $Sn(OH)_4$, draining, drying, washing and drying again The resultant fireproofing is permanent, as the $SnO_2$ is combined with the fiber, it increases the mech strength of the fabric and its resistance to washing and ironing, and moreover it acts as mordant if it is to be dyed A Papineau Couture

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Condensation products from aryldithioglycolic acids [dyes] (Gebauer-Fülnegg Jarsch) 10. Heteropolar C compounds XII New dyestuffs of the aniline blue series and perchlorates of several important triphenylmethane dyes (Dilthey, Dinklage) 10. β-Hydroxy-α-picoline azo dye (Brit. pat 335,818) 10. Leuco indigo (Fr. pat. 693,469) 10. Triazine derivatives [intermediate] (Brit. 335,783) 10.

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Dyes. Compagnie nationale de matières colorantes et manufactures de produits chim du Nord Réunies (Établissements Kuhlmann) Fr. 692,927, June 28, 1929. Anthraquinone derivs which dye cellulose acetate silk are prepd by the reaction of sulfonic acids of aminohydroxyanthraquinones such as diaminoanthrarufin and diaminochrysazine, their salts or reduction products, with either an aldehyde or its substitutes in the presence of hyposulfite, or hyposulfite compds of aldehydes previ-

ously formed in the presence of an excess of hyposulfite or sulfoxylates of aldehydes Thus, Na diaminoanthrarufin 2,6-disulfonate is dissolved in water and BzH and $Na_2S_2O_4$ are added and the mixt. is heated. The product dyes cellulose acetate blue Several other examples are given

Dyes. I G Farbenind A.-G Fr 693,474, April 7, 1930 Dyes of the anthraquinone series are made by the reaction of α-aminoanthrimidcarbazoles or their substitution products with anthraquinone-*o*-halocarboxylic acids or their derivs or substitution products and transforming the reaction products into the corresponding acridones by the known methods. Thus, 4-amino-1,1'-anthrimidcarbazole (by sapon of 4 benzylamino-1,1'-anthrimidcarbazole) is heated with anthraquinone 2-bromo-1-carboxylic acid in the presence of AcOK, MgO and $(AcO)_2Cu$ The product dyes cotton from the vat in olive green shades Other examples and formulas of the products obtained are given.

Dyes. I G Farbenind A.-G Fr 693,169, April 2, 1930 *N* condensation products which dye cotton from the vat are prepd. by condensing aminoanthraquinonecarboxylic acids, the COOH groups of which are so transformed that they do not form salts, with negatively substituted polynuclear org compds Thus, dibromo-3,4,8,9-dibenzopyrene 5,10-quinone is boiled in $C_6H_5$ with NaOAc, CuO and the Et ester of 1-aminoanthraquinone 2-carboxylic acid until practically all the Br is removed. The product dyes cotton in violet red shades from the vat. Several other examples are given.

Dyes. I G Farbenind A.-G (Paul Ochwat, inventor) Ger. 515,331, May 2, 1929 The dyes obtainable from anthrimides by acid or alk. condensation are halogenated, and the products are caused to react with N compds. contg at least one exchangeable H atom Products giving deeper shades than the initial dyes are so obtained. Thus, the dibromo deriv of a dye prepd as described in Ger 507,340 (*C A* 25, 599) may be boiled for 2 days in $C_6H_5$ with 1-aminoanthraquinone in the presence of $Na_2CO_3$, NaOAc and CuCl Other examples are given also

Dyes. I G Farbenind A.-G (Paul Nawiasky, inventor) Ger. 515,006, July 17, 1928 Addn to 498,292 The method of purifying *N*-dihydro-1,2,2',1'-anthraquinonazine described in Ger 498,292 (*C A* 24, 3907), is now applied to the dye obtained by treating the above compd. with $H_2SO_4$ of low water content, preferably in the presence of $H_3BO_3$. An example is given Cf *C A* 25, 599

Azo dyes. Ernest P Grether (to Dow Chemical Co.). U. S 1,790,807, Feb 3. Azo dyes which give various red shades are formed from the tetrazo deriv of a diaminodiaryl ether such as diaminodiphenyl ether coupled with an arylide of 2,3-hydroxynaphthoic acid such as 2,3-hydroxynaphthanilide

Azo dyes. Guillaume de Montmollin (to Soc. anon pour l'ind chim. à Bâle). U S 1,791,444 Feb 3 By coupling arylides of 2,3-hydroxynaphthoic acid such as the arylide derived from *o*-aminodiphenyl ether with diazo compds such as those derived from 4-chloro-2-aminodiphenyl ether, *o* aminodiphenyl ether, the corresponding cresylchlorophenyl or chlorocresyl ether or the benzyl ethers of *o*-aminophenols or *o*-aminocresols, fast red dyes are produced, which may be formed on a suitable substratum and employed for making *red varnishes* Examples and details of procedure are given

Azo dyes. Max Schmid and Fritz Straub (to Soc. anon. pour l'ind. chim. à Bâle) U S. 1,791,432, Feb 3 Azo dyes suitable for conversion into metal derivs such as those of Cr or of Cu are obtained by coupling a diazo-compd contg an OH group in *o*-position to the diazo group (such as the diazo deriv of 4-chloro-2-aminophenol-6-sulfonic acid or 1-diazo-2-naphthol-4-sulfonic acid) with pyrazolone derivs such as 5-pyrazolone-3-carboxylic acid or its Me or Et ester. Examples are given of dyes the Cr compds of which produce violet or red dyeings.

Azo dyes. I G Farbenind A.-G Brit. 335,555, June 21, 1929 Dyes insol. in water are formed in substance, on the fiber or on a substratum by coupling the diazo compd of an amine of the general formula aryl NH R'X.R" $NH_2$ (in which R' and R" are aromatic nuclei which may be substituted or unsubstituted and X represents either a direct linkage or an —N N— group, or in which —R'—X—R"—stands for a condensed aromatic system) with an arylide of 2,3-hydroxynaphthoic acid. By use of 2 mol. proportions of nitrite, nitrosodiazo compds are obtained and the corresponding nitrosoazo dyes may be treated in substance or on the fiber with a reducing or saponifying agent to remove the nitroso group Several examples are given. Cf *C A* 25, 1092

Azo dyes. I G Farbenind A.-G (Rudolf Heil, inventor). Ger 515,230, Sept. 9, 1928 Brown azo dyes insol. in water are prepd by coupling the diazo compds. from 2-amino-*N*-alkylpyrazoleanthrones, or 2-amino-*N*-aralkylpyrazoleanthrones, with arylides of 2,3-hydroxynaphthoic acid An example is given.

**Azo dyes.** Imperial Chemical Industries, Ltd Fr. 692,694, March 3, 1930 See Brit 331,839 (*C A* 25, 213).

**Monoazo dyes and amines.** British Research Association for the Woolen & Worsted Industries and A T King Brit 335,646, July 6, 1929 Monoazo dyes and amines are produced simultaneously by the reduction of disazo dyes of the type X N N Y N N $C_{10}H_4$(OH) in which X and Y represent aromatic residues such as those of benzene, naphthalene, diphenyl, diphenyl sulfide or other grouping the reduction being effected with alkali metal bisulfite (with intermediate formation of disazosulfites) The disazosulfites may be treated with alkali metal hyposulfite to produce the amine or aminoazo compd Several examples are given

**Disazo dyes.** I G Farbenind. A.-G Brit 335,705, Oct. 4, 1928 A disazo dye giving vivid greenish yellow dyeings on wool, fast to fulling and to light, is formed by coupling tetrazotized 4,4'-diamino-3,3'-dichloro-5,5'-dimethyltriphenylmethane with 1 (2'-chloro-5'-sulfo)phenyl 3-methyl-5-pyrazolone The 4,4'-diamino-3,3' dichloro 5 5'-dimethyltriphenylmethane is made by condensing BzH with 3-chloro-2 toluidine Mention is also made of the production of some other similar dyes. Cf *C A* 24, 2304

**Disazo dyes.** I G Farbenind A G (Karl Dobmaier, inventor) Ger 515,231, Aug 21, 1927 Disazo dyes giving yellow shades on cotton are prepd by coupling the diazo compds from nitrobenzoylated diamines or their derivs with suitable components free from $NH_2$ groups, reducing the $NO_2$ group of the monoazo dyes so obtained, diazotizing, and coupling with pyrazolone derivs contg diazotizable $NH_2$ groups, or with compds. of the $C_6H_6$ or $C_{10}H_8$ series in which a diazotizable $NH_2$ group is present in a "heteronuclear" side chain. Suitable components for the first coupling are phenols and their ethers and carboxylic acids, acetoacetanilide, and phenyl methyl pyrazolone For the second coupling, *m* aminobenzoyl 2,5,7 aminonaphtholsulfonic acid is specified, *inter alia* The reduced monoazo dyes may be condensed with nitrobenzoyl chloride or its derivs., reduced again, and diazotized before finally coupling as above Other modifications are described also Examples are given

**Disazo and trisazo dyes and their metal compounds.** Soc. anon pour l'ind chim à Bâle, F. Straub and W Anderau Brit 335,523, April 23, 1929 Disazo and trisazo dyes obtainable by coupling with the monoazo dye from 2-amino-5-naphthol 7-sulfonic acid (2 mols coupled acid) either 1 mol proportion of an *o* hydroxydiazo compd or 2 mol proportions of an *o*-carboxy diazo compd, or one mol proportion each of an *o*-hydroxydiazo compd and a diazo compd contg no *o* hydroxyazo group (excluding in this case *o*-hodroxycarboxy-group contg diazo compds) are treated (at any stage) with chroming or other metallizing compds such as compds of Mn, Fe, Co or Ni Various examples are given for producing dyes of different colors.

**Trisazo dyes.** Imperial Chemical Industries, Ltd Fr 693,585 April 9, 1930 Trisazo dyes, contg at least 2 COOH or 2 $SO_3H$ groups or one of each and suitable for dyeing regenerated cellulose, are obtained by coupling tetrazotized 3-aminobenzene-1'-azo-4' aminonaphthalene or a substitution product thereof with one mol. proportion of a phenol naphthol or a carboxylic or sulfonic acid thereof and with one mol proportion of the same or another component other than a naphtholarylketone or an arylide of 2,3 hydroxynaphthoic acid The same products are obtainable by coupling diazotized 3-nitrobenzene 1'-azo-4'-aminonaphthalene or a substitution product thereof with a phenol, naphthol or a carboxylic or sulfonic acid thereof, reducing, diazotizing and coupling with a suitable component Several examples are given

***o*-Carboxyazo dyes.** I G Farbenind A.-G Fr 693,024, Mar. 29, 1930 *o*-Carboxyazo dyes dyeing substantively and contg Cu are made by the reaction of agents liberating Cu on dyestuffs obtained by coupling tetrazotized 4,4'-diaminodiphenyl-3,3'-dicarboxylic acid with 2 identical or different mols of arylamino- or aroylaminonaphtholsulfonic acids which contain in the aryl or aroyl group groups which render the compd sol in water Several examples are given

**Vat dyes.** I G Farbenind A.-G (Arthur Wolfram and Emil Hausdörfer, inventors). Ger. 514,432, Dec. 31, 1927. See Brit. 303,375 (*C. A* 23, 4579).

**Vat dyes.** I. G. Farbenind A.-G (Paul Nawiasky and Alfred Ehrhardt, inventors) Ger 514,433, July 20, 1929 Green vat dyes are prepd by halogenating dimethoxydibenzanthrone in an inert org solvent in the presence of a catalyst, *e. g.*, $FeCl_3$ Examples are given

**Vat dyes.** I. G Farbenind A.-G (Max A Kunz and Karl Köberle, inventors). Ger 515,328, Mar 31, 1929 Addn to 499,169 (*C A* 24, 4168) and 510,600 (*C. A.* 25, 1094) Violet to green-blue vat dyes are prepd by treating dibenzanthrone or isodibenzanthrone or their derivs with Br or other bromunating agent in an acid medium in the presence of a metal or a metal compd. as a catalyst. Hg, Mn and Sb are suitable

catalysts, and when using these the use of $HClSO_3$ as the acid medium does not give rise to products contg Cl. The products are fast to light and atm influences Examples are given

**Vat dyes.** I G Farbenind A.-G (Robert Berliner, inventor) Ger. 515,329, July 5, 1928 See Brit 314,809 (*C. A.* 24, 1520)

**Vat dyes.** I G Farbenind A.-G (Max A Kunz and Karl Köberle, inventors) Ger 515 330, Dec 30, 1928 Addn to 513,228 (*C. A.* 25, 1396) New vat dyes giving varied shades are prepd by condensing neg substituted dibenzanthrones or isodibenz anthrones with amides or imides of mononuclear carboxylic acids The condensation may be effected in a high boiling solvent in the presence of a catalyst and an acid binding substance The products may be sapond by the usual methods to yield mono- or poly-amino compds of the dibenzanthrone or isodibenzanthrone series Examples are given

**Vat dyes.** I G Farbenind A.-G Fr 692,869, Mar 28, 1930 Halogenated benzanthronepyrazoleanthrones, which dye textile fibers in valuable blue shades, are prepd by treating benzanthronepyrazoleanthrone, its derivs of isomers, preferably in the presence of catalysts, with halogens or substances capable of liberating halogens in the presence of diluents or solvents Several examples are given

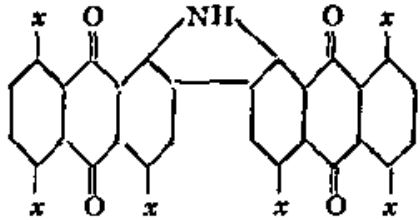
**Vat dyes.** I G Farbenind A G Fr 693,042, Mar 29, 1930 Stable leuco vat dye prepns forming by soln in water a vat ready to be used for dyeing, are prepd by mixing with a protective colloid a wetting agent and a stabilizer, the leuco compds of vat dyes of the anthraquinone and thioindigo series which are capable of dyeing from a "cold vat" of hyposulfite The mixt is dried and the dry powders ground with a caustic alkali and a reducing agent Thus the leuco compd may be mixed with molasses, an alkylnaphthalenesulfonic acid, hydroquinone, caustic alkali and $Na_2S_2O_4$

**Vat dyes.** I G Farbenind A.-G Fr 693,107, April 1, 1930 Vat dyes contg one or more halogens are prepd by treating isodibenzanthrone or its derivs, or derivs of dibenzanthrone, with anhyd metallic halides capable of yielding halogens If necessary other halogenation agents, substances lowering the m. p., appropriate catalysts, solvents or diluent are added The halides of Fe, Al, Sb and Hg are suitable for the chlorination, and alkali and alk. earth salts may be used for lowering the m. p.

**Vat dyes** I G Farbenind A.-G Fr 693,410, April 5, 1930 Vat dyes are prepd by heating 2 mercapto-1-methylanthraquinone or 3 mercapto-2-methylanthraquinone or their derivs with S or by heating 2 halo-1-methylanthraquinone or 3-halo-2 methylanthraquinone or their derivs with S and substances producing or facilitating the substitution of halogens by S Several examples are given

**Vat dyes.** I G Farbenind A.-G Fr 693,817, April 12, 1930 Vat dyes are obtained by treating the anthraquinonyl-4' amino-1,2 benzanthraquinones with condensing agents Thus α anthraquinonyl-4' amino-1,2 benzanthraquinone when heated with moderately dil $H_2SO_4$ or with a mixt of NaCl and $AlCl_3$ gives a product which dyes pure yellow from the vat The same initial material treated with $AlCl_3$ in the presence of a tertiary base such as pyridine gives a greenish blue from the vat Several other examples are given

**Vat dyes (anthraquinonylcarbazoles).** Fritz Baumann (to General Aniline Works) U S 1 791,184, Feb 3 Vat dyes of the general formula,

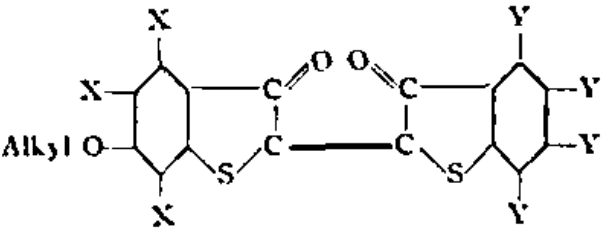



wherein at least one x stands for an anthraquinonylimino residue being attached to the nucleus by only one linkage in the position *x*, and the other *x*'s stand for substituents of the group consisting of H and any univalent substituent and wherein all nuclei may be further substituted generally red to grayish powders, insol in org solvents sol in concd $H_2SO_4$ with a blue to reddish brown color and dyeing cotton from the vat red to grayish black shades of excellent fastness, are produced by the reaction of a 2,2'-dianthraquinonyl 1,1'-carbazole such as 5 5' diamino-2,2' dianthraquinonyl 1,1'-carbazole, with the corresponding 4 4' diamino compd or 5-amino-4' benzoylamino-2,2' anthraquinonyl 1,1'-carbazole, with a halogen anthraquinone compd such as 1 *p* tolylazimino-3 bromoanthraquinone, β-chloroanthraquinone or 1 benzoylamino-4 chloroanthraquinone, at an elevated temp (suitably 180–250°) for 3–4 hrs (suitably in a high boiling solvent

such as naphthalene, trichlorobenzene or ethylcarbazole and in the presence of an acid-binding substance) Cf *C A* 25, 1396

**Vat dyes.** KARL WILKE (to General Aniline Works) U S 1,790,780, Feb 3. See *C A* 24, 2305, 2611

**Substituted thioindigo vat dyes.** KARL SCHIRMACHER, KARL ZAHN, ERWIN HOFFA and HANS HEYNA (to General Aniline Works) U S 1,790,843, Feb 3 Dyes of the general formula




wherein X and Y represent H or any substituent, at least one Y being a substituent (the constitution being such that the left hand side of the formula is not identical with the right hand side of the formula) are in a dry state red powders, insol in water, alc. and ether, sol in nitrobenzene with a red color, sol in concd $H_2SO_4$ with a green color, forming with an alk hyposulfite yellow vats, from which animal and vegetable fibers are dyed red shades fast to light, Cl and washing, and are obtainable either by subjecting the 1 anils of such diketodihydrothionaphthenes as contain an alkoxy group in *m* position to the S atom, and also their further substitution products substituted in the nucleus, to reaction with substituted ketothionaphthenes, the corresponding arylthioglycolic carboxylic acids or with the acylketothionaphthenes obtainable from the said acids by condensation with acetic anhydride, or inversely by subjecting 5-alkylhydroxythionaphthenes, their substitution products substituted in the nucleus or the corresponding arylthioglycoliccarboxylic acids or acylketothionaphthenes obtainable from the said acids by condensation with acetic anhydride, to reaction with the 1-anils of substituted diketodihydrothionaphthenes By introducing further substituents into one or the other nucleus it is possible to influence the shade toward blue or toward yellow Numerous examples with details are given

**Stable water-soluble vat dye preparations.** JAMES MORTON, JAMES I. M. JONES, BIRKETT WYLAM and JOHN E G HARRIS (to Scottish Dyes, Ltd ). U. S 1,790,759, Feb 3 Vat dyes (numerous examples of which are given in detailed examples of treatment) are treated with reagents such as chlorosulfonic acid, its salts, fuming $H_2SO_4$, $SO_3$ or salts of pyrosulfuric acid, in the presence of a tertiary org base such as pyridine and of Cu or Zn (suitably with addn also of a small proportion of $SnCl_2$) The treatment is applicable to dyes of the flavanthrone, indanthrone, dibenzanthrone, benzanthrone, anthraquinone, indigo and halogenated indigo groups, the products being suitable for dyeing cotton, wool or natural or artificial silk from aq soln with development of the color of the original dye on treatment with $FeCl_3$ soln , alkali metal hypochlorite or a perborate or permanganate soln

**Indigoid vat dyes.** I G FARBENIND A -G Fr 693,903, April 14, 1930 6-Methylhydroxythionaphthene is condensed with cyclic diketones of the isatinic series or their derivs Thus, isatin is converted into the α-chloride by means of $PCl_5$ with the addn. of PhCl, 6 methylhydroxythionaphthene in PhCl is added at about 80° and the mixt. stirred The product dyes cotton in intense bluish grey shades Other examples are given.

**Indigoid dyes.** I. G FARBENIND A -G (Wilhelm Bauer, inventor) Ger 513,230, June 13, 1928 Violet indigoid dyes are prepd by coupling 5-halo-3 hydroxythionaphthenes with reactive α derivs of haloisatins, especially of 5,7-dichloro- or -dibromo-isatin An example is given

**Indigoid dyes.** I. G FARBENIND. A -G (Karl Thiess, Theodor Meissner and Hans Heyna, inventors) Ger 515,134, Feb 8, 1928 4,7,4',7'-Tetramethyl 5,5'-dihaloindigos are prepd by the customary processes from 1,4-dimethyl-3 amino 6 halobenzenes, or from 1,4 dimethyl-3 amino-6-halobenzene-2-carboxylic acids. The same products may be obtained from 1,4-dimethyl-3 aminobenzene or 1,4-dimethyl-3-aminobenzene-2-carboxylic acid, by converting these into 4,7,4',7'-tetramethylindigo and then halogenating Examples are given

**Indanthrone dyes.** LYNNE H. ULICH (to Newport Chemical Corp ) U. S 1,790,887, Feb 3. See Brit. 314,803 (*C. A* 24, 1520)

**Wool dyes.** CHEMISCHE FABRIK VORM SANDOZ Ger. 515,055, July 13, 1929.

Reddish blue to reddish violet dyes for wool, etc., are prepd by condensing anthraquinone derivs contg substituents exchangeable for an arylamino group with aromatic amines having at least one halogen atom in the *m*-position to the $NH_2$ group The condensation products may be sulfonated Thus, 1-amino-2-methyl-4-bromoanthraquinone may be condensed with *m*-chloroaniline at 100°, and the product sulfonated Other examples are given also

Acid wool dyes. I G Farbenind A.-G (Georg Kalischer and Ernst Honold, inventors) Ger 514,434, Feb 2, 1928 See Fr 668,871 (*C. A* 24, 1747).

Carboxylic acids of *m*-hydroxyphenylarylamines. I. G Farbenind A.-G (Leopold Laska and Oskar Haller, inventors) Ger 515,208, Dec. 2, 1928 Alkali salts of *m* hydroxyphenylarylamines are heated with $CO_2$ under pressure Thus, the K compd of *m*-hydroxydiphenylamine, heated with $CO_2$ at 150–70° under 5–10 atm pressure, yields a product m. 180–1° believed to be *3 hydroxydiphenylamine-4-carboxylic acid* Numerous compds derived from substituted *m*-hydroxydiphenylamines are described also The products are stable and are useful as *intermediates for dyes*

Dibromodibenzanthrone. Max A Kunz and Karl Köberle (to General Aniline Works) U S 1,791 215, Feb 3 By a process involving brominating dibenzanthrone with Br in chlorosulfonic acid with addition of Sb, there is obtained a substantially pure dibromobenzanthrone which dissolves in 96% $H_2SO_4$ to a pure violet soln , in $PhNO_2$ to a pure blue soln with a pure red fluorescence and in $PhNH_2$ to a pure blue soln without fluorescence, and which *dyes cotton* from a blue vat with a violet tinge strong marine blue shades which are faster to light than the dyeings obtained from the unhalogenated initial material

Pyrazolone derivatives. I. G Farbenind A.-G. (Hans Grotowsky, inventor). Ger 514,421, July 17 1926 Colored condensation *products useful as dyes or as intermediates for dyes or drugs* are prepd by treating 1 phenyl-3-methyl 5-pyrazolone, or its derivs substituted in the phenyl residue, with benzalaniline or other benzalbenzal imines. The reaction is effected in aq acid soln. at atm. temp The products are believed to be benzalpyrazolones Examples are given

Dye intermediates. British Research Association for the Woolen & Worsted Industries and A T King Brit. 335,645, July 6, 1929 Aromatic amino derivs are prepd by reduction of monoazo dyes other than those contg a β naphthol component or which form azo-sulfites or which are reducible by $SO_2$, by the action of alkali bisulfite and sulfite approx. in the mol ratio of $2NaHSO_3.Na_2SO_3$. Examples are given of the reduction of benzeneazosalicylic acid with an ale soln. of the mixed reagent to form aniline and aminosalicylic acid and of the reduction of Na azosalicylic acid to aminosalicylic acid

Intermediates for dyes. I. G Farbenind A.-G (Winfrid Hentrich, Josef Hilger and Rudolf Knoche, inventors) Ger 515,468, Feb 19, 1929 β Naphthylaminophenoxy fatty acids are prepd by the reaction of β-naphthol or β naphthylamine or their substitution products with sulfites and 3- or 4-aminophenoxy fatty acids or their derivs , together or in turn. Thus, Na 2-hydroxynaphthalene-3-carboxylate, heated in aq soln with Na 4-aminophenoxyacetate and $NaHSO_3$, loses $CO_2$ and yields *4 β-naphthylaminophenoxyacetic acid*, m 156°, after acidifying and cooling Numerous other examples are given also

Photochemically decolorizable dyes. I G Farbenind A.-G. Fr 693,360, April 4, 1930 Layers for photochem decoloration are prepd by using dyes the speeds of decoloration of which have been harmonized or regulated by hydrogenation or substitution in the aromatic groups joined directly or indirectly to the chromogen. Hydrogenation or the introduction of halogen or a cyano, thiocyano, $NO_2$, carboxyl or a carbalkoxy group increases the speed of decoloration, while the introduction of an alkyl, aryl, OH, aryloxy or alkoxy group decreases the speed of decoloration. Several examples are given

Naphthalene derivatives. I. G. Farbenind A.-G Fr 692,716, Mar 25, 1930 Derivs of $C_{10}H_8$ are made by the reaction of carboxylic acid chlorides by the Friedel and Crafts reaction on 1 benzylnaphthalene or on 1-alkylnaphthalenes or their substitution products which are not substituted in the 4 position of the $C_{10}H_8$ nucleus, and treating, if necessary, the resulting products with oxidizing agents The products are *intermediates for dyes* Examples are given of the prepn of 4-benzoyl-1 benzylnaphthalene, m. 110°, 1,4-dibenzoylnaphthalene, m. 106°, 4-benzoyl-1-(*p*-chlorobenzyl)naphthalene, m. 123°, 4'-chloro-1,4-dibenzoylnaphthalene, m. 118°, 1,4-di *p*-chlorobenzoylnaphthalene, and 4-acetyl-1 benzylnaphthalene, m 78°, also 4-methyl-1-naphthyl phenyl ketone, 4-benzoyl 1 naphthoic acid, 4-methyl-1-naphthyl methyl ketone and 4 acetyl 1 naphthoic acid, m 184°

**Dyeing.** I. G FARBENIND A.-G Fr 693,426, April 5, 1930 Very clear colored effects are obtained by printing on a support, previously impregnated with arylides of 2,3 hydroxynaphthoic acid and dried, with printing pastes composed of Na formaldehyde hyposulfite and vat dyes, drying again, vaporizing rapidly, and finally coloring with a diazotized base Examples are given

**Applying dyes to fabric.** WILLIAM WHITEHEAD (to Camille Dreyfus) Can 308,605, Feb 10, 1931 Dyes are applied to a fabric contg cellulose acetate by spraying with a material contg a water insol dye and ethylene dichloride and a thickening agent

**Dyeing fibrous material.** I G FARBENIND A.-G (Paul Rabe, Hermann Stötter, Berthold Wenk, and Wilhelm Schepss, inventors) Ger 515,032, Dec 23, 1925 In fixing dyes on fibrous materials by means of complex compds of tungstic or molybdic acid these compds are treated on the fiber, before dyeing, with reducing agents, *e. g.*, $NaHSO_3$, $Na_2S_2O_4$ or $CH_2O$

**Dyeing cellulose esters and ethers.** I G FARBENIND A.-G (Hermann Wagner, Adolf Kuchenbecker Richard Huss and C Erich Müller, inventors) Ger 511,205, Mar 4, 1928 Addn to 509,401 (*C. A.* 25, 421) Fast blue dyeings are produced on cellulose esters and ethers by coupling with 2,3 hydroxynaphthoic acid or its arylides the diazo compds from dialkyl, diaryl, or diaralkyl ethers of 2 amino-5-acylaminohydroquinones or their substitution products Coupling is effected on the material to be dyed Examples are given

**Dyeing cellulose esters and ethers.** I G FARBENIND A.-G (Wilhelm Eckert and Carl L Müller, inventors) Ger 515,029, Jan 26, 1928. Cellulose esters and ethers are dyed in yellow shades by means of 4 aminonaphthalimide or its derivs in which an alkyl, aryl, or aralkyl group replaces H in the imino group Examples are given

**Dyeing viscose products.** I. G FARBENIND A.-G (Karl Bormann, inventor). Ger 515,030, Feb 18, 1928 Uniform dyeings are obtained with dyes prepd. (1) by coupling the tetrazo compds of *m* and *p* azoxyaniline and their substitution products with suitable components, or (2) by coupling the diazo compds. from 3- and 4 nitroaniline or their substitution products with suitable components and reducing the products with alk. reducing agents. Numerous examples are given

**Dyeing artificial silk.** IMPERIAL CHEMICAL INDUSTRIES, LTD Fr 693,179, April 2, 1930 Regenerated cellulose silk is dyed in relatively regular shades with dyes obtained by tetrazotizing a mono- or di sulfonic acid of 4,4'-diaminodiphenylurea or one of its radical derivs and coupling with 2 mol. proportions of a sulfonic acid or carboxylic acid deriv of a phenol, naphthol, naphthylamine or *N*-substituted naphthylamine, or with one mol proportion of a coupling constituent, as above mentioned, and one mol proportion of an aminonaphtholsulfonic acid or one of its *N*-substituted products or one of its derivs Examples and a list of components with the shades obtained are given

**Dyeing artificial silk.** IMPERIAL CHEMICAL INDUSTRIES, LTD Fr. 693,790, April 12, 1930 Silk made from regenerated cellulose is dyed by the products obtained by combining a diazotized amine of the $C_6H_6$ series, contg no $NO_2$ group, with an aminonaphtholsulfonic acid in alk soln., diazotizing again and coupling with another coupling component, all the aminonaphtholsulfonic acids used as final constituents being also coupled in alk soln An example and a table of components with the shades obtained on viscose silk are given

**Dyeing furs, hair, feathers, etc.** I G FARBENIND. A.-G. (Paul Virck, inventor) Ger 515,031, Sept 15, 1926 The materials are treated with an aq. soln. of a salt of a naphthalene deriv. contg at least one 3 aminoarylamino group of the $C_6H_6$ series They are then treated with an acidified nitrite soln Thus, fur is colored yellow by treatment, at atm temp., in a bath contg 2-(3'-aminophenylamino)naphthalene HCl, followed by treatment with $NaNO_2$ soln acidified with AcOH Cf *C. A.* 25, 605

**Coloring textiles.** HENRY DREYFUS. Fr. 692,734, Mar. 25, 1930 In producing discharge effects on textiles, the material is impregnated with a substance having an acid reaction such as an org acid before applying the discharge agent The discharged materials may be colored with acylaminoanthraquinone dyes

**Printing with vat dyes.** CHARLES J SALA (to E. I. du Pont de Nemours & Co.). U. S 1,790,950, Feb. 3 As dye assistants in calico printing pastes, etc., for aiding transfer of the dye to the fabric and producing improved results, there are added substances of the general formula $R_1R_2NAlkOH$ in which Alk represents an aliphatic radical as, for instance, the alkylene group $C_2H_4$, $R_1$ represents either H or a hydroxyaliphatic group, as $CH_2CH_2OH$ and $R_2$, as $R_1$, represents H or a hydroxyaliphatic group The use of mono-, di- and triethylolamines is particularly mentioned, also amines contg ali-

phatic groups with more than one OH group such as a compd. with the group $CH_2CH(OH)CH_2OH$. An example with details of procedure is given.

*Machine for dyeing and treating textiles.* Smith, Drum & Co. Fr. 693,201, April 2, 1930

*Machine for dyeing banks of thread.* Gaetano S. Riccardi. Fr 693,037, Mar. 29, 1930

*Condensation products.* I G Farbenind A.-G Fr 692,890, Mar 28, 1930 New products which are of technical value, *e. g.*, *reserving agents for wool or silk*, are prepd. by condensing a halide of an aromatic carbonylic or sulfonic acid with an aromatic diamine to produce derivs. of the carbonylic or sulfonic acid amide sol. in water which contain no free $NO_2$, $NH_2$ or OH groups. At least one of the constituents of the reaction is substituted in the position *m*- to the halide or to one of the amino groups. The reaction takes place in water or an org. solvent in the presence of an agent fixing hydrogen halide. Thus, bis(2,4-dichlorobenzoyl)-1,3-phenylenediamine-4-sulfonic acid is prepd. by condensing 1,3-phenylenediamine-4-sulfonic acid with 2,4-dichlorobenzoyl chloride and bis(3,4-dimethylphenylsulfonyl)benzidine-*m,m'*-disulfonic acid from 3,4-dimethylbenzenesulfonic acid and benzidine-*m,m'*-disulfonic acid. Several other examples of compds. of this nature are given.

*Reserve effects on textiles.* I G Farbenind A.-G Fr 692,883, Mar. 28, 1930. Reserve effects are obtained on half-silk half wool fabrics by adding to the dye bath contg. a substantive dye or to the mordanting bath, amides of sulfonic or carbonylic acids in which the H atoms of the amide groups are wholly or partly replaced by alkyl, aryl or aralkyl groups. Examples and a long list of substances which may be used are given, including bis(3,4-dichlorophenylsulfonyl)benzidine-*m,m'*-disulfone acid (by condensing 3,4-dichlorobenzenesulfonyl chloride with benzidine-disulfonic acid in the presence of an acid neutralizing agent) and bis(3,4-dichlorophenylsulfonyl-3'-aminophenylsulfonyl-3''-aminophenylsulfonyl)benzidine-*m,m'*-disulfone acid (by the reaction of *m*-nitrobenzenesulfonyl chloride with benzidinedisulfonic acid, reducing to the diamine, condensing with *m*-nitrobenzenesulfonyl chloride, reducing again and condensing the product with 3,4-dichlorobenzenesulfonyl chloride).

*Textiles.* Hermann Bollmann and Bruno Rewald Fr 693,887, April 14, 1930. Textiles are improved by adding to the baths used for treating fibers, threads or cloth a certain amt. of lecithin.

*Waterproofing textiles.* Alexander Nathansohn Fr 693,803, April 12, 1930. Textiles are made waterproof by incorporating in them, by a gentle treatment with esterifying derivs. of higher fatty acids, the corresponding radicals of fatty acids in amts. which do not notably pass the content of the natural fibers in these radicals. Examples are given of the treatment of textiles with stearyl anhydride, stearyl chloride, etc. in benzine, $C_6H_6$, $CCl_4$, etc.

*Sizing or softening agent for fibers.* Hermann Bollmann and Bruno Rewald Fr 692,523, Mar. 21, 1930. A sizing, gumming or softening agent for fibers is composed of an emulsion of phosphatides of vegetable origin (particularly phosphatides from soy beans), fatty oils and (or) fatty acids in water. A small quantity of Turkey-red oil or mineral oil may be added to the emulsion.

*Improving the qualities of fibrous materials.* I. G Farbenind A.-G Fr 693,012, Mar 29, 1930. Fibrous materials such as artificial silk are improved by applying to their surface or incorporating with them aliphatic or cycloaliphatic compds. of high mol. wt. or mixed aliphatic or cycloaliphatic-aromatic compds. which possess aliphatic or cycloaliphatic radicals of high mol. wt. or their salts.

*Treatment of fabric.* Herbert Platt and Cyril M. Crowe (to Camille Dreyfus) Can. 308,437 Feb. 3, 1931. Fabric contg. cellulose acetate has the "stocking" point increased by treatment for 45 min. at 40° with a soln. contg. 10–50 g. of basic Al acetate per l., and about 50–100 cc. of AcOH per l.

*Treating cellulose materials.* Henry Dreyfus. Fr 692,726, Mar 26, 1930. Materials of or contg. cellulose have their qualities improved by a treatment with organo-mineral acids or concd. aq. solns. thereof, *e. g.* aliphatic or aromatic sulfonic acids. The threads may be spun directly from the spinning nozzles into the acids. Examples are given of the use of sulfoacetic acid.

*Artificial threads, films, etc.* Henry Dreyfus. Fr 693,240, April 2, 1930. Threads, films, ribbons, etc., made of or contg. cellulose derivs. are treated with organo-mineral acids such as sulfonic acids or concd. solns. thereof whereby the mech. resistance and elasticity are improved. Solns. of the cellulose derivs. may be extruded into the acids. Examples are given of the use of sulfoacetic acid, ethylenesulfonic acid and methylsulfonic acid. Cf. *C. A.* 25, 1100.

**Artificial silk.** BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 335,583, March 16, 1929. Materials of cellulose acetate or other cellulose derivs. rendered insensitive to the delustering action of moist steam or other hot or boiling aq. media as described in Brit. 332,187 (*C. A.* 25, 205) and Brit. 332,231 (*C. A.* 25, 218) are used together with other cellulose ester or ether products sensitive to such delustering action, so that by use of a delustering material on the product design or pattern effects may be produced by its selective action. Numerous details and examples are given.

**Artificial wool.** MICHEL DASSONVILLE. Fr. 693,321, July 12, 1929. A machine is described for treating cellulosic filaments coming from the coagulating baths to give them the appearance of wool.

**Oleaginous composition suitable for conditioning wool.** AUGUSTUS H. GILL. U. S. 1,791,057, Feb. 3. In order to prevent spontaneous combustion of material to which oleaginous compns. are applied, about 1–2% of hydroquinone is added to the compn., *e. g.*, to "red oil" for lubricating wool.

**Washing wool, textiles, etc.** I. G. FARBENIND. A.-G. Fr. 692,834, Mar. 27, 1930. Aromatic sulfonic acids or their salts, possessing in the ring or in a substituent or both, one or more org. radicals with a chain of more than 5 C atoms, are used for washing wool, textiles, etc. Examples are given of the use of the Na salt of hexylnaphthalene-, octylnaphthalene-, cetylnaphthalene- and *N*-dihexylnaphthylaminesulfonic acid. Substances such as cyclohexanol, AmOH, cyclohexanone and $CCl_4$ may also be added. Cf. *C. A.* 24, 734.

**Mothproofing wool, etc.** I. G. FARBENIND. A.-G. Brit. 334,886, June 10, 1929. Materials such as woollen fabrics are treated with compds. obtained by condensing phenols with aralkyl compds. such as aralkyl halides, ales., and ω-sulfonic acids, and then sulfonating, or by condensing sulfonated phenols with aralkyl compds. Various examples are given, one of which involves the use of the product obtained by condensing 2-sulfo-4-chlorophenol with tetrachlorobenzyl chloride.

**Mothproofing fur, wool, etc.** I. G. FARBENIND. A.-G. (Max Weiler, Berthold Wenk, and Karl Berres, inventors). Ger. 513,387, July 13, 1929, and 513,388, July 18, 1929. Addns. to 503,256 (*C. A.* 24, 5169). The materials are treated with asym. hydroxydi- or tri-arylmethane derivs. obtainable by condensing *p*-chloro- or *p*-bromophenol (or their substitution products having one *o* position to the OH group unsubstituted) with aromatic hydroxy ales. or hydroxy hydrols or their anhydrides or derivs., which are themselves obtainable by condensing an aldehyde with one of the phenols mentioned. A suitable reagent is pentachlorodihydroxytriphenylmethanesulfonic acid, prepd. by condensing 2,4-dichlorophenol with the hydrol anhydride obtainable from *o*-sulfobenzaldehyde and 2,4,5-trichlorophenol (513,387). Alternatively, the materials may be treated (1) with bis(hydroxybenzylated) aromatic hydroxy compds. having halogen in the *p*-position to the OH groups, but free from COOH or $SO_3H$ groups, or (2) with nuclearly mono- or di-benzylated *p*-halophenols free from COOH or $SO_3H$ groups and contg. no OH groups in the benzyl nucleus, or (3) with halogenation products of hydroxydi- or tri-arylmethanes not contg. COOH or $SO_3H$ groups (513,388). Cf. *C. A.* 25, 422.

**Hydroxyarylmethanes.** I. G. FARBENIND. A.-G. Brit. 335,547, April 19, 1929. Mixts. of hydroxydi- and hydroxytri-arylmethanes, or mixed hydroxydi- and hydroxytri-arylmethanes, *suitable for mothproofing wool, furs, etc.*, are prepd. by condensing, in an acid medium, one mol. proportion of formaldehyde with 2 mol. proportions of a mixt. of phenols comprising a *p*-halogenated phenol or phenols with other phenols, or by similar condensation of 1 mol. proportion of an aromatic aldehyde such as mixed *o*- and *p*-chlorobenzaldehydes or *o*-sulfobenzaldehyde (but excluding aromatic hydroxy aldehydes and their sulfonic, carboxylic and sulfo-carboxylic derivs.) with 2 mol. proportions of a mixt. of phenols comprising *p*-alkylated phenols or their mixts. with other phenols, or a *p*-halogenated phenol mixed with other phenols (all the *p*-alkylated and *p*-halogenated phenols having free *o*-positions). Several examples are given and $H_2SO_4$, $AlCl_3$, $FeCl_3$ or a mixt. of $H_2SO_4$ and HOAc may be used as condensing agents. Cf. *C. A.* 24, 6036.

**Rubberized cloth.** E. I. DU PONT DE NEMOURS & CO. Fr. 693,890, April 14, 1930. Rubberized cloth is coated with a final layer of asphaltic varnish and heated to a temp. below the softening point of the asphalt. Cf. *C. A.* 24, 1524.

**Apparatus for cleaning benzine used for degreasing and decoloring.** MOISE DUVAL. Fr. 693,000, Mar. 29, 1930.

# 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Studies in the painting of wood. I. Influence of wood structure on paint behavior. J. H. HASLAM AND S. WERTHAN *Ind. Eng. Chem.* 23, 226–33(1931).—*In order better* to understand the relationships between wood and paint films, H. and W. examd. microscopically the wood surface, the paint film and the interface of the 2. Differential staining of wood-paint sections made possible a study of the penetration of paint into soft woods of several species. The method is described in detail. Woods of apparent uniformity are revealed under the microscope as irregular. *Differences in wood structure* which have an important bearing on the behavior of the paint film include: (1) the sharpness of transition of spring wood to summer wood, (2) the distribution of pits on the fiber walls and their permeability, (3) the direction of the medullary rays with respect to the surface (flat- *vs.* edge-grained boards) and (4) the existence of resin ducts. A study of the shrinking and swelling of wood led to the discovery that the expansion of the summer wood is often greater than the over-all expansion of the wood. In such cases the swelling of summer wood is compensated for by compression of the spring wood. *The expansion of the summer wood is less than the distensibility of a new paint film but exceeds many times the distensibility of a film 8 months old, hence the early loss of paint over summer wood.* Penetration of paint liquids occurs through the pits and medullary rays. Penetration is uneven on flat-grained surfaces because of the existence of ray openings which occupy about 20% of the area. Uneven penetration *results in nonuniformity of paint film and consequent early failure of paint film.* Penetration of vehicles becomes more regular in the order: oil + turpentine, raw oil, bodied oil, varnish. H. K. SALZBERG

Effect of wood grain on paint durability. H. A. GARDNER. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. 377, 128–30(1931).—A Pb-Zn house paint was applied over *various primers to Ark. soft pine characterized by flat, angle and vertical grain.* The primers were (I) the paint itself thinned according to directions, (II) Al spar varnish, (III) $PbCrO_4$ in oil and (IV) a graphite paint. Superior results were obtained on vertical grain with (IV). G. G. SWARD

Why some wood surfaces hold paint longer than others. F. L. BROWNE. U. S. *Dept. Agr., Leaflet 62*, 4 pp. (1930).—*It is not necessary for painters to change the* compn. of the priming coat for the different softwoods. Moisture gaining access to the backs of painted boards causes failure by blistering, peeling and discoloration. The painting characteristics of a board depend on the amt. and distribution of the summer wood. The density of a softwood board measures roughly its ability to hold *paint coatings. Cedars, cypress and redwood hold paint best and northern, western* and sugar pines almost as well, whereas with southern pine and Douglas fir and western larch, serious flaking from the summer wood occurs sooner than with the former species. Other conifers lie between. Wood of the same species varies greatly in texture and density and therefore in painting characteristics. Knots and pitch give trouble. *Edge-grain boards hold paint better than flat-grain. Southern exposure is the hardest on* paint. Repainting should be done before the old coating has flaked or the bare wood is exposed. ALFRED L. H. KAMMERER

Why wood painting research becomes a problem in forestry. F. L. BROWNE *J. Forestry* 28, 1136–45(1930); cf. *C. A.* 24, 2313, 3913.—The variability in paint service *on different woods is considerable. Density, ring width and type of grain*, all widely variable, have a great influence on the integrity of paint films. Progress in wood-painting technology therefore concerns the forester. Results of tests described in previous papers are given. ALFRED L. H. KAMMERER

Commercial paints, substitutes for white lead and anti-corrosion paints. A. VILA. *Chimie & industrie* 24, 1052–67(1930); cf. *C. A.* 22, 3998.—*The results obtained after* 4 yrs.' exposure to the atm. are given, including photographs of the painted surfaces and of sections through them. Ti oxide and lithopone paints had the highest covering power, followed in order by ZnO, one of the white leads, mixed white pigments, Sb oxide and finally a white-lead paint. As regards resistance to weathering, the pure basic pigments (white lead, ZnO) which can combine with the acid radicals of the oil showed least loss to rubbing (light sponging with city or distd. water), while the dust thus removed from these paints had the highest content of org. matter; the Sb paint (Timonox) was already too badly deteriorated to make it worth while making these detns. Various accelerated aging tests for anti-rust paints were tried out, but apparently did not deteriorate the paint any more rapidly (in some cases less) than ex-

posure to the atm or to fresh or sea water As the value of these paints depends essentially on their impermeability, the following test is suggested Apply 2 coats of the sample to be tested over the whole of a small Al plate and allow to dry normally. Fill the hollow of the plate with a soln of NaCl and $HgCl_2$ in distd water and let stand at atm temp if the coating is impermeable the soln evaps without producing any corrosion, but if it is not impermeable the $HgCl_2$ reacts vigorously with the Al as soon as the soln has penetrated to the metal The tests showed that at the present time a no of com French anti-corrosion paints contg no Pb salts are fully equal to, or better than the old minium paints A Papineau Couture

**Technical analysis of titanium white.** J Pfanhauser and S Tomaszewski. *Przemysł Chem* 14, 353 5(1930).—The soln contg Ti is acidified with HCl with exclusion of air and then reduced with Zn for about 2 hrs at 70-80° High temp causes the pptn of insol $H_2TiO_3$ The soln is then either titrated with 0 1 *N* $KMnO_4$ at 60-70° under $CO_2$ with exclusion of air or is reduced with an excess of ferrous $NH_4$ sulfate, which is then titrated back without the need of excluding air A. C. Z

**Thickening of red lead.** W van Wüllen Scholten *Farben-Ztg* 36, 644-5 (1931).—The consistencies of pastes prepd with (I) highly dispersed and (II) normal red lead and varying amts of linseed oil were detd at intervals during several months and plotted The curves for I passed through a min the breadth of which varied directly with the amt of oil 20% being the least amt of oil for which the breadth was very great The consistencies of II increased continuously from the time of their prepn The settled layers of I were softer than those of II In order to det which oxide, PbO or $PbO_2$, is responsible for the thickening properties of red lead, mixts contg varying amts of these oxides were ground with linseed oil The paste contg 100% $PbO_2$ behaved like highly dispersed red lead and the mixts with the highest percentages of $PbO_2$ had the softest settlings In order to study the effect of the manner of prepg the pastes, 84 parts red lead was ground with 9, 12 and 16 parts oil resp After different intervals, the oil content of all the pastes was brought up to 16% The results showed that softer pastes are obtained if only a portion of the oil be used at first. G G Sward

**New methods of preparing chrome oxide green and hydrated chrome oxide green.** A C Heinemann *Farbe u Lack* 1931, 6.—A few of the recent German patents for prepg the chrome oxide greens are briefly reviewed G G Sward

**Survey of preparation of alkali chromates.** Alfred Heinemann *Farbe u Lack*, 1931, 26.—The author briefly reviews a few German and English patents on extn of Cr from its ores. G G Sward

**The toxic action of varnish, paints and polishes.** Delfín L. Barrios and José S Devoto. *Semana méd* (Buenos Aires) 1931, I, 252-7.—A review is given of poisoning by vapors of solvents (PhH, PhMe, AcOEt and $AcOC_4H_9$) A P Meyer

**Spirit of turpentine in varnishes and paints.** A Gérard Vaudin *Bull inst. pin* 1931, 4.—The merits of spirit of turpentine over white spirit are briefly discussed A Papineau Couture

**Oiticica oil.** G G Sward *Am Paint & Varnish Mfrs' Assoc Circ* No 377, 120-5(1931).—A white acetone-insol material, which did not appear to be β eleostearin, was obtained when oiticica oil was exposed in a thin layer to ultra-violet light The yield was about 25% A 25-gal *ester-gum varnish* prepd with oiticica oil compared favorably with one prepd with tung oil The literature of oiticica oil is briefly reviewed and a bibliography is given G G Sward

**Scheibel oil.** G G Sward *Am Paint & Varnish Mfrs' Assoc Circ.* No 377, 126-7(1931).—Some of the phys properties of a drying oil prepd from castor oil were: $d_{15}^{15.5}$ 0 937, I no (Wijs) 120 5, $n^{25}$ 1 487, viscosity (G-H scale) G, and color (Hellige) 1L-1. When subjected to the Brown heat test, the oil did not gel in 2 hrs The properties of a blown oil and of a stand oil prepd from the raw oil are also given G G. Sward

**Oxidation products of drying oils. I. β-Eleostearin from tung oil.** R. S Morrell and S. Marks. *J. Soc Chem Ind* 50, 27-36T(1931); cf. *C A.* 24, 2901.—In the oxidation of the β-eleostearic glyceride the first product is a diperoxide, followed by a change to a monoperoxide, $(CH_3(CH_2)_3CH\overset{O_2}{\frown}CH\ CH:CHC(OH):C(OH)(CH_2)_7COO)_3C_3H_5$ On methylation, Me esters, sol. and insol in light petroleum, are formed The max. number of methoxyl groupings which can be introduced is two Attempts to methylate Me ricineolate were unsuccessful and resulted in the production of a methyl

ester of an acid isomeric with linoleic acid The Me esters are oxidized by $KMnO_4$ to valeric acid and an intermediate $C_{13}$ or $C_{14}$ acid Reduction by $H_2$ with Pd causes addition of two or four atoms of H Treatment of the Me esters with HI or HBr causes reduction of the peroxide group and withdrawal of the methoxyl groups to form $CH_3(CH_2)_4CH\underset{O}{\diagdown\diagup}CHCH\underset{O}{\diagdown\diagup}CH(CH_2)_7CO_2H$ The evidence in favor of pos and neg polarity of the peroxide groups has been strengthened The yellowing of drying films is due to rancidity, caused by disruption of the remote peroxide and the action of strong bases on the near peroxide to form colored salts The inert character of the central double linking is very marked There is a strong associating power of both peroxide groups The peroxides are very stable in acid media Polymerization of the oxidized esters is accompanied by a rise in refractive index The loss in wt of linoxyn films is connected with degradation beginning at the remote peroxide grouping A scheme of orientation on the lines of Staudinger's representation of polymerides is suggested

H M Stark

**Notes on aircraft finishes.** H A Gardner *Proc Am Soc Testing Materials* 1930, Preprint No 33, 37–45.—A discussion of various types of wing dopes Acetate dope for priming coat evidenced lower tautness with good strength, while nitrate dope showed good tautness and satisfactory strength Nitrate dopes properly applied and protected from light by Al-pigmented outer coats showed that the underlying coats of nitrate dope were not broken up by sunlight, the strength of the fabric was maintained and excellent tautness was effected Two thin coats of clear spar varnish were applied over the Al pigmented dopes to make it smooth Properly compounded nitrocellulose lacquer coatings are now being applied to the top side wing surfaces The newly developed lacquer-varnish coatings usually contg nitrocellulose properly compounded in soln with phthalic anhydride glycerol resins appear to offer the advantages of quick drying highly water resistant surfaces and exceptional durability W H B

**The preparation of low-viscosity cellulosic collodions.** Ch Stark. *Rev gén mat. plastiques* 6, 649–59(1930).—A brief review is given of the development of these collodions to meet the modern requirements of nitrocellulose lacquering and varnishing

A Papineau Couture

Nitrocellulose lacquers Hans Wolff and B Rosen *Farben-Ztg* 36, 736–7 (1931).—Ordinary kauri copal in either the natural or "run" states, tends to sep as a gel in films of nitrocellulose lacquers contg it Solvent-extd kauri, however, is not subject to this defect In hardness, abrasion resistance, flexibility, tensile strength and elongation, films of nitrocellulose lacquers contg extd kauri compared favorably with those contg ester gum Films contg Manila copal were inferior to those contg shellac and extd kauri

G G Sward

Compatibility of resins with nitrocellulose solutions Harry C Hofmann *Ind Eng Chem* 23, 127–30(1931).—Although nitrocellulose, ester gum and AcOBu or AcOAm are compatible in all proportions and give clear films, many other systems give cloudy films Of 132 combinations prepd by mixing nitrocellulose with 11 resins and dissolving the mixt in 1 of 12 solvents, 43 gave clear solns and films 15 required only the addn of a plasticizer 12 cleared up on the addn of a plasticizer and diluent, and 3 cleared up on the addn also of ester gum, 59 gave cloudy films in all tests Some of the resins, notably vinyl acetate, rosin, dammar and Rezyl 12, are compatible with nitrocellulose in most of the solvents Ester gum and Amberol H 9 could not be made compatible in systems contg diacetone alc., Et lactate, Cellosolve or Cellosolve acetate Kauri and pontianac could be made compatible only in systems contg AcOEt, Cellosolve or Cellosolve acetate Manila and shellac are incompatible in most systems and cumar could not be made compatible in any system Incompatibility of resins with nitrocellulose in certain solvents is ascribed to lack of miscibility of resin and nitrocellulose rather than to pptn of resin by solvent Careful examn of incompatible systems reveals the existence of 2 homogeneous phases but no ppt Solvents and diluents belong to either an alc. or a hydrocarbon type and resins to either an alc.-sol. or a hydrocarbon sol type In general, compatibility is most readily obtained by using solvents and resins of corresponding types, *e g*, an alc type solvent and an alc.-sol resin However, in those systems requiring the addn of diluent or ester gum, it is found that the type of diluent or resin which produces compatibility is of the type opposite to that of the diluent or resin originally present The ability of a plasticizer to clear up incompatible systems depends upon the nature of the plasticizer A clear lacquer gives cloudy films when that type of solvent which makes for incompatibility is allowed to conc in the film during drying

H K Salzberg

**Cativa resin.** L P HART *Am Paint & Varnish Mfrs Assoc. Circ* No. 377, 131-2(1931).—A balsam-type resin from the tree *Prioria copaifera*, Griseb, made into a tung-oil varnish gave a product whose films were somewhat softer than those of varnishes made from the common resins G G SWARD

**The importance of glycerol and glycol in industry.** G. PETROV. *Masloboino Zhirovoe Delo* 1929, No 7, 18–21.—The new developments in the application of glycerol and glycol in the prepn of synthetic resins by condensation with polybasic acids are reviewed, and attempts to prep linoxyn films' from the ethyl esters of fatty acids of linseed oil are described The results of these expts were negative and P concludes that glycerol cannot be replaced in the drying oils by lower alcs E BIELOUSS

**New method of determining the acid number of copals.** ZYGMUNT LEPPERT *Przemysl Chem* 15, 1–5(1931).—One g finely powd copal is boiled in 20 g terpineol under a reflux until dissolved Some difficultly sol copals may take 1–3 hrs The hot soln is diluted with 20 cc $CH_3OH$ and on cooling is titrated with 0.1 *N* KOH With difficultly sol copals the hot terpineol soln is treated with 20 cc. $C_4H_9OH$ and 20 cc alc 0.5 *N* KOH, and heated for about 15 min Since the soln turns dark it is diluted with 200 cc $C_2H_5OH$ and after cooling titrated back with 0.5 *N* $H_2SO_4$ against phenolphthalein Compared with the methods of Gardner, Dietrich, Marcusson and Winterfeld this method has the advantages in that it gives consistent results in a series of detns on the same copal, it is general and does not require a different set of solvents for every kind of copal the results obtained are very probable. The acidity values obtained by this method on various kinds of copals may be used for comparing their acidities. Tables of the acidity values of many kinds of copals are given A C. Z

**Production of oleoresin from Pinus halepensis of Spain.** VICENTE CUTANDA AND MARIANO SEVILLA *Servicio Forestal de Investigaciones y Experiencias* 2, No 5, 29–42(1929).—The production of oleoresin from stands of *P. halepensis*, which are found along the Mediterranean coast, began during the World War At present about 600,000 trees of this species are being turpentined The oleoresin is being distd at 7 different plants The yields per tree per yr vary from 1.05 to 4.30 kg., depending upon growing conditions These yields compare favorably with those from the more commonly worked *P. pinaster* (maritime pine) The compn. of the oleoresin as given by Lacrue (*C. A.* 23, 5037) is discussed The rosin is somewhat low in grade because of a greenish tinge Cleaning the gum before distn., according to the usual Spanish practice, is especially advantageous on account of the presence of much tannin Water is sepd. by decantation from the oleoresin before distg by allowing the mixt to stand in closed vessels for 10–12 hrs The rosin is invariably sunned to improve its color The turpentine must be distd to remove its greenish color A proposed alternative is filtration through $(CO_2H)_2$ H K SALZBERG

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Azo dyes [for red varnishes] (U S pat. 1,791,444) 25.

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**Paint composition.** RICHARD L BRAGDON and DALE F MCFARLAND. Can. 308,612, Feb 17, 1931 Turpentine is added to paint and then there is added a soln made up of water, shellac and $NaHCO_3$

**Weather-resisting paints.** I G FARBENIND A.-G Brit 335,626, May 2, 1929 There is incorporated with paints or other coating materials at least such a quantity of pptd. ZnO (dried by heating to a temp not materially exceeding 500°) as is necessary to combine into soaps all free or combined fatty acids present in the binding agent such as linseed oil or China wood oil Various details and examples are given.

**Roof paint.** JOSIAH D WALSTON (to Black Diamond Paint Co.) U. S. 1,791,455, Feb 3. A paint is formed from ingredients including coal tar, rosin, PbO, $ZnSO_4$, $CaSO_4$, gasoline and kerosene

**Paints, stains, etc., comprising colloidal dispersions.** SAMUEL CABOT (to Samuel Cabot, Inc.) U. S. 1,791,119, Feb. 3 Pigment particles of colloidal fineness are carried in suspension in an org dispersion medium such as linseed oil and turpentine or solvent naphtha together with a semi plastic treated oil such as a linseed oil jelly.

**Paint filter.** RUDOLF SCHMID Ger 515,439, Sept 28, 1929

**Indelible ink.** MARCEL ROURE Fr 692,929, June 28, 1929 Indelible ink is made by dissolving salicylic acid 2, gum arabic 25, alum 100 and oxalic acid 50 g. in 1 l. of water, boiling and adding 100 cc of ox gall and 100 cc of alc to make soln. A. Aniline dyes according to the color of ink desired are added to a boiling soln. of 20 cc. of HCl in 1 l. of water to form soln. B. Solns. A and B are mixed, allowed to stand and then filtered.

The kernels yielded 61 7% oil (on the dry basis), which had consts agreeing well with those recorded by Bolton for stillingia oil A PAPINEAU COUTURE

Some developments in the oil palm industry. H M LANGTON. *Ind Chemist* 7, No 73, 71–4(1931) E. H.

The lipase of olives and olive oil. E PANTANELLI AND S VERDESCA. *Rend. accad sci Napoli* [3], 36, 76–83(1930).—The acidity which develops in olives after they are picked is due to a lipolytic enzyme which accelerates the hydrolysis of the glycerides into free fatty acids and glycerol with absorption of water The activity of the lipase increases rapidly with the destruction of the cellular structure. The greater the initial acidity of the olives at the time of pressing, the more apt is the oil to be rich in lipase and develop more acidity The acidity which develops in the oil is proportional to the water which remains emulsified during the process and also proportional to the glycerol already present The glycerol, therefore, is the factor which governs the course and intensity of acid development, since it introduces water and lipase into the oil. PETER MASUCCI

Influence of bagging on the percentage of oil in castor beans. G B PATWARDHAN *Poona Agr Coll Mag* 22, 13(1930).—Bagging castor bean flowers for seed propagation had no significant effect on the oil content of the seed K D JACOB

The determination of the oil content of seeds in series. A LEBEDYANTZEV AND N DMITRIEV *Masloboino Zhirovoe Delo* 1929, No 10, 3–10, No 11, 3–9, No 12, 9–17.—With the object of devising a method for serial detns. of oil in seeds L and D investigated the influence of various factors on the extn of oils After 4 hrs of extn 34 65% of the oil was obtained, after 18 hrs, 41 65%, and after 36 hrs, 41 76% The usually specified time, 5–6 hrs for extn with a Soxhlet, is much too short, about 18 hrs would be required for practical purposes. With 30 siphonings per hr the extn. was complete in 16 hrs, as compared with 36 hrs. for 6 siphonings per hr By pulverizing the material to a very fine state and with 30 siphonings per hr the duration of the extn. can be reduced to 6 hrs. By previous maceration of the material with $Et_2O$ for 18 hrs. the extn time was reduced to 2 hrs. Up to 2 g of a finely powd material can be completely extd. within 6 hrs at 30 siphonings per hr Three g of the material under the same conditions gave results which were lower by 1 1% The $Et_2O$ must be freed from alc. and dried over $CaCl_2$ To avoid the contamination of the $Et_2O$ with $H_2O$ the material should be dried at 100° Drying oils should be dried in a N or a $CO_2$ atm to avoid O absorption. Instead of drying, the material may be mixed with calcined $CaSO_4$. The best method for drying the extd oil is to heat it in a N or a $CO_2$ atm not over 60° The oil content was detd from the wts. of the extd. residues. The app., representing essentially an enlarged Soxhlet, was charged with 20 thimbles, each contg 2 g of material The thimbles were allowed to soak for 24 hrs in $Et_2O$ and the extn was carried out in 3 hrs at 6 siphonings per hr Uniform results were obtained agreeing within 0 16% with individual extns in Teuge's app The subsequent drying of the residues presents no difficulties, as it can be carried out by heating in the air at 100° E BIELOUSS

The relationship between acidity and titer of oils. I STETZENKO AND I PANTELEYEV *Masloboino Zhirovoe Delo* 1929, No 10, 20–1.—Although the titer (*i. e.*, solidification point) of the fatty acids is higher than the titer of their glycerides, a high titer is no indication of a high acidity, as the neutral oil forms a eutectic mixt. with the free fatty acids. Thus a sunflower oil with an original acidity of 3.5% had a titer of 35.3° and 46 1° for the free acids. In admixts up to 30% free acids the titer was below 35.3° A hydrogenated sunflower oil with a titer of 56 4° and 61 6° for the free acids had a lower titer in admixts up to 60% free acids E BIELOUSS

The splitting of oils and fats nearly to completion. G PETROV AND A PICHUGINA *Masloboino Zhirovoe Delo* 1929, No 9, 53–6.—By the use of the naphthenic sulfonic acids oils and fats were hydrolyzed up to 97.87–99 6% The hydrolysis was carried out in two steps by adding the sulfonic acids (0 9 to 1% of the oil) in two portions E BIELOUSS

Denaturing of protein of soy bean by alcoholic extraction. L KOJI OKANO AND MANORU NINOMIYA *Abstracts from Rept Central Lab S Manchuria Railway Co* 1929, 7–9.—Alc. extn decreases the $H_2O$-sol and NaCl soln.-sol., and increases the NaOH-sol. protein No difference in the amino acids of the original and extd products was found V F HARRINGTON

Extraction of soy-bean oil with alcohol. II. 1. Solubility of soy-bean oil in alcohol. MASANORI SATO AND HIROSHI SAKAI. *Abstracts from Rept Central Lab. S. Manchuria Railway Co* 1929, 1–3.—The soly of soy-bean oil in alc. of various concns; in alc dild. with $C_6H_6$, benzine or oleic acid, in MeOH, and in MeOH dild. with $C_6H_6$

has been detd 2. Experiments on the extraction of soy-bean oil with alcohol. MASANORI SATO AND MITSUO YOKOCHI *Ibid* 3–6 —The optimum conditions are 2 extns with alc. (96% by vol.) for 2 hrs. at 75° or above. The ext. cooled to 25° deposits the oil Extn above the b. p gives better results An app is described Yields are equal to those with benzine, the product is edible. 3. Separation and recovery of phosphatides and carbohydrates from the alcoholic extract. MASANORI SATO AND IWAWO SETO *Ibid* 6–7 —The residue from the alc. phase contains 27% carbohydrates. 1.27% $N_2$ and 1.07% P Alc dissolves the phosphatides. They can be coagulated by dilu of the alc with $H_2O$ and addn of acid or salts. V. F. HARRINGTON

**Determination of sandy matter in soy-bean cakes.** SHUNICHI USAMI *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 23–4 —The cake is shaken with $CCl_4$ and the sand weighed or measured in a flask similar to an inverted Babcock flask V. F. HARRINGTON

**The soy-bean oil from Kuban.** M. SERGEEV *Masloboino Zhirovoe Delo* 1929, No. 3, 47–51 —Fifty-five samples of the 1927 crop were analyzed The $n_D^{20}$, and the acid and I nos. of the Kuban oil are somewhat lower than the corresponding consts. recorded for the oils of different origins The yield of beans per hectare depends on the vegetation period it reaches 2250 kg. for the late crops (149–163 days) The oil content varies from 19.6 to 25.3% F. BIELOUSS

**Examination of Japanese beeswax. I. General properties.** H. IKUTA *Chem. Umschau Fette, Oele, Wachse u. Harze* 38, 7–10(1931); cf. *C.* 1 25, 613 —I. examd. 8 Japanese beeswaxes, 2 of which were produced by native Japanese bees and 6 by the European bees which rapidly are displacing the native bees The various kinds of honey flowers have no relation to the consts. of the wax produced the differences in Japanese and European waxes are due to the breed of bees The compn. is greatly influenced by the kind of artificial comb employed Waxes from native Japanese bees have: $d_4^{19}$ 0.8168–0.8232, m. p. 64.5–65.5°, $n_{40}$ 1.4557–1.4560, acid no. 7.5–5.4, ester no. 75.6–79.2, sapon. no. 83.1–84.6, I no. (Wijs) 11.3–14.0 acetyl no. 20.7–18.7, unsaponifiable constituents 58.3–56.5% Only 2 of the other 6 samples were considered pure wax (European type of bees) $d_4^{19}$ 0.8141–0.8132, m. p. 62.0–63.5°, $n_{40}$ 1.4554, acid no. 19.8–19.4, ester no. 74.0–74.1, sapon. no. 93.8–93.5, I no. (Wijs) 8.5–7.2; acetyl no. 13.1–14.4, unsaponifiable constituents 49.5–48.6% In addn. I tabulates the consts. of the saponifiable constituents of the waxes, their alcs. and their hydrocarbons. P. ESCHER

**Manganese soaps.** HANS WAGNER AND G. HOFFMANN *Farben-Ztg.* 36, 689–93 (1931) —The reaction of umber with linseed oil fatty acids was studied by exposing mixts. of umber and fatty acids to ultra-violet light, daylight and darkness The samples were exposed on microscope slides with and without cover glasses In all cases where crystn. took place, ether-sol. Mn compds. were found, but the formation of Mn soaps was not definitely proved Pronounced crystn. took place only in the presence of oxidizing or catalytic compds. Thus pyrolusite produced no crystals, but several ter- and quadrivalent Mn compds. did so as a result of the $O_2$ liberated in the reduction of the Mn to the bivalent form G. G. SWARD

**Analysis and preparation of medicated soaps.** G. MATOLCSY *Magyar Gyógyszerésztud. Társaság Értesítője* 5, 489–502(1929) —The flame reaction of soaps may show what alkalies have been used in their prepn. Color, odor and consistency should be observed The water content can be measured on the basis of the resistance against cutting The paste-cutting machine of Rejtö has been used for this detn. Fatty acids, content of alkalies, and org. and inorg. filling materials are detd. according to standard methods A short description of the prepn. of medicated soaps is given S. S. DE FINÁLY

**Combinations of raw materials for toilet soap.** BUNJI NAKAGAWA *J. Soc. Chem. Ind., Japan* 34, Suppl. binding 22–7, 28–31(1931) —Soaps of 8 different oils were mixed in proportions of 10–80% with a soap consisting of 80% Na tallow soap and 20% Na coconut-oil soap and the lathering no. (L. N.), lathering vol. (L. V.), lathering coeff. (L. coeff.) and rate of lather extinguishment detd. L. coeff. = L. N. × L. V., and the rate of lather extinguishment = {[(L. coeff. at 1 min. after shaking) − (L. coeff. at 5 min. after shaking)]/(L. coeff. at 1 min. after shaking)} × 100 Na palm-oil soap (I) has a good effect upon lathering Hardened soy-bean oil soap (II) of 67.7 I no. has a better effect at 40° than at 20°, where it shows a reverse tendency. A Na lard soap (III) has a good effect on the L. coeff. at the start, but the rate of lather extinguishment rises with the increase in amt. of this soap A 40% mixt. is the best for lathering power Na hardened fish-oil soap (IV) decreases the L. coeff. The Na soap (V) of Chinese

vegetable tallow has not much effect on the L. coeff., but the rate of lather extinguishment is larger. At 20° the L. coeff. decreases. Na castor-oil soap (VI), Na peanut-oil soap (VII) and K tallow soap (VIII) all have a good effect upon the lathering, but VI is the most desirable. The soly. of mixed soap was measured in an attrition app. composed of an endless rubber band rotating at 1086 cm. per min. and dipping into a water bath at 40° and 20°. A soap cake 2 × 3 × 2 cm. was fastened and weighted with 135 g. so that the rubber band could rub it. The duration of the operation was 10 min. at 40° and 20 min. at 20°, and by weighing back the soap the attrition was detd. The degree of attrition is designated "rubbing soly." and is calcd. by the formula: rubbing soly. = 100 × [soap by attrition (g.) ÷ rubbing surface (cm.²)]. The rubbing soly. of Na tallow soap mixed with 20% Na coconut oil soap is smaller than that of the former alone but increases with increase of the latter. The mixt. with I or II does not increase the rubbing soly. In the mixt. of III the rubbing soly. increases with increase in amt. of this soap; in mixts. of IV it decreases with increase of this soap. In the case of V the rubbing soly. tends to decrease, and this effect is greater at 20° than at 40°. A 2.5% mixt. of VI increases the rubbing soly., as do also VII and VIII, 15% of VII being equal to 2.5% of VI. The relative hardness of the mixed soaps was detd. from the distances 2.5-cm. metal points 2 and 3 mm. in diam. (weighted to a total of 300 and 600 g., resp.) penetrated into the soaps, a homogeneous curd soap being the standard of comparison. The hardness of mixed Na tallow and Na coconut-oil soap increases with the increase in the amt. of the latter until, with 40% coconut-oil soap, the soap is unsuitable for toilet use. I and II (I no. 67) have a tendency to soften the mixed soap, I having a greater effect than II. IV (I no. 22.3) in lower percentages produces a slight softening in the mixt., but when 50% is used, it hardens the product. V increases the hardness as its amt. is increased. VII, VIII and VI (effective in this order) soften the mixt. according to the amts. added. Conclusion: palm oil, hardened soy bean oil and Chinese vegetable tallow can generally be used as substitutes for tallow, and the most desirable for the combination are castor oil, peanut oil and the K soap of tallow.
F. Scheiffel

**The utilization of soap lyes.** S. Liberman and A. Korelski. *Maslobono Zhirovoe Delo* 1929, No. 6, 21–5.—The soap lyes left after the salting out of the soap base, contain about 1.3% NaOH and 0.5% $Na_2CO_3$. L. and K. recommend their recovery by treatment with free fatty acids and rosin. E. Bielousss

**Actual problems in the manufacture of washing compounds.** J. Leimdörfer. *Seifensieder Ztg.* 57, 869–72(1930).—L. discusses the economic and mfg. phases of toilet, laundry and soft soaps. The brown spots on cottonseed-oil soaps may be prevented by hydrogenating the oil to lard consistency or by polymerizing it at 260–280° for 5–6 hrs. in a $CO_2$ atm. before sapon. P. Fischer

**Ambergris and how to recognize it.** F. R. Morrison. *Bull. Tech. Museum Sydney* No. 15, 9 pp. (1929).—The different varieties of ambergris are described, together with their values, uses and characteristics. All ambergris will float on sea water, and if the latter is slowly heated the material will melt to a brown or black liquid before the water reaches its b. p. A piece of ambergris about the size of a pea is almost completely sol. in about ½ oz. of warm alc., giving a fluorescent soln. A needle, previously heated in a candle flame for 10–20 sec., on being pressed into a sample of ambergris to a depth of ⅛ in. forms a dark brown resinous liquid which when touched by the finger leaves pitch like "strings" adhering to the skin. If the needle be withdrawn and placed in the flame, the ambergris burns, if the flame be extinguished the odor of the "smoke" is somewhat fatty or resinous and resembles that of burning rubber.
B. C. A.

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Oiticica oil (Sward) 26. Insect oils and fats (Timon-David) III. Value of ash determinations of fatty oils (Schaefer) 22.

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**Apparatus for washing and mixing fats and waxes having the consistency of butter.** Richard Bendlin and Ottokar Urbasch. Fr. 692,687, Jan. 6, 1930.

**Coloring higher fatty acids such as stearic acid.** Hermann Schlapebach and Herbert Hähle (to General Aniline Works). U. S. 1,791,431, Feb. 3. A coloring substance such as a thioindigo and an amino compd. such as triethanolamine are added to fatty acids while the latter are in liquid state. Numerous examples of use of Cu salts, etc., also are given.

**Extracting oils and fats.** Stráuli & Cie. (Ernst Müller, inventor). Ger. 515,058, July 20, 1926. This relates to the extn. of oils and fats from oil seed press cakes, used bleaching earth and like residues. The material is ground and mixed with

a solid diluent *e. g.*, sawdust and the mixt. is lightly pressed into briquets which are then extd. with a solvent in known manner.

**Apparatus for extracting oils from seeds, sewage or other materials by solvents.** Clarence J. Bleil. U. S. 1,791,398, Feb. 3. Various details are described of an app. comprising an endless filter made up of connected sections. Cf. *C. A.* 24, 1257.

**Recovering dry palm oil from its admixtures with water.** James H. Holden and Joshua C. Whetzel (to American Sheet and Tin Plate Co.). U. S. 1,790,748, Feb. 3. A water in palm oil mixt. sepd. from a palm oil in water emulsion formed by washing palm oil from tin plate after it passes from the tinning pot, is heated until substantially all the water is vaporized, the mixt. of oil and vapor resulting from the heating is then delivered into a draft of air of sufficient velocity to carry away the vapor and of insufficient velocity to pick up the oil. App. is described. Cf. *C. A.* 24, 3749.

**Soap.** Pierre P. A. Chapelle. Fr. 693,580, April 9, 1930. A soap for domestic use or for mechanics contains tallow soap 50, fine white pumice 43, glycerol 5 and resin 2%.

**Soaps, creams, etc.** Soc. d'Études scientifiques et industrielles. Fr. 692,454, June 19, 1929. Biol. products are used in soaps, creams, etc. Fr. 692,455 describes the use of exts. from fungi, etc., in soaps, creams, etc.

## 28—SUGAR, STARCH AND GUMS

J. K. Dale

**Electrical conductivity and ash content of sugar house products.** K. Šandera. *Bull. assoc. chim. sucr. dist.* 47, 446–9(1930).—A new app. is described for the electrometric detn. of ash in which Pt black electrodes are eliminated. An optical method is used to det. the end point instead of a galvanometer. The app. is in principle a Wheatstone bridge. Two of the 4 resistances are lamps, the light of the lamps falling on the surface of a triangular prism. The bridge is balanced when the 2 lamps appear to be of equal brightness. The prism reflects the light from both lamps onto the field of vision, thereby facilitating comparison. The third resistance is a const., and the fourth is a variable resistance consisting of the sugar soln. with 2 electrodes. The distance between the electrodes is variable and is changed to balance the bridge. The distance apart may be calibrated to read ash content. F. Camps Campins.

**The action of nonsugars in sugars upon the caramelization test.** J. Puchierna. *Listy Cukrovar.* 49, 13–20(1930).—Thin-walled containers contg. 6.5 g. of a sugar mixt. were dried at 100° for 2 hrs. The containers were then submerged in an oil bath at 170° for 15 min., withdrawn and cooled in the air. The residue was dissolved in 50 cc. water, filtered and compared in an objective photometer. The remaining soln. was treated with 0.5 cc. 2 *N* NaOH, digested over a water bath for 10 min., cooled and compared in the photometer for additional coloration. The action of salts falls into 3 classes. (1) large primary and small secondary coloration, (2) small primary and large secondary coloration, (3) very little coloration. Salts falling into class (3) are NaCl, KCl, $BaCl_2$, $K_2SO_4$, $Na_2CO_3$, AcONa, $AcONH_4$, Na oxalate. All salts in this class except $AcONH_4$ are strongly electropositive and their solns. are neutral or alk. The small coloration in alkali formed by the chlorides and acetates indicates a decompn. of sucrose into glucose and fructose which readily give rise to colorations. Acetates form more primary coloration than chlorides. Sucrose in soln. and at high temps. behaves as an acid. At 170° AcOH is volatilized from AcONa by sucrose. The sucrose liberates an equiv. quantity of an acid from the salt of the acid. The action is most pronounced for weak acids, the resulting soln. is alk., which favors a decompn. of sucrose. For NaCl, KCl and $BaCl_2$, the liberated HCl is small, the medium is neutral and no decompn. due to increased alky. occurs. $AcONH_4$, as the salt of a weak acid and base, remains neutral in action. $Na_2CO_3$ leaves an alk. medium, and some coloration results. $K_2SO_4$ decomposes at 1050°, it cannot be attacked by the sucrose and remains neutral during the decompn. Na oxalate behaves more like NaCl than AcONa. $(COOH)_2$ is a stronger acid than AcOH and the decrease in coloration agrees with their dissocn. consts. Class (1) consists of salts or amides of amino acids. Metallic salts of amino acids have a greater effect than the corresponding amides because of the action of the alkali. Class (2) forms products which become colored in alkali. $NH_4Cl$, $Fe(NH_4)_2(SO_4)_2$, $NH_4$ oxalate and $(NH_4)_2SO_4$ cause a large primary coloration in addn. to the secondary; $CaCl_2$, betaine-HCl and glutamic acid-HCl give very little primary coloration. $Fe_2(SO_4)_3$ and $KHSO_4$ lie between these groupings.

Betaine-HCl decomposes at 228°; glutamic acid HCl at 208°, in the presence of sucrose the decompn. begins at a lower temp. The effect of sucrose upon salt is marked HCl is liberated and attacks the sucrose, forming invert sugar The additional coloration in an alk. medium is a linear function of the catalytic salt. Too much acid, 0.2%, causes a more thorough decompn with the production of ulmine acid and caramelin $CaCl_2$, although similar to $BaCl_2$, acts as a strong dehydrating agent and falls into class (2) The larger primary coloration with $Na_2SO_4$ and $Fe_2(SO_4)_3$ is due to the dehydrating and oxidizing action of $H_2SO_4$. *The large primary coloration with* $NH_4Cl$, $(NH_4)_2SO_4$, $NH_4$ oxalate and $FeSO_4(NH_4)_2SO_4$ is due to the action of $NH_4$ on sucrose, with $NH_4Cl$, the action of $NH_3$ exceeds that of HCl The class (2) catalysts form a fluid mixt. very soon after heating Larger addns. cause foaming with intense odors suggesting $C_6H_5CHO$ The solns. become acid Sucrose may act as a solvent for salts capable of dissocn. Granules of salts are often surrounded by a low melting mixt. which contains sucrose in a fluid state The sucrose may exert its high dielec properties as a solvent, the dissocn of salts in this "sucrose solvent" is similar to dissocn in water A mixt. of salts in the form of molasses was also tried The effect is complicated not only by the presence of mixed salts but also by the colored org substances of molasses whose effects have not been studied The primary coloration with molasses is large, the secondary is small the effect is due primarily to substances of class (3) FRANK MARESH

Iodometric determination of sugar. M S FILOSOFOV *Nauk Zapiski Tzukrovoi Prom* 9, 586–9(1930).—In certain cases the sucrose cannot be detd polarimetrically. The following method may be used on molasses The normal wt. of molasses is dissolved in water to 130 cc Fifty cc of soln (10 g of molasses) is transferred into a 100-cc flask and 25 cc of $H_2O$ contg 5 cc of HCl (d 1.19) is added The inversion is conducted according to the Herzfeld method The soln is made up to the 100-cc mark and thoroughly mixed Twenty cc. of the inverted soln is transferred to a 400-cc flask, 20 cc. of $Na_2CO_3$ soln (84 g per l.), 1–2 cc. of lead acetate and the same amt. of $Al(OH)_3$ are added The excess of lead acetate is eliminated with soda ash and the whole made up to the 400-cc mark and filtered Fifty cc of filtrate is transferred into a 250-cc. Erlenmeyer flask Four to five g of pure sucrose, and 50 cc. of Fehling soln. are added The mixt. is boiled for 2 min and then cooled by addn of 100 cc of $H_2O$, transferred to a 250-cc flask and made up to the mark. One hundred cc is transferred to an Erlenmeyer flask 5 cc of a soln contg 0.65 g KCNS + 0.1 g KI in 5 cc. of water, is added and thoroughly mixed Ten cc of 6.5 *N* $H_2SO_4$ is added mixed and titrated with 0.1387 *N* $Na_2S_2O_3 \cdot 5H_2O$ Five cc of 1% starch soln is added as indicator The Brunce table gives mg of invert sugar and this multiplied by 0.9 gives the sucrose. Cf. *C. A.* 24, 985 V. E. BAIKOW

A preliminary study of the glucose, sucrose and refractometer solids relationships of five sugar cane varieties grown under Laguna conditions. MANUEL L. HOLLERS *Philippine Agr.* 19, 299–305(1930).—The sucrose content varies widely in different parts of the plant. The refractometer solids vary directly with the gravity purity. In all varieties the refractometer solids and gravity purity decrease and the glucose content increases from the bottom to the top of the plant A. L. MEHRING

The relation between the ash content of raw sugar and the conductivity of sugar solutions of different concentrations as well as of acidified sugar solutions. O. SPENGLER AND F. TÖDT *Z. Ver. deut. Zuckerind.* 80, 853–65(1930).—Expts. on some 60 samples of German raw sugars show that the elec. detn of ash is more accurate at 5° Bx than at a higher Bx (*e. g.* 25° Bx) The correction factor of Zerban for the decrease of the difference between the chem. and the elec. ash detn was applied to 70 samples of German raw sugars. The results were inadequate. This shows that the non-sugars in the samples tested by Zerban are different from the non-sugars in the German samples F. CAMPS-CAMPINS

The Kämpf viscometer ERHARD LANDT *Z. Ver. deut. Zuckerind.* 80, 949–55(1930).—A description is given and the method of operation of the app. is reviewed Tests were carried out on various sugar solns. Conclusion It is sufficiently accurate for solns. of viscosities over 3 poises (There is no turbulent flow above this value.) It is especially recommended for solns of high viscosity The instrument will work even where solid suspended particles are present The viscosity in this case is, of course, not the same as the viscosity of the pure liquid (cf. *C. A.* 24, 1767) F. C.-C.

The determination of reducing sugars in the presence of sucrose by potassium ferricyanide. R. HAMY *Bull. assoc. chim. sucr. dist.* 47, 385–7(1930).—The method of Jonescu and Vargolici (cf. *C. A.* 15, 3564) is reviewed Comparative tests were made on sugar solns. with varying contents of sucrose It is shown that $CuSO_4$-Rochelle salts methods give results which are too high, increasing with increasing amts. of sucrose.

For the J and V method the true result is obtained as long as the sucrose content is below about 30%. The end point is quite sharp F CAMPS CAMPINS

The continuous recording of the alkalinity of saturation beet juices by conductivity measurements. O SPENGLER AND F TÖDT *Z Ver deut Zuckerind* 81, 1-12 (1931).—The alkr. tester of Reinhard Lindner which gives a continuous indication and record of the alky by cond measurement was tested in a factory Such control seems feasible for continuous satn. A conclusive decision is possible only after further investigation, but a straight line relationship is indicated The influence of juice composition cond needs to be studied F CAMPS-CAMPINS

The Šandera objective photocolorimeter ALOIS DOLIVEK. *Listy Cukrovar* 49, 305-5(1930).—Using various liquors available in a refinery, D compared the Stammer and Šandera photocolorimeters. The av variation in readings with the Stammer was 3.5-5 times as great as with the Šandera colorimeter The variation of eyes is insignificant with the Šandera colorimeter but large with the Stammer F M

Effect of certain non-nitrogenous substances on the polarimetric determination of sugar. F PARISI *Ind saccarif ital* 23, 217-9 (1930). *Chimie & industrie* 24, 1202 (1930).—P shows that the polarimetric detn of sugar can be vitiated by soln of foreign substances derived directly or otherwise from pectin Heating dried beet pulp with distd water on the water bath gives a strongly *l* rotatory soln because of the presence of arabinose (arabinose anhydride), which is partially ppted by basic $Pb(OAc)_2$, if $Ca(OH)_2$ water is used instead of distd water, the soln is strongly *l* rotatory on account of the presence of Ca or Mg salts of pectic acid, if a soln of basic $Pb(OAc)_2$ is used, the soln is much less *l* rotatory A PAPINEAU COUTURE

Determination of the amount of crystal in massecuites by the electrical conductivity method. K. ŠAVDERA. *Z. Zuckerind Cechoslovak Rep* 54, 391-4(1930).—In place of calcns. based on formulas employing the dry substance or polarization of the massecuite, elec. cond measurements afford a more reliable method for the calcn. of the amt. of crystal to be expected, and are besides considerably more expeditious. B C A

Analysis of sugar cane. E. HARRISON *S African Sugar J* 14, 675(1930).—Sucrose in cane is usually estd by multiplying sucrose in juice by a factor which necessarily varies with the proportion of juice in cane H proposes to det. sucrose % cane directly by repeatedly extg on a Buchner funnel 100 g of finely disintegrated cane, neutralized by means of lime water, with hot water until a total vol of 1000 cc. is obtained. The ext. is clarified, polarized in a 400-mm. tube, and the result multiplied by 1.3. To obtain juice % cane, a quantity of the pulp is pressed in a tincture press; the extd juice is clarified and polarized, and its sp. gr is detd. Then juice % cane = 100 sucrose % cane/sucrose % juice. The quantity (100 − juice % cane) is termed marc, which is the hydrated insol. part of the cane The water % cane is detd. by drying the pulp The fiber % cane is then found by subtracting from the marc the difference between water in cane and water in juice. Six typical analyses are given, showing that the fiber % cane detd by lixiviation is considerably lower than that found by H's method. F W ZERBAN

Determination of fiber and sucrose in cane. M. BECHARD. *S African Sugar J* 14, 743(1930). cf preceding abstract.—Haddon's article is criticized The inaccuracies inherent in cane sampling may lead to errors of 2 units in the % fiber. Even if a correct sample of pulp can be obtained the analysis should be made by pressing the pulp, analyzing the juice for Brix and sucrose, and the residue for water and sucrose. From these figures the sucrose and fiber % cane can be calcd. directly. H.'s methods are based on incorrect assumptions, and the results for fiber will be accurate only within −2.4 and +5.4 units. H's figures actually show errors of this magnitude, as the water held by the dry fiber varies in his results from 31.8 to 86.2%. The problem of fiber detn. in cane has not yet been solved satisfactorily F. W. ZERBAN

A new spectral colorimeter. O. SPENGLER AND E. LANDT. *Z. Ver. deut. Zuckerind.* 81, 13-24(1931).—A detailed description and method of use of the app are given In principle it is like a Duboscq colorimeter equipped with a monochromator. Readings are made at $\lambda$ = 610, 560 and 480. Expt. figures show the accuracy of the instrument when used as a Stammer-app. in the broader sense and also for the comparison of 2 colored solns. In the latter case $a_1/a_2 = c_2h_2/c_1h_1$, where $a$ is the extinction coeff. at the given wave length, $c$ the concn., and $h$ the height of the liquid column. F. CAMPS CAMPINS

Apparent disagreement in the analysis of molasses. J. J WEISS. *Listy Cukrovar*, 49, 213-4(1930).—The molasses of the present season have been very dark and have

led to discrepancies in analyses All discrepancies have been due to improper sampling of molasses for analysis Studies in sampling are in progress FRANK MARESH

**Materials for the study of sucrose crystallization.** I. A. KUKHARENKO AND I N KAGANOV *Nauk Zapiski Tzukrovoi Prom* 9, 492-9(1930).—The rate of crystn has the highest velocity during the seeding at the beginning of the process The max speed of crystn does not exceed 10 000 mg on 1 sq m of crystal surface per min One hr from the moment of the seeding is required to obtain crystals of 1 mm length For a sugar crystal of an ordinary kind the approx size is $P = 0.35\ L^3$ and $S = 2.1\ L^2$, where $P$ is the wt of the crystal in mg, $S$ its surface in sq mm, and $L$ its length in mm V E BAIKOW

**Influence of bagasse analysis on the sucrose content of the cane.** E HADDON *S African Sugar J* 14, 741(1930).—Previous investigators have shown that prolonged boiling and greater dilu increase the polarization of the bagasse ext This is probably due to the extn of optically active non sucrose substances derived from the hydrolysis of hemicelluloses To prevent this, the extn must be carried out in the presence of $Ba(OH)_2$, alky to phenolphthalein being kept up until the end of the digestion The baryta method applied to bagasse gave results 0.08 to 0.33% lower than the ordinary method F W ZERBAN

**The deterioration of Philippine sugars under varying degrees of humidity.** QUERINO D RENDON *Philippine Agr* 19, 383-96(1930).—Increase of $H_2O$ in cane sugar favors rapid growth of organisms, which causes the sugar to deteriorate and introduces an error in the polarimetric detn of sucrose The max degree of humidity in which sugar will not deteriorate is 66.2% In an atm of 100% relative humidity 36% of the sugar was lost in 4 months A L MEHRING

**Adsorption from sugar solutions. III. Adsorption in the carbon layer with acetic acid.** J VÁCHA AND J VAŠÁTKO *Listy Cukrovar* 49, 171-5(1930).—Activated charcoal which has the slowest filtration time shows the greatest no of small grains and possesses the greatest surface and internal condensation of water vapors With 10 g of charcoal in a 50-cc filter, $H_2O$ at 20°, $p_H = 7.2$, and a head of pressure of 208 g per sq cm, the increasing order of filtration is Supra norit 5x, Supra norit 3x, Carboraffin, Radit, Supra-carboraffin Polycarbon, standard norit. The rate of flow of $H_2O$ through the charcoals varies exponentially with the pressure Changes in temp alter the viscosity of $H_2O$ At higher temps (85°), a rapid flow occurs during the first stage of filtration the process of wetting the surfaces and packing of layers proceeds slowly at higher temps The rate of flow through charcoal decreases with increased viscosity of sugar solns the degree of coloring had no effect upon the rate of flow Adsorption of $CH_3COOH$ occurs very rapidly during the first addns of $CH_3COOH$ Satn was attained when 1 l $CH_3COOH$ (1.818 g per 100 cc) was used per g of charcoal FRANK MARESH

**The results of sampling raw sugar.** JIŘÍ VONDRÁK. *Listy Cukrovar* 49, 175-80 (1930).—A survey of the result of using standard methods of prepg representative samples during the seasons of 1927-30 is reported FRANK MARESH

**The treatment of the after-liquors** G DIEHN *Listy Cukrovar* 49, 181-2(1930).—The dilu water was computed on the basis of non-sugars present in raw sugar juices and added while the digested liquor was being released During the outflow, an analysis was made, and the final dilu was made during the entrance into refrigerators Samples of computations are given FRANK MARESH

**The course of the first saturation III. Reproducibility of the saturation with lime and sugar solutions** J DĚDEK. *Listy Cukrovar* 49, 183-90(1930).—App used in previous expts were not capable of maintaining identical conditions throughout the course of the whole expt the accuracy of the previous observations and conclusions is lowered Further observation of the satn process in plants showed that it is more complicated than lab findings indicated Using a highly refined app with precise controls, D ran over 100 expts with pure sucrose and CaO from marble and observed total alky alky of the filtrate, absorption of $CO_2$ and elec cond Detailed curves are thoroughly discussed Although the curves show great similarity, D was not able to attain an abs reproduction under the refined method used, especially in elec. cond Curves of changes of alky at 20°, 50°, 70°, 90° do not resemble those of elec. cond at the same temp, at higher temps elec cond curves show 2 characteristic transformation maxima In some instances the elec. cond continued to diminish markedly even after abs neutrality had been attained This is due to a delayed hydration of $CO_2$ and changes accompanying the formation of sediment The $CaCO_3$ comes out of soln in a "firm form" more slowly than when it is formed by neutralizing CaO with $CO_2$ in satd. or supersatd solns IV. The union of lime in sediments. K KOBLIHA AND

E Paleček. *Ibid* 190–203.—The suspensions of $CaCO_3$ or $CaC_2O_4$ which form in a sucrose-CaO soln retain some of the free CaO. The concn of CaO in the sediment depends upon the alky of the filtrate, *i e*, upon the actual concn of CaO in soln. This dependence has the form of an adsorption isotherm The removal of CaO from the sediment is very rapid during the first 0 25–0 5 hr, the remainder is not released completely during the next 48 hrs K assumes that the CaO in suspensions is in 2 states (1) CaO which is immediately sol, (2) CaO which becomes sol after the first is dissolved When oxalates were suspended in a CaO-sucrose soln, CaO was removed from soln

F M

How much non-sugar from the water used for diffusion passes into the juice [in beet-sugar factories]? V Staněk and J Vondrák. *Z Zuckerind cechoslovak Rep* 54, 117–21(1929).—The water supplies of some beet-sugar factories are liable, at times, to contain abnormal amts of dissolved solids To ascertain what proportion of the dissolved solids in the water passes into the juice the authors carried out comparative diffusion expts with a lab battery, using distilled water alone and distilled water contg 0 1 and 0 5% of NaCl and urea From the amts of these substances found in the diffusion juices it is concluded that about 1/3 of the dissolved matter in the water passes into the juice If this is not removed by carbonatation, it must lower the purity of the final juice and increase the amt of molasses obtained The extra molasses due to 0 1% of mineral salts or 0 1% of org non sugar in the original water may amount to 0 25% of the wt of beets in the former case or 0 12% in the latter B C A

The influence of invert sugar upon the removal of amino acids from sugar solutions during saturation. Václav Kons *Listy Cukrovar* 49, 190–5(1930) The presence of a mixt of glucose and fructose decreased the amino N removed with the sediment. Controls made without the invert sugar but with increasing CaO content also increased the amino N in the sediment Glutamic and aspartic acids, asparagine and leucine were studied The removal of the amino acids depends upon the presence of physically active CaO, *i e*, lime which forms $CaCO_3$ during satn and carries the amino acids into the sediment by adsorption Frank Maresh

The balance of analysis of beet juices. Ferdinand Kryž *Listy Cukrovar.* 49, 195–8(1930).—Pressed juice from beet roots is not identical with the natural beet juice; the pressed juice contains natural beet juice secreted by the cells and admixts of juices from cell walls and interstitial tissues Frank Maresh

Scale from (sugar-house) evaporators. E Saillard *Circ hebd. comité central fabr. sucre* 42, 627(1930); *Chimie & industrie* 24, 1205–6(1930).—Analyses were made of 93 samples of scale after a season's run All contained $CaC_2O_4$ in variable amts., also insol. $SiO_2$ and sometimes Ca silicate, the latter being probably produced in the lime kiln because of excessive heating There is generally 1–2% $CaSO_4$ originating from the limestone or from sulfitation The amt of $CaCO_3$ varies according to the efficiency of the boilers in decompg and pptg. bicarbonates The $Fe_2O_3$ and $Al_2O_3$ content decreases from the 1st effect (40%) to the last effect (about 1%), they originate chiefly from the limestone and coke The points to be watched in order to reduce scaling are: the compn of the limestone, the alky of the juices before boiling, the operation of the boilers and of the evaporators, the concn of the wash liquors and the time of washing.

A Papineau-Couture

The importance of a preliminary purification of the diffusion juice (beet). I B. Mintz and B E Krasil'shchikov *Nauk Zapiski Tzukrovoi Prom* 9, 515–37(1930).—Russian kieselguhr was compared with the best American and German grades and was found very much alike except for the wt. which is 3–4 times higher and the proportion of large particles is much greater The filtration of diffusion juice through asbestos or fibrous material is advisable The amt. of total N in carbonation juices, obtained from diffusion juices previously boiled or treated with 0 5–1 0% of kieselguhr, is 9–12% lower than that in ordinarily treated juices. The color of the juices at high alky is the same, at lower alky (0 02–0 01) the coloration of the preliminary treated juices is considerably lower than the color of juices treated in the usual way. Good clarification of the juice is obtained by preliminary sulfitation to a $p_H$ of 4 0 at a temp. of 20–40° followed by neutralization to alky of 0.1 with lime and increasing the temp to 80°, then further filtration and carbonation to an alky. of 0 01–0 02. V. E. B

Hyposulfites, redos, sulfoxylates and oxymethanesulfines. M. Mestre. *Bull. assoc chim. sucr dist* 47, 388–93(1930).—Based on his experience with hyposulfites, M. concludes that the Teatini process is sound as is indicated by the ultramicroscopic study of the colloids The chemistry and application of sulfoxylates and hyposulfites are briefly reviewed. Oxymethanesulfine is entirely different from the others and is not used in the sugar industry.

F. Camps-Campins

Return of greens and molasses into diffusion battery. I. B MINTZ, G S BENIN, A K KARTASHOV AND B E KRASIL'SHCHIKOV *Nauk Zapiski Tzukrovoi Prom* 9, 399–431(1930) —Expts on returning greens and molasses to diffusion juice continuously or intermittently proved unsuccessful The total losses increased from 2 61 to 3 31% The yield of final molasses increased and more fuel was used The purity of the juices and sirups decreased The expts were run in different beet sugar factories with practically the same results V E BAIKOW

The investigation of the incrustation from the juice heater. I O TREFIL'EV AND S A KOSTRO *Nauk Zapiski Tzukrovoi Prom* 9, 432–43(1930) V E B

Investigation of the conditions for increasing the velocity of crystallization in "sugar loaves." M I NAKHMANOVICH AND I F ZELIKMAN *Nauk Zapiski Tzukrovoi Prom* 9, 450–92(1930) —A no of expts in different refineries in Russia showed that velocity of crystn in sugar loaves greatly increases with a sharp decrease of the temp The most convenient temp in the cooling rooms is +5°–+10° In summer the low temp can be maintained with the aid of ventilating fans The increased rate of the cooling does not affect the quality of the refined sugar The hardness and the color of the latter remain practically the same as during the cooling of the sugar loaves at the higher temps The bleaching of the sugar is normal A no of tables and diagrams are included V E BAIKOW

Boiling of a refinery massecuite with low-pressure steam. I F ZELIKMAN *Nauk Zapiski Tzukrovoi Prom* 9, 506–14(1930) —The excess of low pressure (1–2 atm) steam was used for boiling refinery massecuite The increase in the time of boiling caused a slight increase in reducing sugars and coloring matters These difficulties can be overcome by using a vacuum pan with a larger heating surface V E. BAIKOW

The bleaching effect of washing the massecuite of the second skip. V V. CHESNOKOVICH *Zhur Sakharnoi Prom* 4, 305–8(1930) —The following expts were made to det the increase in yield and quality of white sugars resulting from the second skip The massecuite was washed (*A*) with greens of 30° Bé., (*B*) with hot final molasses, and (*C*) with a measured quantity of molasses at 90–95° (3 4–5 0% on the wt of massecuite) followed by warm water (1 8–2 0% on the wt. of massecuite) In (*A*) the yield of yellow sugar decreased 9 5% with purity increase of 0 9%, while color decreased 47 9% and the time of centrifuging decreased 19 2% In (*B*) the yield of the yellow sugar decreased 1 5% with a purity increase of 0 9%, and the color decreased 23 1% Purity of the molasses increased 0 5% and centrifugal time decreased 10% In (*C*) the yield of the yellow sugar decreased 9 2%, while its purity increased 3 7%, color decreased 83 7% and the centrifugal time decreased 25% Obviously method *C* is the most advantageous V F BAIKOW

Cane sirup manufacture J O CARRERO *Porto Agr Expt Sta* 1929, *Rept* 13–4 (1930) —A light-colored sirup of full, agreeable flavor was manufd from sugar cane The juice was readily clarified with $H_3PO_4$ and CaO but considerable sediment was formed during storage The use of CaO always darkened the sirup By restoring the cane juice to its original acidity after clarification, a better color was obtained C R FELLERS

The beet crop in Czechoslovakia for 1930. JAROSLAV SOUČEK. *Listy Cukrovar* 49, 207–12(1930) —The sugar crop was above normal, the sugar content was normal, the total yield is estimated at $62\ 7 \times 10^6$ q of beets and $11\ 1 \times 10^6$ q of sugar FRANK MARPSH

A study of the biology of the beet-nematode, Heterodera Schachtii Schm. M SINITZKII *Nauk Zapiski Tzukrovoi Prom* 9, 538–44(1930) V E B

The physical and chemical properties of kaoliang starch I. The adsorption of iodine and chlorine by kaoliang starch. SHOJI KIKI *Abstract from Rept Central Lab S Manchuria Railway Co* 1929, 24–6 —The absorption of I and Cl is represented by the Freundlich equation $x = kc^n$, in which $x$ is the quantity adsorbed and $c$ is the concn of the Cl or I soln A break in the curve of log $c$ *vs* log $x$ probably represents a change in surface tension due to swelling of the starch granule V F HARRINGTON

Polarimetric determination of starch in potatoes and the relation between potato-dry substance and starch content. CARL VON SCHÉELE *Medd Kel Lantbruksstyrelsen* 1930, No 283, 5–14 —Behrend, Maercker and Morgen (*Landw Vers Sta* 25, 1880) detd the relation between the sp gr of potatoes and the starch content, and prepd a table, which has not been used widely, and which contains errors The relation between potato dry substance and starch content was found to be practically const at 5 75 The accuracy of the starch detn was ±2%, attributed to air spaces For starch detn 3 g of air-dried, finely ground potato heated with 50 cc of $H_2O$ for

marinu Albatorekitra (Majunga) Tanning tests carried out on demineralized calfskin were quite satisfactory, showing that the bark approaches quebracho for tanning purposes, except that it gives somewhat too bright a reddish brown tinge to the leather The bark would be suitable for the local production of dry exts., or for exportation for the production of liquid exts. A Papineau Couture

**Tanning materials of New Zealand.** P. White. *Bull. Imp Inst.* 28, 450-3 (1930).—Tanekaha (*Phyllocladus trichomanoides*) bark was found to contain 17% tannins and 9.2% nontannins, as compared with 23-8% tannins reported by an earlier investigator probably because the later sample was from younger trees. Kamahi (*Weinmannia racemosa*) bark from a 12 in. diam. tree, an 18 in. tree and a very old tree contained tannins 14.5, 22.2, 30.0 nontannins 5.9, 5.9, 6.4%, resp. Tutu (*Coriaria ruscifolia*) has a very thin bark, which would not pay for stripping, the combined wood and bark of a 1 year old shrub and of a 10-year old shrub had tannins 2.7, 3.1 nontannins 10.3, 8.3%. Samples of com. black wattle (*Acacia mollissima*) bark grown in New Zealand contained 37–40% tannins and 9–11% nontannins; silver wattle (*A. dealbata*) bark contained 12.2–22.1% tannins and 9.5–12.1% nontannins, bark of a hybrid between black and silver wattle, which is immune to frosts and fungus disease contained 25.8% tannins and 11.3% nontannins. Bark from 7-, 16- and 26-year old trees of *A. decurrens* var. *normalis* contained tannin 18.9, 28.4, 36.6, nontannins 13.1, 11.2, 10.8%, resp. Other species of acacia had the following tannin and nontannin contents: *A. melanoxylon* (Rotorua) 15.2, 9.9; *A. longifolia* 12.4, 8.0; *A. prominens* 23.4, 12.3; *A. Baileyana* 17.7, 10.1; *A. lunata* 22.4, 12.7; *A. decurrens* var. *Lechardii* (New Plymouth) 33.3, 7.3; *A. pennineruis* (New Plymouth) 28.2, 7.3%. Most of these samples were taken from comparatively old trees, viz., 20 yrs. Two samples of fungus galls (1 year old and much older) contained tannin 13.4, 28.3, nontannins 22.8, 9.2%, resp. The water ext. of the older galls was of a deep red color and had a $p_H$ of 5.8, on adjusting the latter to 4.8 the color was reduced nearly to that of a normal black wattle soln. of similar strength. All results are given on a 10% water basis. A Papineau Couture

**Skin glues and bone glues.** H. Maier Bode. *Kunstdünger- u. Leim-Ind.* 26, 327–9, 339–41, 351–4(1929).—It is confirmed that the viscosity of fresh glue liquor is smaller than that of a sol of equal concn. prepd. from the solid material, it is considered that, on drying, reaggregation of the glutin takes place. Skin glues and bone glues are conveniently tested by detg. the viscosity of a 17.75 or 20% soln. at 30° and 40°. A modification of Ostwald and Köhler's (*C. A.* 22, 2865) test differentiates skin glue from bone glue. B. C. A.

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The condensation of catechol tannin (Bergmann, Pojarlieff) 10.

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**Bleaching leather, skins, furs, etc.** André Cornillot. Fr. 692,981, July 6, 1929. Leather, skins, furs, etc., are bleached in a bath contg. peracetic acid prepd., *e. g.*, by the action of $H_2O_2$ on $Ac_2O$. Salts such as phosphates, borates, alkali salts of org. acids or a base such as $NH_3$ are preferably present.

**Greasing leather.** Hermann Bollmann and Bruno Rewald. Ger. 514,399, July 17, 1927. A mixt. of lecithin and fatty oil is used, *e. g.*, equal quantities of lecithin and train oil.

**Leather substitutes.** Soc. Fleury et Lavanant. Fr. 692,988, July 8, 1929. A leather substitute is made by treating unsized paper with strong $H_2SO_4$ charged with HCl, applying the product to cloth and neutralizing, washing and drying.

**Demineralization of bones.** Gélatines Hasselt et Vilvorde, Soc. anon. Belg. 371,121, July 31, 1930. The bones are treated with aq. $H_3PO_4$. The acid liquor is regenerated by adding it to a bath contg. a sufficient quantity of $H_2SO_4$ so that there will be no excess of liquor until the whole of the $CaSO_4$ has been pptd.

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## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

**The rubber industry in the United States.** L. P. Max. *Rev. gén. caoutchouc* 7, No. 65, 3–6, No. 66, 3–8(1930). C. C. Davis

**A few facts on the study of rubber-bearing plants of the Russian Soviet Republic.** Sergius Ivanov, T. S. Chelzova, S. B. Resnikova, E. I. Trofimova, E. M. Duhne and V. I. Sveshnikova. *Kautschuk* 6, 237–9, 256–8(1930).—The results of an in

vestigation of over 150 plants are described, with analytical data tabulated in detail. The most promising raw material was the rubber of the *Chondrilla*, the "naphivi" of which with suitable improved methods yield considerable rubber C C Davis

The significance of the primary valence chain theory in explaining the structure of rubber. Eugenio Lindmayer *Kautschuk* 6, 249–52(1930), cf *C A* 24, 750.—A review and discussion C C Davis

The plasticizing of rubber. F Jacobs. *Rev gén. caoutchouc* 7, No 67, 19–26 (1930), cf *C A* 25, 1117.—Various wood resins, tars, pine tars and oils are described and discussed, with quant data (already published). C C. Davis

An aging test with kerbosch rubber. R Riebl. *Arch Rubbercultuur* 14, 411–20 (1930)(In briefer form in English 421–4).—Kerbosch rubber and latex sprayed rubber were kept at av temps of 27° and 18° (at places with different climates) to ascertain the influence of different climatic conditions on the aging of both types of whole latex rubber The Kerbosch rubber deteriorated badly at sea level, but nowhere nearly so rapidly at 5000 ft. elevation (cf de Vries, *C A* 18, 2265) The latex-sprayed rubber aged much better than the Kerbosch rubber, and furthermore the aging of the former was not so disproportionately bad at sea level The results in general show the important influence of climate on the aging of rubber of the Kerbosch type C C D

Manufactured rubber, its keeping qualities and reconditioning. P Bruère *Arch méd pharm militaires* 91, 571(1929), *J. pharm Alsace Lorraine* 57, 219–28 (1930) cf *C A* 24, 3397. S Waldbott

The Kelly abrasion machine. A. F Hardman, W. L Mackinnon and S M Jones *Rubber Age* (N Y) 28, 463–5(1931).—The new machine, which is described and illustrated, is designed to simulate the road wear of tires, with special attention to 3 factors: (1) increasing and diminishing pressure of contact of the rubber with the abrasive material, (2) application of only part of the surface to the abrasive material and (3) a side slip as the rubber leaves the abrasive surface. With this method, actual road wear can be foretold reliably C C Davis

Modern methods of cycle tire vulcanization. A. Frölich *Gummi-Ztg* 45, 543 (1930), *India Rubber J.* 81, 154–7(1931).—An illustrated description C C. Davis

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The influence of S dusting on rubber production (Ament) 15. Rubberized cloth (Fr. pat. 693,890) 25. Rubberized conveyor belts (Brit pat 335,475) 1. $SeS_2$ [for vulcanization] (Fr. pat 692,758) 18.

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Van Harpen, N H. **The Electrometric Determination of the Hydrogen-Ion Concentration in the Latex of Hevea Brasiliensis and Its Applicability to Technical Problems.** Medan (Java) Varekamp en Co 459 pp Reviewed in *Chimie & industrie* 25, 266(1931).

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Rubber articles from latex. Soc. Italiana Pirelli. Brit. 335,621, June 27, 1929 In a process generally similar to that described in Brit 292,964 (*C A*. 23, 1527), in which latex with a small proportion of certain added coagulants is subjected to local heating to produce coagulation, normal latex is heated to a moderate temp (suitably 40–60°) and cooled prior to the introduction of the coagulants. Various details of procedure are given.

Rubber. I. G. Farbenind A.-G (Curt Meisenburg, inventor) Ger 511,540, Nov. 13, 1925 Liquid polymerized substances are removed from rubber like condensation products (*e. g.*, from butadiene) by treatment with powd absorbents such as active C, active $SiO_2$, etc.

Rubber, etc., dispersions. The Dunlop Rubber Co., Ltd., and The Anode Rubber Co., Ltd Fr 692,532, Mar 21, 1930 In the manuf of articles from org dispersions of rubber, gutta percha, balata or like vegetable resins, the surface of the molds or formers is covered with a film of dehydrating and coagulating liquid before immersion in the dispersions Thus, the molds may be inserted in a concd soln of $AcONH_4$, NaCl or $NH_4Cl$, to which an acid or a mixt. of acids may be added

Rubber dispersions. Naugatuck Chemical Co. Brit. 335,597, June 20, 1929 Rubber dispersions are prepd as water-in-oil emulsions by emulsifying water in oil with suitable emulsifying agents and adding rubber before, after or during the emulsification, with subsequent mixing to effect dispersion The products can be used in substantially the same manner as rubber-solvent doughs are used in making spread or coated fabrics Numerous details and examples of procedure are given Cf *C A*. 24, 751

Preservation of rubber. Waldo L. Semon (to The B. F. Goodrich Co.). Can

308 541, Feb 10, 1931 Rubber is preserved by treating with the resinous condensation product of $p$-$C_6H_4(NHPh)_2$ with $CH_2O$ Cf *C A* 24, 2329

**Rubber treatment to increase resistance to deterioration from age.** Wm S. Calcott and Wm A Douglass (to E I du Pont de Nemours & Co) U. S. 1,790,794, Feb 3 Rubber compns are treated, before vulcanization, with (as anti-aging addns.) 3 hydroxy-3 methoxybenzylaniline (suitably 1–5%) or various other substances which may be obtained by the reaction of an aromatic primary amine with formaldehyde and a phenolic compd., as described in German patent 109,498 The resulting products are mixts contg in each instance as the major constituent, a hydroxybenzyl aryl amine having the general formula R—NH—$CH_2$—R'—OH, in which R represents an aryl group which may or may not contain alkyl substituents and R' represents an aryl group which may or may not contain alkyl and alkoxy substituents Various examples and details of procedure are given

**Antioxidant for rubber.** Paul C. Jones (to The B F Goodrich Co) Can 308 542, Feb 10, 1931 Rubber is preserved by incorporating with it tetraphenyl hydrazine before vulcanization.

**Rubber stock treatment.** Henry L. Moran U S 1,790 875, Feb 3 Rubber stock is passed through a receptacle contg water heated to about its b p, to soften the rubber without cure or vulcanization App is described

**Apparatus for forming and calendering rubber or rubberized fabrics or strips.** Dunlop Rubber Co., Ltd., and H Willshaw Brit 335 657, July 10, 1929 Mech features and details of app are described.

**Sponge rubber.** Reginald J Noar Ger 515,340, May 26, 1928. See Brit 284,938 (*C A* 22, 4877)

**Ornamenting rubber articles.** Liverpool Rubber Co., Ltd., and G Thorne Brit 335,612, June 28, 1929 Articles produced directly on a former from aq dispersions of rubber gutta percha, balata or the like, are ornamented by dipping them while still on the former into water on the surface of which are floated streams of suitable colored solns such as rubber solns contg pigments such as CdS or vermillion

**Regenerating rubber.** Louis Beaudoin Fr 692,982, July 6, 1929 Waste rubber of all kinds is regenerated by heating it rapidly to 250–280° until the mass becomes bright, this change corresponds to the max devulcanization which it is possible to obtain An app is described

**Substances resembling hard rubber.** I G Farbenind A G Fr 692,606, Mar 24, 1930 Substances resembling hard rubber are obtained by vulcanizing products obtained by the polymerization of erythrene Examples are given

**Porous ebonite articles.** Meyer Wilderman (to American Wilderman Porous Ebonite Co) U S 1,791 437 Feb 3 In forming porous articles such as diaphragms, the surface portions are formed of initially uncured ebonite occupying such volume that adjacent particles are in contact but are not compacted into a nonporous solid mass the coatings of the particles being united by vulcanization between themselves and with the enclosed ebonite particles

**Synthetic rubber** I G Farbenind A-G Fr 691,662, Mar 10, 1930 A product resembling rubber is obtained by polymerizing 1,3 butadiene, a small quantity of water being added during the reaction The water added may be in the form of water of crystn in salts, *e g*, $Na_2CO_3$ $10H_2O$ or $MgCl_2$ $6H_2O$ Cf *C A* 24, 6065

**Synthetic rubber.** I G Farbenind A-G Brit. 335,616, June 29, 1929 Mixed rubber like masses are produced by partially polymerizing a diolefin as described in Brit 307 308 (*C A* 23, 5352), adding a different diolefin (such as 2,3-dimethylbutadiene if butadiene or isoprene is used as the initial material), and then further polymerizing Various details and examples are given Cf *C A* 25, 1120

**Synthetic rubber compositions for tires.** I G Farbenind A-G Brit 334,958, June 15, 1929 Butadiene polymers used for tire manuf as described in Brit 299 037 (*C A* 23, 3376) are replaced by a mixt. of these polymers with a natural or artificial resin Various details and examples are given

**Artificial rubber.** I G Farbenind A G (Helmuth Meis, Wilhelm Klein and Eduard Tschunker, inventors) Ger 515,143, July 21, 1927 Butadiene hydrocarbons in aq emulsion, are polymerized by addn of a small quantity of a finely divided or colloidal heavy metal oxide which does not yield $H_2O_2$ when treated with acids $MnO_2$ and $PbO_2$ are suitable oxides Protective colloids may be included in the emulsions, and the oxide may be formed *in situ* Examples are given

**Vulcanizing rubber.** Imperial Chemical Industries, Ltd Fr 693,178, April 2, 1930 Rubber and like substances and vulcanizable oils are vulcanized in the presence of an *N, N* dithio deriv of a secondary amine such as *N, N*-dithiopiperidine.

# CHEMICAL ABSTRACTS

Vol. 25. APRIL 20, 1931 No. 8

## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A device for determining work input to a laboratory ball mill. JOHN GROSS AND STUART R ZIMMERLEY Bur Mines, *Repl of Investigations* 3056, 3 pp (1931). ALDEN H EMERY

A satisfactory laboratory cement. V. T. JACKSON. *Chemist Analyst* 20, No 2, 23 (1931) —Directions are given for making cements from asphalt, rosin, rubber and turpentine, such cements are used for *making gas tight joints in apparatus* W T H

The shape of clamps. WILHELM VOLKMANN *Chem Fabrik* 1931, 62–3, *cf C A.* 23, 733 —The geometry of lab clamps is discussed as a possible basis for standardization. J H MOORE

Modification of the Seitz 20-ml. filter. N W LARKUM. *Am J Pub Health* 21, 193–4(1931), cf *C A* 23, 3601 —Wider and thicker flanges make possible the application of much more pressure, which is necessary to assure an adequate seal in order to prevent air leakage with its consequent contamination of the filtrate J A KENNEDY

Filters for the reproduction of sunlight and daylight and the determination of color temperature. RAYMOND DAVIS AND K. S. GIBSON Bur. Standards, *Miscellaneous Pub* No 114, 165 pp (1931). E. H.

Mechanical stirrer. IRWIN STONE *Chemist Analyst* 20, No 2, 18–9(1931) —Directions are given for making a stirrer; an old elec. motor or converted fan is used as power. W. T. H.

A generally applicable shaking apparatus. P. DICKENS. *Chem. Fabrik* 1931, 61–2, cf *C A* 22, 3554, 23, 4905 —Two motor-driven shakers are described, one for use with ordinary glass app, the other for connected app for carrying out reactions with air exclusion J H MOORE

A flask, divided in the middle, for evaporating and drying in a vacuum, boiling with reflux, and extracting. ARNOLD LUBINSKI *Chem Fabrik* 1931, 78 J. H. MOORE

Improvised drying oven. GEO W CORRIE. *Chemist Analyst* 20, No. 2, 16 (1931) —For drying a no of bulky objects at 50° it was found possible to make use of a small oven placed in the hood with a baffle plate in front of it A cut of the arrangement is shown W. T. H.

Water baths. LESTER MEYER. *Chemist Analyst* 20, No 2, 16(1931) —An arrangement for keeping the level const. in the bath is shown. W. T. H.

Hot water as a means of attaining higher temperatures. BATTIGE. *Apparatebau* 42, 217–19(1930) —An air-heating system for use in drying rooms is described. Pipe bank "boiler" and heating coils M C ROGERS

Method for preventing an exhaust tube from shutting off on a water-cooled condenser. RUSSELL P EASTON *Chemist Analyst* 20, No 2, 21(1931) —By using a test-tube clamp on the upper outlet of a condenser mantle, collapse of the rubber tubing, which would impede the flow of the water, is prevented W T H

A practical viscometer. H R. HAMMOND *Chemist Analyst* 20, No 2, 21–2 (1931) —An improvised viscometer is shown which can be made at low cost. W. T. H.

An adjustable picnometer float. FERDINAND AMBRUST. *Chemist Analyst* 20, No 2, 22–3(1931) —*In detg d by* the picnometer method it is necessary to support the app in a const.-temp bath so that it remains immersed to the proper depth A floating support is shown which accomplishes this W T H.

Paraffining reagent bottles for alkaline solutions. WALTER B. DYE. *Chemist Analyst* 20, No 2, 18(1931) —Directions are given for lining a bottle with paraffin so that standard alkali soln can be kept without deterioration as a result of action upon the glass W. T. H

A modified Victor Meyer apparatus for the determination of molecular weights. EUGENE W BLANK. *J. Chem Education* 8, 546–7(1931) —An easily constructed app

is described which is accurate enough to give a mol wt of 76.5 for $C_6H_6$ when only *about 0.02 g. is used* J. H. Moore

Apparatus for melting-point determinations. M. Speter. *Chem.-Ztg.* 54, 564 (1930).—The app consists of a glass tube in the shape of a parallelogram with 2 sides vertical, contg $H_2SO_4$ acid or other suitable fluid. Near the upper end of the upper non vertical side is fused in a vertical tube of suitable size, into which the thermometer and m. p. tubes are placed so that their lower ends dip well into the circulating fluid, heat being applied at the diagonally opposite point. A sep. tube of suitable length, closed at the upper end, serves as a cap to cover the thermometer, etc. B. C. A.

Apparatus for determining the fusion curves of low-boiling substances. Schmolke *Die Wärme* 54, 97–8(1931).—App. designed by Simon, *et al.* (*C. A.* 23, 2640) for the detn. of the fusion curves of H, N, A and Ne is described. With the aid of this equipment and method, results were obtained with pressures in excess of 10,000 atm. Cf. *C. A.* 23, 5070 and also *C. A.* 24, 1559, 3411. Allen S. Smith

*Introduction of small, accurately weighed quantities of gas into evacuated receptacles.* Carroll W. Griffin. *Chemist Analyst* 20, No. 2, 20–1(1931).—The method and app. appear to be based upon that described by Pease (*C. A.* 17, 2220). W. T. H.

A broad source of monochromatic light. M. J. Buerger and V. F. Harrington. *Am. Mineral.* 15, 579–80(1930); cf. *C. A.* 24, 1548.—A description is given of a remodelled Terrill burner equipped with a Pt gauze trough for holding the salt used to color the flame. A. M. Brant

A new photoelectric photometer. B. Lange. *Naturwissenschaften* 18, 917 (1930).—A priority claim (cf. Teichmann *C. A.* 25, 847). B. J. C. van der Hoeven

*A recording dust-concentration meter and its application to the blast furnace.* A. W. Simon, L. C. Kron, C. H. Watson and H. Raymond. *Rev. Sci. Instruments* 2, 67–83(1931).—The relation $\log (L_0/L) = klm$, in which $L_0$ and $L$ are, resp., the intensities of the incident and the emergent light, $k$ is a const. characteristic of each dust, $l$ is the distance traversed by the beam in the dust laden gas, and $m$ is the mass of dust per unit vol., was theoretically deduced to connect the transmission of light and the concn. of a suspended material in a gas. To test the law, 2 sets of expts. were made. In one the concn. of suspended particles was kept const., while the distance through which the light beam passed was varied, in the other distance was kept const. and the concn. varied. *While the derivation of the law was based on opaque material suspended* in the gas where the grain size was large compared to the wave length of the radiation used, the tests showed that it also holds for white oil smoke. The app. consisted of an optical system, dust chamber, means for varying the length of beam and the concn., and a light-sensitive receiver. By fixing the length of path, the app. was adapted to installation in a blast furnace gas main. As a receiver, the thermopile was found to be superior to a photoelec. cell. The app. can be calibrated by comparison or by selecting an arbitrary unit of concn. Charts obtained under operating conditions show the use of the instrument adapted for recording instantaneous dust concns. A. S. S.

*Fractionating head.* H. Mainz. *Chem.-Ztg.* 54, 422(1930).—*The app. comprises a* long wide tube with a side tube at the upper end for withdrawing the distillate, the whole being enclosed in a glass air jacket which serves to prevent temp. variations. The head is particularly useful for fractionating the carbolic oil fraction from tar distn. B. C. A.

An inexpensive crystal or molasses separator. R. H. King. *Ind. Eng. Chem.* 23, 300(1931).—A filter made from pipe fittings for the sepn. of solids from viscous liquids is described. L. W. T. Cummings

Determination of the local strength of fabrics, felts, paper, rubber, films, wood, *leather, metals, etc.* L. Friedrich Schubert. *Chem.-Ztg.* 55, 113–4(1931).—*The* app. referred to in *C. A.* 23, 1187, 4103 has demonstrated its usefulness. It is described and its use and results are discussed. J. H. Moore

A design of experimental vacuum oven for temperatures less than 300°. G. Frederick Smith and V. R. Hardy. *J. Chem. Education* 8, 548–55(1931).—A small *tube oven, const. to ±3° made of standard pipe and fittings, and heated by standard* space heaters, is described in detail. J. H. Moore

The regulation of temperatures in industrial furnaces. V. Paschkis. *Forschung Gebiete Ingenieurw.*, Ausgabe A, 2, 29–40, 57–64(1931).—The regulation of temp. difference depends upon the duration of the regulation period as well as upon the furnace and the regulator. The characteristics and sensitivity of the temp. regulation are discussed and exhibited in graphical form. F. D. Rossini

The hydromechanical viewpoint in the construction of furnaces and boilers. F. Michel. *Feuerungstech.* 19, 233–9(1930).—Designers of boilers and furnaces have

not learned to apply modern discoveries in the field of fluid flow. Proper attention to these principles should make possible better utilization of the available combustion vol., reduction in friction losses and an improvement in heat transfer E. W. T.

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Filter. Deutsche Luftfilter-Baugesellschaft m. b. H. Ger 513,573, April 1, 1923 Details of a multistage gas, vapor and liquid filter are given.

Ultrafilter. Staatliche Porzellan-Manufaktur. Ger. 513,861, June 12, 1928. The filter consists of balloon like cells of oval cross section, made of porous ceramic material The cells are placed in a soln and an elec. tension applied to the soln. via the filter cells

Filter for liquids, with a number of filter elements supported in a rotatable frame. Chem Fab Grünau Landshoff & Meyer A G (Walter Kirchner, inventor). Ger. 516,459, Aug 15, 1926

Edge filters for liquids. Svenska Ackumulator Aktiebolaget Jungner. Brit. 336,122, Oct. 30, 1928 Structural features.

Apparatus for separating sediment, scum and gases from liquids. Osbert Dunsch. Ger 516,439, June 30, 1928.

Air filter. I L Bramwell, C. W H Holmes and Birtley Iron Co., Ltd Brit. 335,922, March 26, 1929. Various features of a bag filter construction are described.

Filters for air or other gases. Edward L. Joseph. Fr 694,024, April 16, 1930

Centrifugal apparatus for separating suspended solids from gases. Pneumatic Conveyance & Extraction (1929), Ltd., and W A Smith Brit. 336,620, June 17, 1929 Structural features.

Device for removing dust from air by centrifugal separation and straining. Clyde C. Manchester (to Tillotson Mfg Co) U S 1,791,732, Feb 10 Structural features.

Device for removing dust from air in compressed-air lines. Richard M. Fox and Harvey E Smith (to Aerometric Valve Corp). U S. 1,791,668, Feb 10 Structural features.

Apparatus (with an oil- or water-moistened rotating disk) for removing dust from air. P. E. Egenfeldt-Olsen. Brit. 335,992, July 6, 1929. Structural features

Filter presses. Soc. anon. pour l'ind. chim à Bâle. Fr. 694,717, April 29, 1930. A filter press is constructed with a heating element freely suspended inside the filtration chamber

Fibers extracted from the coverings of coconuts by hot water for use as filters. Ludwig Thomas and Egon Elöd. Ger 513,765, Jan 15, 1928

Thermometer. Z Matsumoto Brit. 335,825, Nov 29, 1929.

Thermometer of the variable electric-resistance and galvanometer type (suitable for use on internal-combustion engines). Safe-T-Stat Co. Brit. 336,683, July 23, 1929. Structural and elec. features.

Temperature-indicating devices of fusible character for apparatus such as superheating or oil-cracking apparatus. Charles W Gordon. (to Superheater Co) U. S. 1,792,086, Feb 10 Structural features.

Accelerator for temperature-control devices such as those of hot water-supply systems. John M. Larson (to National Regulator Co). U. S. 1,792,230, Feb 10. Structural features.

Radiation pyrometer. Kaiser-Wilhelm Institut für Eisenforschung. Brit. 336,296, Oct. 31, 1928. Structural and optical features.

Photometer for testing illumination of rooms, etc. Holophane, Ltd., and H. S. Allpress. Brit. 336,897, Jan 20, 1930 Structural and optical features.

Viscometer. The Automatic Appliance Co. Fr. 694,376, April 24, 1930.

Calibrated viscometer. Richard von Dallwitz-Wegner. Ger. 516,410, Mar. 17, 1926. Addn. to 515,259 (*C. A* 25, 1415).

Röntgen-ray apparatus. Siemens-Reiniger-Veifa Ges. für Medizinische Technik Brit. 337,247, Jan. 4, 1929. Structural features.

Röntgen-ray apparatus. Victor X-Ray Corp. and British Thomson-Houston Co., Ltd. Brit. 336,804, April 30, 1929. Structural features.

Röntgen-ray apparatus. Victor X-Ray Corp. and British Thomson-Houston Co., Ltd. Brit. 336,953, July 18, 1929. Structural features of an app. adapted for stereoscopic work.

Röntgen-ray tube. C H. F. Müller A.-G. Brit. 336,726, Aug. 27, 1929.

Vacuum tubes. E. Y. Robinson and Associated Electrical Industries, Ltd. Brit. 336,710, Aug 14, 1929 In applying insulating coatings to the heater wire of indirectly-heated thermionic cathodes by extrusion, as in the process of Brit. 320,866 (*C. A* 24, 2336), the wire is first drawn through a plastic sludge of the insulating sub-

stance and a vehicle or agglutinant, and is then passed through a die before the coating is baked App is described

**Photoelectric cell.** S Ruben (to Arcturus Radio Tube Co) Brit. 336,397, Jan. 11 1929 An electrode surface of etched $Cu_2O$ is prepd by heating a Cu electrode in an oxidizing atm at 1000° and immersing it in a soln of $NH_4Cl$ or $ZnCl_2$ to produce a rough cryst surface The electrode is embedded in beeswax and resin in a cell and exposed in an electrolyte such as $NH_4Cl$ Cf *C A* 24, 2330

**Photoelectric cell.** August Karolus and Fritz Schröter (to Ges für Drahtlose Telegraphie m b H) U S 1,791,928, Feb 10 Ne or He may be used as a filling

**Photoelectric cell** Soc des usines chimiques Rhône-Poulenc Brit. 336,574, July 12, 1929 Various details are described of a gas filled cell which may have a cathode of a layer of K and an anode and auxiliary electrode in the form of straight parallel wires The auxiliary electrode is near the anode and is maintained at a fixed potential much lower than that of the anode, so that it acts as a non photoelec cathode when the potential applied to the anode nearly reaches the luminous discharge potential Cf. *C A* 25, 238

**Electric discharge device.** N -V. Philips' Gloeilampenfabrieken Brit. 336,563, July 8 1929 App for rectifying a c comprises a gas discharge tube in which are located, in sep chambers, an incandescent cathode (preferably an oxide cathode) and one or more anodes (such as graphite) Vaporized Hg may be condensed in the anode chamber Various details of construction and operation are described Cf *C A* 25, 851

**Electric discharge tubes for emitting ultra-violet rays, etc.** N -V. Philips' Gloeilampenfabrieken Brit 336,222, July 5, 1929 For preventing impairment of the transparency of the tube walls to the rays generated, when the discharge is carried wholly or partly by a substance such as Mg which is likely to cause obscuration of the tube the part of the tube wall intended for the passage of rays is coated with a substance (suitably KCl or KI in the case of Mg) which either prevents deposition or renders the deposit formed transparent to the rays desired $CaF_2$ may be used as a coating for the interior of a Hg vapor lamp K fluoborate also is suitable for use with tubes contg Mg When the tube contains Na vapor, the wall may be coated with S or P Various details are described

**Metallic-vapor luminous discharge tubes.** Patent-Treuhand Ges für elektrische Glühlampen (to General Elec Co, Ltd) Brit 336,490, July 13, 1929 In a lamp with a filling comprising vapor of Na, K, Hg, Li, Cs or Zn, with a rare gas or a gas such as N to facilitate starting, condensation of vapor in the electrode chambers is prevented by encircling the part of the tube remote from the electrodes with laminated or ribbed metal rings to promote cooling Oxide electrodes may be used, heated by a filament Various details of construction are described

**Cathodes for electric discharge tubes.** Vereinigte Glühlampen- und Elektrizitäts- A G Austrian 120,121, June 15, 1930 Cathodes of elec discharge tubes made wholly or partly of glass are oxidized *in situ* by electrolyzing the glass so as to liberate O within the tube The glass is locally heated, and the low pressure gas filling of the tube is rendered conductive by maintaining a discharge in the tube The cathode for the electrolysis is electrically connected outside the tube to the heated part of the glass, and the anode or cathode of the tube serves as the electrolytic anode By interchanging the electrolytic anode and cathode, alkali or alk earth metals may also be introduced into the tube Cf *C A*. 25, 1125

**Catalytic hydrogenation apparatus.** Technical Research Works, Ltd., and E J Lush Brit 336,569, July 11, 1929 In app having a Ni catalyst in the form of wire, turnings, or the like, packed in cages, the catalytic elements are constructed so that their thickness does not exceed 6 in., so that anodic oxidation may be thoroughly effected, an internal and an external cathode are used during the anodic oxidation process Various details of construction and treatment are described

**Filler material for absorption towers.** C. H. Butcher Brit. 335,889, June 28, 1929 Hollow cylinders are used which after manuf have had their sharp rough edges removed as by grinding, or tubes are used which are die pressed so that they are free from sharp edges

**"Molecular pump."** P R. Grote Brit. 336,001, July 9, 1929

**Mechanical-stage construction for microscopes.** C Beck and C J Beck. Brit 336,064, Sept. 4, 1929

**Fine-focusing construction for microscopes.** C. Beck and C J Beck Brit 336,063, Sept 4, 1929.

Air-treatment, humidifying and dehumidifying apparatus. THOMAS CHESTER U. S. 1,791,751, Feb 10 Structural features.

Apparatus (with a perforated inclined plate) for pneumatic separation of solids of different densities. R H KIRKUP Brit 336,055, Aug 29, 1929 Structural features

Continuous process for sterilizing milk or other liquids under pressure. N. J. NIELSEN Brit 337,027, June 27, 1929 Various details of app and procedure are described

Vacuum tank and heated tube system for condensing milk or other liquid products. N. J NIELSEN Brit 335,964, June 5, 1929 Structural features and details of operation are described

Apparatus for pasteurizing milk or other liquids by the "Holding Process." RICHARD SELIGMAN (to Aluminium Plant & Vessel Co, Ltd) U S 1,792,328, Feb 10 Structural features.

Apparatus for pasteurizing liquids in closed vessels. WILLY RÖTRICH Ger 513,522, Nov 11, 1927. Details are given.

Apparatus for producing a foam-like mass from slag suitable for casting porous articles. NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI Brit. 335,875, Feb 27, 1929 Structural features of an app with a horizontal or inclined container with stirrers, etc.

Apparatus and electrical system for magnetic tests of physical characteristics of iron or steel rods, etc. C KINSLEY Brit 336,987, June 19, 1929

Apparatus for continuous reactions between liquids under pressure. IMPERIAL CHEMICAL INDUSTRIES, LTD, and K H SAUNDERS Brit 336,136, Nov 14, 1929 The app for carrying out continuous reactions between liquids under pressure described in Brit 329,260 (*C A* 24, 5188) is constructed of corrosion resisting material in the parts liable to be attacked by the reagents, *e g*, in an app for the manuf of *p* nitroaniline from *p*-chloronitrobenzene and aq $NH_3$ the outer tube may be protected by a mantle of "stainless steel," and the central tube may be formed of the same material Various details of construction and operation of the app are described

Clarifying plant for liquids, particularly for coal and ore industries. PRÉPARATION INDUSTRIELLE DES COMBUSTIBLES. Ger 516,454, Feb 26, 1928.

Apparatus for determining specific gravity of solids or liquids. W. & T. AVERY, LTD, and W. A. BENTON Brit. 336,043, Aug 14, 1929 Numerous structural details are described

Sterilizing apparatus for liquids, with heated filter. CARFUER G M B H and OSWALD PONTIUS. Ger 516,007, Aug 19, 1927

Steam sterilizer. F & M. LAUTENSCHLÄGER G M B H Ger. 516,008, May 23, 1928.

Mixing and emulsifying apparatus. VICTOR A COLLINS Ger 516,443, Oct. 3, 1929 See Brit. 323,534 (*C A*. 24, 2920)

Apparatus for extracting gases from liquids such as oils. SOCIETÀ ITALIANA PIRELLI Fr 693,985, April 15, 1930

Apparatus for separating gaseous mixtures by liquefaction and rectification. SOCIÉTÉ L'AIR LIQUIDE (SOC ANON POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE) Fr 694,035, Apr 16, 1930

Apparatus for washing gases with atomized liquids. G. RAW. Brit. 336,221, July 4, 1929 Various details of construction and operation are described of apparatus suitable for removing dust from air or other gases

Air liquefaction system. M HAZARD-FLAMAND Brit 336,798, Oct. 18, 1928. Various details of app and procedure are described

Apparatus for storing liquefied gases. CHRISTIAN W. P. HEYLANDT. Fr 694,010, April 16, 1930.

Gas washers. PNEUMATIC CONVEYANCE U EXTRACTION (1929), LTD Ger. 513,527, Nov 15, 1928. Addn. to 508,571 (*C A* 25, 622) Further details of a partitioned air, etc, purifier are given.

Apparatus for drying gases with sulfuric acid. RENÉ HAVOT. Fr 694,038, April 16, 1930.

Wet and dry bulb apparatus for determining humidity of gases. CAMBRIDGE INSTRUMENT CO, LTD, J. L. ORCHARD and H T. GLOVER Brit 336,855, Dec 2, 1929 Various details are described of app employing elec resistance thermometers

Apparatus for effecting catalytic reactions between gases at raised temperature and pressure. MARIA CASALE-SACCHI Austrian 120,393, July 15, 1930.

Apparatus for ammonia synthesis and like catalytic gas reactions. HANS HARTER. Ger 516,249, Aug 11, 1926 See Brit 275,983 (*C. A*. 22, 2444).

Drying apparatus (spraying or atomizing type). PAUL KLAHR. Ger. 517,177, April 3, 1927

Drying apparatus with conveyors and several compartments separately controlled as to drying conditions. B J OWEN and R. O. DAVIES. Brit. 336,000, July 10, 1929 Various structural features and details of supply of heated drying gas, etc., are described

Apparatus for drying materials successively on superposed trays. L. N. LLOYD and PHILLIPS ENGINEERING CO., LTD. Brit. 336,602, May 9, 1929 Structural features.

Tunnel drier and associated rotary air filter. TOMLINSONS (ROCHDALE), LTD., and J N TOMLINSON Brit. 336,049, Aug 22, 1929

Removing oil and fat from the hot chambers of drying apparatus. LOTHAR WOLF and KARL KUNZE. Ger 514,074, Aug 29, 1929 Addn to 478,637 (*C. A* 23, 4803).

Evaporating apparatus. SOC. DES CONDENSEURS DELAS. Ger 516,365, May 22, 1927 Means is described for preventing the carrying away of froth by the vapors.

Apparatus for evaporating and cooling solutions. PAUL H. MÜLLER. Ger. 513,789, Nov 21, 1924.

Means for removing salts from evaporators operated at reduced pressure. PAUL H MÜLLER. Ger 516,381, June 3, 1927

Apparatus for evaporating liquids or crystallizing salt solutions. E. M S INDUSTRIAL PROCESSES, LTD., RICHARD A. STOKES and EDWIN G L. ROBERTS. Fr 694,553, Apr 25, 1930

Apparatus for developing crystals. IMPERIAL CHEMICAL INDUSTRIES, LTD Fr. 694,014, Apr 16, 1930 The vessel consists of an annular partition and means for circulating the liquor from the top downward in the central part and from the bottom upward on the sides.

Surface condenser suitable for use with steam. PAUL A. BANCEL (to Ingersoll-Rand Co.) *U S 1,792,060*, Feb 10

Apparatus for cleaning steam. COCHRANE CORP Ger 516,158, Jan. 18, 1929

Apparatus for drying sludge for fertilizer or other materials by the action of heated circulating drying medium such as air or combustion products. JOHN B BERRIGAN and JOHN J BERRIGAN (to The Press and Drier Co.) U. S. 1,792,064, Feb 10 Structural features.

Apparatus for eliminating carbon monoxide from motor-vehicle exhaust gases. HAROLD E STORY U S. 1,791,912, Feb 10 Various structural details are described of a device adapted for elec. heating of the gas in the presence of water vapor

*Wet classifier for pulverulent materials.* LEONARD ANDREWS. *Ger. 516,146*, July 30, 1927 See Brit. 280,121 (*C. A.* 22, 3005)

Heat-resisting cementation pot. FRIED KRUPP A.-G Fr. 694,665, April 29, 1930.

Device for indicating the presence of coal gas, etc., in the air. RICHARD LEISER, Austrian 120,184, Feb 15 1929

Horizontal chamber furnace. STETTINER CHAMOTTE FABRIK A.-G VORMALS DIDIER. Ger 513,594, Mar. 1, 1928. Details of closure are given.

Door-lifting apparatus for chamber furnaces. EBERHARD GRASSHOFF. Ger. 513,571, April 1, 1927. Details are given.

Fusion furnaces. ITALSICE (SOCIETÀ ANONIMA) Fr. 694,186, April 18, 1930. Construction of burner for using powd. fuel is described.

Inclined grate furnace. L. and C. STEINMÜLLER. Ger. 513,476, May 13, 1928. Addn. to 511,566 (*C. A.* 25, 1126). Details of charging the forward part of the furnace.

Counterflow furnace suitable for heating articles in boxes. VEIT A. HAIN (to George J Hagan Co.). U S. 1,792,423, Feb. 10

Burner for liquid fuel. TOM K. A. NORDENSSON. Fr. 694,349, April 23, 1930.

Boiler plant fired with pulverulent fuel. INTERNATIONAL COMBUSTION ENGINEERING CORP. Ger 516,449, Oct. 27, 1925

Pulverulent fuel burner. ROBERT S. WALKER. Ger 516,257, Aug 9, 1921.

Apparatus for distributing pulverulent fuel and air from a main to a number of branches. GEORGE R. ALDEN and CHARLES SKENTELBERY. Ger 516,137, Oct. 7, 1928 Corresponds to Brit. 312,474.

Rotary-drum grate for finely granular fuels. WERNER SCHLEGEL. Ger 516,483, Feb. 12, 1928.

Heat exchanger. SEMJON W. STAKIN. Ger. 513,844, Mar. 25, 1928. A heat exchanger for pre-heating the fuel gas consists of a mass of tubes of eliptical cross section

Tubular heat-exchange apparatus. J. HOWDEN & CO., LTD., and J. H. HUME Brit. 336,755, Sept. 21, 1929. Structural features of an app with metal pieces having

concave surfaces placed between rows of tubes to direct heating gases or the like in sinuous paths between the tubes.

Tubular heat-exchange apparatus. C. A. Hubert. Brit. 337,236, Nov. 22, 1929

Structural features

Method of heating furnaces by the waste heat of spent gases. C. Otto & Co G m. b H. Ger 513,595, April 27, 1930

Apparatus for removing ash without admitting air to the furnace. Julius Josef Kelber. Ger 513,792, July 17, 1928

Gas burner. Gaston B Killam U S 1,791,565, Feb 10.

Gas burner. Clarence H. Morrow (to Hotstream Heater Co) U S 1,791,500, Feb 10.

Gas burner for heating boilers, furnaces, etc. J E. Weyman Brit 336,722, Aug 23, 1929

Safety valve for gas burners. Clarence H. Morrow (to Hotstream Heater Co). U. S 1,791,530, Feb 10 Structural details are described of a valve which cuts off gas supply to a main burner when a pilot light is extinguished

Bunsen-burner attachment for producing radial horizontal flames. Louis Tartaz. U. S 1,791,913, Feb 10 Structural features

Retort door for resisting pressure. Nichols Products Corp Brit. 335,946, July 3, 1929.

Rotary kiln. Huron Industries, Inc., and B E Green Brit 336,729, Aug 28, 1929 A sealing ring between a rotary kiln and its fixed ends is mounted so that its wt. tends to maintain a tight joint

Tunnel kiln construction and heating system. V. Lastovicka. Brit. 336,171, Dec. 23, 1929 Various structural details are described

Electric water heater. L. F. Thompson. Brit. 336,011, July 11, 1929 Structural features.

Acetylene generator. Autogenwerk Sirius G m. b H., Theodor Geis and August H. Gies Ger 513,612, May 16, 1929 Details of app for generating $C_2H_2$ from water and $CaC_2$ dust are given

Acetylene generator and lamp. Wm. F. Hunt and Hermann C Stelling (to Union Carbide Sales Co). U. S 1,791,595, Feb 10.

Thermostat. N.-V. Nederlandsche Technische Handel Maatschappij "Giro" Ger. 513,550, Sept 22, 1929 The device is applicable to hot water systems, the expansion or contraction of a rod opening or closing a rubber, etc, tube

Thermostatic electric switch. R. MacLaren Brit. 337,093 Aug 10, 1929

Thermostatic electric switch. Felten & Guilleaume Carlswerk A.-G Brit. 337,162, May 6, 1929.

Thermostatic device for electrically operated fire alarms. James R. Longworth and Herbert Hirst (Longworth to Hirst) U. S 1,791,598, Feb 10 Structural features

Thermostatic and electrical control system suitable for piezoelectric crystal control systems. Alfred Crossley (to Federal Telegraph Co). U S. 1,791,804, Feb 10 Structural and elec features

Thermostatic cut-out device for electric circuits. Adoniram J Green (to General Elec. Co). U. S. 1,792,299, Feb 10 Structural features

Thermostatic control for heating systems. John M. Larson (to National Regulator Co). U. S 1,792,101, Feb. 10 Structural features of app. employing a plurality of thermostats.

Thermostat construction suitable for control of fluid heating media. R. Carlstedt. Brit 336,481, Nov. 25, 1929

Thermostatically controlled reducing valve construction suitable for steam-heating systems. Clayton A. Dunham (to C. A Dunham Co). U. S. 1,792,213, Feb. 10.

Thermostatically controlled combined hot-water supply and heating system. Hope's Heating & Lighting, Ltd, and J. H. Harpin Brit. 336,125, Oct. 31, 1929. Structural and elec. control features.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Life and work of the late Professor A. C. Baer. R. B. Becker. *Proc. Assoc. Southern Agr. Workers, 31st Ann Convention*, 158-62(1930).—Baer's investigations on ice cream are discussed in particular. K. D. Jacob

Two pioneers in agricultural chemistry of particular interest to the Association of Official Agricultural Chemistry. E M Bailey *J Assoc Official Agr. Chem* 14, 18–28(1931) —An address on the careers of John Pitkin Norton and Samuel W. Johnson A Papineau-Couture

Evgenii Vladislavovich Biron (E. W. Byron) B N Menshutkin *J. Russ Phys Chem Soc* 62, 1749–70(1930) —A biography with portrait E J C

Edward W. Morley, chemist, investigator, teacher Charles F. Thwing *Science* 73, 276–7(1931) E H

Nikolai Aleksandrovich Shilov. S Voznesenskii *J Russ Phys.-Chem Soc* 62, 2102–12(1930) —A biography with portrait E J C

The activity of Professor F Wald in analytical chemistry. O Quadrat *Collection Czechoslov Chem Comm* 3, 49–52(1931) E H

F. Wald's theory of phases and of chemical stoichiometry. A Kliž *Collection Czechoslov Chem Comm* 3, 9–31(1931) E H.

Bibliography of scientific communications [of Francis Wald] Ant. Šimek *Collection Czechoslov Chem Comm* 3, 5–8(1931) E H

The life of Professor Francis Wald. J Baborovský *Collection Czechoslov Chem Comm* 3, 3–4(1931). cf *C A* 25, 1128 E H

Harvey Washington Wiley (1844–1930) *J Assoc Official Agr Chem* 14, No 1, ii–xxi(Feb 15, 1931) The teacher. W W Skinner iv–vi The chemist. C. A Browne vii–ix The leader. W G Campbell. ix–xi The pioneer. A S Mitchell. xi–xiii The public servant. W D Bigelow xiv–xv Cf *C A* 24, 5545 The organizer. H A Huston xv–xvii The boss. Mary T. Read xviii–xix The man. F B Linton xix–xxi A Papineau Couture

The relation of physics to chemistry. N V Sidgwick *Science* 73, 269–76 (1931) E H

Rhodesian manganese mines of 7000 years ago Raymond Dent *Can Mining J* 52, 150–1(1931) —The mines in the district east of Broken Hill, the primitive uses of minerals, the discovery of these mines and the uses of Mn in early civilizations are discussed W H Boynton

The photoelectric measurement of luster. L Blin Desbleds *Dyer, Calico Printer* 64, 515–7, 583–5(1930), cf *C A* 24, 958 Ruby K. Worner

Correlation of sieving analyses. H Heywood *J Inst Fuel* 3, 428–32(1930) — The variable factors entering into a sieving analysis are personal factor, nature of powder, time, weight of powder, variation in sieve aperture These are discussed D A Reynolds

Hydrographic sections and calculated currents in the Gulf of Alaska. George P. McEwen, Thomas G Thompson and Richard Van Cleve *Repl of the Intern Fisheries Commission* No 4, 5–36(1930) —[Printed by Wrigley Printing Co., Vancouver, B C., Can.] The water was classified into 3 arbitrary types: *c*, coastal water with a chlorinity less than 18 per mille and a value $\sigma_{t,0}$ less than 25.50 intermediate water underlying the coastal waters and having a chlorinity between 18 per mille and 18.50 per mille and a value of $\sigma_{t,0}$ between 25.50 and 26.40, and ocean water with a chlorinity greater than 18.50 per mille and a value of $\sigma_{t,0}$ greater than 26.40 $\sigma_{t,0} = (d - 1)10^3$, where the d is computed from the temp and chlorinity but is not corrected for the pressure *p* In all 3 sections a cold surface layer lay over a deeper warmer stratum The temp and chlorinity data were treated hydrodynamically according to Bjerknes' theory (Publ No 88 Carnegie Inst of Washington) C R Fellers

Mixture formulas K K Järvinen *Acta Chem Fennica* 2, 80–6(1929) — Formulas are given for prepg certain solns and similar formulas in the handbooks are discussed All formulas are derived from the equation (1) $k_1p_1 + k_2p_2 = k_3p_3 = (k_1 + k_2)p_3$, where *k* means the wt in kg and *p* wts percent In the following *l* = vol in l, *c* = vols percent or g in 100 cc or normality, *s* = sp gr, *V* = wt in vacuo and *A* = wt in air By defining sp gr $s = k/l$ and substituting in formula (1) (2) $l_1s_1p_1 + l_2s_2p_2 = l_3s_3p_3 = \frac{l_1s_1 + l_2s_2}{s_3}p_3$ Since $p = cd/s$ and $k = ls$ where *d* = density of the dissolved substance, one gets from (1) (3) $l_1c_1 + l_2c_2 = l_3c_3 = \frac{l_1s_1 + l_2s_2}{s_3}c_3$ and for the contraction coeff *K'* (3a) $K = \frac{l_3}{l_1 + l_2} = \frac{l_1s_1 + l_2s_2}{(l_1 + l_2)s_3}$ If one puts $p = cd/s$ in formula (1) (4) $\frac{k_1}{s_1}c_1 + \frac{k_2}{s_2}c_2 = \frac{k_3}{s_3}c_3 = \frac{(k_1 + k_2)}{s_3}c_3$ These formulas are

theoretically exact only for vacuum, metric system and $sl/4V$ at a certain temp, but are practically exact also in other circumstances JOHN RYSELIN

**The atomic number of elements. A study of the specific gravity of elements in liquid form.** L H. BORGSTRÖM. *Finska Kemistsamfundets Meddelanden* 36, 70–81 (1927). J. RYSELIN

**Was Mendelyeev's system known prior to 1869?** G ELSEN *Chem. Weekblad* 27, 378–9(1930).—A historical survey The classification of the elements into 7 groups was proposed by Cooke in 1854 B. C A.

**Revision of the atomic weight of thallium. Analysis of thallous bromide.** O. HÖNIGSCHMID AND H STRIEBEL *Z anorg allgem Chem* 194, 293–8(1930).—The ratio TlBr/Ag was detd by gravimetric titration The mean of 6 detns gave an at wt of 204 390 for Tl with an av individual deviation of 0 008, confirming the previous result 204 39 derived from analysis of TlCl (*C A* 18, 1593) The wt. of AgBr formed by pptn. from TlBr came out high, which was ascribed to occlusion, and the resulting detns of the ratio TlBr/AgBr were discarded L ONSAGER

**An attempt to separate the isotopes of bromine. The atomic weight of bromine from the ratio of silver to silver bromide.** P HARTECK AND H STRIEBEL *Z anorg. allgem Chem* 194, 299–304(1930).—The mass differences of isotopes are expected to cause slight differences in the sp heats and consequently in the vapor pressures at low temps, on this basis a *reversible* sepn is fundamentally possible. Fractional condensation of solid Br from the vapor in 3 stages (—18 5°, —25°, —36°) produced Br of at. wt. 79 916 ± 001 in the most volatile fraction from an initial material of pure ordinary Br, at wt. 79 915 ± 001, both detd from the ratio Ag/AgBr The results confirm the value 79 916 (Ag = 107 880) found by Hönigschmid and Zintl (*C A* 18, 771) L ONSAGER

**The interpretation of adsorption forces from atomic theory.** F LONDON AND M. POLANYI *Naturwissenschaften* 18, 1099–1100(1930).—Recently London (*C. A* 24, 5597) advanced a theory of mol cohesion on the basis of the action of virtual oscillators as known in the theory of light refraction This same theory is applicable to adsorption. It is especially notable that this theory allows in first approximation simple superposition of the adsorption forces (cf. following abstract), this feature has not been included in other explanations of adsorption forces like the electrostatic theory or valence theory. The present theory is a good foundation for the potential theory of adsorption of Polanyi (*C. A* 23, 5079) The adsorption potential of a mol at a distance $d$ from the surface is $\phi = -(N\pi c/6)(1/d^3)$, $N$ being the no of surface atoms per cc, and $c$ a const The const. can be calcd from the dispersion curve of adsorbent and adsorbate, it consists mainly of the product $\alpha\alpha'$ of the 2 mol polarizations Elec dipole moment and higher moments are generally only of secondary influence The adsorption forces become of the same nature as the van der Waals cohesion forces, expressed in his const $a$ Further conclusions are: Adsorption forces are largely independent of temp, if the mols are not too large or the dipoles too strong The forces are independent of other substances present on the adsorbent. B J C VAN DER HOEVEN

**Properties and applications of molecular forces.** F. LONDON. *Z. physik. Chem*, Abt B, 11, 222–51(1930).—The intermol forces can be calcd approx from purely optical data (*C. A* 24, 5597) In contradistinction to those observed electrostatically, forces so calcd exhibit properties of a general cohesion, similar to the force of gravitation. The heat of sublimation, the heat of adsorption of adsorbed gases and the dissocn energy are calcd from the same data Cf *C A* 23, 3399, 5094; 24, 2651 C L. W

**Curie points.** L F BATES *Proc Phys Soc. London*, 43, Pt. I, 87–95(1931).—A description of the magnetic behavior of a ferromagnetic substance may require 3 temps, (1) the ferromagnetic crit. point, at which the rate of change of the square of the intrinsic magnetic moment per unit vol with temp is a max, (2) the ferromagnetic Curie point, at which the intrinsic magnetization may be considered zero and (3) the paramagnetic Curie point, given by $\theta$ in the Curie-Weiss law $\chi = C/(T - \theta)$ The significance of the ferromagnetic and paramagnetic Curie points is discussed in the light of the results of a no of investigators on Fe, Ni, Co, the ferrocobalts, magnetite and manganese arsenide The paramagnetic behavior of these substances can be accounted for by a slight extension of the idea that ferromagnetism is due to a magnetic particle consisting of a group of assocd atoms W. W STIFLER

**Magnetic susceptibility and chemical investigation.** JAMES F. SPENCER. *J. Soc Chem Ind* 50, 37–41T(1931).—Possible applications of measurements of magnetic susceptibility in various types of chem research are outlined Since magnetic susceptibility in the rare earths is additive, it can be used in fractionation as an index of the

degree of sepn of the constituents For this purpose it is often more convenient and more sensitive than the "mean equiv" In the study of alloys, variation of susceptibility with compn often reveals intermetallic compds This application is illustrated by examples from the work of a no of investigators on Pb–Sn, Bi–Sn, Pb–Ag, Pb–Au, and Al–Sn series of alloys Evidence of $O_4$ mols from susceptibility measurements is then discussed Susceptibility detns. may be used to measure the velocities of chem reactions and may also find application in studying assocn and dissocn in binary mixts of org liquids Calcns based on susceptibility measurements prove that Willgerodt's paramagnetic org compd cannot have the formula usually attributed to it Formation of the compd BiO is highly improbable W. W. Stifler

**Effect of internal stresses on the magnetic susceptibility of metals.** Kotaro Honda and Yosomatsu Shimizu *Nature* 126, 900–1(1930) —The adaptability of Cu to cold working was measured by Weiss's electromagnetic method The decrease in d during cold working measures the internal stress As the d decreased from 8.921 to 8.87, the susceptibility changed linearly from $\chi = -0.083 \times 10^{-6}$ to $\chi = +0.063 \times 10^{-6}$, that is the Cu changed from diamagnetic to paramagnetic. On heating slowly to 500° the original diamagnetism was restored between 230° and 330°, proving that cold working set up internal stress. During cold working of Ag the d changed from 10.489 to 10.439 and the susceptibility from $-0.200 \times 10^{-6}$ to $-0.140 \times 10^{-6}$ These results are in accord with H 's theory of magnetism W. W. Stifler

**Magnetic forces in a crystal of the type of rock salt.** J Bouman *Arch. neerland. sci* IIIA, 13, 1–28(1930) —A highly math discussion in which it is shown that certain crystals similar in type to rock salt may be constructed in which the atoms have definite magnetic moments The assumption that the moments of the 2 atoms are equal is not necessary, although when this assumption is made the formulas are less complicated than those developed without it. W. W. Stifler

**Change of the dielectric constant of nitrobenzene with temperature.** J. Mazur. *Nature* 126, 993(1930), cf. *C. A.* 25, 627 —The dielec. const. of carefully purified $PhNO_2$ was measured at a no of temps. between +30° and −75° by a method based on the beat frequency between 2 high frequency circuits The temps were measured to 0.005° and the method was sufficiently sensitive to show a change in the 5th decimal place of the dielec const. The dielec const increases steadily from 35.4 at 30° to 38.18 at 9.6°, then drops abruptly to 11.82 at 7.713°, after which it diminishes gradually to 9.709 at −75° W. W. Stifler

**The thermal resistivity of solid dielectrics.** Anon *J. Inst. Elec. Eng* (London) 68, 1313–55(1930) —The study is divided into four parts (1) a study of the thermal resistivity of solid dielectrics when tested in sheet form and of factors influencing the flow of heat through them (2) a study of the thermal resistivity of solid dielectrics when applied to bars by the usual shop processes of wrapping, (3) a study of the thermal resistivity of sheet steel stampings transverse to the laminations and (4) a study of the thermal resistivity of air spaces The appendix contains an estn of the thermal conductivity of the insulation on a rectangular bar and a bibliography The various forms of app employed, as well as curves and results, are shown W. H. Boynton

**Specific heat of gases.** H Lourié *Chaleur et ind* 11, 423–35(1930), cf. *C. A.* 24, 5555 —A discussion of methods for detg the length of sound waves in gases The The methods are classified as (1) dust methods, (2) methods of reënforcement of vibrations, (3) interference methods and (4) direct measurement For the gases $N_2$, $O_2$, CO, air, $CO_2$ and $H_2O$ at 0–2000° the following are tabulated (*a*) velocity of sound in an unlimited gaseous atm., (*b*) $C_p$ at 1 kg., (*c*) $C_v$ at 1 kg., (*d*) av $C_p$ at 1 kg., (*e*) av $C_v$ at 1 kg., (*f*) $C_p$ at 1 cu m (0/760), (*g*) $C_v$ at 1 cu m (0/760), (*h*) the resp av values. Values of numerous experimenters for $O_2$, $N_2$, $H_2$, CO, $CO_2$ air are also tabulated. Curves are given for the mol. sp heats of these gases 82 references S. L. B Etherton

**Calculation of gas equilibria from spectroscopic data.** L. J. M Bijvoet. *Chem Weekblad* 28, 26–37(1931) —A discussion of the calcn of entropy consts by statistical methods from spectral data E Schotte

**A measurement of molecular velocity and a test of the cosine law.** P. Clausing *Ann Physik* [5], 7, 569–78(1930) —Measurements of the time of passage $\bar{t}$ of A and Ne through a narrow cylindrical capillary at very low pressures non stationary flow being used, agreed within 1–3% with the formula $\bar{t} = L^2/4ru$ ($L$ = length, $r$ = radius, $u = (8RT/\pi M)^{1/2}$ = mean mol velocity) The derivation of this formula from kinetic theory assumes Maxwell's law for mol velocities and the cosine law for the reflection (or reëvapn. after temporary adsorption) of mols. from the walls. The accurate con-

firmation of the given formula for $\bar{i}$ excludes material deviations from the cosine law, *e g*, an appreciable fraction of the mols specularly reflected L. ONSAGER

**Reflection and period of adherence of metal atoms on oil surfaces.** G VESZI *Z physik Chem*, Abt B, 11, 211-21(1930).—Vapors of Cd Zn, Tl, Pb and Bi were directed through a narrow opening against a moving (15 m per sec) olive oil surface and reflected back a distance of 0 2 cm onto a wall cooled by liquid air The distance on both sides of the opening in which the thickness of the deposited metal was uniform was used as a measure of the distribution curve This method gave definite proof that Zn, Cd and Bi adhere to the reflecting surface The period of adherence was $10^{-8}$ to $10^{-6}$ sec Cf Holst and Clausing (*C A* 20, 1737) CURTIS L. WILSON

**Vapor pressures of some hydrocarbons.** ERNEST G LINDER *J Phys Chem* 35, 531-5(1931).—The vapor pressures at temps in the neighborhood of 0° are given for toluene, tetrahydronaphthalene, *m* xylene *o*-xylene, *p* xylene, dipentene, ethylbenzene, mesitylene octane, durene, tetradecane decane, butylbenzene, *sec* butylbenzene, *tert*-butylbenzene, *p*-diethylbenzene, *m*-diethylbenzene, propylbenzene, isopropylbenzene, octylene, diisobutylene 2,2,4 trimethylpentane, decane, hexamethylethane, *p* menthane, *p*-cymene, styrene, 1 methylcyclohexene methylcyclohexene limonene, pinene, decahydronaphthalene, methylnaphthalene, cyclohexene, diphenylmethane, acenaphthene and *o* diphenylbenzene MALCOLM DOLE

**Heat transfer in liquid ammonia. III.** M HIRSCH *Z ges Kälte-Ind* 38, 5-8(1931) F D ROSSINI

**Measurements with the aid of liquid helium. XI. The resistance of certain metals at low temperatures.** W MEISSNER AND B VOIGT *Ann Physik* [5], 7, 761-97(1930), cf *C A* 25, 243 —The resistances of metals of the first 2 periodic groups and of B, Al, In and Tl were measured from 273°K down to the temp of liquid He The characteristic temps for these metals were calcd the Gruneisen formula being used. C F P JEFFREYS

**Determination of the coefficient of diffusion of metals in the solid state.** SHINSUKE TANAKA AND CHUJIRO MATANO *Proc Phys-Math Soc Japan* [3], 12, 279-84(1930); cf *C A* 25, 1135.—The coeff of diffusion was detd at 500° for alternate layers of Au and Ag by measuring the change of elec resistance with time. Fick's law was found valid MALCOLM DOLE

**The question of molecular or atomic solid solution of an intermetallic compound in a pure metal.** G WASSERMANN *Z. Metallkunde* 22, 158-60(1930).—Soln of Mg in Al increases $a_0$ (the side of the unit face-centered cube of Al) from 4 0404 A. U. to 4 0535 A U in an alloy contg 3 at % Mg Soln of Zn decreases $a_0$ from 4 0404 to 4 0330 A U. in an alloy contg 10 at % Zn. When 1 at % Mg and 2 at % Zn($MgZn_2$) are added to Al, $a_0$ increases to 4 0420 A U., which is only slightly lower than the change in $a_0$ calcd additively from the effects of Mg and Zn taken separately. The vols. of 1 Mg atom plus 2 Zn atoms, and of 1 mol of $MgZn_2$ are in the ratio of 1 08 to 0 98 on the basis of the vol of 3 Al atoms (which they presumably replace in the solid soln) = 1 00. Thus if $MgZn_2$ dissociates into atoms when dissolving in Al the Al lattice should expand, whereas if $MgZn_2$ dissolves as mols. the Al lattice should contract The observed expansion of the Al lattice is taken an indicative of an at solid soln rather than a mol ROBERT F. MEHL

**The unipolarity of pressed lead sulfide.** FR TREY *Naturwissenschaften* 18, 1099(1930).—PbS crystals with detector qualities become inactive after pulverization and pressing, pptd PbS after being pressed to a pastille is also inactive However, after heating to 150° the prepns. assume rectifier properties (*C A* 20, 1156) After repeated pressing these properties disappear again and reappear on heating The resistance of the prepns. changes simultaneously with the rectification effect (Bridgman, *C A*. 20, 1542) Both properties depend on the structural qualities of the crystals. B J C VAN DER HOEVEN

**Röntgenographic investigation of the system cadmium-magnesium.** U. DEHLINGER, *Z. anorg allgem. Chem* 194, 223-38(1930).—In the system Cd-Mg there are 2 series of mixed crystals, $\alpha$ and $\beta$ Both are hexagonal. The $\alpha$ crystals exhibit the same axial ratio as pure Cd, namely $c/a$ = 1 89, while $\beta$ crystals, like pure Mg, exhibit the ratio $c/a$ = 1 62. These ratios are independent of concn., and all lattices found belong to one of the types $\alpha$ and $\beta$ However, for crystals contg 25-65 at % of Mg, a transformation between the 2 may be effected by pressure (or mech treatment), which favors $\beta$ with approx 2% smaller vol Compds with "hyperstructure" exist, the most important being $MgCd_3$ ($\alpha$ lattice) and $CdMg_3$ ($\beta$ lattice), both were measured, the latter by the rotating-crystal method A different type of hyperstructure was indicated by x ray lines from alloys with about 50% Mg L. ONSAGER

The ternary system potassium oxide, calcium oxide, silica. G. W. Morey, F. C. Kracek and N. L. Bowen. *J. Soc. Glass Tech.* 14, 149-87T(1930); cf. *C. A.* 24, 5443.—The phase relationships of these 3 rock forming ingredients are described in detail. The quenching method developed so successfully by the Geophysics Lab. was used, great care being observed to insure homogeneity of the melts. More compds. are formed in the $K_2O$-CaO-$SiO_2$ system than in the $Na_2O$-CaO-$SiO_2$ system, and there is a greater tendency for these compds. to dissoc. on melting, the viscosity of the melts at the liquidus is greater over a large proportion of the diagram, and the crystn. and melting processes are more sluggish. The following new compds. were found and their equil. fields and properties detd.:

| | Percent of | | | M. p. or Reaction | |
|---|---|---|---|---|---|
| | $K_2O$ | CaO | $SiO_2$ | t° | Crystal Habit |
| $K_2O$ 2CaO 9$SiO_2$ | 12 61 | 15 01 | 72 28 | 1050 = reaction | Prisms and plates |
| 4$K_2O$ CaO 10$SiO_2$ | 26 46 | 5 42 | 58 12 | 946 | Plates |
| 2$K_2O$ CaO 6$SiO_2$ | 31 15 | 9 27 | 59 58 | 959 | Plates |
| $K_2O$ 2CaO 6$SiO_2$ | 15 62 | 13 73 | 63 59 | 1115 reaction | Prisms |
| $K_2O$ 2CaO 6$SiO_2$ | 15 12 | 27 01 | 57 86 | 1029 reaction | Needles and plates |
| 2$K_2O$ CaO 3$SiO_2$ | 44 26 | 13 20 | 42 43 | 1095 reaction | Octahedra |
| $K_2O$ CaO $SiO_2$ | 44.78 | 29 66 | 28 56 | 1620 | Hexagonal bipyramids |

| | 2 V | Optic Sign | Refractive Index $\gamma$ | $\beta$ | $\alpha$ | Crystal System |
|---|---|---|---|---|---|---|
| $K_2O$ 2CaO 9$SiO_2$ | Large | Neg. | 1 525 | .. | 1 515 | Monoclinic or triclinic |
| 4$K_2O$ CaO 10$SiO_2$ | 0 | Neg. | 1 551 | . | 1 539 | Hexagonal |
| 2$K_2O$ CaO 6$SiO_2$ | 60 = 5 deg. | Neg. | 1 543 | 1 541 | 1 525 | Monoclinic or triclinic |
| $K_2O$ 2CaO 6$SiO_2$ | Large | Pos. | 1 59 | ... | 1.575 | Orthorhombic |
| $K_2O$ 2CaO 6$SiO_2$ | | Neg. | 1 57 | | 1 56 | Orthorhombic |
| 2$K_2O$ CaO 2$SiO_2$ | | | 1 572 | 1 572 | 1 572 | Pseudo? cubic |
| $K_2O$ CaO $SiO_2$ | 0 | Pos. | 1 605 = | ... | 1 600 | Hexagonal |

H. F. K.

The crystal structure of cubic Carborundum. H. Braekken. *Z. Krist.* 75, 372-3(1930).—Laue and rotation photographs on a small crystal of cubic SiC give results which agree with the powder photographs reported by Ott (*C. A.* 20, 3166).

L. S. Ramsdell

The crystal structure of iron silicide, FeSi. F. Weyer and H. Müller. *Z. Krist.* 75, 302-5(1930).—A new detn. of the structure of FeSi (cf. *C. A.* 18, 2323) gives $a = 4.47$ A. U. There are 4 mols. in the unit cube, and the Fe and Si atoms have the positions 4*f*, with $u_{Fe} = 0.1340$ and $u_{Si} = 0.8445$. The distance Fe — Fe is 2.74 A. U. and Si — Si is 2.76 A. U. Since each atom has a single atom of the opposite kind as its nearest neighbor, the structure can be considered as made up of FeSi mols.

L. S. Ramsdell

Crystal structure of the compound $Fe_2B$. Gudmar Hägg. *Z. physik. Chem., Abt. B*, 11, 152-62(1931).—"A new structure is established for $Fe_2B$ which, for spatial reasons, is more probable than the structure assumed by Weyer and Müller (*C. A.* 25, 251). It also offers a better explanation of the observed distribution of intensities" (on powder photograms). "The Fe atoms are located in the corners of tetrahedrons that form a highly uniform system. The B atoms are located in the largest intervals between these tetrahedrons." "Each B atom is surrounded, at equal distances of 2.176 A. U. by 8 Fe atoms. This structure indicates that the B atom has a radius of 0.97 A. U."

G. Tödtheide

The cubic high-temperature structure of some perchlorates. H. Braekken and L. Harang. *Z. Krist.* 75, 323-43(1930).—The structure detns. by Herrmann and Ilge (*C. A.* 25, 1423) for the alkali perchlorates are largely verified, although there are some minor disagreements. Parameters and interatomic distances are given.

L. S. Ramsdell

The crystal structure of calcium chromate. J. H. Clotter. *Z. Krist.* 76, 265-6 (1930) (in English).—X-ray data show definitely that $CaCrO_4$ is not orthorhombic and isomorphous with $CaSO_4$, but rather is tetragonal, and isomorphous with zircon, $ZrSiO_4$. The unit cell contains 4 mols., $a = 7.10$ A. U., $c = 6.19$ A. U., the calcd. $d$ is 3.27; the space group is $D^{19}_{4h}$.

L. S. Ramsdell

Large transparent cubic crystals of sodium chloride. Takehard Yamamoto.

*Bull. Inst Phys Chem Research* (Tokyo) 10, 52–60(1931)(Abstracts 4–5 (in Esperanto) published with *Sci Papers Inst Phys Chem Research* (Tokyo) 15, Nos 283–5) —Various cations have a catalytic effect on the crystn by slow evapn of a satd NaCl soln $Mn^{++}$ gives large transparent crystals (the min concn is 0 01–0 001 g ion per L., hydrolysis of $MnCl_2$ gives enough acidity but the optimum concn of $H^+$ is 0 001 *N*, the best temp is 40–60°) $Pb^{++}$ acts similarly but the angles may be truncated (by 111) $Sn^{++}$ and $Cd^{++}$ give somewhat smaller transparent crystals Nontransparent crystals are given by the following cations, in the order of size of crystals $Ni^{++} > Cu^{++}, Fe^{++}, Cr^{+++}, Tl^+, Rb^+ > Fe^{+++}, Hg^{++} > Al^{+++}$ Austin M Patterson

**Habit variation in crystals of barium and lead nitrates** Harold E Buckley *Z Krist* 76, 147–68(1930)(in English) —The erratic choice of habit when $Ba(NO_3)_2$ crystallizes from soln at const temp is traced to the effect of humidity on the rate of evapn and to traces of $BaCO_3$ For $Ba(NO_3)_2$, the cube planes are increased (relatively to 111) by addn of carbonates of Ba, Na, Ca, Mg and Fe, by $FeCl_3$, methylene blue, Ba or Na manganate, Ba, Na or K permanganate, urea and Congo red Cube planes are decreased by HCl, Ba, Na or K chlorate and perchlorate, safranine and quinine The 210 planes are increased by $K_3Fe(CN)_6$ and $K_4Fe(CN)_6$, K and Ba chromate and $K_2Cr_2O_7$ For $Pb(NO_3)_2$ the cube is increased by Congo red, safranine, methylene blue the cube is decreased by Na and K chlorates Various theories concerning crystal habit are discussed Observations on a large no of crystals lead to the conclusion that the true symmetry of these nitrates is tetartohedral rather than pyritohedral L S R

**The refractive indexes of mixed crystals of magnesium sulfate and zinc sulfate.** Mary W Porter. *Z Krist* 75, 288–300(1930)(in English) —In a series of mixed crystals of $MgSO_4.7H_2O$ and $ZnSO_4.7H_2O$ the variations of the principal *n*s were found to be directly proportional to the compn, as expressed in vol or mol percentage, or in percentage by weight L S Ramsdell

**The dependence of crystal spacing on crystal size.** J E Lennard-Jones. *Z Krist.* 75, 215–6(1930)(in English) —From the theoretical standpoint, an actual increase in lattice dimensions is to be expected for min crystals of the non ionic type For a crystal of 500 atoms, the increase should be 5% for one 5 layers thick each way, 7%, for one 3 layers thick, 14% This is because the total attractive field decreases relatively to the total repulsive field when particle size is decreased. For ionic crystals the reverse is the case L. S Ramsdell

**Absorption of synthetic spinels colored by chromium and manganese.** K. Schlossmacher. *Z Krist* 75, 399–409(1930), cf *C A* 24, 4482 —Absorption measurements with a photoelec. cell were made in the range 400 to 600 mμ on synthetic spinels ($MgO \cdot Al_2O_3$ = 1 1) colored by both Cr and Mn With relatively high Mn content the Mn absorption was superimposed on that of Cr In the region 540 to 570 mμ there was absolute agreement with results obtained from a $KMnO_4$ soln, elsewhere there was only occasional agreement L S Ramsdell

**A powder spectrometric study of urea.** R. W G. Wyckoff *Z. Krist* 75, 529–37(1930) —Powder reflections combined with the best available estimates of at. *F* values give satisfactory results It would appear that this method is useful for simple org crystals, instead of single-crystal spectrometry For urea a unit cell was found with $a$ = 5 670 A. U. and $c$ = 4 726 A U At. positions are $u_N$ = 0 14, $v_N$ = 0 32, $w_O$ = 0 57–0 58, $t_N$ = 0 17 At positions can be fixed with as great accuracy as that provided by Laue and spectral photographic comparisons involving more complicated planes L S Ramsdell

**A determination of the molecular weight of methylbixin by means of x-rays.** J Hengstenberg and R. Kuhn Z Krist 76, 174–6(1930) —The unit cell has the dimensions $a$ = 10 50 A U, $b$ = 17 59 A U, and $c$ = 13 4 A U (±0 05 A U) With 4 mols in this unit, the calcd mol wt. indicates the formula $C_{48}H_{70}O_4$ rather than $C_{24}H_{36}O_4$ as proposed by Karrer (*C A* 23, 4480) L S Ramsdell

**The crystal structure of the diphenylpolyenes.** J. Hengstenberg and R Kuhn. *Z Krist* 75, 301–10(1930) —The unit cells of the diphenylpolyenes are (monoclinic series) diphenylbutadiene $a$ = 7 71 A U, $b$ = 11 70 A U, $c$ = 13 41 A U, $Z$ = 4, diphenylhexatriene 6 33 A U, 7 43 A U, 14 43 A U, 2, diphenyloctatetraene 6.25 A. U, 7 44 A U, 16 03 A. U, 2, (orthorhombic series) diphenyldecapentaene 10 25 A. U, 7 66 A U, 21.2 A U, 4, diphenyldodecahexaene 10.20 A U, 7 60 A U, 23 58 A. U, 4, diphenyltetradecaheptaene 10.2 A U, 7 57 A. U., 25 95 A. U, 4 In every case the mol wt calcd from x ray data agrees with that from the structural formula. In the hexatriene and octatetraene there are definite *trans trans* bindings The mols have a plane oblong shape L. S Ramsdell

**The structure of quinoid compounds and of a molecular compound of the quin-**

hydrone type. EDUARD HERTEL AND GEORG H. RÖMER. *Z. physik. Chem.*, Abt. B, 11, 90–6(1930) —Anthraquinone of the rhombic system contains 8 mols in an elementary structure of only 3.95 A. U. height. The ring planes in this structure are parallel but on different levels. In 2,7 dinitroanthraquinone (I) of the quadratic system, however an elementary structure of 38.4 A. U. height contains 4 mols., the ring planes of which must be arranged perpendicular to each other. The mol. compd. I-fluorene (1 1, triclinic) possesses an elementary structure the dimensions of which preclude a lattice structure according to the tridimensional alternation principle." G. TOENNIES

Determination of the melting point of platinum. G. RIBAUD AND P. MOHR. *Compt. rend.* 192, 37–8(1931) —The method used was the tube method already described for Pd (*C. A.* 24, 1006); the technic being improved by the use of a thermoelec. pile. By optical extrapolation, the m. p. of Au being used, the m. p. of Pt was calcd. as 1762°. The error in this value is probably not more than 2°. LOUISE KELLEY

The extent of dissociation of salts in water. II. Uni-bivalent salts. EDWIN C. RIGHELLATO AND CECIL W. DAVIES. *Trans. Faraday Soc.* 26, 592–600(1930); cf. *C. A.* 21, 3793. —Dissocn. was calcd. from cond. data by using the Onsager theory and assuming an intermediate ion. The values of $K$ for the ions used are: $CdCl^+$ 0.0101, $PbCl^+$ 0.0304, $CaNO_3^+$ 0.521, $SrNO_3^+$ 0.150, $BaNO_3^+$ 0.121, $CdNO_3^+$ 0.394, $PbNO_3^+$ 0.0647, $LiSO_4^-$ 0.229, $NaSO_4^-$ 0.198, $KSO_4^-$ 0.151, $AgSO_4^-$ 0.05 and $TlSO_4^-$ 0.0472. The transport numbers calcd. from these consts. agree with the exptl. A. F.

Notes on the specific gravities of liquid and solid sulfuric acid. D. MCINTOSH. *Proc. Trans. Nova Scotian Inst. Sci.* 17, 270–61(1930) —$H_2SO_4$ from 60° to 66° Bé. can be kept almost indefinitely in solid $CO_2$ without crystn. The sp. gr. was measured in calibrated bulbs with graduated stems of capillary tubing.

| 60° Bé. | Temp. | Sp. gr. | 66° Bé. | Temp. | Sp. gr. |
|---|---|---|---|---|---|
| Liquid | +15° | 1.695 | Liquid | +20° | 1.838 |
| | −40° | 1.756 | | −78.5° | 1.951 |
| | −78.5° | 1.801 | | | |
| Solid | −43° | 1.797 | Solid | −78.5° | 2.040 |
| | −60° | 1.811 | | | |
| | −78.5° | 1.838 | | | |

RACHEL BROWN

The chemical constant of hydrogen vapor and the entropy of crystalline hydrogen. T. E. STERN. *Proc. Roy. Soc.* (London) A130, 367–79(1931) —From the Einstein Bose statistics the vapor pressure of cryst. H at low temp. is calcd. The chem. consts. of H vapor at low and ordinary temps., resp., are −1.11 and −3.70. The effects upon equil. of differences between the moments of inertia of gaseous and cryst. H are investigated. The entropies of cryst. para H, ortho-H and ordinary H at zero abs. are, resp., 0, $R \log 9$ and $\frac{3}{4} R \log 3 + R \log 4$. G. M. MURPHY

The thermal properties of ammoniates and analogous compounds and their use in absorption refrigerating machines. R. PLANK AND L. VAHL. *Forsch. Gebiete Ingenieurw.*, Ausgabe A., 2, 11–8(1931) —Heats of reaction, heats of vaporization, vapor pressures, ds. and refrigerating capacities are discussed for the systems: (1) $CaCl_2 8NH_3 = CaCl_2 2NH_3 + 6NH_3$, (2) $CaCl_2 6CH_3NH_2 = CaCl_2 2CH_3NH_2 + 4CH_3NH_2$, (3) $LiCl\ 3CH_3NH_2 = LiCl + 3CH_3NH_2$, (4) $LiCl\ 2CH_3NH_2 = LiCl + 2CH_3NH_2$. The following new data are given for $CH_3NH_2$: vapor pressure, −77° to 9°, $\log p_{mm} = -\frac{2068.6839}{T} - 8.66437 \log T + 0.004785\, T$, $C_p$, liquid, at 20° = 0.77 g.-cal. per g. F. D. ROSSINI

Problems of present-day colloid chemistry. VII. H. R. KRUYT. *Chem. Weekblad* 27, 176–9(1930) —The phenomenon of lyotropy is discussed in the light of the differences of size of similar ions due to varying degrees of hydration; the greater the hydration of the ions, the less water is available for forming the stabilizing hydration layer of the colloidal particles, the conditions obtaining thus resemble those in a soln. of an org. substance, the soly. of which is depressed by the addn. of electrolytes. The manner in which the water mols. are oriented around the colloidal particles is also of importance. VIII. *Ibid.* 241–4 —A survey of certain outstanding problems, including adsorption, thixotropy, gelatinization and the relationship of emulsions to true colloidal solns. B. C. A.

Heats of adsorption and their bearing on the problem of adsorption. H. R. KRUYT AND JOHANNA G. MODDERMAN. *Chem. Reviews* 7, 259–346(1930) —A thorough review of the exptl. data on heats of adsorption is given. An equation is deduced for calcn. of

the isothermal heats of adsorption Calcd and observed results agree fairly well. Complete agreement is not to be expected The state of the adsorbed phase is discussed critically Each of the equations now in use in connection with adsorption has a domain of usefulness but none of them expresses a complete isotherm at lower temps Eight factors that influence adsorption are listed One equation cannot include all of them. Many heats of adsorption are tabulated Complete bibliography L H R.

Adsorption of chromate ions by colloidal aluminum hydroxide. Ben H. Peterson and Keith H Storks *J Phys Chem* 35, 649–52(1931), cf *C A* 24, 1008.—The adsorption of $K_2CrO_4$ by colloidal $Al_2O_3$ was detd at concns above and below the pptn value Three types of adsorption curves result, representing (1) neutralization of the pos. charge on the suspended particle, (2) surface adsorption not elec. in type and (3) a combination of 1 and 2 It is not always permissible to extrapolate data to zero concn of the adsorbed substance Harry B. Weiser

Adsorption of titanium hydroxide sol. L. S Bhatia and S Ghosh *J. Indian Chem Soc* 7, 687–97(1930).—$Ti(OH)_4$ sol was prepd by dropping $TiCl_4$ slowly into water at 18° The sol cannot be completely freed from HCl by dialysis. A sol contg 15.2 g $TiO_2$ per l was found on prolonged dialysis to become more and more viscous and as soon as the acid concn fell to $p_H$ 4 1 the whole mass coagulated as a gelatinous ppt. The sol adsorbed appreciable amts of anions from solns of Na and K salts The order of adsorption expressed as g -mol per g of adsorbent was found to be $Fe(CN)_6^{----} > NO_3 > SO_4 > Cl > S_2O_3 > Cr_2O_7 > Br > Fe(CN)_6^{----} > IO_3 > CrO_4 > OH$. The coagulating power of the anions was found to be in the following decreasing order $Fe(CN)_6^{----} > Fe(CN)_6^{---} > OH > SO_4 > Cr_2O_7 > CrO_4 > IO_3 > S_2O_3 > NO_3 > Cl > Br$ Strong adsorption does not always indicate high coagulating power in this sol The adsorption of OH ions by this Ti sol was small. The high coagulating power of OH ions was due to the removal of the stabilizing H ions The sol adsorbed more anions than cations with the liberation of OH ions and a corresponding increase of $p_H$ $Ti(OH)_4$ is more basic than acidic. On aging, the sol prepd. at 18° became stable toward electrolytes and showed a decrease in sp. cond. and viscosity A sol prepd at 55° did not change in stability on aging and the sp cond and viscosity increased very slightly. Adsorption of $Ti^{++++}$ by the sol prepd at 18° accounts for its stability L H Reyerson

Studies on electrokinetic potentials. VII. The temperature coefficient of the ζ-potential. Henry B. Bull and Ross Aiken Gortner. *J. Phys Chem* 35, 456–66(1931), cf. *C. A.* 25, 1138.—The temp coeffs of the ζ-potential for the interfaces water-cellulose, $1 \times 10^{-4}$ *N* NaCl-cellulose, and EtOH-cellulose were measured between 20° and 51°. The latter interface potential has a pos. temp. coeff., while the other 2 show a slight max in the neighborhood of 40°. Malcolm Dole

Structure of thin films formed from solutions of crystallizing and non-crystallizing substances. G Tammann and H. Flsner von Gronow. *Z. anorg allgem Chem.* 194, 268–72(1930).—The surface films formed by evapn of solns. contg soaps or similar substances were studied by interference colors Perrin (*C A* 24, 3411) found that the local thickness of a Na oleate film varies by steps of 4.2μμ This observation was confirmed, and the same formation of flows with step structure was observed for films of K undecylate and K myristate Among a considerable no of substances which were investigated, the phenomenon occurred only with Na and K salts of higher fatty acids It is suggested that besides an elongated form of the mols, a film capable of swelling is required L Onsager

Experiments with precipitated and colloidal manganese dioxide. Jnanendranath Mukherjee, Satyaprasad Roy Choudhury and M R Sibba Rao *J Indian Chem Soc* 7, 803–13(1930).—The results of adsorption, antagonism and coagulation expts with both pos and neg $MnO_2$ sols and of adsorption expts with negatively pptd $MnO_2$ conflict in many respects with the findings of Dhar and his co-workers (*C. A.* 21, 3005, 22, 1075) Further study is needed to reveal the true chem nature of the particles in these sols Oscar T. Quimby

A critical study of Kohlschütter's method of preparing silver hydrosol. M. Raman Nayar and P. S MacMahon *J Indian Chem Soc* 7, 699–707(1930).—The presence of alkali ions is not essential in the formation of a Kohlschütter sol as stated by Pauli, *C. A.* 18, 2629 The walls of the exptl. vessels det the nature of the sol Silvered vessels produce no sol or only thin, pale, white, unstable sols Silica or glass vessels invariably give rise to wine red, stable sols The contradiction between Pauli's results and those of N. and M. is traced to the neg catalytic effect of the Ag vessels used by Pauli. Stable Kohlschütter sol was prepd at 85° Reduction of $Ag_2O$ soln near the b p produces a coarse suspension L. H Reyerson

Regarding the colloidal nature of cuprammonium solution. Alfred J. Stamm.

*J Phys Chem* 35, 659–60(1931) —It was demonstrated by the aid of the ultracentrifuge that cuprammonium solns contain colloidal material, probably $Cu(OH)_2$. The sol is polydisperse, contg particles ranging in diam from 6 5 mμ to more than 20 0 mμ for the concns investigated HARRY B WEISER

Micelles and base exchange. MERLE RANDALL AND JESSIE Y. CANN. *Chem Reviews* 7, 369–405(1930) —Micelles are considered intermediate steps between ordinary ions and solid crystals The soln of micelles is taken to be a homogeneous phase and the thermodynamics of such a system is therefore that of a homogeneous phase rather than *that of a heterogeneous system* The *theory of the formation of micelles* is extended to very large aggregates. The electrolytic nature of cryst. and near cryst. micelles is considered and the activity coeff of such cryst. micellar masses is shown to be practically zero All substances forming neg micelles in soln. should possess differential base-exchang" properties Base exchange in zeolites, the compn of zeolites and the methods of prepg artificial zeolites are discussed *In zeolites the neg ions of the* aluminosilicate are considered to form large micelles The rapid base or acid exchange properties of solid solns and those of zeolites are explained by the electrolytic nature of the solids Base exchange is considered in other systems as well as in zeolites L H REYERSON

Mechanism of the mutual coagulation process. HARRY B WEISER AND THOMAS S CHAPMAN *J Phys Chem* 35, 543–56(1931) —The zone of complete mutual coagulation of 2 sols of opposite sign may be very narrow or quite broad When a given series of pos sols, *e g*, is arranged in order of the optimum concn for mutual coagulation on mixing with neg sols, the order of the pos sols may vary widely with different neg sols The reason for this behavior is that the mutual pptg power is not detd exclusively by the charge on the particles Other factors are (*1*) mutual adsorption of colloidal *particles that is independent of the charge, (2) the presence of pptg ions as impurities* and (*3*) interaction between stabilizing ions The latter factor is not a general cause of *mutual coagulation* but it may be important in certain cases The investigations were carried out with the following sols (*a*) positively charged $Fe_2O_3$, $Cr_2O_3$, $CeO_2$, $BaSO_4$, Night blue, (*b*) negatively charged $SnO_2$, $Zn_2Fe(CN)_6$, $Cu_2Fe(CN)_6$, Congo red, $As_2S_3$. H B W.

A contribution to the theory of thixotropy. E A HAUSER. *J Rheol* 2, 5–9 *(1931) —The particles of a sol added to a bentonite dispersion do not come into close* contact with the particles of the latter but rebound while at some distance away The effect is due to the formation of solvated hulls around every particle The view that each mech disturbance disrupts certain solvatized hulls, thereby lessening the viscosity, is widely held but it is untenable, because there is no change in vol. On the other hand, thixotropy is characteristic of anisotropic particles in extreme cases of *scale like particles* The actual setting of the gel is an instantaneous effect of orientation and not a continuous change from liquid to solid EUGENE C. BINGHAM

Lyophilic colloids. I. Hydration. S M LIPATOV AND L. N KOROBOVA. *Z anorg allgem Chem* 194, 369–76(1930) —The substance used in these expts is "geranine' acid, $C_{10}H_{17}N_3O_6S_2$ In dil aq solns it is slightly ionized, as shown by a small elec. cond. The mol. wt. found from diffusion expts is 506, the theoretical value is 497 The mol. wt. calcd from cryoscopic measurements varies with the concn. and is lower than the theoretical value The failure of geraninic acid to dialyze (nature of membrane not given) indicates hydration. The ability of "true" solns. of geraninic acid to gelatinize at low temp is further evidence of its hydration. Osmotic pressure detns on solns contg 2–25 g per l show that 1 g geraninic acid holds 31 g $H_2O$ Viscosity detns on sols contg 0 175 to 1 40% geraninic acid indicate a similar high hydration Both the viscosity and the osmotic pressure of geraninic acid dispersions are greatly lowered by the addn. of small quantities (0 25–1 00%) of tannic acid. II. Theory of macro- and micro-syneresis. *Ibid* 377–82 —Geraninic acid gels show a much larger syneresis in 0 1 *N* NaCl than in $H_2O$ alone The time required for the complete syneresis decreases as the concn of geraninic acid increases The velocity of syneresis is a function of the distance between particles and depends upon the intensity of the attractive forces, which are the same in all directions The velocity of syneresis follows the law of the first-order reaction. The concn. of geraninic acid in the liquid squeezed out is independent of the gel concn. When the vol. of the disperse phase is just equal to the total vol. of the system, no syneresis is observed, the addn. of more geraninic acid breaks up the structure of such a gel because of partial dehydration The elec. charge is the only true stability factor of lyophilic systems. Hydration merely delays the changes. Also in *J Russ Phys Chem Soc* 62, 1895–1906(1930) OSCAR T QUIMBY

Hysteresis in sol-gel transformations. S N BANERJI AND S GHOSH *Z. anorg*

glacial AcOH or of other proteins in anhyd HCOOH, are miscible in all proportions and without flocculation with solns of cellulose acetate (I) or nitrate in AcOH; these acid proteocellulose solns remain stable during evapn The membranes formed may be regarded as true solid solns, the structure of which depends on the ratio protein cellulose A 10% soln of gelatin in cold glacial AcOH is first prepd According to the percentage of gelatin desired in the membrane (the percentage may vary from 5 to 75), a suitable quantity of this soln is mixed with a 10% soln of I in AcOH The mixt. is shaken energetically, and the membrane prepd as usual If the drying is complete, a resistant membrane is obtained, the permeability of which depends on the condition of evapn of the original soln Membranes with 5% gelatin are transparent; those with 25% are opalescent The preceding method is applicable to the prepn of membranes contg other proteins, except that anhyd HCOOH must be used to dissolve the protein A perfectly dry membrane contg 20 parts casein to 80 parts dry I is clear and does not give the Tyndall effect Using the method described, a series of membranes contg egg albumin gliadin and the proteins of serum were prepd LOUISE KELLEY

Solubility of thallous iodate in ethyl alcohol-water mixtures. VICTOR K. LA MER AND FREDERICK H GOLDMAN *J Am Chem Soc* 53, 473-6(1931) —The application of Born's equation for the electrostatic work of transfer of charged spheres of av radius r was tested with $TlIO_3$ alc.-water mixts The soly of $TlIO_3$ was measured in EtOH-water mixts contg 0-47% EtOH From the data, the av. radii were calcd compared with the values of the parameter "a" computed from soly. data in dil salt solns.
ALLEN S. SMITH

Liquid ammonia as a solvent and the ammonia system of compounds. VII. The nature of free radicals, their preparation and properties, as revealed by studies in liquid ammonia solutions. WARREN C. JOHNSON AND W. CONARD FERNELIUS. *J. Chem Education* 7, 2000-8(1930) cf *C A* 24, 3486 —Kraus classified free radicals on the basis of their affinity for the electron into strongly electropos, strongly electroneg and amphoteric The strongly electropos radicals include the tetraalkylammoniums, which behave like typical alkali metals, *i e*, they give blue solns in liquid $NH_3$ and form amalgams The $RHg$ radicals exhibit metallic properties. The strongly electroneg radicals include $(CN)_2$, $(OCN)_2$ $(SCN)_2$ and $(SCSN_3)_2$ They do not exist in the monomol state and they behave chemically like the halogens Among the amphoteric radicals are $Ph_3C$, $Me_3Sn$ and $Me_2Sn$ These substances combine with both the strongly electropos and strongly electroneg elements Liquid $NH_3$ is a suitable solvent for the prepn and study of the amphoteric free radicals because many of the substances from which the radicals are prepd are sol in liquid $NH_3$ and do not react with it. Typical reactions in liquid $NH_3$ are $Me_3SnCl + 2Na \longrightarrow Me_3SnNa + NaCl$, $Me_3SnNa + Me_3SnCl \longrightarrow 2Me_3Sn + NaCl$, $Me_3SnBr_2 + 2Na \longrightarrow 2NaBr + Me_3Sn$
W C. FERNELIUS

The connection between ionic mobility and diffusion velocity in solid salts. CARL WAGNER *Z physik Chem*, Abt B, 11, 139-51(1930) —For mixed crystals of solid salts of AgI + CuI or $PbCl_2$ + $PbBr_2$ a formula is derived to calc. the diffusion coeffs of the ions from conductivities and transference nos or from the migration velocities of the ions From the conductivities of pure solid salts with exclusive cationic or anionic conductivities the self diffusion const of the more mobile ion can be derived. The formulas used by Hevesy (*C A* 15, 3243 1440 22, 1711, 23, 3395, 24, 1573) and by Tubandt, Reinhold and Jost (*C A* 22, 342, 23, 3612) are confirmed It is assumed that the single ions move practically independently of each other (no common migration of cation and anion, no exchange of places between adjoining cations or anions) Approx exptl verification of the derived formula confirms this assumption G T

The temperatures of maximum density and the surface tensions of aqueous solutions in relation to concentration. G TAMMANN AND A ROHMANN *Z. anorg allgem Chem* 194, 273-7(1930), cf *C A* 23, 19 —The changes of the temp of max d $t_m$ and of the surface tension $\sigma$ effected by addn of different substances to water are discussed from the viewpoint of internal pressure Solutes of high internal pressure cause a marked decrease of $t_m$ directly proportional to concn Solutes of low internal pressure cause a smaller decrease of $t_m$, occasionally preceded by an increase at low concns, and the decrease is always smaller (particularly at low concns) than the amt calcd by assuming the thermal expansion curves of water and solute additive The difference is attributed to the internal soln pressure's ($K$) being smaller than that of water, which affords a basis for the calcn of $K$ It is pointed out that $\Delta\sigma/\Delta x$ ($x$ = concn) has the same sign as $\Delta K/\Delta x$ For substances of high $K$, $\Delta\sigma/\Delta K$ ranges between 13 and 72, while for substances of low $K$, $\Delta\sigma/\Delta K$ takes values in the range 5000-70,000 This contrast is connected with the well known fact that substances lowering $\sigma$, which conc

in the surface layer, effect a much greater abs. change than those that tend to keep away from the surface, raising $\sigma$ L. Onsager

Viscosity of electrolytes. W E Joy and J H Wolfenden *Nature* 126, 994–5 (1930).—The viscosities of dil aq solns. of KCl were measured at 18° in both silica and glass viscometers. The results in glass indicate viscosities greater than that of pure water for concns up to 0.025 *N*. When extrapolated to zero concn the curve agrees with the predictions of the Dole Falkenhagen equation. The results with the silica viscometers are less concordant but agree in general with those with glass. W W Stifler

The measurement of electrolytic resistance by the barretter method. J. Schiele and M Wien *Ann Physik* [5], 7, 624–32(1930).—An oscillating circuit of 10,000–100,000 hertzes is connected to a barretter for measuring resistance of electrolytic solns. The barretter is a d. c. bridge that is shielded from the high frequency circuit with choke coils and condensers. The effects of increase in the applied potential, of strong and of loose coupling, and of thin and of thick platinizing of the electrodes are shown. The limit of precision with the Kohlrausch method, using a telephone, is 30 sq. cm. ohm, by the barretter method, 1 sq. cm. ohm. G M Murphy

The measurement of the conductance of electrolytes. III. The design of cells. Grinnell Jones and Giles M Bollinger *J Am Chem Soc* 53, 411–51(1931), cf. *C. A* 23, 4613.—Data are given that confirm the observation of Parker (*C A* 17, 2382, 3440) that the ratio of the resistance of 2 conductance cells when filled with a common soln. is not independent of the sp. conductance of the soln. used. In addn. to the error due to polarization, there is a capacitative shunt between parts of the cell of opposite polarity which makes the measured resistance too low. New cells are designed which give results reliable within 0.01%. John R Hill

Conductivity measurements and titrations. A contribution to their technic. Friedrich L. Hahn *Z Elektrochem* 36, 989–91(1930).—A Cu–Cu$_2$O–Pb detector is used as a rectifier and a galvanometer as a null instrument in cond. measurements. The method is fast and accurate and is especially adaptable to titrations. H F J

Reduction potential of quadrivalent to tervalent iridium in hydrochloric acid solution. Sho-Chow Woo *J. Am Chem Soc* 53, 469–72(1931).—The reduction potential at 25° is 1.021 v. for the reaction $IrCl_6^{---} = IrCl_6^{--} + E^-$. The solns. were 0.1 *f* in HCl and the concns. of the 2 ions of the reaction between 0.002 and 0.008 *f*. The free energy decrease is —23,540 cal. and the temp. coeff. between 25° and 20° is +0.00098 v. per degree, which makes $\Delta H$ = —30,400 cal. John R. Hill

The electrolytic reduction of acid solutions of vanadium. F. Foerster and F. Böttcher. *Z. physik Chem.*, Abt. A, 151, 321–400(1930).—The purpose of this investigation was to find out to what degree the reduction of V solns. is similar to solns. of Mo. E. m. f. measurements were made on equal mixts. of V solns. of different states of oxidation at various acid concns., with electrodes of Pt, Ir and Au. On platinized electrodes the first stage of reduction runs smoothly, but the second stage encounters considerable polarization so that H may be evolved. On bright Pt the first stage of reduction forms a diaphragm on the cathode, thereby producing polarization. As was the case with Mo this diaphragm consists of difficultly sol. products of hydrolysis. Au cathodes act similarly to Pt ones. Malcolm Dole

An effect of the breadth of junction on the electromotive force of a simple concentration cell. Geo. Scatchard and T. F. Buehrer. *J. Am Chem. Soc.* 53, 574–8 (1931).—The e. m. f. of HCl concn. cells increased a few hundredths of a mv. when the liquid junction was made very thin. Flowing junction electrodes were used. This increase is greater than would be calcd. from the Debye-Hückel theory and is probably caused by the change in temp. in the boundary layer resulting from the heat of mixing of the 2 solns. John R. Hill

The quinhydrone electrode. I. J Livingston R. Morgan, Olive M Lammert and Margaret A. Campbell. *J Am Chem Soc* 53, 454–69(1931).—A comprehensive study of the quinhydrone electrode was made to det. its reproducibility in 0.1 *N* HCl under different conditions. Flaws in metal electrodes were the sources of the greatest error. A method of making, cleansing and testing these which minimizes breakage is described. The effect of the size, compn., form, condition and age of the metal electrodes, with and without the use of Hg as a connecting medium, is reported. The purity and amt. of quinhydrone do not appreciably affect the results if the concn. is not too low. Stirring the solns. is recommended when feasible. II. Olive M. Lammert, J. Livingston R. Morgan and Margaret A. Campbell. *Ibid* 597–604.—The effect of N on the reproducibility of the quinhydrone electrode in 0.1 *N* HCl was detd. Better results

were obtained when N was passed through the solns. Equil. was attained more rapidly with electrodes prepd. with N than with air. F. W. Marsh

Effect of various manganese compounds on the quinhydrone electrode. S. Oserr and H. Kashihara. *J. Sci. Soil and Manure* 3, 4(1929); *Proc. Intern. Soc. Soil Sci.* 5, 104(1930). —The presence of oxides of Mn ($MnO_2$ and $Mn_2O_3$) in small proportions (0.001 and 0.005%, resp.) caused inaccuracies in $p_H$ measurements with the quinhydrone electrode. In soils known to contain Mn, however, no significant differences in $p_H$ values as detd. by H and quinhydrone electrodes were observed. B. C. A.

The potential of the cadmium electrode. Frederick H. Getman. *J. Phys. Chem.* 35, 527–37(1931). —Single crystals of Cd function as const. and reproducible electrodes, but give potential values that are uniformly greater than electrodes of the polycryst. form. A revision of the normal electrode potential of Cd gives the value, $E_0 = 0.225$ v. Malcolm Dole

The potential of passive iron. A. Travers and J. Achery. *Compt. rend.* 192, 161–3(1931). —The e. m. f. of Fe in $Na_2SO_4$ solns. of different $p_H$ values and in various oxidizing agents was detd. The values vary considerably with the conditions and time, finally becoming const. There are degrees of passivity and the oxide-film theory is not generally applicable. V. F. Hanson

The passivity of chromium. I. Erich Müller and O. Essin. *Z. Elektrochem.* 36, 923–7(1930). —Electrolytic Cr is passive at 0° in N HCl, HF, HBr, $H_2SO_4$, $HClO_4$, $H_3PO_4$, and $HNO_3$. In the first 4 of these acids the metal becomes active when the acid is warmed, and each acid has a definite characteristic activation temp. that is proportional to the diam. of its anion. In $HClO_4$ and $H_3PO_4$ the metal is not active at 100°. Passive Cr is made more noble by removal of adsorbed H, but when placed in the active acids the potential gradually rises with time until it is greater than the reversible H potential, without the loss of its passivity by the Cr. When Cr is cathodically polarized in active acids (except $H_3PO_4$) it suddenly becomes active at a definite potential and the potential increases immediately to that of the Cr, $Cr^{++}$ equil. The passivity of Cr is due to a layer of oxide, the pores of which are permeable to certain anions. H. F. Johnstone

Atomic reactions that are affected by inertia. H. v. Hartel and M. Polanyi. *Z. physik. Chem., Abt. B*, 11, 97–120(1930); cf. *C. A.* 22, 940. —The reaction of Na vapor with alkyl halides is accompanied by, at most, only a trace of luminescence. To show the dimensions of the Na alkyl halide flame a Na "resonance" lamp was used. $N_2$ or $H_2$ was used as the inert gas for the connection. The diam. of the flame is inversely proportional to the square root of the pressure of alkyl halide and at controlled pressures serves to measure the speed of reaction. With MeI reaction is practically instantaneous. With MeF it is slow and could not be measured. Series were also obtained with Na in Br, the speed being greater than with MeI. The same relative order is obtained with $PbCl_4$, $PbBr_4$ and $PbI_4$. Substitution of more halogens on a C increases the speed of reaction. Substitution of other groups for H increases the rate of reaction. The heats of activation of MeBr (3 cal.), MeCl (8 cal.), MeF(>20 cal.), can be correlated with London's theory, but that of $(CN)_2$ cannot. The reaction of Na vapor with $CCl_4$ tends to form NaCl instead of NaCN with increase of temp. The free $CH_3$ liberated in these reactions with alkyl halides reacts with $H_2$ at 300–500° to give $CH_4$ and H. Foster D. Snell

The reaction mechanism of the formation of hydrogen molecules from atoms. H. Senftleben and O. Reichenheim. *Physik. Z.* 31, 960–1(1930); cf. *C. A.* 24, 2033, 4980. —If $\alpha = c_1 n_a + c_2 + (c_3/n_a)$ ($n_a$ = no. of atoms, $c_1$, $c_2$, $c_3$ = consts.) then $\alpha$ must be a linear function of $n_a$ if the surface reaction can be suppressed. This was found to be the case. The values of $c_2$ at 60, 30 and 15 mm. Hg were detd. and the conclusion was reached that space collisions between 2 atoms and 1 mol. preponderate. The at. collision diam. was found to be 3.5 times as great for triat. collisions as for collisions between 2 atoms and 1 mol. In the latter case, the collision diam. is only slightly larger than the gas-kinetic one. Franz Ulrich

Kinetics of the polymerization of ethylene at pressures above one atmosphere. Forrest N. Pease. *J. Am. Chem. Soc.* 53, 613–9(1931). —The rate of polymerization of $C_2H_4$ was measured at 2.5, 5 and 10 atm. from 350° to 500°. Fifty % of the $C_2H_4$ may be polymerized to gaseous and liquid monoolefins without formation of more than 2% of H and satd. hydrocarbons. Butylene is concluded to be the primary reaction product. The reaction is of the second order and has an abnormally low temp. coeff. The mechanism of the anom. reaction is discussed. S. Leavitt

Polymerization and thermal decomposition of acetylene. P. Schläpfer and M. Buresch. *Helv. Chim. Acta* 13, 1125–31(1930). —Polymerization of $C_2H_2$ begins at

300°, but does not become rapid until 450°. Uncatalyzed spontaneous decompn. occurs only above 500° Polymerization was carried out in glass tubes and the reaction velocity at various temps was measured by the decrease in pressure that accompanies polymerization At 420° the pressure decreased 110 mm in 0.5 hr and 590 mm in 5 hrs., when gas analysis showed that 71.5% of the $C_4H_2$ had disappeared Polymerization proceeds in the homogeneous phase and the reaction probably is bimol Increased glass surface (10–100 times) has little effect on the reaction velocity, but catalysts such as Cu accelerate, while Fe powder or C (from $C_4H_2$) retards decrease in pressure Polymerization products could not be isolated The temps and pressures at which explosive spontaneous decompn of $C_2H_2$ takes place were detd Below 530°, no deflagration occurs at pressures under 3 atms at higher temps it takes place under much lower pressures (as 700° and 0.6 atms) C Fe and Fe oxide speed the relatively slow non-explosive decompn but retard the explosive decompn especially at higher temps Although deflagration occurs as low as 590° at approx 1000 mm in the absence of C and Fe, in their presence it does not occur at 1960 and 2400 mm., resp Impurities usually present in crude $C_2H_2$ have no appreciable effect on the spontaneous decompn., but the presence of small quantities of O causes deflagration at much lower temps With increasing amts of O, explosive decompn occurs less readily and spontaneous combustion (oxidation) more readily A Wieben

**The thermal decomposition of nitrogen pentoxide at low pressures.** J H Hodges and E F Linhorst *Proc Natl Acad Sci* 17, 28–32(1931).—Previous detns of this rate gave conflicting results The rate was detd at 35° and at pressures from 0.12 to 0.001 mm The reaction is unimol above 0.06 mm partial pressure of $N_2O_5$ Below this the rate decreases with the pressure and below 0.004 mm the reaction appears to be bimol V T Harrington

**Equilibrium diagrams of the aluminum–manganese, copper manganese and iron–manganese systems.** Torajiro Ishiwara *Science Repts Tôhoku Imp Univ* 19, 499–519(1930).—By thermal analysis, elec resistance measurements, dilatometric and magnetic analyses, new and corrected equil diagrams of the Al-Mn, Cu-Mn and Fe-Mn binary systems are set forth Fifty six photomicrographs are reproduced Curtis L Wilson

**The equilibrium iron-iron carbide-oxygen.** P Pingault *Compt. rend.* 192, 45–7(1931).—The Fe-C-O diagram is completed by detg the curve representing the equil. between Fe and $Fe_3C$ in mixts of CO and $CO_2$ In the app used the gas was passed continuously through a closed circuit The 50-cc samples were analyzed chemically with an accuracy of more than 0.5% The Fe was used in the form of fine wire which made it possible with a small wt of material to fill the whole tube and obtain a rather large reaction surface The expts were carried out at atm pressure To insure having no false equil due to passive resistance, Fe was carburized in a mixt rich in CO and decarburized in a mixt rich in $CO_2$ Analysis showed that the 2 methods gave the same results at the same temp When a mixt of Fe and C was kept in a limited quantity of O the results varied with the temp above 740° $Fe_3C$ was formed and $CO_2$ in the gaseous phase varied from 0 to 28% between 740° and 700°, the proportion of $CO_2$ was 28–42%, and $Fe_3C$ was oxidized to Fe and CO, below 700° the content of $CO_2$ became sufficient to oxidize Fe. The following calcns were made between 700° and 1000°, $CO_2 + Fe_3C \rightleftarrows 3Fe + 2CO - 14.5$ cals., $3Fe + C \rightleftarrows Fe_3C - 27.5$ cals. L K

**Notes on catalysis.** A. Beyer. *Tiba* 8, 1287–97(1930).—A general review of catalytic reactions, enumerated in chronological order, and of the various theories which have been proposed to explain catalysis A Papineau Couture

**The heat capacities at low temperatures of manganese sulfide, ferrous sulfide and calcium sulfide.** C. Travis Anderson. *J Am Chem Soc* 53, 476–83(1931).—Heat capacities were detd for MnS, FeS and CaS between 60° and 300°K. The values obtained for entropy are compared with related thermal data found in the literature. R. H Lambert

**The heats of combustion of methane and carbon monoxide.** Frederick D. Rossini. *Bur. Standards J. Research* 6, 37–49(1931).—With the app that was used in detg the heat of formation of water, the heats of combustion of $CH_4$ and CO were measured For 25° and a const. pressure of 1 atm., the values per mole are, resp., 890,160 ± 300 and 282,890 ± 120 *international joules*, 212,790 ± 70 and 67,623 ± 30 g-cal. F. D Rossini

**The heat of mixing in molten metals.** Masuo Kawakami. *Science Repts Tôhoku Imp. Univ* 19, 521–49(1930).—A continuation of previous expts (cf *C. A.* 22, 718) With similar or slightly modified app 25 binary systems were investigated. The at. heats of mixing for 12 systems having intermetallic compds existing up to the

liquidus were without exception pos and reached a max. at the compn. of the compd. as given Sn–Mg (at 800°), value of $Q_{max.}$ = +3420 cal for 63 3 at. % Mg, Bi–Mg (800°), $Q_{max.}$ = +3050 cal, 55 4 at. % Mg, Pb–Mg (800°), $Q_{max.}$ = +2410 cal, 61 6 at % Mg, Zn–Mg (800°), $Q_{max.}$ = +1520 cal, 39 5 at. % Mg; Cd–Sb (800°), $Q_{max.}$ = +829 cal, 46 7 at % Sb, Mg–Al (800°), $Q_{max.}$ = +1130 cal., 47.8 at. % Al Al–Ag (1050°), $Q_{max.}$ = +1212 cal, 74 1 at. % Ag, Mg–Ag (1050°), $Q_{max.}$ = +3050 cal, 46 1 at. % Ag, Sb–Ag (1050°), $Q_{max.}$ = +1192 cal, 71 6 at. % Ag, Sb–Cu (1200°), $Q_{max.}$ = +903 cal, 57 4 at. % Cu, Al Cu (1200°), $Q_{max.}$ = +4880 cal., 62.2 at. % Cu, Sn–Cu (1200°), $Q_{max.}$ = +1077 cal, 71 4 at. % Cu Because the heat for Sn–Cu was pos and a max at the conen $Cu_6Sn_5$ it was thought that this compd should persist up to the liquidus Eight systems having no intermetallic compds. up to the liquidus showed neg heat effects Bi–Sb (800°), $Q_{max.}$ = —309 cal, 48 6 at % Sb, Sn–Al (800°), $Q_{max.}$ = —1630 cal, 59 8 at % Al, Zn–Al (800°), $Q_{max.}$ = —1215 cal., 48 6 at. % Al, Bi–Ag (1050°), $Q_{max.}$ = —1078 cal, 59.8 at. % Ag, Pb–Ag (1050°) $Q_{max.}$ = —1680 cal, 60 5 at. % Ag, Pb–Cu (1200°), $Q_{max.}$ = —2030 cal., 52.3 at. % Cu; Bi–Cu (1200°), $Q_{max.}$ = —1650 cal, 56 4 at % Cu, Ag–Cu (1200°), $Q_{max.}$ = —1105 cal, 50 3 at % Cu Three exceptions were found, of which 2, Pb–Sb (800°), $Q_{max.}$ = +107 cal, 45 3 at % Sb, and Sn–Sb (800°), $Q_{max.}$ = +1182 cal, 55 7 at. % Sb, were attributed to the presence of Sb, which, like Bi (see *C. A.* 22, 718), has abnormal phys properties In the other exception, Sn–Ag (1050°), $Q_{max.}$ = +1260 cal, 67 9 at % Ag, the reliability of the equil diagram is questioned. The systems Cu–Au and Ag–Au showed very small heat changes and are offered as examples of ideal solns

CURTIS L. WILSON

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The relation of the viscosity of cellulose ester solutions and temperature (BERL, *et al.*) 23. The motion of ions and colloid particles in an electric field (PAINE) 3. Magnetic susceptibility of certain complex Mo compounds (RAY) 3.

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**Measuring $p_H$ values.** SOLOMON F. ACREE. Fr. 694,936, May 1, 1930. A stable buffer standard of H ion concn. is composed of an acid alkali metal salt of a dibasic org. acid the anion and cation of which have equal ionic mobility, *e. g.* acid Na phthalate mixed with very pure water. An alkali metal carbonate and an indicator, the latter being preferably regulated so as to be isohydric with the acid Na phthalate, are also present.

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## 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

**Radioactivity and the thermal history of the earth.** ARTHUR HOLMES. *Naturwissenschaften* 19, 73–9(1931).—A review with numerous references on the cooling process of the earth. B. J. C. VAN DER HOEVEN

**Interaction of free electrons and radiation according to Dirac's theory of electrons and quantum-electrodynamics. I.** TAMM. *Z. Physik* 62, 545–68(1930).—Math. The Klein–Nishina formula is deduced. Transitions between neg. energy levels are essential to the scattering formula. A simple method for calcn. of the wave function of a free electron is given. B. C. A.

**Proper energy of an electron on the quantum theory of scattering.** I. WALLER. *Z. Physik* 62, 673–6(1930); cf. *C. A.* 25, 23.—Math. The difficulty of an infinite proper energy of a free electron in an electromagnetic field is discussed with the use of Dirac's relativity and non relativity dynamics. B. C. A.

**Mechanics of photons.** V. FOCK. *Compt. rend.* 190, 1399–1401(1930).—A math. development is given of the mechanics of a photon by treatment of Maxwell's equations in a manner corresponding with the wave motion of a photon (light quantum). An equation for a single photon is deduced and extended to a number of photons by application of Dirac's method of "posterior" quantification. The reasoning may be applied to the deduction of Einstein's law of energy fluctuation and to the laws of the interaction of matter and light. B. C. A.

**Undulatory theory of quantum phenomena.** L. DÉCOMBE. *Compt. rend.* 190, 1385–7(1930).—The author's theory (*C. A.* 24, 1575), when applied to band spectra, indicates that the Deslandres spectral term (*C. A.* 24, 3950) is attributable to ionic oscillations about the center of gravity of the mol. With the assumption of a const. *H* for the proton, analogous to the electronic quantum const. (*h*), it is shown that there is resonance between the 2 rotatory frequencies of the spinning proton and electron. B. C. A.

**Application of group theory to the quantum dynamics of monatomic systems.** CARL ECKART. *Rev. Modern Physics* 2, 305–80(1930).—The math. principles of finite group theory are discussed with special reference to quantum dynamics. The general theory includes discussion of invariant manifolds, Schur's lemmas, perturbation theory, multiplication of groups and orthogonality relations. The applications are concerned with complex at. spectra and include the method of sums, selection principles, alterna-

tion rule of multiplets, the permutation group and the Pauli principle The influence of external fields is considered for the Zeeman and Stark effects Mol spectra valence and electron conduction are not discussed G M MURPHY

**Magnetic susceptibility of certain complex molybdenum compounds.** PRIYADA RANJAN RAY *J Indian Chem Soc* 7, 741–3(1930) —The mass susceptibilities of 5 complex coördination compds of quinquevalent Mo were measured at 20° The results ranged from $\chi_m = 2\,435 \times 10^{-6}$ for $(C_5H_5N)_2MoOCl_4$ to $\chi_m = 1\,140 \times 10^{-6}$ for $(C_5H_5N)_2MoOBr_4$ The corresponding Weiss magneton nos are 8 093 and 7 257, and in every case the nearest Bohr magneton no is one These results do not agree with Bose's rule for the magneton no and a table of possible electron arrangements to account for the anomaly is given It is also suggested that the magnetic behavior of Mo may be masked by that of the org radical W W. STIFLER

**The motion of ions and colloid particles in an electric field.** H H. PAINE *South African J Sci* 27, 11–22(1930) —An address, in which the analogy between ions and colloid particles as concerns their elec structure, is discussed from the standpoint of the Debye Huckel theory C F. P. JEFFREYS

**The presence of hydrogen ions among the positive thermions as usually obtained. III. Catalytic hydrogenation.** OTTO SCHMIDT. *Z physik Chem*, Abt A, 152, 269–83(1931) —Theoretically it appears impossible to form $H^+$ by thermal emission S finds exptl proof of this and so all theories of hydrogenation as an ionic reaction in the gas phase are invalid This does not preclude the possibility of such reactions in the metal phase The app is described and data are given V F HARRINGTON

**Measurements on the Langmuir dark space.** A GÜNTHERSCHULZE *Z. Physik* 62, 619–23(1930) —The Langmuir dark space which surrounds an electrode maintained at a neg potential, with respect to a region in which a discharge is maintained, is due to the relative inefficiency of pos ions in producing new ions on collision and is accompanied by a pos space charge The dimensions of this dark space can be calcd., provided certain conditions are fulfilled, by the simple form of the space charge equation Expts have been carried out in H He Ne and A in which the above mentioned conditions are approx fulfilled a fairly satisfactory agreement exists between the observed and calcd dimensions of the dark space B C A

**Wave length of x-rays.** T H LABY AND R BINGHAM *Nature* 126, 915–6(1930) —By means of a plane glass grating of 10 800 lines to the inch, a vacuum spectrograph and x ray tube with graphite target in the same vacuum, it was found that the carbon *K* line could be photographed from the 18th neg to the 13th pos order With very small dispersion the carbon *K* line was compared with Cu $L_\alpha$ and $L_\beta$ in their 2nd and 4th orders the wave lengths 44 7 and 44 8 A U being obtained for the C line relative to 13 32 for the Cu $L_\alpha$ line Al $K_{\alpha_{1,2}} = 8\,315$ A U relative to Cu $K_{\alpha_{1,2}} = 1\,5392$ A U C F P JEFFREYS

**Electron emission by collision of positive ions at low gas pressures.** A. GÜNTHER SCHULZE *Z Physik* 62, 600–6(1930) —The efficiency of pos ions for the liberation of electrons has been examd at a Cu surface acting as a subsidiary electrode adjacent to a low voltage arc in A, Ne and He, the pressure ranges being 0 0017–0 0036, 0 0126–0 0156 and 0 019–0 026 mm , resp The efficiency is of the same order in all these gases and increases from about 10 to 30% as the potential of the subsidiary electrode is increased sevenfold B C. A

**The emission of positive electricity from palladium.** FR GULBIS *Acta Univ Latviensis, Mat un Dabas Zinatnu Fakult* Serija I, Fasc. 1 Burtnica, (in English 51–66)(in Lettish 67–8)(1931) —G investigates the pos (thermionic) emission of Pd in order to det the decay of emission with time and the effect of occluded gases and dirty surfaces The app used consisted of a loop of pure Pd wire surrounded by a cylinder of Pt foil, electrically connected to an electrometer The 2 electrodes were enclosed in a pyrex bulb attached to a vacuum pump and an auxiliary spark gap for testing the reduced pressure The Pd electrode was removable for cleaning The values detd. for the decay of emission with time were not found to agree with the equation $s - s_0 = Ae^{-kt}$, but they more nearly agreed with the expression $st = K$ Attempts to revive the Pd by admission of dry air or $H_2$ for several hrs were unsuccessful, but contact with $H_2SO_4$, HCl, $H_2O$, LiOH, $Li_2O$ grease and dust particles gave various increases in the emission Immersion of the Pd wire in toluene or xylene caused no increase in emission The theory is advanced that the pos emission of metals is due to some "active matter" which is widely distributed and which can be transferred from one body to another The ions of the "active matter" are thought to be bound in the metal in such a way that a definite energy is required for their liberation The process of emission is unknown but is maintained by itself and decays with time Temp is only a promoter of it H W L.

**Oxygen films on tungsten. I. A study of stability by means of electron emission in presence of cesium vapor.** I. Langmuir and D. S Villars *J. Am Chem. Soc.* 53, 486-97(1931), cf. *C. A.* 19, 931 —W filaments in the presence of Cs vapor emit more electrons than the pure W filament Up to 640°K at which emission is many billion-fold that of pure W the Richardson equation, $i = AT^2e^{-b/T}$, is valid in the presence of Cs vapor If O is admitted to activate the filament by forming a W O Cs surface the emission is greatly increased and the Richardson equation is valid to much higher temps A theoretical discussion of results and a description of exptl methods are given with suggestions for their application to the study of the loss of O from films on W and its detection in a gas A Lloyd Taylor

**γ-Rays in the power field.** Robert T Muhl and Charles S Barrett *Power* 73, 410-2(1931) —The penetrative limit of γ rays through steel is about twice that of x rays The expense of radiographs taken with γ rays may be less than of those taken with x rays since Ra capsules may be rented and are easily portable D B Dill

**An attempt to demonstrate the existence of short-range α-particles from radium C.** G H Henderson and J L Nickerson *Proc Trans Nova Scotian Inst Sci* 17, 250-8(1930) —An attempt was made to detect short range particles from Ra C by the Wilson chamber method but no group of particles of definite range could be detected above the general background Rachel Brown

**The rate of flow of heat of some radioactive minerals.** A Doradialska *Bull intern acad Polonaise* 1930A, 42-9(in French) —See *C. A.* 24, 1280 J W

**Application of an adiabatic microcalorimeter for measurements of rates of flow of heat of uranium, thorium and radioactive minerals.** A Doradialska *Bull intern acad Polonaise* 1929A, 487-96(in French) —See *C. A.* 24, 2012 J W

**Photographic effects of γ-rays.** J. S Rogers *Proc Phys Soc London* 43, Pt I, 59-67(1931) —γ-Rays from Ra and Rn in equil with their short lived products were collimated between Pb blocks and allowed to fall on Agfa duplitized film Besides the direct beams, rays filtered through lead screens, varying in thickness from 0.19 to 4.03 cm., were used The densities of the traces on the films were measured with a Moll microphotometer Results are given for the variations of photographic density both with time and with intensity of radiation The shape of the characteristic curves was found to be independent of filtering Similar results were obtained for the Hurter-Driffield curves, except when no lead filter was used The absorption coeff of Pb was found to be 0.533 cm$^{-1}$ for thicknesses from 1 to 7 cm W W. Stifler

**Ionium in dispersed masses of Tyuya-Muyun. Description of the method of preparation of a solution for its determination.** I D. Kurbatov, N. A. Karzhavina and N. A. Samoilo *Compt rend acad sci U R S S* 1930A, 69-74 —In certain ores of Tyuya-Muyun, Ra is shown to be present in excess of the amt. in radioactive equil. with U. It is assumed that this is due to the presence and transformation of Io As there is no direct method for detn of Io an indirect method was devised to solve the problem whether Io is in excess of the equil ratio of Io:U. The sample was fused with $Na_2CO_3$ and a Ba salt Ra and Ba were sepd as sulfates The initial amt. of Ra and that resulting from transformation of Io were detd with a Wulf electrometer. The results confirmed the assumption Still another mineral deposit of Io and Ra probably exists in Tyuya-Muyun J. G. Tolpin

**Proportions of active elements in dispersed masses of Tyuya-Muyun.** I. D. Kurbatov. *Compt rend acad sci. U. R S S* 1930A, 452-8(1930) —Ra ore in Tyuya-Muyun consists of (*a*) active minerals contg Ra, (*b*) minerals that contain no Ra but exert no influence upon the soly of *a* in acids and (*c*) minerals contg no Ra and lowering the soly. of *Ra-contg minerals Only minerals of class a are discussed here* Most important of them is tyuya-muyunite, $CaO\,2UO_3\,V_2O_5\,xH_2O$, which is easily sol in dil. acids. Another Ra bearing mineral with entirely different chem properties is brass-yellow radiobarite. From disturbed radioactive equil it was concluded that other Ra-bearing minerals could be found in Tyuya-Muyun fields. For exptl work active dispersed masses were chosen Detn. of U and Ra showed an excess of Ra over the equil amt. from $0.23 \times 10^{-7}$ to $0.50 \times 10^{-7}$ for each g of U. The excess is explained as being due to sepn of Ra and Io from the ore in quantities in excess of the equil amt or to disturbance of equil on account of migration of the active element with the sepn. of a new mineral contg Ra and Io formerly present in U mineral In the second case the new mineral should be less sol than tyuya-muyunite. Exptl evidence tends to show the opposite At least 3 minerals in which Ra is being coned. are present in Tyuya-Muyun; (1) tyuya-muyunite where Ra is stored (U ⟶ Io ⟶ Ra); (2) radiobarite (Io ⟶ Ra), (3) dispersed $Fe_2O_3$ in primary ores (Io ⟶ Ra) J. G Tolpin

**Optics of x-ray reflection from crystals. V. Wide-angle diagrams. II** Sekmann *Ann Physik* [5], 7, 633–49(1930); cf. *C. A.* 25, 870 C. E. P. Jeffreys

**Studies in x-ray diffraction. I. The structure of amorphous carbon.** P. Krishnamurti *Indian J. Physics* 5, 473-86(1930) —X ray powder diffraction patterns were measured for amorphous carbon prepd from benzene, sugar, $C_2Cl_4$ and $CCl_4$, for active charcoal and for Acheson graphite. A strong scattering extending to an angle of 7° was observed for amorphous C which indicates that the C atoms are joined together in clusters of about 60 atoms of C per unit. II. Some colloidal solutions and liquid mixtures *Ibid* 489-98 —Aq. solns of starch, tannic acid and gum arabic show a strong scattering at small angles to the primary beams due to dissolved mols or micelles. The mol. wts. calcd. from the extent of the corona were 6200, 3134 and 2810, resp. The small angle scattering from AcOH disappears immediately on dilu. indicating a breaking up of mol. assocn. Mesitylene-cyclohexane, and ethyl phthalate benzene systems were also investigated. III. Aromatic hydrocarbons in the solid and liquid states. *Ibid* 543–58 —Acenaphthene, naphthalene, fluorene and phenanthrene show 2 rings in the liquid state while biphenyl, bibenzyl and stilbene show only one. An explanation for this is given based on the assumption of impedance to free rotation or vibration for compds. having *o*- and *m* substitution in the aromatic nucleus. The relation of the liquid diffraction patterns to crystal structure data is discussed. Malcolm Dole

**X-ray diffraction in heated liquids and in solutions.** V. I. Vaidyanathan *Indian J. Physics* 5, 501–21(1930) —This work was done to test the applicability of the Einstein-Smoluchowski theory of optical scattering to small angles of scattering with x rays. Since, according to this theory, the ratio of the intensity of the scattered to the incident beam must increase at high temps., the x ray scattering of a no. of liquids was examd. at high temps. With benzene the ratio is greater than the ratio of scattering in the optical region. The abs. values of the ratio for water and benzene at room temp. were calcd. theoretically and shown to agree well with the observed values. The origin of the inner and outer rings is considered. Since the inner halo intensity did not diminish with rise of temp. with assocd. liquids like phenol the conclusion is that the inner ring origin is not due to assocn. The theory of scattering by dissolved mols. is also discussed from a math. standpoint. Malcolm Dole

**Part-absorption phenomena of x-rays.** R. C. Majumdar *Nature* 127, 92 (1931) —Partly absorbed lines were observed with C, N and Al as the absorbing substances and the incident radiations from Fe $K_{\alpha_{1,2}}$, Fe $K_\beta$, and Ni $K_{\alpha_{1,2}}$. Cf. Ray, *C. A.* 24, 5608. H. P. Johnstone

**Influence of the form and polarity of molecules on the Röntgen spectrum of liquids. III. The appearance of two amorphous rings in substances whose molecules are probably disk-shaped.** J. R. Katz and J. Selman *Z. Physik* 66, 834–57(1930); cf. *C. A.* 22, 2881 —The Röntgen spectra of many fluid org. compds. have been observed and are found to consist of 2 "amorphous" rings sepd. by a zone of more or less diffuse light. Measurement of the rings gives data from which the structure of the mol. groups is inferred. The mols. are regarded as disks arranged in parallel layers very similar to a stack of coins, the stacks forming a space grating. This arrangement is disturbed by thermal excitation whereby the axes of the groups assume a random distribution and individual mols. may wander from one group to another. This is betrayed by a loss in distinctness of the rings in the Röntgen diagram. C. C. Kiess

**The intensity relations in the spectrum of a mixture of alkalies and the possibility of a quantitative spectrum analysis of these elements.** Horst Lucas *Z. anorg. allgem. Chem.* 195, 321–37(1931) cf. *C. A.* 24, 5663 —The arc and spark spectra of salts of Na and K mixed in various proportions were photographed together with a source of white light of known intensity distribution to study the possibility of making quant. spectrochem. analyses. It was found that the relative intensities of the lines, as detd. from microphotometer measurements, depended on the region of the arc under investigation. In the middle zone of the arc where the temp. and elec. field are lowest the spectrum of K is emitted with greater strength than that of Na. Detns. of the relative concns. of Na and K from the line intensities were made with an accuracy of approx. 20%. As a by product of the investigation it was found that the relative intensities of the principal and subordinate series are 1 100. C. C. Kiess

**The disperaion of internal energy between the quartet and triplet terms $3sP$, $3pP$, and $3pD$ of the spectra of carbon, nitrogen, oxygen and fluorine in different stages of ionization.** J. Gilles *Compt. rend.* 192, 350–2(1931) —From a study of the sepns. shown by the triplet and quartet *P* and *D* terms of C, N, O and F, coming from the electron configurations $1s^22s^22p3p$ and $1s^22s^22p^33p$, resp., it was found that (1) in passing from the 4th to the 5th column of the periodic table the triplet sepns. are very

nearly 80 × 2 and 80 × 4 wave no. units; (2) from the 5th to the 7th columns the quartet sepns. are very nearly 80 × 3 and 80 × 5 units. C. C. Kiess

Investigations of the anomalous dispersion of excited gases. V. Negative dispersion in excited neon. H. Kopfermann and R. Ladenburg. *Z. Physik* 65, 167–88(1930); cf. *C. A.* 22, 2514.—The neg. dispersions of the Ne lines resulting from the $s_i - p_k$ combinations were measured by the method previously described (*C. A.* 22, 4264). With increase in strength of the current in the discharge tube the anomalous dispersions of all the lines terminating in the $s_i$ state increase in the same manner, but when the c. d. reaches 0.1 amp./sq. cm. the dispersions begin to decrease by amts. different for each line, depending on the atom density of each of the $p_k$ states. The no. of atoms in each of the $p_k$ states appears to reach a satn. value for a max. current of 0.7 amp., apparently because of the equil. between the atom densities of the various $p_k$ states and the exciting and neutralizing electrons. The sp. temp. for the $s$ and $p$ states derived from the measurements for max. current is approx. 23,000°. VI. Control experiments for demonstrating negative dispersion: absorption, anomalous dispersion, intensity distribution and intensity of different neon lines. R. Ladenburg and S. Levy. *Ibid* 189–206.—Expt. tests of the above interpretation of the anomalous dispersion of Ne lines is afforded by (1) the anomalous dispersion and absorption shown by lines resulting from combination of a $p_k$ state with a higher state, (2) the increase in intensity of the $s_i - p_k$ lines with increase in strength of the exciting current. Measurements of the anomalous dispersion and absorptions of the line at 7059 A. U. ($p_{10} - s_i''$) show that they increase markedly when the crit. current strength is reached and investigations of the intensity distribution within the red line at 6304 A. U. by means of the Fabry–Perot interferometer show that it is caused solely by a Doppler effect. A formula is derived for the intensity of a spectrum line affected by absorption within a finite gaseous layer. C. C. Kiess

Two remarks on the dispersion of mercury vapor. R. Ladenburg and G. Wolfsohn. *Z. Physik* 65, 207–8(1930); cf. *C. A.* 24, 5031.—(1) The new dispersion measurements in Hg vapor give a value of $1.14 \times 10^{-7}$ sec. for the life of the $^3P_1$ state. (2) The frequency corresponding to the limit at 1120 A. U. of the principal series of Hg has assocd. with it a large $f$ value (2.50). This is attributed to the first simultaneous jump of both valence electrons. C. C. Kiess

The variations in intensity distribution in a resonance spectrum. Ludwik Natanson. *Z. Physik* 65, 75–83(1930); cf. *C. A.* 24, 5226.—The resonance spectra of Te and Se, excited by light from a Hg lamp, were observed at different pressures. The spectrograms, exposed also to the light of a W-filament lamp, were microphotometered to study the changes in intensity in the members of the resonance spectrum caused by the change in pressure. For Te intensity changes were noted which could not be attributed to absorption of the resonance rays by the vapor itself. For Se, in which the doublets of the resonance series were resolved by the spectrograph employed, the long wave length component of each doublet was strengthened relative to the short wave component with increase in pressure, the effect of absorption being eliminated. C. C. K.

Quantized rotation of the potassium atom. R. G. Loyarte and R. Grinfeld. *Univ. Nacl. La Plata, Estudio Cienc.*, No. 89, 103–8(1929); *Science Abstracts* 33A, 645; cf. *C. A.* 24, 2669.—Williamson has published curves which show the stimulation of K atoms by electron shocks. These curves show that it is probable that there is a quantized rotation of these atoms. The crit. potential, which corresponds to the leap from level $n = 0$ to level $n = 1$, must be 3.39 v., which corresponds to a $\Delta\nu = 27{,}441$ cm.$^{-1}$. On spectroscopic testing, 23 Lines of the arc and spark spectra of K are found, obtainable by combination of a rotation-quantum leap with the electron leaps. Since the value $\Delta\nu = 27{,}441$ cm.$^{-1}$ is very large, it is not possible to find Lines for which to subtract the rotation-quantum leaps from those of the electrons, for such lines would be in the deep infrared, where measurements have not been made. The no. of combination lines within the observed region is, therefore, small. G. G.

Anomalous Zeeman effect. P. Drumaux. *Bull. assoc. ing. Elec. Electrotech. Montefiore* 7, 101–8, 142–58, 164–72(1929); *Science Abstracts* 33A, 678.—This paper, in 3 serial portions, gives a summary of the theory of the anomalous Zeeman effect. The 1st portion deals with the classical theory, the 2nd with the classical quantum theory and the description of the effect in different multiplets and the final portion gives the quantum-mechanics treatment, with the use of wave mechanics and the matrix mechanics of Heisenberg and Dirac. G. G.

Elementary theory of the Zeeman effect. J. Zahradníček. *Z. Physik* 62, 694–5(1930).—The Lorentz equations for the motion of a bound electron in a magnetic

field are best solved by the usual transformation of 2 real equations into one imaginary equation B C A

**The Zeeman effect of quadripole lines.** E. Segrè. *Z. Physik* 66, 827-9(1930) — The narrow doublet of K at 4642.17 and 4641.58 A. U. representing the transition $^1S - {}^1D$ results from quadripole radiation. The Zeeman effects of these lines have been observed in a field of 12,700 gausses and confirm not only the theory of Rubinowicz for the Zeeman effect of quadripole radiation but also the character of these lines as forbidden $S - D$ combinations C C Kiess

**The Stark effect of some helium lines in the visible part of the spectrum.** Karl Sjögren. *Z. Physik* 66, 377-88(1930) — The canal ray method of Stark was used to observe the displacements of visible He lines produced by elec. fields ranging from 175 to 350 kv./cm. Details of the measurements are given for the lines $2S - 3P$, $2S - 3D$, $2P - 4S$, $2P - 4D$, $2P - 4F$, $2P - 4B$, $2p - 4s$, $2p - 4d$, $2p - 4f$ and $2p - 4p$. C. C. Kiess

**Lithium-like spectra of carbon, nitrogen and oxygen, C IV, N V and O VI.** B. Edlén and A. Ericson. *Z. Physik* 64, 64-74(1930) — The spectra of C, N and O have been examd. in the extreme ultra violet, the vacuum spark method being used. The series of Li like doublets was obtained. For the fundamental term $2^2S_{\frac{1}{2}}$ for the different elements, the following values were obtained: C IV, 520, 220; N V, 789, 591; O VI 1,114, 200. These correspond with ionization potentials of 64.19, 97.428 and 137.482 v., resp. The term values for the complete series for Li I, Be II, B III, C IV, N V and O VI are compared. B. C. A

**C IV lines in the visible and near ultra-violet regions of the spectrum. The term system of C IV.** Bengt Edlén and John Stenman. *Z. Physik* 66, 328-38(1930) — With the terms of C IV previously described (preceding abstract) the lines which should appear in the near ultra violet and visible regions of the spectrum have been calcd. These lines and others belonging to C IV have actually been observed in the spectrum emitted by a condensed spark discharge between graphite electrodes in vacuum. These new wave length observations together with those in the extreme ultra-violet have permitted a redetn. of all the terms up to those with principal quantum no. 6. The $^1P$ terms follow Lande's formula for the doublet seprns. very closely, giving a value 1.82 for the screening const. $\sigma$. C IV is now the best representative of a Li like spectrum. C. C. Kiess

**The nuclear moments of $Li^6$ and $Li^7$.** Hermann Schüler. *Z. Physik* 66, 431-5 (1930), cf. *C. A.* 25, 249 — With a Perot-Fabry etalon and a Schüler lamp, the hyperfine structure of the Li II triplets, $2^1P_{0,1,2} - 2^1S_1$ at 5485 A. U., was photographed. Several discrepancies in the earlier measurements have been removed. The results do not agree with the calcd. nuclear moments, $i = {}^1/_2$ or ${}^1/_3$ but the latter is slightly favored. No splitting of the lines for $Li^6$ was detected. In case it exists, it cannot be more than ${}^1/_4$ as great as that for $Li^7$. G. M. Murphy

**The para-ortho splitting and the mean value of the *S*-terms of helium for higher quantum numbers.** Egil A. Hylleraas. *Z. Physik* 66, 453-70(1930), cf. *C. A.* 25, 1156 — Math. By a perturbation method, the term values for the *S* states of para and ortho-He are calcd. for higher quantum nos. A similar calcn. is made including the influence of the polarization of the atom core. The results are $E(n,0) = -Rh/(n - a)^2$, where $a = 0.176 \pm 0.054$, $0.22 \pm 0.07$, $0.219 \pm 0.079$ for calcn. without and with polarization effect and exptl., resp. G. M. Murphy

**The calculation of the spectra of ions.** Enrico Fermi. *Mem. accad. Italia, Classe sci. fis. mat. nat.* 1, No. 2, 10 pp. (1930) — F. first presents his general method of calcg. the statistical distribution of the electrons in an ion. The electrons surrounding the nucleus are treated as a cloud of electronic gas the d. of which is detd. statistically as a function of the distance from the nucleus. Next is given the calcn. of the elec. potential in the interior of an ion as a function of the distance from the nucleus. This makes possible the numerical calcn. of the energy levels, which procedure is exemplified by the calcg. of the *S* terms, or rather their Rydberg corrections, of the spectra of triply ionized atoms. Good agreement between calcd. and observed values is shown. R. H. Lombard

**The magnetic moments of atomic nuclei.** Enrico Fermi. *Mem. accad. Italia, Classe sci. fis. mat. nat.* 1, No. 1, 12 pp. (1930) — The hyperfine structure of spectra is due to the interaction between the motion of the electrons of the atom and the intrinsic magnetic moment of the nucleus. Methods are derived theoretically for calcg. this hyperfine structure of spectral lines. The magnetic moments of the nuclei of Na, Rb and Cs are deduced by applying these theoretical results to the experimentally detd. hyperfine structure of the spectra of these elements. R. H. Lombard

**Nuclear spin and the third law of thermodynamics. The entropy of iodine.** W. F. GIAUQUE *J Am Chem Soc* 53, 507–14(1931), cf *C A* 25, 867.—The value of $S_{298.1} = 27.9$ calorie/degree per mole of solid I obtained by extrapolation of existing data represents the abs entropy less the nuclear spin entropy. For gaseous I the combined translational, rotational and vibrational entropies consists of the abs entropy less the nuclear spin entropy and has a value as obtained from band spectra, $S_{298.1} = 62.29$ cal./degree/mole. The high temp. entropy effects due to nuclear spin in I are found to persist below 10°K., which is not the case for H. The *vapor pressure of solid I* is given by the equation, $\log_{10}P(\text{atm}) = -(3512.3/T) - 2.013\log_{10}T + 13.374$.
A. LLOYD TAYLOR

**Nuclear spin of nitrogen.** W. R. VAN WIJK. *Arch neerland sci. IIIA*, 13, 29–57 (1930).—In certain band spectra of mols. in which the atoms are identical, alternate lines are very weak or even missing. This is ascribed to the symmetry of the mol. and to resonance in the at. nuclei. The theory of this method of investigating the nucleus, by photometric measurements of the intensities of the lines in the band spectrum, is outlined with special reference to the $N_2$ mol. Exptl. details are given for work carried out on spectra emitted by the $N_2^+$ and the neutral $N_2$ mols. The ratio of the alternating intensities of the neg. bands at 3914, 3884, 4278 and 4237 A. U. was found to be 2:1. A Maxwell-Boltzmann distribution among the rotational levels was found. The ratio for the nuclear spin was confirmed by other measurements, including work on the resonance line of Th at 3776 A. U.
W. W. STIFLER

**The experimental assignment of the $H_2$ bands to the singlet and triplet systems.** W. FINKELNBURG. *Z Physik* 66, 345–9(1930).—A spectrogram of $H_2$ (obtained by Gehrcke and Lau) excited by streams of electrons of various velocities shows the same effect as that described for the singlet and triplet lines of Hg by Schaffernicht (*C A* 24, 5621). The lines which extend entirely across the spectrogram with undiminished intensity as the excitation energy increases are those belonging to the A, B and analogous bands of the singlet system. Those lines extending only part way across the spectrogram, fading out with increasing energy of the cathode rays, belong to the $\alpha,\beta,\gamma$ and $\delta$ bands of the triplet system.
C. C. KIESS

**Optical dissociation of diatomic molecules in gases and vapors. I. II. III.** G. H. VISSER. *Chem. Weekblad* 27, 237–41, 380–4, 390–3(1930).—A survey of recent work.
B. C. A.

**Analysis of the $S_2$ spectrum.** R. ROMPE. *Z Physik* 65, 404–29(1930).—This analysis of the $S_2$ spectrum includes (1) the bands classified by Rosen (*C. A.* 22, 2717, 23, 564) which are shown to represent a $^1\Sigma - {}^1\Pi$ transition, (2) the ultra violet bands described by Gilles (*C. A.* 23, 4406) which result from the term combinations $^1\Sigma - {}^3\Sigma$ (or $^1\Sigma$) and $^1\Sigma - {}^3\Pi$, (3) the resonance bands excited by the ultra violet rays of Hg. Five resonance series have been observed. These have been arranged into band schemes for which the corresponding anti-Stokes members have also been observed. The intensity distribution within the resonance series resembles that noted by Rosen for the fluorescence spectrum and deviates markedly from that required by Condon's theory. The effect of the addn. of a foreign gas, $N_2$ or He, to the $S_2$ vapor is to bring out more or less completely the band systems assocd. with the resonance series.
C. C. KIESS

**The emission bands of sulfur.** R. K. ASUNDI. *Nature* 127, 93–4(1931).—Spectrograms of the emission bands of S were obtained from discharge tubes contg. S vapor in the presence of high pressure A. New bands toward the red indicate that A helps in some way to prevent the predissocn. of the S mols. A few new bands degraded toward the shorter wave lengths were also obtained in the extreme ultra violet beginning from about λ2100 A. U.
H. F. JOHNSTONE

**Raman spectra of some triatomic molecules.** S. BHAGAVANTAM. *Nature* 126, 995 (1930).—Photographs of the Raman spectrum of $SO_2$ gas show a line with a wave no. shift of 1154, which differs somewhat from the strong line having the shift 1146 which was previously found in the Raman spectrum of liquid $SO_2$. The 2 fainter lines found in the spectrum of the liquid do not appear in that of the gas. Photographs of the spectrum of liquid HCN show a triplet with shifts of 2076, 2097.2 and 2122, the middle component being much stronger than the others. The results of Krishnamurti on $CS_2$ were confirmed and 3 new, very feeble bands at 4438, 4605 and 4680 A. U. were found in the spectrum of $CS_2$ excited by the Hg line at 4358.3 A. U.
W. W. STIFLER

**Raman effect and molecular structure. III. The basic frequencies of molecules of the type $XY_4$. Mixed halides.** B. TRUMPY. *Z Physik* 66, 790–806(1930), cf *C A* 25, 250.—The Raman spectra of $CCl_4$, $SiCl_4$, $TiCl_4$, $SnCl_4$, $SnBr_4$ and of mixts. of $SnCl_4$ and $SnBr_4$ in the ratios 1:1, 3:1 and 1:3, were observed. The measurements show that the tetrachlorides and also the tetrabromide all exhibit 4 basic frequencies, those of

$SnBr_4$ being displaced to longer wave lengths compared with those of $SnCl_4$. These observed frequencies are in good agreement with those calcd from a theoretical consideration of a mol having its outer atoms at the vertices of a tetrahedron. Two of the frequencies represent active oscillations and 2 inactive oscillations of the mol. The infra red absorption spectra of these compds., so far as known, correspond to the active oscillations and to combinations of them. The Raman spectra of the mixts show new lines in addn to those due to the constituent mols. The lines of the original mols are weak compared to those of the new mols, which are probably of the form $SnCl_3Br$, $SnClBr_3$ and $SnCl_2Br$. C. C. KIESS

**Apparatus for the demonstration of the Raman effect in liquids.** N. B. REYNOLDS AND F. BENFORD. *Rev. Sci. Instruments* 1, 413–6(1930).—A hot-cathode He lamp (of cylindrical shape) is used in conjunction with a Ni oxide glass filter (cf. Wood, *C. A.* 23, 5419). The lamp is surrounded by a reflector of elliptical cross section, the cross section of the lamp being concentric with one of the foci of the ellipse. Concentric with the other focus is placed the tube contg. the liquid to be examd. A hot-cathode Hg lamp has been similarly used. B. C. A.

**The Raman effect and the polymerization of water at various temperatures.** O. SPECCHIA. *Nuovo cimento* [N. S.], VII, 10, 388–91(1930).—At room temp. the Raman spectrum of water excited by means of a Hg arc over the range 4108 to 5790 A. U. gives 3 bands of greatest intensity at 4176, 4693 and 5158 A. U., and 2 much weaker bands at 4258 and 4480 A. U. The bands at 4176 and 4693 A. U. are composed of 3 components each. The effect of increase of temp. in modifying the band at 4176 A. U. was particularly studied. Measurements were made between 17° and 91°. A marked diminution of intensity of the 3 components of this band was noted with increasing temp., as well as a displacement toward greater wave length. L. T. FAIRHALL.

**The photochemical union of hydrogen and chlorine. I. The effect of light intensity.** ARTHUR J. ALLMAND AND EDWARD BEESLEY. *J. Chem. Soc.* 1930, 2693–708.—An extensive study to det. the relation between the reaction velocity and the intensity of light in the photochem. combination of $H_2$ and $Cl_2$. Thus, 405 mμ and 436 mμ monochromatic light over measured intensity ratios of about 180:1 and 440:1 resp., plane-polarized complex light over a measured intensity ratio of 4:1, and intermittent monochromatic light of wave lengths 313 + 303 mμ, 365 mμ, 405 mμ and 436 mμ are used. The light intensities are measured with a thermopile. They are varied in the expts. with the 405 mμ and the 436 mμ monochromatic light by 4 wedges of neutral tint and continuously varying density, with the polarized light by crossed Nicol prisms, and in the expts. using the intermittent monochromatic light by a rotating disk with 2 adjustable open sectors in opposite quadrants. The results show that the reaction velocity is proportional to the intensity of the incident light. The results of Baly and Barker (*C. A.* 24, 2385) are explained. J. BALOZIAN.

**The photochemical union of hydrogen and chlorine. II. The effect of wave length. Measurements with filtered light.** ARTHUR J. ALLMAND AND EDWARD BEESLEY. *J. Chem. Soc.* 1930, 2709–21.—The dependency of the quantum efficiency (γ) on the wave length (260–546 mμ), the relative temp. coeffs. for the lines 436 mμ, 405 mμ, 365 mμ and 313 + 303 mμ (comparative velocity measurements being made at 19.7° and 25.0°), and the simultaneous effect of 2 monochromatic rays are investigated in the photochem. reaction between H and Cl. The app. and methods are similar to those used in expts. of the preceding abstract, extra light filters (260 mμ and 546 mμ) being also used. With decreasing wave length, γ at first increases to a max. and then decreases rapidly in the ultra violet. The expts. show that between 313 mμ–436 mμ the temp. coeff. of γ increases with increasing wave length. In every case the simultaneous effect of 2 monochromatic rays is equal to the sum of their sep. effects. The threshold wave length for this reaction is found to be 546 mμ. J. BALOZIAN.

**The photo-reaction of hydrogen and iodine monochloride.** D. P. MELLOR AND T. IREDALE. *Nature* 127, 93(1931), cf. Rollefson and Lindquist, *C. A.* 24, 4224.—H and ICl react rapidly in strong light if the H pressure is large compared with the pressure of ICl. This indicates that conditions favor the greater probability of the reaction, $H_2 + Cl \longrightarrow HCl + H$, and that excited Cl atoms may not be necessary for it to take place. In thin glass bulbs the reaction between H and ICl is very slow in artificial light, more rapid in diffuse daylight, and very rapid in direct sunlight, $I_2$ and HCl being the main products. H. F. JOHNSTONE.

**Photo-reaction between hydrogen and iodine monochloride.** G. K. ROLLEFSON AND F. E. LINDQUIST. *J. Am. Chem. Soc.* 53, 1184–5(1931).—R. and L. point out that the results of Mellor and Iredale (preceding abstract) are not inconsistent with their

previous conclusions (*C. A.* 24, 4224), since their exptl. conditions were considerably different C. J. WEST

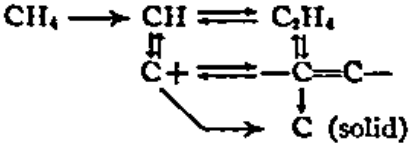
**Photochemical interaction of ethylene and ammonia.** HUGH S. TAYLOR AND HARRY J EMELEUS *J Am Chem Soc.* 53, 562-74(1931) —The photochem decompn of $NH_3$ in the presence of $C_2H_4$ and $C_2H_4$-$H_2$ mixts induces a polymerization of $C_2H_4$ at room temp to a liquid product. A formation of satd hydrocarbons is subordinate to this process The velocity of the reaction is independent of the $C_2H_4$ pressure over a wide range, and of $NH_3$ pressure when absorption is complete Conclusions are reached as to the efficiency of methods for producing satd hydrocarbons from $C_2H_4$ and at H C. E. P JEFFREYS

**Photochemical decomposition of hydrogen peroxide in aqeuous solution in presence of sodium nitroprusside.** I. M QURESHI. *J. Phys Chem.* 35, 656-8(1931).—An aq soln of $H_2O_2$ to which a few drops of Na nitroprusside soln are added is sensitive to the visible light, the decompn of the $H_2O_2$ continuing after the illumination ceases It is probable that the illumination produces some colloidal Prussian blue which acts as a catalyst for the dark reaction The course of the reaction was not followed quantitatively but this will be done later HARRY B WEISER

**The transfer of energy between atoms at collision.** OSCAR KNEFLER RICE *Proc Nat. Acad. Sci* 17, 34-9(1931) —Kallmann and London have considered the question of energy exchange between atoms and mols. at distances greater than those comparable with the at. or mol radii They neglected the relative translational energy of colliding atoms or mols A modification of Born's method for solving collision problems is outlined which takes into account the mutual kinetic energy of the particles and meets the objection of K and L (*C A* 24, 4696) to Frenkel's suggestion (*C A.* 24, 2052) V. F HARRINGTON

**The separation of two types of iodine molecule and the photochemical reaction of gaseous iodine with hexene.** R. M BADGER AND J W. URMSTON. *Proc. Nat Acad. Sci.* 16, 803-11(1930) —Since one type of I mol absorbs the Hg line 5461 and the other does not, an attempt at sepn has been made by causing the activated type to react with hexene vapor Indications, which are not conclusive, point to a partial sepn. J. B. AUSTIN

**The mechanism of the action of electrical discharge upon methane.** KURT PETERS AND O H WAGNER *Brennstoff-Chem* 12, 67-8(1931), cf *C. A* 23, 3861, 4326, 24, 2955, 5715, 25, 399, 645 —Spectrum analysis of the arc in the discharge tube before the color change observed upon increasing the elec. charge shows the bands of the —CH, N and —CN groups This is taken to show the progression in radicals from $CH_4 \longrightarrow CH_2 \longrightarrow CH$ Polymerized satd hydrocarbons are thus formed at low pressures and low charges while $C_2H_4$ and $C_2H_2$ are formed at high pressures Following the change from pale blue to yellow, bands of the Balmer series, the Swann spectrum with exception of group I, and the —C=C— and C+ groups were observed Solid hydrocarbons result from the reaction of —C=C— groups with reactive H The mechanism is indicated as




The relation between elec consumption, % in the final gas and the charge is shown graphically for $C_2H_2$ and $C_2H_4$ F. W. JUNG

**The ammonia discharge tube.** G. I. LAVIN AND J. R. BATES. *Proc. Nat Acad. Sci* 16, 804-8(1930), cf. *C. A.* 24, 3441.—The active gas reacts with ethylene to give cyanides and with O to give nitrides Solid surfaces show sp action. Cu and $Fe_2O_3$ extinguish the glow immediately. Sn, Ni, Fe, Pt, show an induction period. Mo and W produce little effect. J. B. AUSTIN

**Disadvantages of the quartz lamp in fluorescence analysis.** J. PLOTNIKOV. *Chem.-Ztg* 54, 582(1930) —The low light intensity, fragile nature, and monochromatic emission are mentioned, only those substances fluoresce under the lamp which can absorb radiation of wave length 366 mμ. B C. A

**Transmission changes in ultra-violet glasses during high-temperature exposure to light.** C. C. NITCHIE AND F. C. SCHMUTZ. *Science* 71, 590(1930).—When kept in contact with the hot tube of the Hg arc lamp (about 450°), certain glasses showed a marked increase in short-wave transmission. B. C. A.

**The absorption of ultra-violet rays by liquids transparent to light.** J. CLUZET

AND T. KOPMAN *Compt rend soc biol* 103, 783-5(1930).—A Cd photoelec. cell was used to measure the ultra violet light (3000-2300 A. U.) absorbed by several liquids transparent to visible light B. C. BRUNSTETTER

**Quantitative investigations on the absorption spectra of organic dyes.** J. AUŠKALNS. *Acta Univ. Latviensis Kim. Fakultat. Serija* 1(in German) 362-8(in Lettish) 279-301.—Absorption spectra of 70 org. dyes were measured with a Koenig-Martens spectrophotometer between 7200 and 4100 A. U. Values of the mol. absorption const. are given for each. The advantages of the quant. method are discussed. The Lambert-Beer law is valid for weak dye solns. in presence of small amt. of colorless inorg. compds. The results are discussed with regard to the relation between spectra and structure of the dye. The advantages of the color triangle are also discussed. G. M. MURPHY

**Effect of impurities on the phosphorescence of calcium sulfide.** D. N. GOYLE AND N. SINGH. *J. chim. phys.* 27, 433-51(1930).—The effect of adding up to 0.1% of eosin, fluorescein, quinine hydrochloride, methyl blue, $PbCl_2$, $Pb(NO_3)_2$, $CuCl_2$, $CuSO_4$, $Cd(NO_3)_2$, $CdSO_4$, $Ba(NO_3)_2$, $BaCl_2$, $Sr(NO_3)_2$ and $SrCl_2$ to CaS on the phosphorescence of the CaS was measured. The first 6 named gave a max. effect in concns. of about 0.003%, the highest value being obtained with quinine hydrochloride. Addns. of the other mineral salts gave minima in small concns., followed by maxima which were usually lower than the initial value. The intensity of the radiation decreased with age. The luminosity of CaS is explained by the equations: (1) $2CaS + 2H_2O \rightleftharpoons Ca(SH)_2 + Ca(OH)_2$, (2) $CO_2 + Ca(OH)_2 \longrightarrow CaCO_3 + H_2O$, (3) $H_2O + CO_2 + Ca(SH)_2 \longrightarrow CaCO_3 + 2H_2S$. $H_2S$ was detected by odor and by test with lead acetate. GERALD M. PETTY

**Thermoluminescence in glasses which contain two activators.** BYRON E. COHN AND WM. D. HARKINS. *J. Am. Chem. Soc.* 52, 5146-54(1930).—The thermoluminescence of a zinc borate glass caused by Ce and Mg alone and mixed in concns. up to 1% of each element was measured from 2600 to 3350 A. U. The effect of mixts. was not additive. Intensity measurements of the thermoluminescence indicate that the energy for thermoluminescence is drawn from near the edge of the absorption bands. Relative thermoluminescent intensity varies with the source of excitation. The data are presented graphically. GERALD M. PETTY

**Scattering of light by dielectrics of small particle size.** G. F. A. STUTZ. *J. Franklin Inst.* 210, 61-85(1930).—The diffusion of light by a dielec. material, Zn oxide, was investigated in the range of particle sizes where, with increasing particle size, Rayleigh scattering rapidly diminishes and reflection and refraction effects increase in importance. The turbidity max. for Zn oxide dispersed in water, detd. for 3 wave lengths of light, occurs at 0.25$\mu$ for the wave length 5500 A. U. and at smaller particle sizes for shorter wave lengths; the particle size of max. turbidity was found to be proportional to the wave length of the light in the range 4800-6300 A. U. An app. for detg. the angular distribution of the light scattered by a suspension of fine particles is described. The total observed intensity has not the same distribution as calcd. by Blumer (cf. *Z. Physik* 38, 304(1926)), the observed depolarization is in fair agreement with theory (cf. Lange, C. 1922, 2503-4). B. C. A.

**The acceleration produced by light of the flocculation of colloidal solutions in fluorescent media.** AUGUSTIN BOUTARIC AND JEAN BOUCHARD. *Compt. rend.* 192, 957(1931).—The effect of visible and of ultra violet light on the rate of flocculation of $As_2S_3$ and other sols by electrolytes in presence of fluorescein, eosin and erythrosin was studied. In all cases illumination decreased the time required for flocculation, the effect being greater in ultra violet than in visible light freed from infra red. $K_2SO_4$ and $H_2SO_4$, which inhibit the fluorescence of the dyes also suppress the effect of light. Light has no effect in the absence of fluorescent compds., and the dyes do not affect the sols in the dark. K. V. THIMANN

**Increased bactericidal effect of inorganic compounds in the presence of x-rays.** ROBERT J. NORRIS. *Bull. Basic Sci. Research* 3, 21-36(1931).—When bacteria are irradiated in solns. contg. NaBr, NaCl, NaI, $BaCl_2$, $HgCl_2$, $UO_2(NO_3)_2$, CsI or $Th(NO_3)_4$, the resulting lethal action is very much greater than that obtained by exposing the bacteria successively to x rays and to the salts previously irradiated with x rays, and is a true synergistic action. This action has previously been ascribed to ultra violet fluorescence or to emission of photoelectrons. Expts. are described which indicate that the synergistic action of the above salts is not due primarily to these factors. The expts. indicate that the synergistic action is independent of permanent chem. decompn. For Th salts, it has been shown that at the crit. voltage for the ejection of the $K$ electrons the resulting action is greatest, while theoretically the speed of the emitted $K$ electrons is at a min. at this voltage, and that at a higher voltage, at

which $K$ electrons are emitted at much greater speed, the action is much less A tentative explanation is based upon the theory that the toxicity of the ion is related to its ionic potential or state of ionization J A KENNEDY

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Röntgenographic investigation of the system Cd–Mg (DEHLINGER) 2. An attempt to separate the isotopes of Br (HARTECK, STRIEBEL) 2. A series of new tetrammine-cobaltic complexes (SARKAR, DAS-GUPTA) 6. Photoelectric cells in science and technics (LANGE) 4. Isotopes of K their association with plant life (DRUCE) 11D. Ultra violet absorption spectra of the quinoline group (HICKS) 10. Isotopes and living organisms (VERNADSKII) 11D

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Ergebnisse der exakten Naturwissenschaften. Band VIII. J. ESTERMANN Elektrische Dipolmomente von Molekülen. H SACK Dipolmoment und Molekularstruktur. Berlin J Springer Reviewed in *Z physik Chem* 152, 318(1931)

HUMPHRIS, F HOWARD Ultra Violet and Other Rays. London Macmillan 123 pp

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Electron-emitting compositions. ANTON LEDERER. Austrian 120,212, Sept 15, 1929 An electron-emitting compn comprises more than 2% of Th incorporated into a metallic carrier consisting mainly of Os, with or without difficultly fusible metals or alloys such as W The compn may be coated on a wire or the like of W, or a paste contg $ThO_2$, Os and a binder may be extruded to form a filament, which is then heated to a temp above the m p of Th, suitably in an atm of CO Addnl. details are given.

Ionizing gases. ERIC DUTT Fr 695,016, Aug 5, 1929 Gaseous currents are ionized to bring about chem reactions at ordinary temps in an elec. field produced by an alternating or pulsatory source of current the potential of which is not below 1500 v., so that the shocks of the ionized mols between themselves liberate a sufficient amt. of energy to produce the reaction The process may be used for the production of NO from N and O

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## 4—ELECTROCHEMISTRY

COLIN G FINK

The direct-current arc furnace. SIEGMUND SCHEY. *Giesserei-Ztg* 26, 583–7 (1929) —The elec. accessories of an elec. steel furnace are described C. L. W.

The high-frequency furnace in the steel mill. N. BROGLIO. *A. E G Mitt* 1931, 37–42 —The "coreless" high frequency furnace in which the charge (contained in the crucible) forms the core is described; it is used in an improved method of producing C and alloy steels The layout of the instrument panel and elec. connections is given A 300 kg charge of cold high-speed steel was melted and poured in 82 min. with a requirement of 720 kw hrs per ton C. J. B.

Use of electric furnace for the preparation of nonferrous alloys. K. OKIMOTO. *J. Fuel Soc. Japan* 10, 48–58(1931) —The use of an elec. furnace in place of a coke-crucible furnace in prepn of Cu alloys is recommended F I NAKAMURA

Photoelectric cells in science and technics. B LANGE. *Naturwissenschaften* 19, 103–7, 128–32(1931), cf. *C. A.* 25, 1435 —A review with many references.

B J C. VAN DER HOEVEN

Photoelectric control for soaking-pit covers. R. M BOYLE. *Elec. World* 97, 409(1931) —A Middle West plant has a soaking-pit control which makes use of a light-sensitive relay as the initiating source The moving crane carries only a foot-operated push button and a light box mounted on the end of the crane for each soaking pit spanned by the crane. The layout consists of 2 soaking pit cranes operating on a common runway and each spanning 2 pits Preparatory to opening a cover or during the operation the crane may be shifted 5 ft. on either side of the center line and the operating lamp-box will still be opposite the light relay for that cover To open the cover a single short flash of the lamps in the box is all that is necessary The circuit is self-maintaining. A simple transfer circuit permits the light ray to be alternately effective to open or close the pit cover. The light-sensitive cells respond only to coned light above the room illumination, leaving no danger of false operation. W. H. BOYNTON

Temperature compensation in electrolytes. E BLAMBERG AND K. MÜLLER. *Arch. Elektrotech.* 23, 435–40(1930); *Science Abstracts* 33B, 411.—The fact that the cond of an electrolytic cell varies rapidly with temp. as well as with concn. may be a disadvantage in some processes of deposition. The authors show how to proportion a

combined shunt manganin resistance and a series Cu resistance to compensate substantially for the effect of temp. G. G

Electrolytic cells for chlorine and caustic soda. C. L. Mantell. *Chem. Met. Eng.* 38, 88–90(1931).—Ten electrolytic cells for Cl—the Castner, Sorensen, Townsend, Harpreaves-Bird, Nelson, Allen-Moore, Rock-McRae, Gibbs, Wheeler, Vorce—are briefly described as to their constructional details, and compared. A table of operating data on the various cells has been tabulated from information furnished by users of the equipment. Yields of from 0.62 to 0.76 lb. Cl and 0.69 to 0.85 lb. NaOH per kw. hr. are in the range of com. practice. C. L. Mantell

Electrolytic iron. R. Dipeis. *Metallbörse* 20, 1529(1930).—A lecture reviewing the qualities of electrolytic Fe and the technical methods of its production. L. P.

A note on the preparation of silver-free copper. Bart Park. *J. Am. Chem. Soc.* 52, 3165–6(1930).—The last spectrographic traces of Ag were removed from Cu by electrolyzing a soln. of 4.0 g. $CuSO_4$ made up to 2 l. with 5% $HNO_3$ between Pt electrodes with 0.05 amp. at 7 v. The Ag in the 7 fractions of deposits removed at intervals of 1–24 hrs. was estd. by Nitchie's spectrographic method (*C. A.* 23, 1857). J. D. S.

Electrolytic gold plating with high current densities. H. Pawlek and K. Weiser. *Z. Elektrochem.* 36, 872–80(1930).—The compn. of the bath recommended for Au plating with high c. d. is 200 g. $K_4Fe(CN)_6$, 50 g. $HAuCl_4$, 50 g. anhyd. $Na_2CO_3$ and 1 l. of $H_2O$. The ppt. of basic Fe carbonate is filtered from the warm soln. and the clear filtrate serves as the electrolyte. The bath is used at 70° with rapid stirring. Gold anodes are used with the surface equal to or > that of the cathode. The cathodic c. d. is maintained at 4–6 amp./sq. dm., which corresponds to an e. m. f. of 1.2–1.5 v. when the electrodes are 4–6 cm. apart. A smooth Au plate is produced which does not require burnishing. At higher c. d. the plate is darkened. With the recommended conditions the cathodic current efficiency is equiv. to 150–190% and the anodic efficiency to 115–180%. A further study was made of the effect of varying the concn. of each of the components of the bath on the c. d.-anode potential curves. H. F. Johnstone

Electrogalvanizing wires and strips at high current densities. A preliminary communication. D. V. Stepanov, B. N. Karanov and N. T. Kudryavtsev. *Tsvetnye Met.* 1930, 1151–8.—Cold Zn plating has many advantages over the hot dip process, such as greater uniformity of the coating, steadiness of the bath, economy of Zn and easier control of the bath. The proposed methods of increasing the c. d. to hasten the process have serious drawbacks. The authors made about 300 expts. to find conditions essential for good results with high c. ds. Circulation of the bath permits higher c. ds. (200 to 400 amp./sq. dm.) than those used before. Different concns. of $ZnSO_4$, $H_2SO_4$, $H_3BO_3$ making up the bath were also studied, as well as the changes in the bath during the process and the suitable indicators. At 50 amp./sq. dm. it is necessary to add to a bath of 1000 l. 30 l. water, 1 kg. $H_2SO_4$ and 10 g. boric acid per hr. At 50 amp./sq. dm. the best temp. is 45°. At higher c. ds. the temp. should be higher. The problem of cooling the electrolyte which is heated by the current is solved by the application of air stirring; a formula is developed by which the equilibrium temp. suitable for the process can be calcd. Tables show the change of voltage with temp. and with the distance between the electrodes and a set of optimum conditions at c. ds. 50, 100 and 200 amp./sq. dm. J. G. Tolpin

Electrodeposition of lead-thallium alloys. C. G. Fink and C. K. Conard, Jr. *Metal Ind.* (N. Y.) 29, 116–7(1931).—See *C. A.* 24, 4989. G. G.

Polarographic studies with the dropping-mercury cathode. XVI. Electroreduction of acetaldehyde. I. Shikata. *Collection Czechoslov. Chem. Comm.* 2, 609–71 (1930), cf. *C. A.* 24, 5579.—The detection and estn. of aldehydes occurring in certain alc. beverages by their electroreduction potentials, with the dropping Hg cathode, have been previously described (Shikata and Tachi, *C. A.* 21, 1917; Shikata and Shoji, *C. A.* 22, 2895). The aim of the present work was the investigation of the mode of reduction of AcH in its pure solns., and its detn. in fermentation products. The reduction of the AcH was studied in solns. of Li salts or LiOH, since Li has the most neg. deposition potential of all cations at the dropping Hg cathode. AcH was found to be reduced at a cathode potential 0.50 v. more pos. than that at which Li is deposited from solns. of equal concn. as the AcH solns. Thus the reduction potential of AcH in a 1 M soln. is −1.60 v. The value of the reduction potential was uninfluenced by changes from a neutral to a weakly acid, or to a strongly alk., soln. Increasing acidity of the soln. hindered the electroreduction. A change in concn., c, of AcH produced a shift of the reduction potential, v, according to the formula $v = 0.060 \log c$ v. Math. analysis of the bend of the current voltage curve showed that $v = -0.060 \log i$ ($i$ = current), i. e., $= -(RT/F)\log i$. The value of the diffusion current in 0.001 M AcH solns. was

the same as those given by 0.001 *M* solns of Ba or Sr chlorides; it is, therefore, concluded that the electroreduction of 1 g mol of AcH requires the same amt. of electricity as is required to deposit 1 g equiv of Ba, *i. e.*, 1 Faraday. The probable reduction product is stated to be dimethylglycol. With this method it was found possible to est. the presence of 1 part AcH in 2 million to an accuracy of 10%. The results obtained were applied to the estn of AcH in EtOH samples and in various vinegars. In fermented vinegars 0.001–0.002% AcH were estd. polarographically, while in synthetic or pyroligneic vinegars no traces of AcH were found. E. B. SANIGAR

Anodic oxidation of acetic acid in sulfuric acid solution. RUDOLPH SCHREINER. *Z. Elektrochem.* 36, 953–63(1930).—In order to study the mechanism of the anodic oxidation of AcOH, solns. of oxalic, glyoxylic, glycolic, acetic and formic acids, HCHO and MeOH were electrolyzed, with a diaphragm, in 2 *N* $H_2SO_4$ at const. c. d. Oxidation potentials were detd., and the gaseous products were analyzed. The electrodes were Pt foil. In the AcOH series the main reactions are: $CH_3COOH \xrightarrow{+O} H_2COH\text{-}COOH \xrightarrow{+O} HC(OH)_2COOH \xrightarrow{-2H} (COOH)_2 \xrightarrow{-2H} 2CO_2$, and the side reactions: $H_2COH\text{-}COOH \xrightarrow{-2H} H_2CO + CO_2$ and $HC(OH)_2COOH \xrightarrow{-2H} HCOOH + CO_2$. In the MeOH series, the main reactions are: $CH_3OH \xrightarrow{-2H} H_2CO \xrightarrow{+O} HCOOH \xrightarrow{-2H} CO_2$, with $H_2CO \xrightarrow{-2H} CO$. The data are interpreted as suggesting the following general rules for anodic oxidation of org. compds.: (*a*) an increase in potential favors addn. of O over the removal of 2H; (*b*) in general, the removal of 2 H atoms from the same C is easier than the addn. of O; (*c*) the difficulty of H removal increases in the order —OH, —CH, —COOH; (*d*) the simultaneous removal of 2 H mols. attached to different C atoms (in the present case 1 H was always a member of —COOH) is possible only when the H atoms are at the end of a 6-membered chain. H. F. JOHNSTONE

Electrodeposition of chromium. B. RASSOW AND L. WOLF. *Chem.-Ztg.* 55, 73–6(1931).—An investigation of the com. prepn. "Chromprotekt," used as a protecting layer to prevent formation of chrome mists, is reported. Cf. *C. A.* 24, 4993. C. L. W.

The acute effects of chromic acid mists. L. SCHWARTZ AND F. SEIKE. *Zentr. Gewerbehyg. Unfallverhütung* 17, 232–4(1930).—Mists given off by Cr plating baths are the cause of ulcerations and other skin diseases among the employees. Of 233 persons examd., 42.6% had dermititus, ulcers or scars and 52% showed nasal changes; of these 37 had perforation of the septum, and 79 showed ulceration or devitalization of the mucous membrane. Ulcerations of the mucous membrane were seen after 2 weeks, and perforation of the nasal septum from 6 months to 4 yrs. The authors recommend exhaust ventilation or covering the surface with petroleum or some of the less dangerous homologs of $C_6H_6$. Objections to these methods are liability to fire hazard and $C_6H_6$ poisoning. GEORGE R. GREENBANK

Modern metal cleaning. LESLIE WRIGHT AND F. TAYLOR. *J. Electroplaters' and Depositors' Tech. Soc.* 6, 71–90(1931).—This paper is a survey of work which has been done by various experimenters upon the nature of soap solns. and the mechanism by which such solns. remove dirt. Various types of soaps, their alky., phys. properties and cleansing properties are reviewed. The evaluation of the alky. and of the detergent action of soaps is explained. The application of detergent materials to modern metal-cleaning practice is discussed. The authors are of the opinion that no one chem. cleaner is yet available which will satisfy all plating-shop requirements, so that scouring and mopping and subsequent acid dips to remove tarnish are likely to remain in general use. However, with large batches of material, which have passed through similar shop processes, a study of the grease and dirt accumulated during these processes makes it possible to devise a cleaning soln. best suited to the particular foreign materials to be removed. E. B. SANIGAR

High-voltage surge testing. F. D. FIELDER. *Elec. J.* 28, 161–4(1931).—The cathode ray oscillograph operation is outlined—the importance of the timing systems being emphasized. The 3-electrode gaps permit the operation of the Dufour type oscillograph for the cathode voltage within the one microsecond. The operation is simple and consistent when care is used in the circuit design and adjustment. In synchronizing circuits, the most complex system is the combination of the Dufour type oscillograph and single-sweep timing. The essential parts of the system are shown in a fig. W. H. BOYNTON

Developments in hydrogen-cooled condensers. C. J. FECHHEIMER. *Elec. J.*,

28, 165–9(1931).—Success of the $H_2$-cooled condenser is largely due to the development of many devices for making the machine safe. Features of the machine include (1) it has been made explosion proof, (2) an inert gas is used for scavenging when changing from air to $H_2$ or the reverse; (3) the internal pressure is automatically maintained above atm. pressure to prevent air entering; (4) various alarm signals are provided to inform the operator that the internal pressure or % of $H_2$ is low, or that any part of the machine or auxiliaries is not performing properly; (5) suitable indicating devices are provided for the gas, water, bearings, etc., in addn. to the usual elec. instruments. Brief descriptions of these devices are given. Several illustrations and a good bibliography are included. W. H. Boynton

Some comments on the use of "getters." George D. O'Neill. *Electronics* 2, 510–11, 528(1931).—The application of the following materials as "getters" or "clean-up" agents in various types of radio tubes is considered. P, Mg, Al, Misch metal, Ba, Ca, Li, active charcoal and cerium. M. McManon

Sensitizing the photoelectric cell. Richard Fleischer. *Electronics* 2, 518–9, 530(1931).—Four requirements of photoelectric cells are instantaneous response, linear relation between light intensity and resulting electronic current, sensitivity in the visible spectrum, and constancy. Data are given showing that to increase the sensitivity of the K layer in the photoelectric cell, the K in vapor form must be brought into contact with the gas ($H_2$ or inert gas) present in the tube. The K is vaporized by ionic bombardment. M. McManon

The cleaning of blast-furnace gas by electric precipitation; the Siemens-Schuckert system at the Falva Works of the Bismarckhütte. Hermann Bosse. *Stahl u. Eisen* 49, 1153–61(1929).—By elec. pptn. in 5 filter units, the suspended matter is sepd. from 14,000 cu. m. of blast furnace (cu. m. at 0°, 760 mm.) gas at a flow of 3.5 m./sec. The cleaned gas has a solid content of 0.01 to 0.02 g./cu. m. The d. c. at 65,000 v. is obtained by means of a transformer from an a. c. at 500 v. The moisture content of the gas is very important, if it is too low, the particles are not charged properly. The required moisture content of the gas depends also on the compn. of the gas, a high Zn and Pb content requires a higher moisture content. The gas temp. must be kept above the dew point, in order to prevent clogging of the equipment. There is a pre-cooler installed before the pptg. filters, where the gas is cooled by injection of water, followed by heating of the gas attained through combustion of part of the gas. The cost of the elec. pptn. is 1% of that of the wet mech. pptn. at the Falva Works. J. A. Scillard

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Electro-melted cement as a new building material in the chemical industry (Redzich) 20. The mechanism of the action of electrical discharge upon $CH_4$ (Peters, Wagner) 3. The hardness testing of electrodeposits (O'Neill) 9. Electric-furnace production of high heat-duty refractories (Schroeder) 19. Analysis of petroleum and its distillates for reducible substances and adsorbable matter by means of the polarographic method with the dropping-Hg cathode (Gosman, Heyrovsky) 22. Evaporation of electrolytic caustic soda (Lee) 18. Values from ores by leaching and electrodeposition (Brit. pat. 336,584) 9. Magnetic testing system for electric coils (U. S. pat. 1,792,249) 9. Electrodeposition of rubber (Brit. pat. 336,659) 30. Alloys for sealing to glass such as in vacuum tube and incandescent lamp manufacture (Brit. pat. 337,088) 9. Recovery of Zn from ferrite compounds in the electrolytic Zn process (Ohlinger, Nicoloff) 9

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Marti, Othmar K., and Winograd, Harold. Mercury Arc Power Rectifiers. New York: McGraw-Hill Book Co. 473 pp. $6. Reviewed in *J. Western Soc. Eng.* 36, 63(1931).

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Gas-ent for electric batteries. Pritchett & Gold & E. P. S. Co., Ltd., and H. M. Genese. Brit. 336,041, Aug. 9, 1929.

Manufacture of dollies for dry cell electric batteries. H. A. Bumke Ges. Brit. 337,001, April 8, 1929. Mech. features.

Manufacture of dollies for dry cell electric batteries. H. Blacher. Brit. 337,164, April 2, 1929. Mech. features.

Batteries. Otto Böhm. Ger. 513,805, Jan. 17, 1930. Details are given of fastening the electric storage cells together.

Storage batteries. Fritz Hentschel. Ger. 513,807, Feb. 23, 1930. A continuous process app. for filling dry battery cells with alk. electrolyte, comprising recessed wheels between which curved electrode strips and electrolyte are rolled, is described.

**Storage batteries.** Società Italiana Batterie Elettriche Chiloiro. Fr. 604,745, Apr. 29, 1926. Neg. electrodes are formed of sheets covered with a layer of Zn deposited electrolytically by means of an anode of Zn and in an electrolyte contg. alkali silicate.

**Storage battery with sulfuric acid electrolyte.** T. Stanbury. Brit. 336,113, Oct. 29, 1929. A $H_2SO_4$ electrolyte is gellified by adding 2 parts Na silicate to 5 parts of water, heating the mixt. and then adding it to 2 parts $H_2SO_4$ dild. with 5 parts of water.

**Storage battery separators.** W. R. Edwards and R. Edwards & Co., Ltd. Brit. 336,418, Oct. 30, 1929. Structural features.

**Electrodes for accumulators.** Fritz Hentschel. Ger. 513,800, Feb. 14, 1930. Details are given of forming electrodes for storage batteries, contg. alk. electrolytes, from blocked perforated sheets.

**Metallic oxide electric rectifiers.** Siemens Schuckertwerke A.-G. Brit. 330,926, Feb. 27, 1930. The oxide layer is coated with graphite, and the latter and a lead to be attached are both smeared with a pasty soft solder compn. contg. an acid free deoxidizing agent such as colophony to which $NH_4Cl$ may be added. Zn is then sprayed onto the oxide layer to form a coating, melt the solder and unite the oxide layer and the lead.

**Electric condensers.** Hermsdorf Schomburg Isolatoren Ges. Brit. 330,090, July 18, 1929. Multi part insulator condensers are made so that the outer part forming the insulator is of a material of high mech. and thermal strength such as porcelain, steatite, stoneware or quartz glass, while the material such as glass of the inner condenser part has a high breakdown strength and the highest possible dielectric const. (even if this involves a lessened mech. or thermal strength).

**Electrodeposition of copper.** A. Mozer. Brit. 330,109, Oct. 29, 1929. In operations such as plating, manuf. of electrotypes and refining of black copper, an electrolyte contg. $CuI_2$ is employed, *e. g.*, $CuI_2$ 60, KI 600 and water 1000 parts may be used with an addn. of 5–10 parts of a colloid such as glue or gelatin or of a substance having capillary activity such as phenol or tannin. A c. d. of 400 amps. per sq. meter at 0.3 v. is suitable.

**Electroplating materials such as feed-mill screens with metals such as chromium.** Richard Stursau (to Swifton Mfg. Co.). U. S. 1,702,107, Feb. 10. The electrolyte in which an anode is immersed is caused to circulate through the interstices of the material, which is connected as cathode, and at the same time elec. current is passed through the electrolyte to effect plating of the interstices of the material as well as of its exterior surface. App. is described.

**Coating objects with chromium.** Metals Protection Corporation. Ger. 513,742, July 3, 1927. See Fr. 610,013 (*C. A.* **23**, 1065) and Brit. 277,295 (*C. A.* **22**, 2331).

**Nickel and chromium coatings on foundation metals such as iron or steel.** Colin G. Fink and Li Cui Pan (to Chemical Treatment Co.). U. S. 1,702,082, Feb. 10. A heat treated plate of Ni on the foundation metal is provided with an overlying plate of Cr.

**Stripping off chromium plating.** J. P. McCullough (to Ternstedt Mfg. Co.). Brit. 330,532, March 6, 1929. See Ger. 511,410 (*C. A.* **25**, 1167).

**Plating aluminum.** Louis Schuler. U. S. 1,701,612, Feb. 10. The surface of an Al article is "passivified" (suitably by treatment with $HNO_3$), and the prepd. surface is plated with an alloy of Ni and Fe by electrodeposition in a bath contg. sulfates of Ni and Fe and a cond. salt such as $Na_2SO_4$, and the coating thus formed is then further plated with a finishing metal such as Ag, Au, brass, Cu, bronze or Ni.

**Electrolysis.** Otto Liebnau. Austrian 120,100, July 15, 1930. In pptg. metals from soln. by electrolysis, the cathodes used are made of Fe (or an Fe alloy) that has been converted superficially into the nitride. A nitrided Fe Cr alloy is instanced. The electrolyte must not be too acid. The pptd. metals are readily removed.

**Electrolytic cells.** Joseph L. Woodbridge. Ger. 513,011, Nov. 29, 1927. An arrangement for insulating the electrodes is described.

**Electrolytic cells such as those for producing oxygen and hydrogen.** A. R. Knowles. Brit. 315,987, July 6, 1929. Liquid level in an electrolytic gas generator is maintained by flow from a tank, which is fed with electrolyte from gas-washing chambers, and delivery of fresh liquid to the washing chambers is controlled by a float in the tank. Various details of app. are described. Cf. *C. A.* **25**, 1167.

**Electrolytic production of hydrogen peroxide or other compounds containing active oxygen.** Erich Noack, Oswin Nitzschke and Georg Pfleiderer (to I. G. Farbenind. A.-G.). U. S. 1,702,189, Feb. 10. See Brit. 310,618 (*C. A.* **24**, 1805).

Acetylene. Consortium für Electrochemische Industrie G. m. b. H. Fr 694,109, Apr 17, 1930 $C_2H_2$ is made by submitting a current of CO or $CO_2$ or both mixed with H or hydrogenated compds. to the action of high tension elec. discharges, preferably under reduced pressure.

Formaldehyde. Gutehoffnungshütte Oberhausen A.-G. Fr. 694,330, April 23, 1930 $CH_2O$ is made by passing a mixt. of $CH_4$ and $CO_2$ or gases contg these through an elec. field produced by an elec. current of high tension and frequency. Cf. *C. A.* 24, 5241

Decomposition of water. Yuji Morishima. Fr. 694,346, April 23, 1930. An app. is described for decomposing water into H and O, in which water from a chamber can flow into a very narrow space between 2 of 3 coaxial tubes forming a chamber in which the water is vaporized by heat from an elec. heating element disposed in the central tube. The vapor thus produced is introduced into a decompn. chamber in which it is decomposed into its constituents by another heating element.

Electrolytic manufacture of salts. Jean Alas. Fr 694,918, Jan. 15, 1930. Sol. salts of metals placed at the anode are made with the acid salt of alkali metals as electrolyte. The process may be used for making sol. sulfates of Cu, Fe, Al, Ni and Zn and also phosphates, chlorates, perchlorates and persulfates.

Alumina. Gino Gallo. Fr. 694,885, May 2, 1930. Leucite or other silicates contg Al and K or Na or natural or artificial salts of Al are treated to obtain $SiO_2$, $Al_2O_3$ and salts of K or Na in a very pure state, by making a soln. of a K- or Na-alum and submitting the soln. to electrolysis to obtain $H_2SO_4$ at the anode and $NaAlO_2$ or $KAlO_2$ at the cathode. An excess of alkali sulfate is used to facilitate the formation of the corresponding aluminate. The anode may be of Pb and the cathode of Fe.

Zinc. I. G. Farbenind. A.-G. Fr 694,234, April 19, 1930. Max. yields are obtained in the electrolysis of $ZnSO_4$ solns. by maintaining the circulating electrolyte at the most favorable compn. for the working conditions, each individual vat of the app. being charged directly from the circulating vessel.

Electric furnace. Emil F. Russ. Ger 513,762, Aug 5, 1927.

Electric furnaces. Akt.-Ges. Brown, Boveri & Cie. Ger. 516,397, June 8, 1926. Means is described for insulating the electrodes against the electrode-moving device.

Electric furnaces. Siemens-Planiawerke A.-G. für Kohlefabrikate. Fr. 694,428, April 25, 1930. Mounting of electrodes is described.

Electric induction furnaces. I. G. Farbenind. A.-G. (Emil Fendt and Carl Schörg, inventors). Ger 513,689, Dec. 29, 1928. The spools and rolls, etc., carrying the heating filaments are rendered sufficiently resistant to heat by making them of asbestos-insulated wire impregnated with a cement mass of fluosilicate.

Electric induction heating of apparatus such as that for treating oils or further oxidation of Litharge. Edwin F. Northrup (to Ajax Electrothermic Corp.) U. S. 1,791,934, Feb. 10. Coils and elec. connections are arranged so as to provide sections for regulated differential heating.

Electric resistance furnace. W. J. Miller and Electric Furnace Co., Ltd. Brit. 336,097, Oct. 8, 1929.

Electric resistance furnace for carrying out erothermic reactions. Allgemeine Elektrizitäts-Ges. (Viktor Paschkis, inventor). Ger. 513,542, Sept. 27, 1927.

Electric resistance furnace for annealing or other heat treatments. P. Carlberg. Brit. 336,078, Sept. 23, 1929. Structural features. A cooling medium may be circulated through the resistance, tubular in form, when the heating is completed.

Electric resistance furnace for firing enameled goods. C. L. Irsen and J. L. McFarland (to British Thomson-Houston Co., Ltd.) Brit. 336,168, Dec. 18, 1929. Structural features.

Electric furnace with resistance heaters under the hearth. Allgemeine Elektrizitäts-Ges. Ger 516,396, Mar. 1, 1929.

Apparatus for regulating the position of electrodes of tilting electric furnaces. Henning G. Flodin U. S. 1,792,293, Feb. 10. Structural features.

Electric heating elements. C. B. Backer. Brit. 336,949, June 22, 1929. Mg is applied to a wire in the form of 2 or more longitudinal strips bent in arcuate form so that the strips form a tube about the wire, and the Mg is converted into MgO by the action of steam, a resistance element embedded in the MgO and provided with an outer casing being formed.

Electric smelting oven. Emil F. Russ. Ger. 516,190, Mar. 5, 1929. Addn. to 504,419 (*C. A.* 24, 5241)

Acetylene and hydrogen by electric arc treatment of saturated hydrocarbons.

I. G. Farbenind A.-G. Brit. 337,088, Aug. 7, 1929. See Fr. 674,459 (*C. A.* 24, 2385). Gases such as $CH_4$, $C_2H_4$, natural gas, distn. gases from coal, shale or peat, cracking gases, oil or tar vapors, or gases contg. pulverized carbonaceous materials such as tar oils or coal dust (which may be assocd. with H or with small quantities of N, CO or $CO_2$) are passed through a series of arcs, the lengths of which are adapted to the changing compn. of the gas so that longer arcs are used as the concn. of hydrocarbons decreases. Various details and examples are given.

Thermal decomposition of methane, etc. I. G. Farbenind A.-G. Brit. 336,201, July 10, 1929. Gases such as $CH_4$ or natural gas are decompd. (for production of $C_2H_2$, carbon black and H) by passage through an elec. arc at a temp. of about 2300° or higher, so that the ratio of the quantity of gas (measured in cu. meters per hr.) to the power of the arc, in kilowatts, lies below 0.6.

Iron cores for electrical purposes. Wittenberger Carbl. G. m. b. H. (Walther Ehlers, inventor). Ger. 513,701, Dec. 24, 1927. Fe powder, e. g., obtained by electrolysis, is pressed at 20,000 to 30,000 atm.

Electrical gas purifiers. Metallges. A.-G. Fr. 694,603 and 694,604, April 28, 1930. Electrodes and means for suspending them are described.

The purification of gases and the manufacture of fertilizers. Société Belge d'Electro-Synthèse "Solvelsyn". Belg. 371,622, Aug. 31, 1930. Solid fertilizer is obtained electrolytically. The electrolyte consists of a soln. of some base salt, preferably liquors contg. $CO_2$ in some form and org. matter such as ammoniacal liquors from the gasification of coal, liquid manure, etc. A graphite or retort C anode is used. Cf. *C. A.* 25, 1062.

Electrical purification of blast-furnace gas. Siemens-Schuckertwerke A.-G. Fr. 694,219, April 19, 1930.

Alloy armoring for electric cables. W. T. Henley's Telegraph Works Co., Ltd., and P. Rosling. Brit. 330,408, Oct. 3, 1929. For reducing armoring losses in single-core a. c. cables, the armoring is formed of an alloy of Al contg., also Mg 0.4–0.5, Si 0.5–0.6 and Fe about 0.3%.

Loading material for electric cables. Standard Telephones & Cables, Ltd., and T. N. Riley. Brit. 330,630, July 17, 1929. Dissimilar loading materials are used on different portions of a cable, the sections (such as the end sections) to be used at greater energy level being loaded with material of constant permeability over the normal working range (such as Ni 45, Fe 30 and Co 25%) and the intermediate portion being loaded with material of high resistivity (such as Ni 78.5, Mo 3% and the remainder Fe).

Temperature-indicating device for oil-immersed electrical apparatus such as transformers. General Elec. Co. and British Thomson-Houston Co., Ltd. Brit. 336,431, Oct. 14, 1929. Structural features.

Metallic-vapor lamps. N.-V. Philips' Gloeilampen Fabrieken. Brit. 330,208, July 5, 1929. Various structural details are described of elec. discharge tubes contg. an alloy or mixt. of metals such as a Cd amalgam, which preferably constitutes an electrode of the tube.

Electric neon lamps. Claude Neon Lights, Inc. Brit. 330,956-7, July 18, 1929. Structural and elec. features.

Electric incandescent lamps. N.-V. Philips' Gloeilampen Fabrieken. Brit. 335,903, July 1, 1929. Various structural details are given of a lamp having a "concentrated" W filament assocd. with Hg or like material inert to W in a bulb allowing the Hg to circulate and which also may contain gases such as N or A. Cf. *C. A.* 25, 1449.

## 5—PHOTOGRAPHY

E. P. Wightman

New processes of color photography. G. Grote. *Phot. Korr.* 66, 177–81(1930).—A review is given of the subject matter of all the patents issued in 1929 for additive (screen), subtractive or direct color processes. E. R. Bullock

Photography in the infra-red. W. Dieterle. *Phot. Korr.* 66, 309–15(1930).—After an historical account of progress in infra red photography by means of filters and suitably sensitising dyes, from the discovery of chevanne to the present time, D. describes its applications to distance photography, to night-effect exposures (with Kodak or Agfa film), to spectrophotography and photomicrography in the infra-red and to the photography of substances at temps. below a visible red heat. Working prescriptions are given for the infra red sensitising of ordinary high-speed plates and films and for the

hypersensitizing of the purchaseable Kodak or Agfa infra-red sensitive plates. A suitable light filter, especially suitable for the purpose of the exposure, must be used and development may be carried out by a feeble green light. E. R. BULLOCK

Filter solutions for fluorescence photography. K. WEBER. *Phot. Korr.* 66, 317–9 (1930).—A 2% aq. soln. of $NaNO_2$ in a thickness of 1 cm. in a glass cell absorbs ultra violet radiations of 366 mμ almost completely. W. gives comparative illustrations of fluorescence photography with a $NaNO_2$ filter and with "G. G." (Schott & Gen.) solid glass filters, the latter, though the most suitable of that kind available, do not absorb ultra-violet nearly as satisfactorily as does the former. E. R. BULLOCK

Photographic hardness and absorption measurements of x-rays. L. GRebe and W. SCHMITZ. *Z. wiss. Phot. (Schaum Festschrift)* 29, 129–33(1930).—By comparing x-ray exposures made through an Al step tablet with those made sensitometrically one may compute from the absorption law the effective wave length of a heterogeneous beam. The method is the same in principle as the ionization method. H. E. S.

The concentration speck or centripetal theory of light action. A. STEIGMANN. *Kolloid Z.* 53, 318–22(1930), cf. *C. A.* 24, 30, 25, 44.—The theory is applied to the mechanism of the action of light on photographic plates. ARTHUR FLEISCHER

Sensitiveness of photographic dry plates. M. MIYATA. *Mem. Coll. Eng., Kyoto Imp. Univ.* 6, No. 2, 113–72(1930).—A possible addnl. cause of the sensitivity of the dry plate is presented. It is found that AgCl is always present with AgBr at its pptn. and it is presumed that the AgCl grains are the sensitive centers in the AgBr crystals. Further expts. show that AgBr and AgI in photographic emulsions act as both chem. acceptors and optical sensitizers for AgCl nuclei. Ripening of an emulsion is the result of the adhesion of AgCl and AgBr crystals sepd. at pptn. by gelatin. L. A. STAIB, JR.

The accumulation effect of photographic plates and its influence on the accuracy of photographic photometry. N. BARABASCHEFF AND B. SEMEJKIN. *Z. wiss. Phot.* 28, 333–40(1930).—The accumulation of photographic density (growth of the latent image) is real and must be taken into account in photometry. It is advisable to develop plates at least 2 days after exposure, otherwise systematic errors which influence the results are introduced. *Old plates show this accumulation effect to less extent than new plates.* A. P. H. TRIVELLI

Reproduction of negatives. P. HANNEKE. *Camera* (Luzern) 9, 155–7(1930).—A AgBr plate or film is bathed in 4% $K_2Cr_2O_7$ soln., dried and exposed under the negative to be copied until a faint brown image is visible. The duplicate is then washed and finally developed by ordinary light, in a regular photographic developer. The unexposed portions develop, giving a duplicate negative. The contrast can be controlled by the length of exposure or by a subsequent flash exposure. M. W. SEYMOUR

Dyes unstable to light are sought. H. HERMSDORF. *Camera* (Luzern) 9, 160–4 (1930).—The theory and history of color printing processes by means of bleach-out dyes are briefly described. The problems to be solved in the improvement of the bleach-out process are said to be increasing the sensitivity and working out a good means of fixation. A process useful practically requires plates or papers that will keep for at least 6 months to a year. M. W. SEYMOUR

Role of dyes in the progress of photography. A. SEYEWETZ. *Photo-Revue* 42, 353(1930).—In the application of dyes to photography the following uses have been found: (1) chromatic sensitizing of photographic negative materials, (2) photographic reproduction of colors, (3) lighting of the darkrooms and the chromatic desensitizing of plates, (4) prepn. of antihalo plates, (5) tinting of plates and films for transparencies, (6) prepn. of colored motion pictures and (7) production of photographic images with diazo compds. Most of the dyes which are used for the chromatic sensitizing of photographic materials belong to the following types: (1) diphenylmethane, (2) triphenylmethane, (3) acridine, (4) phenylacridine and (5) quinoline. A description including the spectral region which they sensitize is given for several dyes. *Ibid* 375(1930).—The cyanine dyes used as sensitizers for photographic materials are classified into 4 groups: (1) the cyanines, (2) the isocyanines, (3) the pinacyanols and (4) the dicyanines. A brief description is given for several dyes belonging to each class. The use of desensitizing dyes after exposure in order to permit inspection with a bright light during development was introduced by Lüppo-Cramer with the discovery of phenosafranine and has led to a study of the desensitizing properties of other dyes. Certain dyes which sensitize Ag chloride and bromide emulsions were found to desensitize Ag iodide emulsions. *Ibid* 43, 5–7, 23–4(1931).—*No direct relation exists between* the constitution of a dye and its desensitizing properties. All of the safranines, however, which contain amino groups have desensitizing properties. The expts. of Lumière and Seyewetz have indicated that the desensitizing action of phenosafranine is

due to the formation of an adsorption complex between the AgBr and the dye which is not sensitive to light and is slowly destroyed by washing. Lüppo-Cramer considers that the desensitizing action is due to the oxidation by the dye. Dyes are used in the prepn. of films and plates for the suppression of photographic halation due to reflection. In this case the dye is incorporated in the subcoating between the sensitive emulsion and its support or is applied as a dyed gelatin backing. One of the most important uses of dyes has been in the photographic reproduction of color by the indirect method. A practical discussion with formulas is given for this process on the selection of the dye and the dyeing of the monochromes. H. D. Russell.

**Acceleration of development by neutral salts and dyes.** Lüppo-Cramer. *Phot. Korr.* 66, 233–6(1930).—L.-C. for the first time gives density curves to illustrate the phenomenon of acceleration of development by the addn. to the hydroquinone or other developer of large amts. of neutral salts or relatively very small quantities of certain basic dyes. Plates of very contrasty emulsion (not further described) were used, and the standard developer was hydroquinone with sulfite, $K_2CO_3$ and KBr. With these the effect of $KNO_3$ (10%) or of pinakryptol green (0.005%) is very conspicuous. As regards theory, L.-C. remarks that the action of the neutral salts and also, though there are some exceptions and contradictions in this case, that of basic dyes, recalls their coagulating action on such suspensoids as colloid Ag. The exceptional difference between the action of pinakryptol green and pinachrome, the latter producing fog and a relatively flat gradation, is illustrated. E. R. Bullock.

**Fine grain developers and their application to spectrography.** Duilio Vitelli. *Nuovo cimento* [N. S.], 6, 88–9(1929). *Proc. 7th Intern. Congr. Phot.* 1928, 365–7. I. I. C.

**The role of sulfite in photographic developers.** J. Rzymkowski. *Camera* (Lucerne) 9, 128–32, 164–7(1930).—Evidence is adduced from the literature and from original exptl. work to show that the protective action of sulfite against the aerial oxidation of hydroquinone developers can be explained by the following series of reactions: (1) $C_6H_4(OH)_2 + O \longrightarrow O\,C_6H_4\,O$ [+ $H_2O$]. (2) $3Na_2SO_3 + H_2O \longrightarrow 2Na_2SO_4 + S + 2NaOH$. (3) $S + Na_2SO_3 \rightleftharpoons Na_2S_2O_3$. (4) $O\,C_6H_4\,O + Na_2S_2O_3 + H_2O \longrightarrow (HO)_2C_6H_3SSO_3Na + NaOH$. (5) $(HO)_2C_6H_3SSO_3Na + NaOH \longrightarrow Na_2SO_3 + (HO)_2C_6H_3SOH$. (6) $(HO)_2C_6H_3SOH + O_2 + NaOH \longrightarrow (HO)_2C_6H_3SO_3H + H_2O$. The hydroquinone-sulfite complex previously assumed by Mees and Piper (*Brit. J. Phot.* 1912, 441–3) to explain the fogging action and eventual exhaustion of hydroquinone developers with a deficiency of sulfite is believed to be the hydroquinone monothiosulfonic acid formed in equation 4. The occurrence of hydroquinone disulfonic acid in oxidized hydroquinone developers is explained by assuming that the monosulfonic acid, formed in equation 6, undergoes the same series of reactions as the hydroquinone itself. M. W. Seymour.

**A critical examination of the Hübl system of color sensitometry.** E. Heisenberg and M. Biltz. *Phot. Korr.* 66, 169–76, 198–206(1930).—H. and B. find that the color reproduction of materials calcd. according to the Hübl system agrees with the true color reproduction within an error of at most 20%. The variation of emulsion gradation (gamma) with the filter (wave-length range) needs to be taken into consideration, the unsharpness of cut of the filters, and the variation in color sensitivity of the emulsion within the limits of transmission of any one of the filters are, on the other hand, generally practically negligible. E. R. Bullock.

**Solarization. IV. Dependence of solarization upon the preparation of emulsions.** H. Arens. *Z. wiss. Phot.* 28, 341–7(1930); cf. *C. A.* 25, 651.—An emulsion freshly prepd. from a peptized Ag compd. solarizes a little or not at all. After some time the power to solarize increases. This increase is greater the less the excess of Ag ions. If they are removed as far as possible by KBr, in a few seconds the emulsion acquires the power to solarize very strongly. This process is irreversible. A. P. H. Trivelli.

**Constancy of the amount of light in magnesium foil sensitometry.** G. Schwarz and F. Urbach. *Phot. Korr.* 66, 261–4(1930).—Using a micro-burner for igniting the Mg and a Rb and a K photoelectric cell for measuring the light, S. and U. conclude from the results of their expts. that Mg foil as prescribed by Eder (cf. *C. A.* 23, 4158) gives a practically const. source of light sufficient for this kind of sensitometry. It is necessary, however, by const. manipulation to diminish fluctuations in the light and also to take the mean of several measurements to bring the residual accidental error below that of the Eder-Hecht sensitometer. E. R. Bullock.

**Physics of the washing-out of hypo from prints.** R. E. Liesegang. *Phot. Korr.* 66, 324–6(1930).—Expts. with ferrous $NH_4$ sulfate and with $CuCl_2$ suggest that, in consequence of the high osmotic pressure, hypo is removed in the washing process

from fixed prints more quickly than would be expected on the basis of simple diffusion.
E. R. BULLOCK

**Displacement of silver in partly swollen gelatin layers.** E. WAGNER AND K. SCHAUM *Z. wiss Phot* 28, 325–7(1930).—A drop of water on a photographic plate or film causes a spot after development, in which the edges have higher densities than the center This is due to a displacement of the gelatin contg Ag halide grains to the edge of the wetted spot The extent to which the real Ag density or addnl. light reflections cause the dark edge can be investigated by detg the edge density after immersing the surface of the film or plate in glycerol It is shown that even in that case the edges have a higher density, because of migration of Ag halide to the edge of the spot
A. P. H. TRIVELLI

**Hydrolyses occurring in washing of the gelatin-silver nitrate system.** H. H SCHMIDT AND F PRETSCHNER *Z wiss Phot* 28, 328-32(1930).—Lüppo-Cramer had observed that in the gelatin system plus $AgNO_3$, hydrolysis takes place The authors made a quant. investigation of this phenomenon as a support for their theory that during pptn of Ag halides in gelatin, some Ag is formed by the action of $AgNO_3$ on gelatin The hydrolysis of $AgNO_3$ in the presence of gelatin gives $Ag_2O$ and $HNO_3$, which $Ag_2O$ is retained by gelatin
A. P. H TRIVELLI

**Stability of the latent image of a silver iodide emulsion toward dichromate-sulfuric acid.** H. H. SCHMIDT. *Phot Korr.* 66, 315–7(1930).—S distinguishes 2 latent light images, one occurs in AgI-gelatin emulsion formed with excess of sol. iodide, the other in emulsions formed with excess of Ag salt. The former latent image is found to be very unstable and readily destroyed by solns of oxidizing agents, while the latter is stable even toward dichromate-sulfuric acid The latter is, moreover, not susceptible of intensification by nucleus denudation, but is on the contrary, apparently somewhat diminished for phys. development, by the action of an intermediate bath of KI.
E. R. BULLOCK

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*Photographic effects of γ-rays* (ROGERS) 3. *Manufacture of photographic lenses* (GUILFORD) 19. Photographic sound records (Brit. pat. 336,559) 18.

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**Color photographs.** LOUIS DUFAY (to Old Jewry Trust, Ltd.). U. S. 1,792,418, Feb 10 In a process for the reproduction of color photographs on a transparent film bearing only one sensitive layer on each of its faces, the sensitive layers are impregnated with tartrazine, corresponding neg plates are simultaneously applied on each of the sensitive layers, and the film and neg plates are exposed to light, and the film is subsequently washed to eliminate the tartrazine and the layers are differently colored

**Color photography.** J N GOLDSMITH, T. T. BAKER and SPICERS, LTD Brit. 337,073, July 30, 1929 A film of material such as celluloid, viscose or the like, to which a multicolor screen is to be applied by dyeing, applying a resist pattern, bleaching and redyeing the parts unprotected by the resist, is preliminarily coated with an isolating layer of substantially waterproof character, such as a synthetic resin or cellulose acetate varnish and a surface layer of material such as collodion or cellulose prepd. from viscose which is receptive to dyes

**Color photography.** T. T. BAKER, A B. KLEIN and COLOUR SNAPSHOTS (1928), LTD. Brit. 337,057, July 27, 1929 A "tripack" is formed with a green-sensitive front layer, a blue-violet sensitive intermediate layer, a red sensitive rear layer and (in order to protect the rear layer from green and blue violet light) filters preferably comprising a green absorbing filter between the front and intermediate layers and a blue-violet-absorbing filter between the intermediate and rear layers. Various details of manuf are described

**Color photography.** T. T. BAKER. Brit. 337,040, July 25, 1929 In a process of obtaining prints in natural colors in which a light-sensitive layer coated over a multicolor screen on a transparent support is printed through the support from a negative assocd with a multicolor screen (the image and screen being subsequently transferred to an opaque support with the screen uppermost), the screen is printed on a celluloid, cellulose acetate, regenerated cellulose, collodion or gelatin layer attached by an adhesive such as gum dammar to a translucent stripping support such as celluloid or parchmentized paper. The final support may be paper, a cellulose acetate film contg baryta or material such as is described in Brit. 282,980 (*C. A.* 22, 3848) which is coated with an adhesive such as gum arabic. Brit. 337,041 describes a process in which, to avoid the moiré effect in copying by projection from a master cinematograph film, a sheet of plane glass scored or indented with lines is placed in front of, or behind, the

projection lens The lines may be formed as concentric circles about 0 125 in. apart. Cf *C A* 24, 5245

**Color photography.** I G FARBENIND A -G Fr 694,031, April 16, 1930. Color images are obtained on films with microscopic lenticular gratings by producing, during the taking of the view, all the images of the colored screen in the layer of emulsion so that they coincide with the central axis of the corresponding lenticular elements.

**Photographic layers.** PHILIPPE FRANGIALLI and GEORGES H A FREYSS. Fr, 695,006, Aug 2, 1929 Layers sensitive to light are made on suitable supports by using as sensitive material diazonium salts of aromatic amines which contain the imidazole group, simple or substituted, mixed with an azo compd of phenolic or aminophenolic properties and adding, according to the case, an acid which does not deteriorate the support. Thus, Schaeffer acid and oxalic acid are added to a soln of diazotized *N*-methyl C-methylaminobenzimidazole and the mixt is used for coating supports which are then dried Other examples are given

**Photographic surfaces.** JOS-PE FARBENPHOTO G M B H (Gustav Koppmann, inventor) Ger 513,277, Feb 17, 1929 See Brit 327,283 (*C A* 24, 4996)

**Photographic films from mixed cellulose esters.** C S WEBBER and C J STAUD (to Kodak, Ltd ) Brit 336,151 Mixed esters are employed which contain an acyl radical and a radical of an acid contg a hydroxy group in the $\alpha$-position or a ketonic group in the $\alpha$- or $\gamma$ position and which are sol in acetone or its homologs or in 50-75% aq alc soln and these esters are dissolved in a mixt of ethylene chloride and a monohydroxy aliphatic alc contg 5 C atoms or less

**Combined cinematograph and sound record films.** T T BAKER Brit 335,899, July 1, 1929 Before application of the resean to the surface of the film, the narrow marginal strip which is to serve as the sound track is protected from the dyes in the resean by application of a layer of protecting varnish such as a soln of bitumen in $C_6H_6$ The resean is then applied to the whole surface of the film, followed by treatment with a varnish-removing solvent, so that a strip of clear uncolored film is provided to receive the sensitive emulsion upon which the sound record can be photographed in black and white

**Fire-resistant motion picture films.** ARTHUR ARENT (to Arthur Arent Laboratories, Inc ) U. S 1,792,457, Feb 10 Films are treated with a soln prepd from urea and $SbCl_3$ or from other suitable acid-binding org compd which does not promote inflammability and a suitable acid yielding fire retardant metal salt, applied in a substantially non aq solvent such as EtOAc

**Photographic developers.** I G FARBENIND A -G (Gustav Reddelien and Werner Muller, inventors) Ger 516,030, Jan 8, 1930 Addn to 454,839. *N*-Monohydroxypropyl and *N*-monohydroxybutyl derivs. of *o*- and *p*-aminophenol and their nuclear substitution products not contg $NO_2$ groups are used as the active constituents of developing solns for Ag halide layers A suitable soln comprises *p*-(hydroxypropylamino)phenol-HCl 1, $Na_2SO_3$ 9 and $K_2CO_3$ 8 g in $H_2O$ 200 cc. Cf Ger. 467,818 (*C. A* 23, 572)

**Transforming photographic silver images.** F. LIERG Brit. 335,930, July 2, 1929 The opaque substances such as AgBr or Ag are converted into transparent complex compds. having strong mordanting properties by treatment with a reagent such as an iodide, urea, thiocyanate or thiocarbamide and other substances such as bisulfites may also be added which react with the complex forming reagent. Various details and examples are given

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

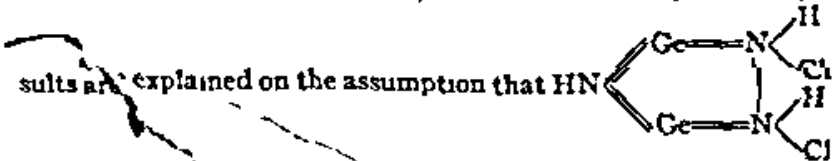
**The isomerism of radicals.** CLEMENT DUVAL AND MME. CL *Compt rend.* 191, 843-5(1930), cf *C. A* 24, 563 —A special study w isomeric ions $[CoSO_4(NH_3)_4]^-$ and $[CoSO_4(NH_3)_4]^{--}$. Persulfatepentammine sulfate has a d. of 2 1 and a mol susceptibility of $-588 \times 10^{-6}$ Sulfatepentammine sulfate is red, has a d. of 1 7 and a mol susceptibility of $-212 \times 10^{-6}$, measured at 15°. Both give the same product on hydrolysis in dil soln. GERALD M PETTY

**The coördination value of multivalent negative radicals.** PAUL PFEIFFER. *Z. anorg allgem Chem* 192, 366-8(1930) —If it is assumed that Co has a const coördination no of 6, certain bivalent radicals sometimes have a coördination value of 1 and sometimes of 2, as follows $[(H_3N)_4Co(CO_3)]X$ and $[(H_3N)_4Co(CO_3)]X$. These can be satisfactorily explained by the following distribution of charges on dissocn : $^{++}[(H_3$-

N)$_4$Co—O—CO—O$^-$] + X$^-$, $\left[(H_3N)_4Co\begin{matrix}O\\O\end{matrix}CO\right]^+$ + X$^-$. The following general statement can be made bivalent acid radicals take 2 coördination positions in the uncharged condition and only 1 coördination position when carrying a single neg charge If 2 neg charges are carried, then the coördination no of the radical is zero H. STOPPTZ

**The mechanism of precipitation changes. I. The reaction between lead chloride and ammonium chromate.** Z KARAOGLANOV AND B SAGORTSCHEV. *Z. anorg allgem. Chem* 194, 151–8(1931) —$PbCrO_4$ pptd in the presence of HCl contains Cl, whose quantity varies with the concn of $Cl^-$, the time required for complete pptn and the temp The Cl held by the ppt does not appear to be volatile at high temps When $HNO_3$ is present no nitrate could be detected in the ppt No dichromate was found in either case The Cl is believed to be held as $Pb_3Cl_2CrO_4$ (cf. *C A.* 24, 4690) The results are reproducible only with carefully controlled conditions **II. The reaction between sulfuric acid and lead bromide.** *Ibid* 195, 105–12 —Pptn of $PbCrO_4$ with $PbBr_2$ gives the same results as with $PbCl_2$ The reproducibility of the results depends on the length of time the ppt stands in the soln The longer the time the less the Br in the ppt **III. Further investigations of the reaction between sulfuric acid and lead bromide.** *Ibid* 113–20 —The decrease in Br content of the ppt. which occurs when the ppt is not immediately filtered has been studied There appears to be a metastable Br-contg product which is not a mixed crystal, solid soln or abs compd but rather a complex of the type $(PbBr)_2SO_4$ which decomposes on standing in soln to give $PbSO_4$ and $PbBr_2$ J B AUSTIN

**Investigations on cerium.** LEON LORTIE *Ann chim* [10], 14, 407–60(1930) — Ceric salts (valence 4) dissolve in alkali carbonates to form complex salts The ceric carbonate of Na, $[Ce(CO_3)_4(H_2O)_2]Na_8\ 10H_2O$, has been sepd. as yellow crystals and analyzed It decomposes in $H_2O$ to ceric hydroxy carbonate, $CeCO_3(OH)_2$ Although K, $NH_4$, Li and Tl form similar compds., they could not be crystd The Na salt is isomorphous with the Na thoricarbonate, $[Th(CO_3)_4(H_2O)_2]Na_4\ 10H_2O$ Tl, Zr and Ti salts show similar reactions Cerous tartrate (valence 3), $Ce_2(C_4H_4O_6)_3\ 6H_2O$ or $Ce_2(C_4H_4O_6)_3\ 4^1/_2H_2O$, dissolves in halogen acids to form complex acids as cerous chlorotartrate, $Ce_2(C_4H_4O_6)_3\ 3HCl\ 14H_2O$, and cerous bromotartrate, $Ce_2(C_4H_4O_6)_3\ 3HBr\ 14H_2O$ With tartaric acid it forms cerotartaric acid, $Ce(C_4H_4O_6)_2H\ 2H_2O$ which is able to form the Na cerotartrate, $Ce(C_4H_4O_6)_2Na\ 8H_2O$ In alk tartrates it forms ceric compds., which are subsequently reduced by the tartrate to cerous compds With excess O unstable perceric compds (valence 6) form Cerous tartrate dissolves in alkalies to form salts as K ceritartrate, $2CeO(C_4H_4O_6)K_3\ C_4H_4O_6K_2\ 11H_2O$ These are red crystals sol in water, bases and acids With Na salicylate cerous salts give perceric salicylate, $Ce_2O_3(C_6H_4\ CO_2\ O)_2\ 6H_2O$ A LE V.

**Germanium. VIII. The action of ammonia on germanium tetrachloride: germanium imide.** JOHN S THOMAS AND WM PUGH *J. Chem Soc* 1931, 60–71; cf. *C A* 24, 2391 —The principal object of this investigation is to det whether $GeCl_4\ 6NH_3$ is a pure compd or whether it is a mixt. of $Ge(NH)_2$ and $NH_4Cl$ Since $Ge(NH)_2$ is readily hydrolyzed when exposed to traces of $H_2O$ vapor, an all glass app is described in which $GeCl_4\ 6NH_3$ can be prepd., washed with liquid $NH_3$, dried and weighed without opening at any stage. Thus, $Ge(NH)_2$ of 97.2% purity was prepd By means of liquid $NH_3$, $GeCl_4\ 6NH_3$ was broken up into 1 mol $Ge(NH)_2$ and 4 mols $NH_4Cl$, thus it is a mixt rather than a mol compd of $GeCl_4$ and $NH_3$ The existence of $Ge(NH)_2$ as an intermediate product of the action of $NH_3$ on $GeCl_4$ above —20° could not be confirmed When HCl is passed over $Ge(NH)_2$ the addn compd $Ge(NH)_2\ 2HCl$ is first formed, this then combines with 4 mols of HCl to form $GeCl_4$ and $NH_4Cl$ The action of heat (up to 300°) on mixts of $GeCl_4$ and $NH_4Cl$ was studied The results are explained on the assumption that  is formed J BALOZIAN

**The chemistry of germanium.** ROBERT SCHWARZ, P. W. SCHENK AND H GIESE *Ber* 64B, 362–8(1931); cf *C A* 24, 3189 —From vapor pressure and x ray measurements hydrated $GeO_2$ is found not to exist $GeO_2$ m. 1115 ± 3°. The prepn of $GeO_2$ from $Ge(OEt)_2$ of $Ge_2OCl_6$ and of $Ge(SO_4)_2GeO_2$ is described V. F. H

**Nitrogen compounds of germanium I. The preparation and properties of ger-**

manic nitride. WARREN C. JOHNSON *J. Am. Chem. Soc.* 52, 5160–5(1930).—Ge was heated in $NH_3$ at 650° to 700°, yielding $Ge_3N_4$, a light brown powder. The $Ge_3N_4$ is reduced by $H_2$ at 700°, reacts with $O_2$ at 850° and with $Cl_2$ at 600° to 700°; decomposes at 900° to 1000° and resembles the corresponding compd. of Si in its high stability. GERALD M. PETTY

Studies on heteropoly acids of germanium. I. Germanomolybdic acid. CHARLES G. GROSSCUP *J. Am. Chem. Soc.* 52, 5154–60(1930).—A heteropoly acid of Ge and Mo having the formula $H_4[Ge(Mo_2O_7)_4]aq$ was prepd. The coeff. for "aq" has an apparent max. of 26. The use of $MoO_3$ for the colorimetric detn. of Ge is suggested. GERALD M. PETTY

Chlorogermanites of alkaloids and chlorogermanites of cesium. ARAKEL TCHAKIRIAN *Compt. rend.* 192, 233–4(1931).—$GeCl_2$ forms with alkaloids, as quinine and pilocarpine salts of 2 types. $GeCl_6$, A 2HCl (dibasic alkaloid) and $GeCl_5$, A HCl (monobasic alkaloid) in which A represents the mol. of the alkaloid. The method for the prepn. of the salts and their properties are described. If to a soln. of $GeCl_2$ strongly acidified with HCl a soln. of CsCl is added, a sparsely sol. white microcryst. ppt. is obtained. Its formula is $GeCl_2$, CsCl. An analog is obtained with RbCl, but not with LiCl, NaCl or KCl. At 100° in an atm. of dry HCl the Cs salt liberates the $GeCl_2$. The stability of the new compd. is such that at the temp. of fusion in an atm. of dry HCl $GeCl_2$ is not liberated but $GeHCl_3$ is formed instead. It is possible, therefore, that the Ge exerts its tri-coordinated valence and that the formula of the compd. is $[GeCl_3]Cs$. B. S. LEVINE

Sulfides of the rare earths. W. KLEMM, K. MEISEL AND H. U. v. VOGEL. *Z. anorg. allgem. Chem.* 190, 123–44(1930).—The disulfides of La and Ce, and the sesquisulfides of Sc, Yt, La, Ce, Pr, Nd, Sm, Gd, Dy, Er and Yb were prepd. by treating the anhyd. sulfates or chlorides in a stream of dry $H_2S$ at elevated temps. The ds., colors, magnetic susceptibilities and x ray cryst. structures were studied. On the basis of the color and x ray detns. the sesquisulfides may be divided into 2 series, the first of which (La–Dy) shows a regular variation in the mol. vol., while the second (Dy–Yb, Yt, Sc) has an irregular variation. The magnetic properties indicate that the sesquisulfides are salts. The disulfides were proved to be of a polysulfide nature. L. L. QUILL

The sulfates of zirconium and hafnium. GEORG v. HEVESY AND ERIKA CREMER. *Z. anorg. allgem. Chem.* 195, 339–44(1931).—$Zr(SO_4)_2$ and $Hf(SO_4)_2$, prepd. from the tetrahalides or the oxides, always contain an excess of $H_2SO_4$. This is the reason why the at. wts. of Zr and Hf, as detd. by the sulfate method, are too small. The last traces of $H_2SO_4$ are removed only at temps. at which the sulfates decomp. noticeably. The relation between the decompn. pressure of the sulfates and the temp. was detd. between 550° and 630°. $Zr(SO_4)_2$ has the higher decompn. pressure. L. K.

Properties of cuprous oxide. O. v. AUWERS. *Naturwissenschaften* 19, 133–4(1931).—The sp. resistance of artificial Cu$_2$O depends on various factors, such as the pressure of the surrounding gas; a decrease in air or $H_2$ pressure gives a decreasing resistance, a decrease in $O_2$ pressure causes an increase in resistance, while $N_2$ or Ne has no effect. The resistance is increased several hundred % by increased gas removal from the substance in high vacuum. Cu$_2$O has a reversible transition point at 56°, above which the previously transparent substance becomes opaque. This transition point is less distinct after removal of gas; $O_2$ addn. causes a reappearance of it. The thermal expansion coeff. of Cu$_2$O depends likewise on the condition of the Cu$_2$O lattice. Fresh Cu$_2$O has practically no expansion up to 56° ($\alpha = 0.00000005$), while above 56° it contracts. On cooling it contracts more until 56° is reached, the length changing irreversibly. If previously the gas has been extd. *in vacuo* the coeff. is 0.000001, changing little at 56°. It is concluded that the phys. properties of Cu$_2$O depend largely on substances dissolved in ($O_2$) or adsorbed on ($H_2$) the lattice. For the change in transparency, formation of CuO + Cu is believed to be responsible, although the reversibility remains unexplained. The photo effect of Cu$_2$O can also be related to the gases moving about in the lattice by the theory of phosphoric centers. Other oxides as those of Ni, Sn and Zn (Skaupy, *C. A.* 14, 2111), seem to have similar qualities. B. J. C. VAN DER HOEVEN

Structure of silicates. W. L. BRAGG *J. Soc. Glass Tech.* 14, 295–305(1930).—See *C. A.* 24, 5553. H. F. KRIEGE

Structural principles of compounds of boron and hydrogen. P. WIBERG *Z. anorg. allgem. Chem.* 187, 302–8(1930). cf. *C. A.* 23, 2807.—Polemical against Hellriegel (*C. A.* 24, 2040). The conception of a special "B linking" to explain the existence of the different B hydrides is unnecessary. From its position in the periodic table it is reasonable to regard B as quinquevalent toward H. As proof that Gmmm's hydride

law may be applied to B the similarity between the properties of diborane, $B_2H_6$, and $C_2H_6$ is pointed out. This indicates that B is quinquevalent in this compd., the 2 B atoms being joined by a double linking B. C. A.

**Preparation of anhydrous stannous chloride.** Henry Stephen. *J. Chem. Soc.* 1930, 2786–7.—$SnCl_2$ (long needles) may be more simply prepd than as previously described (*C. A.* 19, 3261) by treating $SnCl_2·2H_2O$ (1 mol.) with $Ac_2O$ (2 mols.), washing the anhyd. salt, sepg. with dry $Et_2O$ until free from AcOH, and crystg. from AcOH contg. a little $Ac_2O$ J. Baldzian

**Preparation and purification of the triiodides of antimony and arsenic for use in immersion media of high refractive index.** H. G. Fisk. *Am. Mineral.* 15, 263–66 (1930).—$SbI_3$ and $AsI_3$ were synthesized by gently heating a mixt. of the metals with I in a large test tube. The crude iodides were purified by recrystn. from $CS_2$. In this step a small excess of the metals was necessary for combination with free I in the soln. A second recrystn. was made further to purify the compds. In prepg. melts from the iodides and piperine it was found essential to avoid heating the mixts. above 135° to prevent decompn. A. M. Brant

**Nitrogen triiodide.** Herbert W. Cremer and Donald R. Duncan. *J. Chem. Soc.* 1930, 2750–4.—It has been found that $NI_3$ is formed by the action of $NH_3$ on the less stable alkali dibromoiodides (*i. e.*, those with high dissocn. pressures). With the K salt as typical, the reaction is $3KIBr_2 + 4NH_3 = 3KBr + 3NH_4Br + NI_3$, the mechanism of which most probably is: $3KIBr_2 \rightleftharpoons 3KBr + 3IBr$, $3IBr + NH_3 = 3HBr + NI_3$, $3HBr + 3NH_3 = 3NH_4Br$. As found by Dobbin and Masson (*Ibid.* 49, 848(1886); *J. prakt. Chem.* 31, 37(1885)), the more stable dibromoiodides such as the tetramethylammonium and trimethylsulfonium salts (having very low dissocn. pressures) do not react with $NH_3$ to form $NI_3$, but form additive compds. with 2 mols. of $NH_3$. J. Baldzian

**A comparison of the action of halogen salts of iron on phenyl magnesium bromide and phenyl zinc chloride.** G. Champetier. *Bull. soc. chim.* [4], 47, 1131–7(1930).—Anhyd. halogen salts of Fe did not give stable organometallic compds. on reacting with PhMgBr. The 3 reactions obtained were: (1) $6C_6H_5MgBr + 2FeCl_3 \longrightarrow 3(C_6H_5)_2 + 2Fe + 3MgBr_2 + 3MgCl_2$; (2) $2C_6H_5MgBr + 2FeCl_3 \longrightarrow (C_6H_5)_2 + 2FeCl_2 + MgBr_2 + MgCl_2$; (3) $2C_6H_5MgBr + FeCl_3 \longrightarrow (C_6H_5)_2 + Fe + MgBr_2 + MgCl_2$. *PhFeI*, a new organometallic compd., was prepd. according to the reaction $2C_6H_5ZnCl + 2FeI_3 \longrightarrow 2C_6H_5FeI + ZnCl_2 + ZnI_2$. On hydrolysis, the reaction was $2C_6H_5FeI + 2H_2O \longrightarrow 2C_6H_6 + Fe(OH)_2 + FeI_2$. Gerald M. Petty

**The action of halogens on ethyliodostibine. Antimony bromodiiodide.** Robert E. D. Clark. *J. Chem. Soc.* 1930, 2737–9.—The action of I, Br and Cl on ethyl iodostibine (I) is studied. $SbI_3$ (1.2 g., red needles, m. 168–170.5°) may be prepd. by adding a soln. of I (1.2 g.) in $CHCl_3$ (10 cc.) by drops to I (0.75 g.) in a min. of $CHCl_3$, refluxing for a few min. and cooling, the $SbI_3$ sepg. out. *Antimony bromodiiodide*, $SbBrI_2$ (long yellow needles (2.9 g.), m. 88°) is formed when Br (1.6 cc. dissolved in $CHCl_3$ (5 cc.)) is added in drops to a soln. of I (12.0 g.) in a min. of $CHCl_3$ (about 15 cc.), cooled in a freezing mixt., refluxed for a few min., cooled to 0°, the $CHCl_3$ decanted off, the mixt. treated with xylene until free from I, and the residue recrystd. from $CHCl_3$ or light petroleum (b. p. 80–100°). As typical of the reaction between Cl and I, into a soln. of I (10.0 g.) in warm $CHCl_3$ (10–15 cc.), $Cl_2$ (530 cc. in all, calcd. 600 cc.) is passed at the max. rate (in this case 35 cc. per min.), at which absorption is complete for the temp. employed (25–30°), the mixt. is boiled, filtered and cooled, red $SbI_3$ and its yellow metastable modification alone being produced. J. Baldzian

**Chloramine, its preparations, properties and uses.** W. Hirschkind. *Western Construction News* 5, 531–2(1930); *U. S. Pub. Health Eng. Abstracts* 11, W. 21(Feb. 21, 1931).—The chemistry, properties and application to water sterilization of the chloramines ($NH_2Cl$, $NHCl_2$ and $NCl_3$) are discussed. C. R. Fellers

**A note on the preparation of hydriodic acid.** T. H. Whitehead. *J. Chem. Education* 8, 541–2(1931).—In the prepn. of HI from $H_2S$ and $I_2$ it has been found that the formation of $I_2$ on distg. the HI soln. can be prevented if the mixt. is dialyzed through a collodion membrane for 48 hrs. This removes the colloidal S which seems to cause oxidation of the HI. R. H. Carter

**The action of bases on non-metals.** A. Laurence Curl. *J. Chem. Education* 8, 490–7(1931).—Most of the non metallic elements with the exception of N and the rare gases react with the alkali hydroxides. In general the reactions take place in accordance with the type $Cl_2 + 2NaOH \longrightarrow NaCl + NaClO + H_2O$. The exact mechanism of this type of reaction is not known or discussed. Similar reactions are obtained with the alkali amides which are analogous to the hydroxides in the $NH_3$

system of compds In $NH_3$ the polysulfides, polyphosphides, etc., are more stable than in water, but the ammono salts are less stable than the corresponding aquo salts.
R. H. CARTER

**Course of the reactions between graphite and oxides as well as between heavy metal carbides and oxides.** OSKAR MEYER *Arch. Eisenhüttenw.* 4, 193–8(1930). — These reactions were studied by detg the course of vapor pressure-temp curves In the case of $SiO_2$ and graphite, the partial pressure of CO ($p_{CO}$) reaches 20 mm at 1400° MnO is reduced by graphite at lower temps $p_{CO}$ having attained about 130 mm at 1200°. Curves and similar data are given for argillaceous earth and graphite and reactions between the carbides of Si, Mo, W and Cr and the oxides of Mn, Fe, Cr and Si
H. STORRTZ

**The interaction between iodine pentoxide and nitric oxide.** MADHAVLAL SUKHLAL SHAH AND TRAMBAKLAL MOHANLAL OZA *J. Chem. Soc.* 1931, 32–6. — *The course of* the reaction at 120° between $I_2O_5$ and NO was followed by measuring (*a*) the vol. of NO used, (*b*) the amt of $I_2$ produced and (*c*) the amt of nitrate formed The reaction may take place according to either (I) $10NO + 2I_2O_5 = 2I_2 + 5N_2O_4$, and subsequently $5N_2O_4 + I_2O_5 = I_2 + 5N_2O_5$, or (II) $10NO + 3I_2O_5 = 3I_2 + 5N_2O_5$. No decisive evidence could be obtained to indicate that it occurred according to I. The assumption that first II takes place with the formation of $N_2O_5$, and subsequently $N_2O_4$ is formed according to $5N_2O_5 + 5NO = 7\,5N_2O_4$ is equally possible J. B.

**Action of mercuric oxide on solutions of cupric chloride.** H. PÉLABON AND MLLE. DELWAULLE *Bull. soc. chim.* [4], 47, 556–9(1930); cf. *C. A.* 19, 1105, 24, 3454. — The reaction between HgO and $CuCl_2$ is shown to take place according to $3HgO + 4CuCl_2 = 3HgCl_2 + 3CuO\,CuCl_2$ The action of CuO on, as well as the soly of $HgCl_2$ in, solns of $CuCl_2$ was studied separately.
G. TORNNIPS

**Formation of a ferromagnetic iron sesquioxide by decomposition of the hydrate of van Bemmelen's sesquioxide.** G. CHAUDRON AND A. GIRARD *Compt. rend.* 192, 97–9(1931). — The cryst. $Fe_2O_3\,H_2O$ prepd from $Fe_2O_3\,Na_2O$ by the method of van Bemmelen (*J. prakt. Chem.* 46, 520(1892)) loses water slowly at 100° and rapidly at 140° to form a strongly magnetic sesquioxide which at 675° is converted into the ordinary sesquioxide. Both the monohydrate and the oxide are hexagonal, while the magnetic oxide obtained by slow oxidation of magnetite (Malaguti's oxide) is cubical (cf. Welo and Baudisch, *C. A.* 19, 3182)
K. V. THIMANN

**Decomposition of magnesium salts by calcium carbonate at elevated temperatures.** E. SAUER AND J. HUTER *Z. anorg. allgem. Chem.* 195, 211–6(1931). — $MgCl_2$, $MgSO_4$ and $Ca(HCO_3)_2$ in aq. soln were autoclaved for long periods (as high as 9 hrs.); the courses of the decompns. were followed Mixts of the Mg salts with $Ca(HCO_3)_2$ were also studied, pptn of $Mg(OH)_2$ occurs. Solid $CaCO_3$ was also present in some expts Data and curves are given
WILLIAM E. VAUGHAN

**The double decomposition between aqueous sodium formate and ammonium sulfate.** G. BREDIG AND P. LOTZ *Chem.-Ztg.* 55, 4(1931). — Isotherms are given for the reciprocal salt pair at 13.5°, 21.0° and 60°. There are several difficulties in the way of prepg $HCO_2NH_4$ by double decompn
T. H. CHILTON

**Thoryl nitrate.** PH. CHAUVENET AND MME. SOUTEYRAND-FRANCK. *Bull. soc. chim.* [4], 47, 1128–31(1930). — $Th(NO_3)_4\,5H_2O$ was obtained by slow evapn of a soln in air at 15°. Above 80° the trihydrate was obtained; above 110° the dihydrate; from 125° to 150° decompn of the salt yielded $ThO(NO_3)_2\,1/2H_2O$; from 150° to 360° decompn was continuous, yielding pure $ThO_2$ The dihydrate was not affected by reduced pressure. Anhyd. $Th(NO_3)_4$ could not be obtained $Th(NO_3)_4\,5H_2O$ reacted in soln with 2 mols NaOH, yielding $ThO(NO_3)_2\,H_2O$ No other product of hydrolysis was obtained. The hydrolysis is similar to that of $ZrCl_4$ (cf. *C. A.* 24, 5654).
GERALD M. PRITY

**The complex cuprothiosulfates of ammonium, potassium and sodium. III.** G. SPACU AND I. G. MURGULESCU. *Bul. soc. stiinte Cluj* 5, 344–70(1930); cf. *C. A.* 24, 4230. — Potentiometric titrations of $Cu(NO_3)_2$ by $Na_2S_2O_3$ in the presence of regulated amts of EtOH show flexures corresponding to the following Na cuprothiosulfates: $Na_4Cu_7(S_2O_3)_6\,8H_2O$, $NaCuS_2O_3\,1\,1/2H_2O$, $Na_4Cu_2(S_2O_3)_3\,xH_2O$, $Na_4Cu(S_2O_3)_2\,xH_2O$, $Na_4Cu(S_2O_3)_2\,2NaNO_3$ $Na_4Cu_7(S_2O_3)_6\,8H_2O$ is formed as a yellow cryst. ppt. when 7 vols of 0.5 *M* $Cu(NO_3)_2$ and 13 vols of 0.5 *M* $Na_2S_2O_3$ are mixed in the presence of 3 1/2 vols of EtOH $NaCuS_2O_3.1\,1/2H_2O$ is obtained as a white amorphous ppt. when 5 vols of 0.2 *M* $Cu(NO_3)_2$ are mixed with 4 vols of 0.5 *M* $Na_2S_2O_3$ in the presence of 16–20 vols. of EtOH. When 2 moles of $NaCuS_2O_3\,1\,1/2H_2O$ are titrated with 1 mole of $Na_2S_2O_3$, $Na_4Cu_3(S_2O_3)_5$ seems to be produced in the form of a brown oily soln This salt could not be further isolated, for upon evapn the soln. changed to a glassy homo-

geneous mass. It was attempted to prep $Na_4Cu(S_2O_3)_3$ from a soln. contg theoretical amts of $Na_2S_2O_3$ and $NaCuS_2O_3$. A mass of iridescent crystals was obtained, too hygroscopic for further purification. The double salt $Na_4Cu(S_2O_3)_3\cdot 2NaNO_3$ is prepd by treating a mixt of $NaCuS_2O_3$ and $NaNO_3$ with 3 *M* $Na_2S_2O_3$. Upon recrystn it appeared as colorless needles. *The following table contrasts the hydration of the* cuprothiosulfates of $NH_4$, K and Na.

| | | |
|---|---|---|
| | . . . | $Na_4Cu_2(S_2O_3)_3\ 8H_2O$ |
| $NH_4CuS_2O_3\ ^1/_2H_2O$ | $KCuS_2O_3\ H_2O$ | $NaCuS_2O_3\ 1^1/_2H_2O$ |
| $(NH_4)_4Cu_2(S_2O_3)_3\ 2H_2O$ | $K_4Cu_2(S_2O_3)_3\ 2H_2O$ | $Na_4Cu_2(S_2O_3)_3\ xH_2O$ |
| | $K_4Cu_2(S_2O_3)_3\ H_2O$ | ? |
| $(NH_4)_2Cu(S_2O_3)_2\ 4H_2O$ | $K_2Cu(S_2O_3)_2\ 3H_2O$ | $Na_4Cu(S_2O_3)_4\ xH_2O$ |

J. H. Reedy

**A series of new tetrammine-cobaltic complexes.** Pulin Bihari Sarkar and Tuhinangsu Das Gupta *J. Indian Chem. Soc.* 7, 835–7(1930).—$\left[Co\begin{matrix}Cl\\(NH_3)_4\end{matrix}\right]S_2O_3$ at 35–40° for 4 weeks changes completely to the more stable $\left[Co\begin{matrix}S_2O_3\\(NH_3)_4\end{matrix}\right]Cl$ without appreciable change in wt. Thiosulfato-pentammine compds. possess a characteristic ultra violet absorption spectrum by which they can be easily distinguished from their ionic isomers. Their conductivities are half that of the corresponding chloro compd. $\left[Co\begin{matrix}(1,6)Cl_2\\(NH_3)_4\end{matrix}\right]Cl$ *or* $\left[\begin{matrix}(1)Cl\\Co(2)H_2O\\(NH_3)_4\end{matrix}\right]Cl_2$ *in aq. soln. with* $Na_2S_2O_3$ *below* 0° *gives trans thiosulfato-aquo tetrammine cobaltic thiosulfate* $\left[\begin{matrix}(1)S_2O_3Co(NH_3)_4\\(6)H_2O\end{matrix}\right]_2S_2O_3$ (I) by double decompn. The free $S_2O_3$ group of I is replaced to give the corresponding Cl, Br, $NO_2$, SCN, $CrO_4$, $SO_4$ and $S_2O_6$ compds. Their ultra violet absorption spectra in aq. solns. are identical. At higher temps. the soln. by hydrolysis gives $\left[\begin{matrix}(1)S_2O_3Co(NH_3)_4\\(6)OH\end{matrix}\right]$. Further hydrolysis permits the formation of $H_2SO_4$, which partially reduces the $Co^{+++}$ compds. to the $Co^{++}$ - $Co^{+++}$ complex, $\left[\begin{matrix}(H_2O)_4\\Co''(OH)_2[Co'''(NH_3)_4]_2\end{matrix}\right](S_2O_3)_2$, isolated by alc. Foster Dee Snell

**A new class of ammines. The double selenocyanammines.** G. Spacu and V. Armeanu *Bul. soc. stiinte Cluj* 5, 294–318(1930).—Solns. of $K_2Hg(SeCN)_4$ and $KAg(SeCN)_2$ *were formed by the action of KSeCN on* $HgCl_2$ *and AgCl, resp.* By causing these solns. to react with various metallic salts of ethylenediammine, the following double selenocyanammines were pptd.: $Cu(en)_2[Hg(SeCN)_4]$, $Ni(en)_2[Hg(SeCN)_4]$ $Cd(en)_2[Hg(SeCN)_4]$ $Zn(en)_2[Hg(SeCN)_4]$ $Co(en)_2[Hg(SeCN)_2](SeCN)$, $Cu(en)_2[Ag(SeCN)_2]_2$, $Ni(en)_2[Ag(SeCN)_2]_2$, $Cd(en)_2[Ag(SeCN)_2]_2$ $Zn(en)_2[Ag(SeCN)_2]_2$ $Co(en)_2[Ag(SeCN)_2]_3$. *These double selenocyanammines as a class, are cryst. solids,* stable toward light and dry air. They are insol. in EtOH, $Et_2O$, $C_6H_6$, $CHCl_3$, etc., and slightly sol. in $H_2O$, $Me_2CO$, etc. They are decompd. by the feeblest acids and bases. J. H. Reedy

**The salts of hexafluophosphoric acid.** Willi Lange and Emil Muller *Ber.* 63*B*, 1058–70(1930).—The reaction of dil. HF with $P_2O_5$ gives three types of acids $H_2PO_3F$, $HPO_2F_2$ and $HPF_6$. $HPO_2F_2$ and $HPF_6$ ppt. with nitron. Keeping the soln. overnight results in complete hydrolysis of $HPO_2F_2$, and the soln. yields with nitron a ppt. of pure nitron $HPF_6$. *This ppt. shaken with chloroform and ammonia gives the* well crystallizing $NH_4PF_6$ in the water soln. The hexafluophosphates strikingly *resemble the perchlorates* in solv. They differ completely, however, in crystal *form*. All the inorg., especially the complex, $PF_6$ compds. have refractive indexes similar to that of water, which gives them a gel like appearance in water suspension. Aryl diazonium $PF_6$ *compds. are less sol. than the perchlorates, they do not decompose* when dry, and are not sensitive to shock or blows. Heating results in decompn. *according to* $ArN_2PF_6 = ArF + PF_5 + N_2$. $HPF_6$ is stable in cold soln. but *is hydrolyzed* in hot soln. $PF_6$ compds. on boiling with strong acids are hydrolyzed. Mol. vols. of $PF_6$ and $ClO_4$ compds. are compared. Prepn. and properties are described for $KPF_6$, $NH_4PF_6$, $NaPF_6$, $H_2O$, $RbPF_6$, $CsPF_6$, $Cu(PF_6)_2\ 5NH_3\ H_2O$, $Cu(PF_6)_2\ 4NH_3$, $Cu(PF_6)_2\ 2C_2H_4(NH_2)_2\ 2H_2O$, $Cu(PF_6)_2\ 5C_5H_5N\ NH_3\ H_2O$, $Co(PF_6)_2\ 6NH_3$, $Ni(PF_6)_2\cdot 6NH_3$, $Me_4NPF_6$, $Et_4NPF_6$, $PhN_2PF_6$, *o* $MeC_6H_4N_2PF_6$ *p p'* $F_6PN\ NC_6H_4C_6H_4N\ NPF_6$, $C_5H_5N\ HPF_6$, strychnine $HPF_6$, brucine $HPF_6$, morphine-$HPF_6$, cocaine-$HPF_6$, nitron $HPF_6$, nitron $HAsF_6\ H_2O$, nitron $HSbF_6\ 2H_2O$ and nitron $HSbF_6$. R. W. S.

**Bis-*p*-phenetyl telluride and its derivatives.** GILBERT T MORGAN AND FRANCIS H BURSTALL. *J Chem Soc.* 1930, 2599-601.—Bis *p*-phenetyl telluride and some of its derivs are prepd, the view of Burstall and Sugden (*C A* 24, 2652) that bis-*p*-phenetyl telluridichloride is a nuclear-substituted telluride being confirmed. *Bis p phenetyl telluride*, $(EtO\ C_6H_4)_2Te$, (white plates, m 64°) is prepd by adding 63 g *p*-bromophenetole (by the Sandmeyer reaction from *p*-phenetidine) to Mg (7.2 g) suspended in dry $Et_2O$, warming until nearly all the Mg is in soln., decanting, adding the soln slowly to a $TeBr_4$ (43 g) suspension in dry $Et_2O$, refluxing for several hrs., cooling, treating with ice, adding HBr, filtering, drying the $Et_2O$ layer over $CaCl_2$, evapg to dryness, extg the residue of gum with petroleum ether (b 40–60°), evapg and repeatedly recrystg the solid sepg out from alc. *Bis-p-phenetyl telluridichloride*, $(EtO\ C_6H_4Cl)_2Te$, m 108°, is prepd (1) by adding $Cl_2$ to a soln of the preceding telluride in $CCl_4$, (2) by heating *p*-phenetyl telluritrichloride with an excess of phenetole at 180–190° and (3) by heating $TeCl_4$ (1 mol) with phenetole (4 mols) at 180–190°.

*Bis p phenetyl tellurioxychloride*, $(EtO\ C_6H_4)_2Te\langle{}^{O}_{Cl\ Cl}\rangle Te(C_6H_4\ OEt)_2$ (fluffy white crystals, decompg at 193°) is prepd by boiling an aq suspension of the dichloride. *Bis p-phenetyl telluridibromide*, $(EtO\ C_6H_3Br)_2Te$, (lemon yellow crystals, m 127°) and *bis p-phenetyl telluridiiodide*, $(EtO\ C_6H_3I)_2Te$, (orange red needles, m 144°) are prepd from mixts of their generators in soln. *Bis p-phenetyl telluroxide*, $(EtO\ C_6H_4)_2TeO$, (white microcrystals, decompg at 181°) is prepd by boiling the dichloride or the dibromide with aq 2 *N* NaOH soln. *p-Anisyl p-phenetyl telluridichloride* (white needles, m 165–6°) is prepd by heating the trichloride (1 mol) at 160° with anisole (4 mols) for 6 hrs., cooling, treating with petroleum ether (b 40–60°) and recrystg the residue repeatedly from alc. *p-Anisyl p-phenetyl telluride* (white needles, melting to a clear liquid at 45°) is prepd by heating the dichloride for an hr in glacial AcOH with Zn dust in excess, filtering, pouring the filtrate into $H_2O$ and crystg the ppt from alc.

J. BALOZIAN

**Researches on residual affinity and coördination. XXXII. Complex salts of bivalent silver.** GILBERT T MORGAN AND FRANCIS H BURSTALL. *J Chem Soc* 1930, 2594–8, cf. *C A.* 23, 1877.—As with Cu salts and a diamine (*C. A.* 20, 3400, 3401, 21, 3166), it has been found that the chelate group in $\alpha,\alpha'$-dipyridyl is sufficiently powerful to stabilize a bivalent argentic complex. Thus, by starting with $\alpha,\alpha'$-dipyridyl (as prepd by Hein and Retter (*C A.* 23, 143)), a series of Ag salts is prepd in which the bivalent Ag has coördination nos of both 4 and 6. *Bis-$\alpha,\alpha'$-dipyridylargentous nitrate* $[Ag2dipy]INO_3$, (felted masses of yellow needles, decompg at 155°) is prepd from hot alc. solns of $AgNO_3$ (16.9 g) and $\alpha,\alpha'$-dipyridyl (31.2 g), and recrystd from hot dil alc. *Bis $\alpha\ \alpha'$-dipyridylargentic persulfate*, $[Ag2dipy]^{II}S_2O_8$, (deep reddish brown microcrystals, decompg. rapidly at 137°) is prepd by stirring the preceding nitrate into a cold satd soln. contg. an excess of $K_2S_2O_8$. *Pentakis-$\alpha,\alpha'$-dipyridyldiargentic persulfate*, $[Ag_25dipy](S_2O_8)_2$, (small reddish purple needles, decompg rapidly at 159°) is prepd by triturating the preceding persulfate with cold dil. $HNO_3$ (60% $HNO_3$ (d = 1.4) and 40% $H_2O$) and pptg. with $H_2O$ (4 vols). *Tris-$\alpha,\alpha'$-dipyridylargentic nitrate*, $[Ag3dipy]^{II}(NO_3)_2$, (small dark brown needles, decompg at 176°) is obtained by draining the residue from the persulfate trituration, extg with warm $H_2O$, adding an excess of aq $NH_4NO_3$ and cooling in ice. *Tris-$\alpha,\alpha'$-dipyridylargentic chloride*, $[Ag3dipy]^{II}(ClO_3)_2$, (dark purple plates or needles, decompg quietly at 171°) is prepd by adding aq $NaClO_3$ to the preceding nitrate and recrystg the product from $H_2O$ by the addn of $NaClO_3$. *Tris-$\alpha,\alpha'$-dipyridylargentic perchlorate*, $[Ag3dipy]^{II}(ClO_4)_2$, (orange-brown microcrystals, detonating violently on heating) is prepd by adding $NaClO_4$ to a soln of either the preceding chlorate or nitrate. *Bis $\alpha,\alpha'$-dipyridylargentic hydrogen sulfate*, $[Ag2dipy]^{II}(HSO_4)_2$, (brown cryst. powder, decompg at 157°) is prepd. by treating the persulfate with cold 40% $H_2SO_4$ or by adding $Na_2SO_4$ and $H_2SO_4$ to solns of the preceding chlorate or nitrate.

J BALOZIAN

## 7—ANALYTICAL CHEMISTRY

W. T. HALL

**Reply to the remarks of L. Moser and L. v. Zombory concerning my paper on "New ways in analytical chemistry."** J. DICK. *Z anal. Chem* 83, 105–7(1931), cf *C. A* 25, 891; M and Z, *C. A.* 24, 4725.—The method of washing the ppt. with alc. and ether with vacuum drying at room temp is defended.

W. T. H

Collecting average samples from storage tanks. H O Bernstrom. *Chemist Analyst* 20, No 2, 10–1(1931) —The taking of a sample from tank cars by means of a circular thief is described W. T. H.

Standardizing silver nitrate solutions. Alvin Mavrian *Chemist Analyst* 20, No 2 14 5(1931) —One soln of $AgNO_3$ can be standardized against another of the same kind by making an approx 0.2 *N* HCl soln and titrating one portion with the old and another portion with the new soln by Mohr's method W. T. H

Sodium sulfite for analysis. Holzverkohlungs-Ind A.-G *Chem.-Ztg* 54, 502(1930) —Contrary to earlier statements, pure $Na_2SO_3$ does not yield alk. solns., and the faint blue color with thymolphthalein is destroyed by one drop of 0.1 *N* HCl *In the use of* $Na_2SO_3$ *for the detn of* $CH_2O$, *the grade "pro analysi" is not essential*, because reasonable proportions of neutral saline impurities, such as $Na_2SO_4$, do not affect the titration, $Na_2CO_3$ must, however, be absent B. C. A.

*"Direct green B." A new reagent very sensitive to copper.* P. Sisley and David *Bull soc chim* [4], 47, 1188–92(1930) —When Cu salts are added at 90° to a soln of "direct green B," the color changes from blue-green to violet pink. The soln should have a $p_H$ value between 6 and 9 The ratio dye/Cu should be 10, but results are satisfactory between 6 and 50 The reaction is sensitive to 0.1 mg Cu per l Anions had no effect on the color No other metal gave a violet pink color Neutral salts retarded the reaction and reduced the intensity of the color, $K_2SO_4$ having the greatest effect. Colloids masked the reaction. Cu was found in distd. water used *for diluting serums and medicines.* Gerald M Petty

Correct methods of analyzing for carbon in rustless steels. C. M. Johnson *Iron Age* 127, 549–51(1931) —In some cases it is necessary to have the results on C detns accurate to *0.01%* of the wt of the sample. *Low results may be caused by* incomplete combustion because of failure to cover the sample with $Pb_3O_4$, and high results may be caused by the S content. Directions are given for carrying out the combustion in an elec. furnace, and an absorption train is shown in which danger due to $SO_3$ or $SO_2$ fumes is overcome by passing the gas through 50 ml. of 5% $KMnO_4$ soln., through the usual Zn tower, through $P_2O_5$ and finally into the Stetser and Norton ascarite bulb W. T. H

Determination of total sulfur by the sodium peroxide method. M R. Bercovitch *Chemist Analyst* 20, No 2, 8(1931) —In neutralizing the aq ext. of the melt, loss by effervescence can be avoided by introducing the acid at the bottom of the soln. by means of a pipet or funnel drawn out to a fine point. W. T. H.

*Wet oxidation method for the determination of total sulfur in slags, ores, cinders, etc.* Frank W Scott *Chemist Analyst* 20, No 2, 8(1931) —The sample is dissolved in concd. $HNO_3$ which has been satd with $KClO_3$, and the resulting $SO_4^{--}$ is detd. as in the well known Lunge method W. T. H

Detection of minute quantities of phosphorus in oil. Conrad Stich. *Pharm Ztg* 76, 112(1931) —A commentary on S.'s previously published method (*C. A* 21, 3856) with suggestions for its more precise application. W. O E

Spectrophotometric determination of phosphorus. Torsten Thorell. *Biochem. Z.* 230, 1–9(1931) —Fiske-Subbarow's procedure for the colorimetric detn. of P is modified to be used for a photospectrometric analysis of quantities ranging from 0.01 to 0.05 mg P. The method dispenses entirely with the standard soln., and detns. can be made with an accuracy of ±2% S. Morgulis

Colorimetric estimation of nitrogen by direct nesslerization, with a note on a modified Nessler-Folin reagent. Lance S Walters. *Australian J. Exptl Biol. Med Sci* 7, 113–6(1931) —By using a gum ghatti soln for protective colloid and replacing NaOH by LiOH in the Nessler Folin soln., it was possible to nesslerize 100 cc. of soln contg 2 cc. concd. $H_2SO_4$ and up to 1 mg N The nesslerized soln. remained clear for weeks The usual Kjeldahl digest contg 20 cc. of $H_2SO_4$ *is diluted to* 100 cc. and an aliquot taken which contains 0.5 to 1.0 mg N. This is diluted to about 60 cc., 3 cc. colloid soln. is added, followed by nesslerization and making up to 100 cc. for matching a standard. The *protective colloid soln. contains 2%* of alc.-pptd and dried gum *in thymol*-satd water C. G King

Determination of nitrogen by a "micro-Kjeldahl" method. A C. Andersen and B Norman Jensen *Z anal Chem* 83, 114–20(1931) —The method previously described by A and J (*C A* 19, 1461) can be used equally well for 0.5–1 mg of N if the app is built on a smaller scale. Such a modification is shown and exact dimensions are given The app was tested with 5 org nitrogenous compds. and excellent results were obtained W. T. H

Determination of some gases by means of the spectrograph. Bouchetal de la

ROCHE *Bull soc chim* [4], 47, 1326–31(1930), cf *C A* 24, 1252, 1580, 5667.—Further description of the method is given. Spectrographic analyses of mixts of Si and B fluorides and Cl with dry air are in close agreement with the results by the chem. method Br and I are less sensitive and therefore difficult to det by this method O gives certain lines by which it can be detd, but the intensity is independent of the quantity of O introduced, this is probably due to the oxidation of the electrodes N diluted with H or $CO_2$ is detd by the line 5008 or 3437, resp., and the results agree well with those of volumetric analysis H W. WALKER

**Bromoiodometric investigations. V. Determination of bromine in bromides.** J H VAN DER MEULEN *Chem Weekblad* 28, 82–6(1931), cf *C A* 25, 1182.—To 20 cc KBr soln (contg about 0 1 g) add 10 cc. *N* KOCl in 0 1 *N* KOH and 25 cc satd NaCl soln Heat the mixt on the water bath to about 85° and add 10 cc of a satd $H_3BO_3$ soln Continue the heating for about 5 min after discoloration takes place Decompose the excess KOCl with 10 cc *N* $H_2O_2$ and boil off the excess $H_2O_2$ After cooling add KI and HCl and titrate the mixt. A blank titration is necessary F SCHOTTE

**Spectroscopic detection of fluorine.** JACOB PAPISH, L E HOAG AND W E SNEE. *Ind Eng Chem, Anal Ed* 2, 263–4(1930).—A mixt of a substance contg F with a salt of Ca is placed on a graphite electrode and the arc or spark spectrum photographed. A band at 5291 A U is intense enough to detect 0 02 mg F The method is applied to complex F compds, F minerals, bones and teeth of animals In the latter case and when the quantity of F is very small, the sample is ashed by distg with $H_2SO_4$ and the HF is collected in $Ca(OH)_2$ soln The dried $CaF_2$ is then applied to the electrodes. G M MURPHY

**Qualitative microanalysis. Detection of traces of copper by capillary separation.** F. FEIGL AND H J. KAPULITZAS *Mikrochemie* [N S], 2, 239–44(1930).—Traces of Cu may be detected in the presence of large amts of Ni by placing one drop of the AcOH soln of the elements on a filter paper which has been dipped into an alc. soln. of dithioöxamide and dried If Cu is present, the middle of the drop immediately develops an olive green to black ring, the Ni diffuses further before it reacts with the amide, so that a white ring surrounds the Cu ring and is itself surrounded by a dirty violet to violet blue ring The reaction will detect 0 05γ of Cu in the presence of 20,000 times as much Ni or 2000 times as much Co, which forms a yellowish brown ring outside the Cu ring B. C. A.

**Effect of the presence of other elements on some microscopical tests for the metals.** W. F. WHITMORE AND F. SCHNEIDER *Mikrochemie* [N S], 2, 293–304(1930).—The formation of triple nitrates with K and Pb is a test for Cu or Ni in the absence of the other, the former giving black or dark brown cubes and the latter light yellow cubes; when both elements are present the color may vary from light yellow to black. The oxalate test for Mn, Cd, Pb and bivalent Sn is sp only when each element is present alone; when 2 or more are present in the test soln the crystals formed usually have a different habit from the normal, or the cryatals due to one element may fail to appear. *Similarly, the* $Hg(CNS)_2$ *test for Cu, Co, Zn and Cd does not distinguish the elements* from one another when in admixt., the crystal habit and color varying considerably with the nature and relative proportions of the metals present Fe cannot be detected by the ferrocyanide test when more than 10 times as much Cu is present, and Pb and Hg cannot be detected by the iodide test when 50 times as much Hg or Pb is present in the same soln (cf. *C A* 24, 2004) B C. A.

**Analysis of white metals and solder.** H L. MATTHIJSEN *Chem. Weekblad* 27, 284–7(1930).—Slight modifications in standard methods, and particularly in simultaneous electrolytic detn of Pb and Cu, are described. B C A

**Spot tests for the detection of the precious metals.** H. HOLZER. *Mikrochemie* [N. S], 2, 271–6(1930).—For the detection of Au in a soln contg. Pt a drop of the liquid is placed on a filter paper and allowed to dry; on addn of a min drop of acid $SnCl_2$ soln to the middle of the spot it becomes yellowish brown, *and a purple ring gradually* forms around the outside if Au is present Feigl's test for Ag with *p*-dimethylaminobenzylidenerhodanine (*C. A.* 22, 4080) is interfered with by Au, Pt and Pd, which produce colored flocculent ppts with the reagent The Pd ppt is dark violet in color and its formation serves as a sp test for Pd B C A

**Inorganic gravimetric microanalysis. I. Determination of minute amounts of gold in the presence of much iron, lead and copper.** J DONAU. *Mikrochemie* [N. S], 2, 257–63(1930).—To the boiling, slightly acid soln. (0 2–0 3 cc) of the Au is added a small piece of Japanese silk previously washed in HCl, then in water and dried. The Au deposits rapidly on the silk, coloring it dark purple; a 2nd piece of silk may be added

to make sure that pptn is complete. The silk is collected on a glass microfilter, washed with hot water, dried in a small Pt foil dish and ignited over a small flame. Further heating causes the Au residue to alloy with the Pt, which is then weighed on the microbalance. Fe, Cu and Pb do not interfere in the test. B. C. A.

Determination of cadmium with potassium ferrocyanide. Alfred Kundert. *Chemist Analyst* 20, No. 2, 5-6(1931).—It is shown that the $K_4Fe(CN)_6$ titration gives results that are comparable to those obtained gravimetrically. W. T. H.

Specific reaction for the detection of cadmium. F. Pavelka and E. Kolmer. *Mikrochemie* [N. S.], 2, 277–80(1930).—Cd salts in AcOH soln. yield a characteristic yellowish white cryst. ppt. with nitrophenolarsinic acid, under the microscope the crystals appear as long narrow rectangular prisms often clustered in prickly spherical aggregates. The reaction will detect 1 part of Cd in 200,000 parts of soln. and is not affected by the presence of any metal which forms a sol. acetate. B. C. A.

Detection of zinc by means of resorcinol. K. Fabich. *Verhandl. Geol. Bundesanst. Wien* 1929.—The addn. of a 10% soln. of resorcinol in alc. to a dil. soln. of a Zn salt gives on shaking in the cold a yellow color, which on heating changes to olive green or blue, the color depending on the concn. Other metals, such as Cd, Ni, Co, Cu and Mn, give similar colors with resorcinol. B. C. A.

Analysis of the coating of galvanized sheet steel. Frank W. Scott. *Chemist Analyst* 20, No. 2, 4–5(1931).—Cut 3 test pieces, 2.25 in. sq., of the metal, clean with gasoline or benzene, dry, mark one of them and weigh. Place the 3 pieces in a 400-cc. beaker with their bottom edges resting on pieces of pure Zn and with the sheets sepd. by glass rods. Cover the squares of metal with 3.3 *N* $H_2SO_4$ and put a watch glass over the beaker. Move the pieces from time to time but keep them in close contact with the pure Zn. When the evolution of gas is very slow, showing that the coating has been dissolved, transfer the acid to another beaker and at once cover the undissolved metal with water. Using a policeman and a jet from the washer bottle, scrub off the sheets and pieces of pure Zn, adding the black residue and water to the acid soln. Dry the marked sheet and again weigh, the loss in wt. in g. is equal to the wt. of coating in oz. on a piece a foot sq. This wt. multiplied by 3 gives the wt. of sample analyzed. Titrate the $Fe^{++}$ in the soln. with $KMnO_4$. Add $HNO_3$, evap. with concd. $H_2SO_4$ and det. the Pb as $PbSO_4$. Dil. the filtrate from the $PbSO_4$ to 450 cc. and, while introducing $H_2S$, reduce the acidity so that some Zn together with all the Cd is pptd. as sulfide. Filter, dissolve in acid and repeat this pptn. twice more until finally pure CdS is obtained and weighed. To det. Sn, treat 3 more pieces in the same way, from the resulting soln. ppt. sulfides of Sn and Pb with $H_2S$, dissolve the ppt. in aqua regia, boil off $Cl_2$, dil., nearly neutralize with $NH_4OH$, add an excess of $NH_4OAc$, make neutral to methyl orange and allow to stand in a warm place to ppt. $Sn(OH)_4$. Filter, ignite and weigh as $SnO_2$. Call the remainder of the coating Zn. W. T. H.

Determination of the iron contained in the coating of galvanized steel. Benjamin E. Cohn. *Chemist Analyst* 20, No. 2, 4(1931).—The method of obtaining the sample is similar to that described by Scott (see preceding abstr.) but $HgCl_2$ is added to the soln. before titrating with $KMnO_4$. W. T. H.

The determination of iron in aluminum. Giulio Agamennone. *Giorn. chim. ind. applicata* 12, 486–7(1930).—Fe occuring in Al is usually detd. volumetrically as $Fe^{II}$, leading to some losses due to carbides not completely decompd. because of the danger of oxidizing to $Fe^{III}$ again, and to some Fe remaining as $Fe^{III}$. To avoid these losses, Fe is detd. as $Fe^{III}$ by dissolving the Al in dil. HCl, boiling the soln., adding $H_2O_2$ and again boiling. The soln. is then cooled and the $Fe^{+++}$ detd. iodometrically. A. W. Contieri.

New test for tin. Irwin Stone. *Chemist Analyst* 20, No. 2, 6–7(1931).—Meissner's Bunsen flame test is described in which a blue coloration is obtained. W. T. H.

Lead-antimony-tin alloys. Max Hale. *Chemist-Analyst* 20, No. 2, 10(1931).—The sp. gr. of the sample gives a fair idea of the Sb content of Pb-Sb alloys. The treatment of the alloy with acid, sepn. of Sb and Sn from Pb by NaSH soln., detn. of Pb as $PbSO_4$, in the ppt., electrodeposition of the Sb from the alk. soln. to which KCN is added and the pptn. of Sn in the electrolyzed soln. are described. W. T. H.

Electrolytic determination of copper in steel. Lawrence Anderson. *Chemist Analyst* 20, No. 2, 7–8(1931).—Dissolve 5 g. of metal in 100 ml. of 3 *N* $H_2SO_4$, filter off the Cu and any insol. carbide, treat the residue with hot dil. $HNO_3$, filter and electrolyze. W. T. H.

Analytical applications of a reaction of copper salts. Manuel Lora y Tamayo. *Rev. acad. ciencias Madrid* [2], 25, 267–98(1930).—The reaction between $Cu^{++}$ and

tartrate in alk. soln. serves to indicate 15.0–16.7 mg. of $Cu^{++}$ per 100 cc. of aq. soln. or 0.4 mg. of $Cu^{++}$ if sufficient ale is added. By measuring the vol. of KCN used to decolorize the soln. a fairly satisfactory detn. of $Cu^{++}$ can be made. A bibliography of methods for detg. Cu and of studies of the action of various cations on alk. tartrate is given. JOHN B. PETRIKIN

**Study of Spacu's reaction. Methods for the volumetric determination of copper based on this test.** J. GOLSE. *Bull. soc. chim.* 49, 81–100(1931).—Salts of Cu give ppts. of $[Cu(C_5H_5N)_2](SCN)_2$ when placed in contact with pyridine and an alk. thiocyanate. The ppt. is easily dissolved by $CHCl_3$ giving an emerald green soln., and by evapn. of this soln. a residue is obtained which can be weighed as such or ignited to CuO. Quantities of Cu varying from 5 to 60 mg. can be detd. volumetrically by using 1 cc. of pyridine and 25 cc. of 0.1 *N* KCNS in a total vol. of 100 cc., filtering off the ppt., adding a known quantity of $AgNO_3$ and titrating the excess $Ag^+$ with 0.05 *N* $NH_4CNS$, using ferric alum as indicator. Cl$^-$, Br$^-$, Zn, Cd, Ni and Co must be absent and *proper allowance must be made for a blank run in the absence of Cu.* Another method, suitable for even smaller quantities of Cu, consists in pptg. the Cu similarly, filtering the soln. and detg. the excess CNS by the following method. Take 20 cc. of filtrate, add 0.5 cc. of NaOH (d. 1.32–1.36) and expel excess pyridine by a current of steam, using glass connections without any contact with rubber and keeping the vol. at 20 cc. *Cool and dil. to 30 cc. Add 20 cc. NaBrO soln. (5 cc. Br, 30 cc. of NaOH (d. 1.32–1.36) and water to make 500 cc.)* to oxidize the excess CNS$^-$ to $SO_4^{--}$ and $CNO^-$ with reduction of $BrO^-$ to Br$^-$. After 15 min. add 10 cc. of 20% KI and 20 cc. of 2 *N* HCl. Titrate the liberated $I_2$ with 0.1 *N* $Na_2S_2O_3$. Run a blank without any Cu soln. W. T. H.

***Separation of nickel from cobalt metal or ferro-cobalt.*** H. A. KAR. *Chemist Analyst* 20, No. 2, 15(1931). Treat the $HNO_3$ soln. with $NH_4OH$ and $(NH_4)_2S_2O_8$, filter, add considerable $NH_4Cl$ and treat with dimethylglyoxime. Dissolve the ppt. in acid and repeat the above treatment; the final Ni ppt. will be free from Co. W. T. H.

***Estimation of copper and nickel in steel.*** W. L. KNOWLES. *Paper before Swansea Tech. Coal. Met. Soc.*, 18 pp. (Feb. 22, 1930). *Metals & Alloys* 1, 738.—If small amts. of Cu are assocd. with large amts. of Fe, the sepn. is best effected by the pptn. of the Cu as a sulfide by means of ZnS in place of the usual $NH_4$ sulfocarbonate. No new method is offered for the estn. of the Ni. G. G.

***New volumetric method for the estimation of sodium.*** A. BLENKINSOP. *J. Agr. Sci.* 20, 511–6(1930).—Certain disadvantages of the gravimetric $NaZn(UO_2)_3Ac_9$ method (*C. A.* 22, 2808; 23, 462; 24, 5012), due to manipulative details are overcome by a proposed method in which the U is detd. by reduction to $U^{++++}$ by means of standard $TiCl_3$ soln. Ppt. the Na as $(UO_2)_3ZnNaAc_9 6H_2O$, as in the gravimetric method, *filter through a Jena glass filtering funnel (porosity G4), remove as much of* the reagent as possible by suction and wash 2 or 3 times with 2 cc. portions of a satd. soln. of the ppt. in 95% ale. Dissolve the ppt. in dil. HCl, transfer to a 500 cc. conical flask, add about 10 cc. of strong HCl and displace the air in the flask by a stream of $CO_2$. Reduce the U to the uranous state by addn. of an excess of 0.03 *N* $TiCl_3$ soln. Maintaining the $CO_2$ atm., shake the mixt. and allow to stand for 2 or 3 min. or heat to 40–50° to insure complete reduction. Add 20–25 cc. of 2% HF to stabilize, or even ppt., the U. After addn. of about 10 cc. of 10% KSCN, est. the excess of $TiCl_3$ by back titration with 0.02 *N* Fe alum soln. to a permanent red color. P. R. DAWSON

**Determination of water in glycerols.** L. F. HOYT AND P. C. CLARK. *Soap* 7, No. 2, 25–27; *Oil & Fat Ind.* 8, No. 2, 59–61(1931).—Water in concd. glycerols may be detd. directly by the Bidwell-Sterling distn. method using toluene as the boiling liquid. A variable but small amt. of glycerol (never exceeding 0.1 mg.) is carried over with the water, and the correction of the apparent percentage did not exceed 0.15% in any of the glycerols contg. up to 10% of water. The use of xylene b. above 100° is not advisable, as more glycerol is carried over and the time of distn. is not markedly shortened. An analysis of a 25 g. sample of dynamite glycerol to which 2.8 g. of water was added giving 10.37% water, gave a recovery, corrected for 0.030 g. of glycerol carried over, of 10.39% water. B. SCHERUBEL.

**Determination of phosphoric acid as ammonium phosphomolybdate or as phosphomolybdic anhydride.** A. VON ENDREDY. *Z. anorg. allgem. Chem.* 194, 239–57(1930).—For ppts. 0.0003–0.035 $P_2O_5$, it is recommended to add 8 g. $NH_4NO_3$, 20 cc. 4 *N* $HNO_3$ and 20 cc. of reagent (100 g. tartaric acid, 150 g. $(NH_4)_6Mo_7O_{24} 4H_2O$, 10–12 drops $HNO_3$ per l.). Dil. to 100 cc., shake vigorously and filter after the ppt. has settled. Wash the ppt. with 5% $NH_4NO_3$ which is 0.6 *N* in $HNO_3$, dry with acetone and weigh

or ignite The dried ppt contains 3 55% $P_2O_5$, after ignition it contains 3 92% $P_2O_5$. The tartaric acid is added to stabilize the soln. B A SOULE

**Analysis of gases and vapors which affect oxidation of phosphorus.** J. TAUSZ AND H GÖRLACHER *Z anal Chem* 83, 81–92(1931) —A method is given for the analysis of substances like hydrocarbons and $Fe(CO)_5$ which tend to prevent oxidation of P in mixts with $O_2$ and air As indication of the beginning of its oxidation, the luminescence shown by the P can be taken The pressure of the gas at which this takes place is sharply defined and reproducible so that it can be called the "luminescence pressure" It serves to detect low concns of impurities which would be difficult to detect in other ways. The literature on this subject of oxidation hindrance from 1797 to the present time is reviewed The luminescence pressures of mixts of $O_2$ and air with the following substances were detd benzene, cyclohexane, acetylene, methylcyclohexane, ethylene, propylene, cyclohexene, isoprene and $Fe(CO)_5$. On the basis of these data it is possible to analyze binary gas mixts of these substances with either $O_2$ or air The results quoted were accurate within about 0 05% W. T. H

**Absorption spectrum of sulfohemoglobin.** JEAN PRÉVOT. *J. usines gaz.* 54, 576–80(1930) —$H_2S$ leaves the 2 characteristic bands of hemoglobin unchanged, but adds a new one at 0 610–20$\mu$, the red blood color being changed to olive-green In analyzing suspected gas mixts for $H_2S$ the gas was washed with 200 cc. blood soln in a gas-absorption app A paraffin oil was used as the replacement fluid, instead of water A min of 30 cc. $H_2S$ (room temp and pressure) produced the characteristic band $CO_2$ and $O_2$ did not interfere K. H. ENGEL

**Notes on the detection of carbon disulfide.** F. FEIGL AND K. WEISSELBERG *Z anal Chem* 83, 93–104(1931) —The sensitiveness of tests for $CS_2$ was studied and of 12 methods, the formation of a difficultly sol Ni salt with "Hector's base," $C_{11}H_{12}N_2S$, proved the most sensitive test. In a small test tube of Jena glass, which is provided with a well fitting rubber stopper, put a little of the soln. to be tested, a few crystals of $Ni(OAc)_2$ and some of the org reagent. If the $Ni(OAc)_2$ is insol in the liquid, add 5–10 drops of water Stopper the tube, heat a few min in a water bath, then remove and allow to cool. A pink color will appear if 0 0005 mg of $CS_2$ is present in 1 cc. of soln tested and a red ppt if much more is present. The ppt. can be weighed and used as the basis of a gravimetric detn. Of the other methods tested, the next best results were obtained by the reactions with $NaN_3$ and $I_2$, in which the $CS_2$ acts as catalyzer, and with HCHO and $Na_2PbO_2$ these reactions served to detect 0 002 mg of $CS_2$ in 1 cc. of liquid W. T H

**A new reaction to differentiate between kaolin and talcum.** E. TSCHIRCH. *Seifensieder Ztg* 57, 909–10(1930) —Boil about 1 g of the substance with 10 cc. of 2 *N* HCl, filter neutralize with AcOH and add 1 cc. of a freshly prepd 1% alc. soln. of hematoxylin (ext of 'Blue Wood'), a rose violet color turning blue-violet (test for Al) indicates kaolin a yellowish color indicates talcum P. ESCHER

**The chemical analysis of bastnasite.** I P. ALIMARIN *Trans. Inst Econ. Mineral* (Moscow) No 44, 55–6(1930) —F is sepd from the decompd. mineral according to Berzelius and detd. by the Merwin colorimetric method Rare earths and sesquioxides are pptd with $NH_4OH$ and then sepd by Peter's oxalate method. Th is sepd. from the Ce and Y groups with $H_2O_2$ and Ce from the remaining rare earths by Br Water is detd by an improved Penfield method Other common elements are detd by the usual methods H. C. PARISH

**The determination of sulfate ions in chrome-plating baths.** O MACCHIA. *Industria chimica* 5, 1345–51(1930) —After a lengthy review of the numerous methods which have been proposed for the detn of $SO_4$ ions in chrome-plating solns, including an extensive bibliography the following method is developed To 20 cc of soln. add 20 cc. of glacial AcOH and reduce Cr(6) with $NH_2OH$ or $C_6H_5NHOH$, adding the reagent until there is no further evolution of gas Add 150 cc. of water, boil and ppt with 8 cc. of 10% $BaCl_2$ It is claimed that this method will give results within 5% of the truth A. W. CONTIERI

**Analysis by distillation.** HANS WOLFF AND J RABINOWICZ *Chem Fabrik* 1931, 37–8 —Directions are given for constructing the simple app and performing distns by which the characteristics and boiling relations of solvents, single or mixed, may be detd. when only 2–4 cc of substance is available Charts show comparative results by this method and the Engler method for benzine, a mixt. of benzine and acetone, and for a mixt. b 60–200°, but the nature of this mixt. is not stated J H M

**Determination of the constituents of a mixture of volatile liquids.** M LEMARCHANDS. *Bull soc chim* 49, 80–4(1931) —The method, which can be used for the detn. of alc. and ether in pastes of Poudre B, depends upon the complete vaporiza-

tion of the alc and ether in a vacuum, the detn of the quantity of heat absorbed by *this vaporization and the wt of the substances vaporized* The app consists of a silvered Dewar tube fitted with a stopper carrying a thermometer graduated in tenths of a degree and an Al tube which is provided with an exit tube to be connected with the vacuum pump The sample is weighed in the Al tube which is placed in the heated Dewar tube which is filled with hot water The tube is evacuated and the rate of cooling observed The results obtained were better than those obtained by the usual methods. W T H

**Effect of light on the determination of ethylene.** J Louis Oberfrider and J. H. Boyd, Jr *Ind Eng Chem, Anal Ed* 3, 123(1931).—By painting the Williams pipet *black, except for a narrow vertical strip, the detn can be made more accurate when* made in sunlight, which probably increases the activity of Br upon heavy hydrocarbons so that the $C_2H_4$ results obtained by absorption in Br aq are otherwise high when made in sunlight W T H

**Volumetric determination of citric acid in calcium citrate.** G Romeo *Rivista ital essenze profumi* 11, xxiii xxvi(1929); cf *C A* 24, 2963 The Ca citrate is converted into the K salt and treated with an excess of standard $AgNO_3$ soln, the excess being titrated with thiocyanate Oxalic acid, tartaric acid, HCl and $H_3PO_4$, but not $CaSO_4$ nor pectic substances, interfere B C A

**Color reaction of glycerol with alkali thiosulfates** D Ganassini *Arch ital biochim* 2, 239–42(1930).—Most of the color reactions of glycerol are due to its products of oxidation or dehydration Of these, acraldehyde, which is formed by heating with $KHSO_4$ (or $B_2O_3$ or $P_2O_5$) either glycerol or its derivs, may be identified by spontaneous conversion of its phenylhydrazone into phenylpyrazoline this giving an intense violet coloration in the presence of oxidizing agents in acid soln Powd. $Na_2S_2O_3$ dissolves in very concd glycerol soln, with slight heating to a colorless soln, which becomes sky blue and then deep indigo when heated to boiling This reaction is not given by carbohydrates in general, but a much less intense coloration is obtained with the polyhydric alcs To sep glycerol from org liquids and tissues, the material is mixed with water and filtered, the filtrate being treated with a slight excess of basic Pb acetate and filtered After removal of the Pb as sulfide, the liquid is evapd to dryness with milk of lime, the residue being extd with a mixt of 95% alc (2 parts) and Et$_2$O (1 part) and the soln evapd to a sirup, to which the above test is applied *To ext glycerol present as glycerides, glycerophosphate or lecithin, the material must* first be hydrolyzed with NaOH The coloration given with thiosulfate appears to be due to the transitory formation of the unstable blue modification of S The test may be used also for the detection of thiosulfate B C. A.

**New analytical applications of the reaction of ammonia on resorcinol in the presence of cations.** Ligor Bey *Bull soc chim* [4], 47, 1192–3(1930); cf. *C. A.* 23, 1900, 24, 2397.—$NH_3$ was added to a 5% soln of resorcinol in ether, just to the point of re solution A soln contg 0.0011% $CdCl_2$ $2H_2O$, added carefully, gave a blue ring at the junction of the 2 layers in 26 min It persisted 5–10 min Lower concns. gave a noncharacteristic violet. In the analysis for Sn, stannic Sn gave the best results The Sn was oxidized with Br until the soln was a light yellow. Two or 3 cc. was shaken with 5 cc. $NH_3$ (d = 0.925) for several min, 2 or 3 cc of 5% aq resorcinol was added, giving a white ppt of $Sn(OH)_4$, which turns blue in 2–20 min This test is sensitive to 0.0015% $SnCl_2$ $2H_2O$ Lower concns gave a noncharacteristic gray. *The result is not affected by less than 400 times as much Sb as Sn* G M P.

**Detection and estimation of hydroxyl groups in organic compounds.** Huppmann, *Pharm Ztg* 76, 113–4(1931).—This is a commentary on the usual methods (by the aid of AcCl, $Ac_2O$ and BzCl) in connection with expts on resorcinol, orcinol, Me salicylate and 2,7-hydroxytetralol, in which the procedure of Verley and Bölsing was used W. O. E.

**Iodoxybenzoate as a test reagent for free phenolic hydroxyl groups in organic compounds.** Chauncey D. Leake *Proc. Soc. Exptl Biol. Med* 28, 148–50(1930).—Morphine salts treated with an aq soln of $NH_4$ iodoxybenzoate give a straw to garnet color reaction *No other opium alkaloid, except apomorphine, gives a color with this* reagent The reagent does not decompose the compds with which it comes in contact; it reveals by an oxidizing color reaction the presence of a "free" phenolic hydroxyl group The test should be useful in detecting and differentiating morphine and apomorphine from other opium alkaloids, adrenaline from ephedrine, acetarsone from *other quinquevalent arsenicals* It detects phenol and cresol as preservatives in org. fluids The test substance need not be miscible with the reagent; thorough shaking is sufficient The pharmacol effect of substances treated with this reagent does not

seem to be altered Substances such as codeine, in which the H of the phenolic hydroxyl group is replaced, have much less toxicity and general pharmacol action than the parent substances. C. B. BAILEY

**Detection of hydrogen in volatile organic compounds.** IRWIN STONE. *Chemist Analyst* 20, No 2, 7(1931) —By passing the vapors through a small opening so that they strike against hot CuO in a test tube, water is formed and condenses on the upper walls of the tube W T. H

**Note on the Ter Meulen-Heslinga methods for the estimation of nitrogen, carbon and hydrogen in organic material.** E P GRIFFING AND C. L ALSBERG *J. Am Chem Soc* 53, 1037–9(1931) —This is a discussion and suggestion of modifications of the methods for N, C and H developed by Meulen and Heslinga (cf *C A* 19, 226, 2465) C. J WEST

**A method for the (mercurometric) determination of formaldehyde and hexamethylenetetramine** ENRIQUE E REBAGLIATI *Ann Farm Bioquim* 1, 150–8(1930) —The substances are reduced with the aid of Knapp's reagent modified, and the final detn is accomplished by titration with 0 1 *N* $AgNO_3$ according to the method of Denigès R claims that the method is rapid and exact B S LEVINE

**New method for the estimation of halogens in organic substances.** JUAN A SANCHEZ *Ann farm bioquim* 1, 121–34(1930) —Heat the org substance in a closed tube together with solid $K_2MnO_4$ ext with water and destroy the excess of the reagent with $H_2O_2$ Det the halogen titrimetrically The method can be applied to quantities of org matter as low as 0 02 g It is applicable with a high degree of precision to aliphatic and cyclic derivs and to substances rich in C and poor in halogen, and *vice versa* The detn of halogens in substances such as $C_6Cl_6$ and the halogen derivs. of phenyl is accomplished with greater ease than by the method of Carius. B S LEVINE

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The activity of Professor F Wald in analytical chemistry (QUADRAT) 2. Conductivity measurements and titrations (HAHN) 2. Oxidation of heterocyclic As compounds by I (RAZUVAEV, MALINOVSKII) 10.

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**Fälschungen.** Edited by SIEGFRIED TÜRKEL. Graz: Ulr Moser 93 pp M 12 Reviewed in *Analyst* 56, 141(1931).

SCHUFTAN, P **Gasanalyse in der Technik.** Leipzig: S Hirzel. 80 pp M. 5 50

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## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T WHERRY AND J F SCHAIRER

**Gallium. IV. Occurrences of gallium in zinc minerals.** JACOB PAPISH AND CHESTER B STILSON *Am Mineral* 15, 521–7(1930) —The arc spectrographic method, with graphite and also Ag electrodes, was used in a study of a no of Zn minerals for the detection of Ga The relative intensity of the Ga lines is listed Sphalerite, gahnite, hopeite, parahopeite and adamite were found to be galliferous Ga was not detected in calamine, smithsonite, zincite, hydrozincite, goslarite, hodgkinsonite, hardystonite and clinohedrite A M. BRANT

**Tellurium and tellurium minerals of Hungary.** S KOCH *Bányás Kohás Lapok* 62, 425–9, 449–52(1929) —Te is the one element discovered by a Hungarian scientist Pál Kitaibel Eleven Te minerals are found in Hungary, ten of which were first discovered there The genetic relations of these are summarized Native Te of Facebánya contained 0 15–2 78% Au Tetradymite, hessite, wehrlite, petzite, muthmannite, krennerite, sylvanite nagyágite, tellurite and stützite are described The mines which once yielded such Au-contg tellurides belong now to Roumania, and most of them are not being worked S S DE FINÁLY

**Notes on rickardite, a new occurrence** WM P CRAWFORD *Am Mineral* 15, 272–3(1930) —Rickardite $Cu_4Te_3$ has been found in the sulfide ores of the Brigg's mine, Warren, Ariz A M BRANT

**Crystallography of stibnite and orpiment from Manhattan, Nevada.** CHARLES PALACHE AND DAVID MODELL *Am Mineral* 15, 365–74(1930) —The crystallographic features are given in detail The data on orpiment give addnl proof that the mineral is monoclinic A M. BRANT

**Crystal habit of zinc blende.** G KALB AND L KOCH *Centr Mineral Geol* 1929A, 353–7 —Zn blende is referred to the octahedral isoharmonic crystal type, 2 forms, resp , black and reddish brown to reddish yellow, are distinguished B C. A

**Arsenoferrite from Jachymov, Czechoslovakia.** Wm. F. Foshag and M. N. Short. *Am. Mineral.* 15, 428–9(1930).—This mineral, $FeAs_2$, is the arsenide member of the pyrite group. It is isotropic in character, differing from löllingite which is anisotropic. It can be distinguished from smaltite only by chem. tests. The color is dull medium gray. The phys. properties are: metallic luster, no cleavage, hardness 5.5, sp. gr. 6.42. Jachymov arsenoferrite occurs as fine-grained irregular masses in a carbonate gang. Chem. analysis of material contg. some gang gave: Fe 24.88, Cu 1.34, Pb 0.05, $CaCO_3$ 34.00, $MgCO_3$ 1.57, As 66.84, S 1.08, sum 99.76%. Co and Ni were not detected. The blowpipe characteristics are the same as those for löllingite. A. M. Brant

**The crystal structure of cryolithionite.** G. Menzer. *Z. Krist.* 75, 265–87(1930).—A detailed report of the structure of $Li_3Na_3Al_2F_{12}$ (cf. *C. A.* 22, 2340). The side of the unit cube is 12.097 ± 0.004 A. U. and the calcd. d is 2.791. Coördinates for the F atoms are 0.035, 0.04 and 0.64 (all ±0.01). Although the structure is analogous to that of garnet, the diffraction effects are quite different, for in garnet the O atoms are almost negligible, while in cryolithionite the corresponding F atoms are the most important. L. S. Ramsdell

**Boleite, pseudoboleite and cumengeite.** B. Gossner. *Z. Krist.* 75, 365–7 (1930).—A criticism of the structure detn. of Friedel and Hocart (*C. A.* 24, 4734). G. *maintains that the x-ray data show boleite to be cubic and not tetragonal.* L. S. Ramsdell

**Origin, weathering and artificial coloring of agate.** H. Heinz. *Chem. Erde* 4, 501–25(1930).—The different layers in agates were examd. chemically, optically and by x-rays. Analyses are given of the white weathered crust and of the fresh agates; *e. g., flint from the English chalk gave I for the inner black portion and II for the white* chalk like crust.

| | $SiO_2$ | $(Fe,Al)_2O_3$ | $(Mg,Mn)O$ | $CaO$ | Ign. | D |
|---|---|---|---|---|---|---|
| I | 97.93 | 0.27 | 0.20 | 0.59 | 1.25 | 2.596 |
| II | 96.72 | 0.28 | 0.09 | 1.71 | 1.68 | 2.501 |

The portion sol. in 10% KOH soln., taken to represent admixed opal, varies in different bands from 5.02 to 30.69%, with a corresponding range in d. from 2.620 to 2.601. Artificial coloring, by soaking in sugar soln. for 14 days and then in concd. $H_2SO_4$, was effected in the finer-grained layers contg. more opal, rather than in porous weathered layers. Banded and tubular structures, similar to those seen in agates, were obtained experimentally by the interaction of silicic acid sols and salt solns. B. C. A.

**Agate.** G. Linck and H. Heinz. *Chem. Erde* 4, 526–8(1930).—A discussion of the preceding abstr. The banding of agate is attributed to the alternating action of solns. of silicic acid and of salts, the former during the dry season and the latter during the wet season of the year. B. C. A.

**The relations of magnetite and ilmenite in the magnetite deposits of the Duluth gabbro.** G. M. Schwartz. *Am. Mineral.* 15, 243–52(1930).—Polished surfaces of the titaniferous magnetite ores and gabbro were examd. in reflected light. The Ti was found to occur only in the form of ilmenite, as grains and as intergrowths along the parting planes of magnetite. The intergrowths are estd. to amount to 15% of the ore. Their texture is attributed to the breaking down of a solid soln. A. M. Brant

**Four stages in the alteration of the Villeneuve uraninite.** H. V. Ellsworth. *Am. Mineral.* 15, 455–60(1930).—The specimen, found in 1886, shows well-marked zones of material due to progressive alteration. The central zone A has a steely blue-black color, hardness 6, sp. gr. 9.144, zone B has a pitch-black color, hardness 4.5, sp. gr. 7.779; zone C has a bright "flame-scarlet" color, hardness 3.5, sp. gr. 5.273, waxy luster; zone D is a very thin irregular layer with hardness 3 and has a buff to apricot-yellow color and waxy luster. The chem. analysis of the first 3 are tabulated. The results indicate that when analyzing altered uraninites for age detns., all red and yellow alteration products should be excluded. This is due to the abnormal increase in the Pb-Ur ratio in these products. A. M. Brant

**Uraninite from Placer de Guadalupe, Chihuahua.** Roger C. Wells. *Am. Mineral.* 15, 470–3(1930).—The mineral occurs in a calcite vein about 2 ft. thick between porphyry and shale. It is intimately assocd. with Au. The nodules range from small specks to the size of a walnut. Above the water level the pitchblende is leached out leaving wires of Au and small quantities of uranophane and a dark green U mineral. The mean of 2 analyses is: $UO_3$ 70.09, $UO_2$ 22.69, $ThO_2$ 0.20, $CeO_2$ 0.71, $La_2O_3$ etc., 1.02, $Y_2O_3$ etc., 3.41, $Fe_2O_3$ 0.10, $As_2O_3$ 0.06, PbO 0.40, CaO 0.30, $TiO_2$ 0.06, $Al_2O_3$ 0.25, $H_2O$ (0.41), sum 99.70%. The age of the veins calcd. from the Pb-Ur ratio

is 36 million years The sp gr, 10 63, detd by pycnometer, is the highest so far reported for uraninite A M BRANT

**Euhedral magnesite crystals from Winkler County, Texas.** JOHN T. LONSDALE *Am Mineral* 15, 238–0(1930) —*Magnesite crystals* 1–5 *mm long were obtained from* drill cores at 2690 feet. The matrix is dolomite limestone contg flint nodules Many of the crystals are *stained with petroleum or asphalt* A. M. BRANT

**The occurrence of magnesite and of iron ores at Tarrekaisse, Sweden.** ALVAR HÖGBOM. *Geol Foren Forh* 52, 417–30(1930) —The magnesite is usually accompanied by chlorite, asbestos and magnetite The probable formation of the ores is discussed WILHELM SEGERBLOM

**Feldspars in the Adirondack anorthosite.** HAROLD L ALLING *Am. Mineral* 15, 267–71(1930) —A discussion of an article by Barth (*C A* 24, 6258) A. concludes that (1) the plagioclase of the Adirondack anorthosites consists of labradorite grading into andesine with an appreciable though small percentage of K feldspar in solid soln., and (2) late-stage interstitial feldspars are Na rich anorthoclases and K-bearing oligoclases The latter may be untwinned A. M BRANT

*A chromium-bearing pyroxene from Jagersfontein, S. Africa.* JJ. O'DANIEL. *Z Krist* 75, 575(1930) —This dark green mineral occurred as a nodule in the blue-ground *The angle between the 110 and 1̄10 cleavages was 92°49′; between 110 and* 001, 70°7′ Analysis gave $SiO_2$ 53 53, $Al_2O_3$ 1.30, $Cr_2O_3$ 1 96, FeO 2 10, CaO 22 96 and MgO 17 88, sum 99 73%, *np* $\alpha$ 1 6722, $\beta$ 1 6847, $\gamma$ 1 7015 L S RAMSDELL

**A titaniferous augite from Chaudrawati, Sirohi State, Rajputana.** A L COULSON *Records Geol Survey India* 63, 448–60(1930) —The mineral occurs in a contact metamorphic product at the junction of olivine gabbro with calcic rock. Its assocd minerals are calcite, wollastonite, pectolite, quartz, microcline, orthoclase, plagioclase and magnetite Optical data are given ALDEN H EMERY

**Iron-rhodonite from Tuna Hästberg.** N SUNDIUS *Geol Fören Förh* 52, 401–6 (1930) —An ore found at Tuna Hastberg was a very Mg poor olivine holding 27 9% MnO and 40% FeO, small grains of garnet and a pyroxene like mineral which made up 4 to 5% by vol *of the ore* *The last named mineral was found to be an Fe rich rhodonite* with the compn $SiO_2$ 47 78, $Al_2O_3$ 0 08, $Fe_2O_3$ 0 11, FeO 14 51, MnO 29 20, MgO 1 93, CaO 6 55, $H_2O$ 0 09, *sum* 100 25% *The mineral is colorless or slightly pink* and has 2 excellent cleavages nearly at right angles to each other. Discussion of the work *of Weibull and of Palmgren and Sobral on similar minerals leads S to conclude* that the name iron rhodonite should be reserved for members of the series which contain *considerable amts of FeO* WILHELM SEGERBLOM

**The structure of anthophyllite, $H_2Mg_7(SiO_3)_8$.** B E WARREN AND D I. MODELL. *Z Krist* 75, 161–78(1930)(in English) —Anthophyllite is the simplest orthorhombic amphibole X ray data lead to the formula $H_2Mg_7(SiO_3)_8$ rather than $MgSiO_3$ Rotation photographs give $a$ = 18 6, $b$ = 17 9 and $c$ = 5 27 A U The unit contains 4 mols and the space group is $V_h^{21}$ Compared with enstatite (*C A*. 25, 1420) the values for $a$ and $c$ are identical, but $b$ for anthophyllite is twice that for enstatite A block of enstatite is multiplied by the action of *symmetry planes to form* the anthophyllite cell, except for 1/8 of the Mg atoms, which fall in unlikely positions and drop out Each Si is surrounded by 4O *atoms tetrahedrally arranged* *Sharing of tetrahedra corners* gives rise to the characteristic amphibole double Si-O chains One twelfth of the (O, OH) positions are not *bound to Si, but to only 3Mg* *These are only singly charged and must* be OH The general relations between amphiboles and pyroxenes are discussed L S RAMSDELL

**Soda-rich anthophyllite asbestos from Trinity County, California.** J D LAUDERMILK AND A O WOODFORD *Am Mineral* 15, 259–62(1930) —*The country rock is* serpentine contg minute branching veins of chrysotile and much thicker veins (up to *5 cm*) *of amphibole asbestos* *They are short branching and lie in the crushed slickensided* rock in roughly parallel positions The fibers are usually perpendicular to the walls *The material was found to be anthophyllite with* $\alpha$ = 1 606, $\beta$ = 1 613, $\gamma$ = 1 623 Z, parallel to elongation, was pale yellow green, in the other directions colorless *Analysis gave* $SiO_2$ 57 70, $Al_2O_3$ 2 00, $Fe_2O_3$ trace, FeO 5 32, MgO 21 12, CaO 5 10, $Na_2O$ 7 40, $K_2O$ absent, MnO trace, $H_2O^+$ 1 80, $H_2O^-$ 0 30, sum 100 74% A. M. B.

**An association of anthophyllite and enstatite.** F. COLES PHILLIPS *Geol. Mag* 67, 513–6(1930) —These minerals were observed in thin sections of rocks from the Shetland Islands The anthophyllite shows a variable degree of alteration to talc The enstatite is of later formation than the anthophyllite, but there is little evidence that the pyroxene formed at the expense of the amphibole A M. BRANT

**Hypersthenization and its explanation.** D. GUIMARAES. *Ann acad. brasil sci.* 2, 1–11(1930) —The formation of hypersthene from diopside by way of clinoenstatite is discussed from the crystallographic point of view, and a general theory is put forward to account for the chem transformations which have occurred for silicate minerals It is supposed that at high temps and pressures the small quantity of water present acts as an electrolyte, and interaction of silicates, or of silicates and $SiO_2$, and the transformation of one mineral into another is possible in directions controlled by the H-ion concn B C A

**Tremolite from near Jasidih, Bihar.** A L COULSON *Records Geol Survey India* 63, 444–6(1930) ALDEN H EMERY

**Changes in hornblende at about 800°.** VIRGIL E BARNES. *Am. Mineral.* 15, 393–417(1930) —A set of 14 samples of hornblende including edenite and pargasite and 6 of the tremolite-actinolite series were studied optically before and after heating in air The samples were later heated to 850° in a stream of H and the optical properties again studied The results are given in tabular and graph form It was found that green hornblende when heated in air changes to brown hornblende, with the optical properties of basaltic hornblende. The Fe poor hornblendes do not change on heating Tremolite behaves like the Fe-poor hornblendes and actinolite like the iron-rich ones The changes observed in heating the latter are an increase in d, *ns*, birefringence and dispersion; a decrease in extinction angle, a change in optic angle to about 65°; a change in pleochroism from greens to browns The birefringence of brown hornblende in violet is greater than that for red, and the opposite is in general true for common hornblende The wt.-% loss on heating is only a fraction of the $H_2O$ obtained by analysis; there is marked conversion of $Fe^{++}$ to $Fe^{+++}$. Heated hornblendes in general show a more complete change in $Fe^{++}$ than basaltic hornblendes. Dehydration has little effect on the optical properties, but they change almost in proportion to the change in the total Fe oxides, with $Fe^{+++}$ being especially influential. Brown hornblende when heated in H changes back to green hornblende. Inversion does not take place In dehydration, H and not $H_2O$ (except that which is not a constituent part of the space lattice) is given off The O remains in the mineral, either oxidizing $Fe^{++}$ to $Fe^{+++}$, or in the absence of $Fe^{++}$ remaining free because of its size. A M. BRANT

**Notes on some Franklin minerals.** L. H. BAUER AND HARRY BERMAN. *Am. Mineral* 15, 340–8(1930) —*Cummingtonite* (Zn, Mn-bearing) was found embedded in rhodonite or garnet. The green prismatic crystals have a cleavage angle of 54°28′. The chem compn is: $SiO_2$ 49 74, $Al_2O_3$ 1 72, FeO 12 80, MgO 8.31, ZnO 10 46, MnO 13 79, CaO 0 49, $Na_2O$ 0.22, $H_2O^+$ 2 16; sum 99 69% The optical properties are: biaxial −, 2V = 75°, ZAc = 15°, Y = b, $\alpha$ = 1 657, $\beta$ = 1.674, $\gamma$ = 1 685 *Apophyllite* found as pale-pink radiating crystals in limestone has the compn $SiO_2$ 50 90, CaO 24 74, $K_2O$ 3 70, $Na_2O$ 0 42, MnO 0 47, ZnO 1 79, $H_2O$ 17 71% The derived formula is $(Ca, K, Na, Mn, Zn)_2 Si_2O_5 3^1/_2H_2O$ *Barysilite* occurs as thin films and veinlets assocd with garnet, axinite, hardystonite The chem compn is $SiO_2$ 16 84, PbO 77 35, MnO 3 33, FeO 0.23, $Al_2O_3$ 0 59, CaO 0 21, MgO 0 78, ZnO 0 30, $H_2O$ 0 07, sum 99 70%, the formula is $3PbO\,2SiO_2$ The optical properties are uniaxial −; $\omega$ = 2 033, $\epsilon$ = 2 015 *Celestite* is reported from Sterling Hill It occurs in cavities in franklinite ore as good crystals tabular parallel to *a*(100). *Chlorophoenicite* (previously described as clinozoisite) is compared with that mineral *Datolite* has been found in crystals tabular to *b*(010) *Ferroschallerite*, in which the Mn of schallerite is partially replaced by Fe, has the compn: $SiO_2$ 31.12, MnO 29.22, FeO 17 12, MgO 0 12, ZnO 3 63, $As_2O_5$ 12 46, $H_2O$ 6 42, sum 100 09% A single specimen of *manganbrucite* was found This had a Mg to Mn ratio of 5 1 The chem analysis of *svabite* is: insol 0 29, $H_2O$ 1.32, F 1 41, $CO_2$ trace, CaO 45 89, ZnO 1 54, MnO 1 23, MgO 0 84, PbO 0 51, $As_2O_5$ 35 24, $P_2O_5$ 12 54, sum, corrected for O = $F_2$, 100 22%; sp gr is 3 542 and $\omega$ = 1 684. The relations of the members of the apatite-svabite series are discussed A. M. BRANT

**The structure of hardystonite, $Ca_2ZnSi_2O_7$.** B E WARREN AND O. R. TRAUTZ. *Z. Krist* 75, 525–8(1930)(in English) —From rotation and oscillation photographs it is shown that the unit cell and space group of hardystonite are the same as those found for melilite (*C. A.* 24, 4736). The dimensions are $a$ = 7.83, $c$ = 4 99 A U, $c/a$ = 0 637. The at. arrangement is the same as in melilite, except that the (Mg, Al) is replaced by Zn L. S RAMSDELL

**Crystal lattice of eulytite, $Bi_4Si_3O_{12}$.** G. MENZER. *Centr. Mineral. Geol.* 1928A, 420–1.—Powder photographs show a cubic, space-centered lattice, $a_0$ 10 25 ± 0 02 A. U.; d. 6.32 ± 0.21. If a mol. wt. of 1109 is assumed, there are 3.7 mols in the unit cell. B. C. A.

The structure of danburite, $CaB_2Si_2O_8$. C. Dunbar and F. Machatschki. *Z. Krist.* 76, 133–46(1930)(in English).—The orthorhombic unit cell has the dimensions $a = 8.75$, $b = 8.01$ and $c = 7.72$ A. U. If the symmetry is holohedral, the space group is $V_h^{28}$. There are 4 mols. in the cell. The unit of structure is not an $SiO_4$ group, but rather $Si_2O_7$, 2 tetrahedral groups being linked by a common O atom. The eighth O atom forms a tetrahedron with O atoms from $3Si_2O_7$ groups. The B atoms are at the centers of these tetrahedra. Although the presence of B makes the detn. of structure difficult, parameters are derived for all positions. L. S. Ramsdell

Zoisite and its native rock from the high mountains of Västerbotten. Erland Greif. *Bull. Geol. Inst. Univ. Upsala* 22, 289–98(1930).—Three samples of amphibolite from different localities were examd. The rock is dark grayish green, somewhat slate-like, with porphyritic injections of zoisite in a granular base of hornblende, plagioclase and quartz. The long, flat, striated zoisite needles are white with a tinge of green, and are, in general, oriented with respect to the cleavage plane (100). The optical orientation is $\alpha = c$, $\beta = b$, $\gamma = a$. The sp. gr. is 3.378, it is optically + and $2V = 50$–$56°$, $\alpha = 1.7011$, $\beta = 1.7020$, $\gamma = 1.7073$. Analysis gave $SiO_2$ 39.37, $Al_2O_3$ 32.06, $Fe_2O_3$ 1.47, FeO 0.15, MnO 0.02, CaO 24.32, MgO none, $TiO_2$ 0.36 and $H_2O$ 1.89%. Descriptions and analyses of the other mineral constituents are included. The composite material from Spångfjället, sp. gr. 3.090, contained hornblende 70.7, zoisite 10.3, quartz 7.7, plagioclase 3.5, garnet 5.7 and titanite 2.1% by wt. W. L. Hill

Sapphirine in the Vizagapatam district. H. Crookshank. *Records Geol. Survey India* 63, 446–8(1930).—The material occurs as a thin rim around grains of hercynite. Optical data are given. Alden H. Emery

Formulization of silicates. W. Kunitz. *Chem. Erde* 4, 349–50(1930).—A further discussion of the chem. formula of tourmaline, with comparison of the views of K. (*C. A.* 25, 1461) and of Machatschki (*C. A.* 23, 5132 and *C. A.* 25, 1461). To conform with the detn. that the unit cell contains 3 mols., the empirical formula may be multiplied by 3/2 or 9/4. B. C. A.

The space lattice of natrolite. Franz Halla and Ernst Mehl. *Z. Krist.* 75, 421–9(1930).—The orthorhombic unit cell of natrolite has the dimensions $a = 18.384 \pm 0.004$, $b = 18.715 \pm 0.027$ and $c = 6.632 \pm 0.008$ A. U. It contains 8 mols. of $Na_2Al_2Si_3O_{10}.2H_2O$. If holohedral symmetry is assumed, the space group is $V_h^{29}$; otherwise it is $C_{2v}^{18}$ or $V^7$. L. S. Ramsdell

The crystal structure of muscovite. W. W. Jackson and J. West. *Z. Krist.* 76, 211–27(1930)(in English).—The structure for muscovite proposed by Pauling (*C. A.* 24, 2694) has been confirmed, and the details of the structure are discussed. Four mols. of $KAl_2(AlSi_3)O_{10}(OH)_2$ are in the monoclinic unit, with $a = 19.96$, $b = 9.02$, $c = 5.13$ A. U. and $\beta = 95°30'$. The close relations between diopside, tremolite and muscovite are discussed. L. S. Ramsdell

The structure of chrysotile, $H_4Mg_3Si_2O_9$. B. E. Warren and W. L. Bragg. *Z. Krist.* 76, 201–10(1930)(in English).—Chrysotile (variety of serpentine) occurs only in bundles of parallel fibers, with random orientation about the fiber axis ($= c$ axis). It is not possible to obtain rotation photographs about any other axes, and exptl. data are consequently meager. This proposed structure is believed, however, to be correct in its main features. The unit cell is monoclinic, with $a = 14.66$, $b = 18.5$, $c = 5.33$ A. U. and $\beta = 93°16'$. The space group is probably $C_{2h}^3$. The unit contains 4 mols. of $(OH)_4Mg_3Si_2O_{11}.H_2O$. Each Si atom is surrounded by a tetrahedron of O atoms. Sharing of O atoms by adjacent tetrahedra gives rise to double Si–O chains, just as in the amphiboles. These have the compn. $Si_4O_{11}$, and between them lie sections of Mg and OH arranged as in brucite ($Mg(OH)_2$). Although the formula calls for $4H_2O$, these are not $H_2O$ mols. as each H is shared by 2O atoms. The lateral binding between the chains is very weak, the perfect fibrous character of chrysotile being thus accounted for. L. S. Ramsdell

Aluminum silicate from Allchar, S. Serbia. F. Tućan. *Bull. soc. franç. minéral.* 52, 42–7(1929).—The product, having a compn. corresponding with the formula $Al_2O_3.3SiO_2.7H_2O$, has da 1.9515, when heated it evolves water (completely at 650°) having an acid reaction. The dehydration curve ($CaCl_2$, $H_2SO_4$ or $P_2O_5$ being used) is continuous. B. C. A.

The chemical composition of lessingite and cerite from the Kyshtym district. Vr. N. Knipovich. *Trans. Inst. Econ. Mineral. and Met.* (Moscow) No. 44, 46(1930).—The formula for the new mineral lessingite may closely approach $H_2Ca_2Ce_6Si_9O_{28}$. On the assumption of the presence of an admixt. of bastnäsite, the compn. of the cerite is

$4Ce_2O_3\ 6SiO_2\ H_2O$ which closely approaches Swedish cerite but contains less $H_2O$
H C PARISH

**Cenosite from North Burgess Township, Lanark County, Ontario.** R. P. D. GRAHAM AND H V ELLSWORTH *Am Mineral* 15, 205–19(1930).—The mineral occurs as minute pink or pale rose colored crystals on calcite and quartz in soln. cavities in a coarse granular limestone. Chalcopyrite and celestite are also present It is orthorhombic in crystn, prismatic in habit The mineral is optically −, with 2 V about 39°45′, $\alpha = 1.644$, $\beta = 1.689$, $\gamma = 1.691$. Orientation $a = \alpha$, $b = \beta$, $c = \gamma$ Other phys properties are hardness 5–6, sp gr 3.612, vitreous to pearly luster, no cleavage Chem analysis gave $SiO_2$ 34.66, (Ce, La, Di)$_2O_3$ 3.22, (Yt, Er)$_2O_3$ 35.46, CaO 16.72, SrO 0.31, $Al_2O_3$, $Fe_2O_3$, BeO 0.22, MnO 0.02, $Na_2O$ 0.27, $K_2O$ trace, MgO 0.19, $CO_2$ 6.58, $SO_3$ 0.04, $H_2O$ 2.54, $H_2O$ (110–130°) 0.04, sum 100.23%, formula deduced, 2CaO·(Ce, Yt)$_2O_3$ $CO_2$ $4SiO_2$ $H_2O$
A M BRANT

**Allodelphite, a new silicoarsenite from Långban.** P QUENSEL AND H VON ECKERMANN *Geol Foren Forh* 52, 439–46(1930).—The mineral which Flink labelled "undescribed mineral no 325" in his catalog of new minerals from Långban (cf *C A* 19, 2623, 20, 1778) is now named *allodelphite* to show its relation to synadelphite. Allodelphite occurs as thin crusts of small well defined elongated tabular crystals of a dark red brown color, but deep wine red in transmitted light. The luster is submetallic, fracture conchoidal and streak chocolate brown It is optically −, sp gr = 3.573 The compn is $SiO_2$ 6.23, $As_2O_5$ 21.91, $As_2O_3$ 0.62, $Sb_2O_5$ 0.15, $Al_2O_3$ 1.50, $Fe_2O_3$ 0.98, PbO 0.39, MnO 50.30, CaO 1.10, MgO 6.22, $K_2O$ 0.74, $Na_2O$ 0.53, $H_2O$ 8.82, sum 99.49% Allodelphite is evidently a new representative of the small group of silicoarsenates or silicoarsenites. Two general formulas are suggested $9RO.As_2O_5.SiO_2\ 5H_2O$ and $5RO.2R_2O_3\ As_2O_3\ SiO_2\ 5H_2O$. Q and E discuss these in the light of a new analysis of the related mineral synadelphite and conclude that, pending further investigation, the formula of allodelphite may be assumed to be $MnO\ (Mn_2, As_2, MnSi)O_3\ H_2O$ W S

**The hiddenite deposit in Alexander County, North Carolina.** CHARLES PALACHE, S C. DAVIDSON AND E. A GORANSON *Am Mineral.* 15, 280–302(1930).—The genetic history of this deposit was traced, 3 stages of mineralization being distinguished, as follows (1) the *list-par-list* pegmatite stage, (2) the hiddenite pegmatite stage, (3) the hiddenite cavity stage. The minerals of the latter stage are described in some detail The optical properties of *holmquistite* are $\alpha = 1.625$, $\beta = 1.645$, $\gamma = 1.654$; pleochroism X = light yellow, Y = violet, Z = purplish violet; Z nearly parallel to *c*, dispersion weak $\rho > V$, 2V = 51°. The mineral is compared as to chem compn. with the find at Uto, Sweden
A. M BRANT

**Paragenesis of the Newry pegmatite, Maine.** H. J. FRASER. *Am. Mineral* 15, 349–64(1930).—Structural and textural data indicate 3 periods during the formation of the pegmatite, and that the process was essentially continuous In the first period mainly silicates were deposited During the second period these changed to Li silicates and phosphates The third period was one of deposition of Mn, Fe, Al and Be phosphates
A M. BRANT

**Pegmatite minerals of Poland, Maine.** HARRY BERMAN AND F A GONYER *Am. Mineral* 15, 375–87(1930).—The minerals found in pockets in microcline comprised *amblygonite*, as a compact rim around the pockets, *lithiophilite*, partially replaced by reddingite The chem. compn. is FeO 10.96, MnO 31.90, $Na_2O$ 0.30, $Li_2O$ 9.55, $H_2O$ + 0.40, $P_2O_5$ 46.35, insol 0.16, sum 99.62% The optical properties of the analyzed material were biaxial+, 2V = 60°, $\alpha$ and $\gamma$ parallel to cleavages $\alpha = 1.675$, $\beta$ 1.679, $\gamma$ 1.688 *Rhodochrosite* occurs as an irregular layer over the amblygonite contg cavities with small protruding crystals of the mineral, strongly etched. *Quartz* occurs as min doubly terminated crystals in veinlets in the rhodochrosite *Eosphorite* (cf Drugman *C. A* 10, 31) occurs as well formed crystals embedded in rhodochrosite *Reddingite* replaces rhodochrosite as granular masses and as veinlets in lithiophilite The color varies from colorless to deep brownish red, depending on the degree of alteration to landesite. The chem. compn is· $Fe_2O_3$ 0.05, FeO 12.68, MnO 38.36, CaO 0.15, $Na_2O$ $K_2O$ trace, $H_2O$ + 13.16, $P_2O_5$ 34.52, insol 0.45, sum 100.27%, formula $3(MnFe)O\ P_2O_5\ 3H_2O$, with Mn:Fe = 3:1, optically biaxial + with 2V = 65°; $\alpha = 1.655$, $\beta$ 1.662, $\gamma$ 1.683 *Dickinsonite* occurs as small, tabular, highly etched crystals assoed with fairfieldite The color is brownish to yellowish green The chem compn is FeO 12.33, MnO 31.83, MgO 1.67, CuO 2.01, $Na_2O$ 7.41, $K_2O$ 1.73, $Li_2O$ 0.20, $H_2O$ 1.82, $P_2O_5$ 40.78, insol 1.00, sum 100.78%; formula $7(MnFe)O.2(Na_2K_2Ca)O\ 3P_2O_5 \cdot H_2O$, optically biaxial + with 2V near 90°; $n\alpha = 1.648$, $\beta = 1.655$, $\gamma = 1.662$ *Fairfieldite* occurs as white foliated plates in rhodochrosite and on dickinsonite. Its compn is FeO 4.74, MnO 14.82, CaO 30.85, $Na_2O$ 0.41, $K_2O$ none, $H_2O$ 9.70, $P_2O_5$ 39.55, insol

0 50, sum 100 58%; formula $(MnFe)O.2CaO\ P_2O_5.2H_2O$, with Mn.Fe = 3 1; optically biaxial + with 2V = 86°; $\alpha$ = 1 640, $\beta$ = 1 650, $\gamma$ = 1 660 *Apatite* occurs as small "nailhead" crystals resting on the other crystals. *Landesite*, a new mineral, is a brown alteration product of reddingite. The crystals are rough and of a form suggesting the unit pyramid of the latter Two cleavages are shown. The chem compn is $Fe_2O_3$ + FeO 13 91, $Mn_2O_3$ 2 69, MnO 33 65, MgO 3 07, CaO 1.39, $H_2O$ 13 60, $P_2O_5$ 31 94, insol 0 13, sum 100 38%. This analysis yields the formula $3Fe_2O_3$-$20MnO\ 8P_2O_5.27H_2O$. The mineral is related to salmonsite in compn and to sicklerite in optical properties. These are biaxial −, 2V large; Z perpendicular to best, and X to an inferior cleavage; pleochroism X = dark brown, Y = light brown, Z = yellow, $\alpha$ 1 720, $\beta$ 1 728, $\gamma$ 1 735 *Cassiterite* is contemporaneous with rhodochrosite *It is* identified optically by the following: uniaxial +; $\omega$ = 2 01 = light green, $\epsilon$ = brown The pleochroism is worthy of note A *beryl* crystal from this locality has on the base an excellent etch figure of the forms (10$\bar{1}$1) and (11$\bar{2}$1) Its $\omega$ = 1.585, indicating high alkali content and probably Cs This crystal was not a part of the phosphate *suite of minerals and is probably of an earlier period* The *solns leading* to the formation of the foregoing minerals were essentially of Mn phosphate with carbonate and water, *Li* rich in the earlier phase and Ca rich toward the *end* A. M Brant

**Pegmatite minerals of Ontario and Quebec.** Hugh S. Spence *Am Mineral.* 15, 430–50, 474–96(1930).—The minerals occurring in (1) the normal granite pegmatites of Ontario and Quebec and (2) the syenite pegmatites of the Wilberforce district, Ontario, are reviewed and the pegmatites described The minerals are listed for those of more restricted regional development (1) the Sn bearing pegmatites of New Ross, Nova Scotia, (2) mica-apatite-pyroxenite pegmatites of Ontario and Quebec, (3) Li pegmatites of southeastern Manitoba and (4) granite pegmatites of British Columbia A. M Brant

**A remarkable occurrence of thucolite and oil in a pegmatite dike, Parry Sound district, Ontario.** Hugh S. Spence *Am Mineral* 15, 499–520(1930), cf *C. A* 23, 790.—*The location is the Besner mine in Henvy township. The pegmatite is a light*-pink perthite The mineral occurred near the dike walls, at or near the surface. It was closely assoed with radiated groups of a highly altered mineral now chlorite, thought to have originally been pyrorthite The mineral thucolite occurred in part as well-defined cubic crystals, apparently pseudomorphic after uraninite Massive material is jet black with a conchoidal fracture and a sooty brownish black streak. Its hardness = 4 and sp gr 1 57 The cubes have a dull earthy appearance. Analysis gave

| | Thucolite Crystals | Massive Thucolite |
|---|---|---|
| Moisture, 110° | 2 00 | 1 60 |
| Volatile hydrocarbons | 20 19 | 19 96 |
| Fixed C | 50 82 | 61 56 |
| Ash | 26 86 | 16 63 |
| | 99 87% | 99 75% |

The ash from both samples was strongly radioactive. Minerals found closely assoed with the thucolite were allanite, beryl, *biotite, cyrtolite*, garnet, *marbite*, pyrorthite (?), titanite, uraninite An oily substance was found in 2 parallel fracture zones across the *dike The occurrence of the thucolite indicates that it is not a primary constituent* of the pegmatite, and S suggests that its origin may have been from oil introduced *in a later* stage. A M Brant

**A note on the occurrence of monazite in western Arizona.** Robert E S. Herneman *Am Mineral* 15, 536–7(1930).—Scattered pebbles were found in the stream gravels in Mohave county Some were good crystals, elongated on the b-axis. The sp gr of a group of 8 crystals was 5 04 A M Brant

**The structure of apatite.** I. *Martin Mehmel. Z. Krist* 75, 323–31(1930).—The dimensions of the hexagonal unit of apatite are $a$ = 9 36 and $c$ = 6 85 A U (±0 02) The space group is $C_{6h}^3$, and there are 2 *mols of* $Ca_5F(PO_4)_3$ *in* the cell General positions for all atoms are given, but no parameters. St Naray-Szabo *Ibid* 387–98(1930)(*in English*).—A complete detn has been made by means of *abs* intensity measurements Parameters are given for all at. positions There are 6 $(PO_4)$ *groups in the unit* cell, 4Ca ions are on trigonal axes, surrounded prismatically by 6O ions, 6Ca ions are surrounded by an irregular polyhedron of 1F and 5O F *ions are at the corners of the reflection planes*, touching 3Ca ions each. L. S. R

**Larnlite from Chittenden, Vermont.** Charles Palache and F. A. Gonyer. *Am*

*Mineral* 15, 338–9(1930) —The specimen, deep blue in color, is backed by quartzite containing sericite, rutile needles and hematite grains Soln of sample for analysis gave 1 49% insol , contg $SiO_2$ and probably $TiO_2$ The sol material had the compn · $Al_2O_3$ 33 11, FeO 2 59, MgO 12 38, $H_2O^+$ 6 24, $P_2O_5$ 46 17, sum 100 49%; formula (Mg,Fe)O $Al_2O_3$ $P_2O_5$ $H_2O$, with Mg Fe = 8 1 The sp gr is 3 08 The optical properties are biaxial- with 2V = 70°, $\alpha$ = 1 612 colorless, $\beta$ = 1 634 light blue, $\gamma$ = 1 643 blue A M. Brant

**Two phosphates from Dehrn, dehrnite and crandallite.** Esper S. Larsen and Earl V Shannon *Am Mineral* 15, 303–6(1930) —The 2 minerals were found on a specimen of brecciated phosphorite *Dehrnite* formed grayish or greenish white crusts of fibrous to bladed crystals Its phys properties are hardness 5, sp gr 3 04, fusibility 2, with formation of a white opaque bead basal cleavage, hexagonal outline Optically it is uniaxial–, $\omega$ = 1 622, $\epsilon$ = 1 614 The compn is insol 0 12, CuO 50 88, $P_2O_5$ 37 12, $K_2O$ 1 20, $Na_2O$ 7 11 $H_2O^+$ 1 52, $H_2O^-$ 0 16, $CO_2$ 1 49, sum 99 60%, probable formula 7CaO $Na_2O$ $2P_2O_5$ $H_2O$ *Crandallite* occurs in creamy-white radiating prismatic fibers attached to dehrnite It is optically +, has a moderate optical angle and has $\alpha$ = 1 59, $\gamma$ = 1 60 X is parallel to elongation and Z perpendicular to the cleavage (100) It is probably orthorhombic The compn is· $SiO_2$ 4 92, $Al_2O_3$ 37 52, $P_2O_5$ 25 24, CaO 11 04, MgO 0 24, $H_2O^+$ 17 90, $H_2O^-$ 1 00, $CO_2$ 2 54, sum 100 40%, formula CaO $2Al_2O_3$ $P_2O_5$ $6H_2O$ This mineral has previously been called "kalkwavellit " A M Brant

**The minerals of the phosphate nodules from near Fairfield, Utah.** Esper S. Larsen and Farl V Shannon *Am Mineral* 15, 307–37(1930) —The nodules were found embedded in a matrix of quartz and calcite They have an ellipsoidal or discoidal shape and vary in size up to 8 in The methods used in the study and analysis of the minerals are described Most of the nodules consisted of a no of minerals arranged in concentric layers or in part lining or filling cavities Calcite, variscite, pseudowavellite and wardite were present in most of the nodules Dehrnite (cf preceding abstr ) was observed in cavities of the pseudowavellite Seven new minerals were segregated and studied optically and physically and analyzed The results are tabulated Wardite was found to be identical with soumanite Pseudowavellite is the most abundant mineral in the nodules The new minerals are *deltaite*, 8CaO $5Al_2O_3$ $4P_2O_5$ $14H_2O$, *dennisonite*, 6CaO $Al_2O_3$ $2P_2O_5$ $5H_2O$, *lewistonite*, 15CaO $(K,Na)_2O$ $4P_2O_5$ $8H_2O$, *englishite*, 4CaO $K_2O$ $4Al_2O_3$ $4P_2O_5$ $14H_2O$; *millisite*, 2CaO $Na_2O$ $6Al_2O_3$ $4P_2O_5$ $17H_2O$, *lehiite*, 5CaO $(Na,K)_2O$ $4Al_2O_3$ $4P_2O_5$ $12H_2O$, *gordonite*, MgO $Al_2O_3$ $P_2O_5$ $9H_2O$ A M B

**Scorodite from Gold Hill, Tooele Co., Utah.** Wm F. Foshag, Harry Berman and Ruth A Doggett *Am Mineral* 15, 390–1(1930) —The color of the crystals is pea-green The mineral is optically–; by the Merwin dispersion method the *n*s for D are: $\alpha$ = 1 784, $\beta$ = 1 796, $\gamma$ = 1 814, dispersion F-C = 0 3 ± 005 2V = 54° ± 5°. The mineral is a normal scorodite and at Gold Hill forms bodies of considerable magnitude as an alteration product of arsenopyrite. A M Brant

**Psittacinite from the Higgins mine, Bisbee, Arizona.** Stephen Taber and Waldemar T Schaller *Am Mineral* 15, 575–9(1930) —The mineral occurs in coarsely granular masses of anhedral crystals up to 2 cm diam with well-defined cleavage in one direction It is intimately assocd with higginsite and platy white barite The compn is $V_2O_5$ 21 11, $As_2O_5$ trace, PbO 50 13, CuO 19 10, ZnO none, ignition loss ($H_2O$) 4 79, insol 3 06 ($MnO_2$), sum 98 19%, approximating the formula 2PbO 2CuO · $V_2O_5$ $2H_2O$ ascribed to psittacinite The color is dark olive-green, streak yellow. The cleavages show parallel extinction, and the mineral is probably orthorhombic Approx values for *n* are $\alpha$ = 2 22, $\gamma$ = 2 33 The dispersion is strong, $\rho > V$. Thick fragments show distinct pleochroism from yellow to olive-green. The analysis of the mineral from the Higgins mine is compared to that from the Shattuck mine nearby, and the relation to descloizite is discussed A M. Brant

**Seamanite, a new manganese phosphoborate from Iron County, Michigan.** E H Kraus, W. A Seaman and C B Slawson *Am Mineral* 15, 220–5(1930) —The mineral occurs in the Chicagon mine near Iron River, Mich , as small acicular crystals in crevices in a highly ferruginous siliceous rock A fibrous asbestos like mineral is assocd with it The crystals are transparent, pale yellow, unit prisms terminated by pyramids, with distinct basal cleavage, orthorhombic—bipyramidal, with *a b c* = 0 5195 1·0 4508, hardness 4, sp gr 3 128 It is optically + with $\alpha$ = 1 640, $\beta$ = 1 663, $\gamma$ = 1 665; X = *a*, Y = *b*, Z = *c* and 2V about 40°. Analysis gave· MnO 56 22, (Mg,Ca)O 1 61, FeO 0 13, $B_2O_3$ 9 95, $P_2O_5$ 16 65, $H_2O$ 14 57%. The mineral is regarded as a double salt of 3MnO $B_2O_3$ $3H_2O$ and 3MnO $P_2O_5$ $3H_2O$ in equal proportions. A. M. Brant

**Crocoite, lautarite and dietzeite and their crystallographic relationships.** B. Gossner and F. Mussgnug *Z Krist* 75, 410–20(1930).—*Lattice constants were detd. as follows crocoite, a* = 6 82, *b* = 7 49, *c* = 7.16 A. U, *β* = 102° 33′, $C_{2h}^5$, 4 mols $PbCrO_4$ *in cell, lautarite, a* = 7 18, *b* = 11.39, *c* = 7 42 A. U, *β* = 106° 22′, $C_{2h}^5$, 4 mols. $CaI_2O_6$, dietzeite, *a* = 10 16, *b* = 7.30, *c* = 14 03 A U, *β* = 106° 32′, 4 mols The compn is considered as $CaI_2O_6$ $CaCrO_4$ rather than $7(CaI_2O_6)$ $8(CaCrO_4)$ as usually stated The structural and crystallographic relations of these minerals are discussed
L. S Ramsdell

**Transparency of gypsum and mica in the ultra-violet.** W. Hausmann and O Krumpel. *Strahlentherap* 35, 387–90(1930).—*Gypsum is highly transparent for ultra-violet rays, which are largely absorbed by mica* B C A

**The chemical composition and genesis of the natural iron sulfates. XIV.** Rudolph Scharizer *Z Krist* 75, 67–87(1930), *cf C A*, 22, 47.—*A detailed discussion of the genesis of römerite* If free $H_2SO_4$ is present in an aq soln of rhomboclase, hydrolysis is prevented and the acid $H_4Fe(OH)_2(SO_4)_4(H_2O)_4$ is stable. This reacts with $(HO)Fe(H_2O)_4$ *to form römerite A series of analyses of natural and artificial voltaite shows* it to be a mixt. of the $K Fe^{++}$ salts of $H_{10}Fe_4(SO_4)_{12}$ + 13Aq and $H_{10}Fe_4(SO_4)_{12}$+18 Aq
L. S Ramsdell.

***Replacement of wolframite by scheelite, with observations on the fluorescence of certain tungsten minerals*** Frank R Van Horn. *Am Mineral.* 15, 461–9(1930).—A specimen from the East Pool mine, Camborne, Cornwall, England, contains wolframite *which is partly or wholly altered or replaced by pinkish scheelite.* The alteration seems to have taken place at right angles to the cleavage planes The scheelite shows a bright blue fluorescence under ultra violet rays, of a darker shade of blue than other specimens exam'd The results of tests made on a series of W minerals are tabulated. It is suggested that the fluorescence of some wolframites and hübnerites is caused by a slight alteration to scheelite A M Brant

**A new iron meteorite from Carbo, Mexico.** Charles Palache and F. A Gonyer. *Am. Mineral* 15, 388–9(1930).—The meteorite, found in 1923, weighed about 1000 lb The surface is covered with the usual rounded depressions, and in addn there are a no of cylindrical holes which are thought to have contained troilite An etched section shows well marked octahedral structure There are numerous nodules of troilite The bands of kamacite are regular and *from 0 5 to 1 mm. thick. The meteorite is* classed as a medium octahedrite, its compn. is given A. M. Brant

**Statistical review of Ontario's mineral industry in 1929.** W. R. Rogers and A C Young *Ann Rept Ont Dept Mines* 39, Pt I, 1–68(1930) A H. E

**Quinquennial review of the mineral production of India for the years 1924 to 1928.** E H Pascoe *Records Geol Survey India* 64, 89–92, 254–7, 318–20, 322–4, 380–3, 384, 385–92, 400–3(1930), *cf C A*. 24, 4245 A. H. E

**The copper shale of Mansfeld.** J. W. Gregory *Bull. Inst Mining and Met* No 316, 1–22(1931), *cf C. A* 25, 898.—Discussion. Alden H. Emery

**Origin of Copper Mountain (British Columbia) ores.** V. Dolmage *Trans Can Inst. Mining Met* 32, 151–62.—An analysis is given of the ore, which consists of basaltic and andesitic breccia very little altered by mineralization Possible modes of origin of the ore are discussed, it was probably formed before the magma had solidified to any great extent. B. C. A.

**Copper on the Coppermine River, N. W. T.** Geoffrey Gilbert. *Econ Geol* 26, 96–108(1931).—This region in the past has been very inaccessible, but the airplane has revolutionized these conditions Native Cu, although of widespread occurrence, *gives little promise of economic importance, and the chief Cu mineral is the sulfide,* chalcocite Mineralization is apparently confined strictly to the fissures Resemblances to the deposits of Michigan are obvious, the main difference being in the angle of dip of the flows, which may have a *definite bearing on the question of ore deposition.* There appears no reason to suppose that the Cu mineralization will be co-extensive with the basalts on the one hand or strictly limited to them on the other. In this district, as in any other, the main requisite is an adequate supply of Cu bearing solns Without these, the basalts are no more likely to contain important ore than any other rock, given these, the deposits may occur in other formations as well as in the basalts
Alice W Epperson

**A quantitative and qualitative determination of the ores of Cobalt, Ontario.** Jacob W Young *Econ Geol* 26, 112–8(1931).—*V. discusses the recent paper by Ellis Thomson* (*C A* 25, 1466) T s' conclusions as to the pptn of Ag in the veins at Cobalt, and *also for the time of the deposition of the calcite composing the veins in relation to the*

metallic arsenides and sulfarsenides, are at variance with previously formulated views which have much to support them. Y. gives data to support these contentions.
ALICE W EPPERSON

Determination of carbon content in carbonaceous pyrite. V P ZEMLYANITZUIN. *J Chem Ind* (Russia) 6, 889-90(1929).—Detns by 3 different methods were made on a closely bound mixt. of coal and pyrite. All gave practically the same figure of 26 3% C
A C ZACHLIN

Origin of the Manchurian magnesite deposit. HIRONAO NISIHARA *Econ Geol* 26, 118-21(1931).—N discusses a statement made by T Kato (*Econ Geol* 24, 90-3) as to the origin of the Manchurian magnesite deposit. The conclusion as to whether this deposit is a product of replacement of calcareous rock by Mg of magmatic origin, as Nunomy and Kato conclude, or of sedimentary origin, as N believes, may have an important economic bearing on future exploration for similar magnesite deposits elsewhere.
ALICE W EPPERSON

The witherite deposit of the Settlingstones mine, Northumberland. G TRESTRAIL. *Bull Inst Mining and Met* No 316, 23-6(1931). cf *C A* 25, 899.—Discussion.
ALDEN H EMERY

A gold and diamond field in Brazil. ANON *Mining J* 170, 744-5(1930)
ALDEN H. EMERY

Diatomite. PAUL HATMAKER. *Bur Mines Information Circ* 6391, 20 pp (1931).—H discusses diatomite under the headings varieties, occurrence, distribution, properties, uses, mining, prepn., marketing, producers, production, economic condition of the industry and a bibliography of 35 references.
ALDEN H EMERY

Gypsum. P P BUDNIKOV *Bull acad sci U R S S* 1930, No 77, 1-180.—A collection of the papers published on the above subject by B and co-workers from 1922 to 1928
B C. A

Salt and gypsum in Alberta. J A. ALLAN *Trans Can Inst Mining Met* 32, 232-54(1929).—An account is given of the distribution of salt and gypsum in Alberta They are mostly of Devonian or Silurian age Interbedding of salt, anhydrite and dolomite in the McMurray deposits shows that they have been deposited at the edge of a sea of varying concn The anhydrite is of primary origin, but much of the gypsum occurring as selenite, is secondary
B C. A.

The microbiological aspect of peat formation. A. C. THAYSEN *Fuel in Science & Practice* 9, 560-3(1930).—Analysis of the behavior of all known types of cellulose-decomposing microörganisms is given as proof that their activity is limited to the very surface layers of peat, that it decreases in intensity under an excess of moisture and that in acid peats it ceases long before the cellulose has been eliminated D. A. R.

The present nature of coals resulting from their history. LEON DUBRUL. *Rev. univ mines* 5, 10-5, 40-7, 65-77(1931).—It is difficult to draw clear-cut conclusions as to the effect of the history of coals on their nature. The single conclusion is that the causes of differentiation are many The evolution of the coal beds is as follows: The peat formed had a variable chem. compn. depending on the nature of the plants and especially on their manner of decompn and consequently on the rate at which the peat bogs sank. According to the wt. of the overlying material the mass underwent an anthracitization, the modality of which depended upon the initial state, this mass, then under equal pressure and time, showed what is termed the "original differentiation," consisting in a localization of varieties richer in volatile matter in the zone where the subsidence was quickest. But if the overburden varied in thickness, it could have modified the differentiation and at times might have had the reverse effect (Gard) At the same time, under the influence of the variable load there was produced a vertical change by a decrease in volume, relatively greater for lower beds (Hilt's law). At the time of folding the influence of static pressure became negligible as compared with dynamic pressure Orogenic forces were the cause of a new lateral differentiation, because the quantity of energy transformed into heat depended upon the resistance to the lateral thrusts It was thus that the regions displaced did not become thinner, the rubbing having been solely a source of heat (Serang); the masses that had been crushed against a resistant block for the most part lost energy, from folding, in heat and underwent an intense devolatilization (Herstal) The depth of the bed had only a min influence on the coals already formed Four differentiations are: (1) original; (2) by wt. before folding; (3) through orogenic forces, and (4) by wt. after folding The first and third are generally the most important; the second is found occasionally, and the last relatively seldom.
C. W. OWINGS

Igneous intrusions and ore deposits of the zone of flowage. E. C. ANDREWS. *Econ. Geol.* 26, 1-23(1931).—The igneous rocks of the Willyma or Broken Hill "older-

mass" belong to 2 periods of intrusion: that of marked folding, and that of relative stability. The ore deposits are phases of igneous intrusions belonging to the closing stages of the "bedded" form. All the ore deposits examined appear to end vertically as well as laterally, either against or between bedding planes. No sign of feeding source has been detected for the igneous rocks. A infers that the Broken Hill region during the earlier portion of pre Cambrian time was affected by a movement of strong folding in which there was a strong reaction toward the surface of the earth. Field study suggests that the igneous rocks and the ore deposits may not contain the same mineral assemblages which they possessed during their passage to the "pressure-slacks." The latest stages of igneous intrusions appear to have been attended with increased mobility of the igneous material, resulting in injection and replacement, both of sediments and the earlier orthogneisses, by aplite, pegmatite and ore deposits. A. W. E.

**Structural geology of the Conception Bay region and of the Wabana iron ore deposits of Newfoundland.** Albert O. Hayes. *Econ. Geol.* 26, 44–64(1931).—A table of formations is given, and stratigraphy and structural geology of the region is discussed. The limits of the Fe ore are fixed by faults, and the northern limits of the ore are thought to be along a fault line from Colliers Bay to the middle of Conception Bay. The Fe ore reserves are discussed, and it is estd. that mining operations may continue on a scale limited only by the amt. the market will absorb and the engineering difficulties of submarine operations. Alice W. Epperson

**Southern contact of the Riesen Mountain granite and the adjacent slate region.** Adolph Watznauer. *Lotos* 78, No. 2, 112–64(1930).—A petrographical study. W. L. Hill

*Differentiation in the Cape Spencer flow.* Richard J. Lund. *Am. Mineral.* 15, 539–65(1930).—This is the thickest and lowest of a series of 5 Triassic lava flows found on Cape d'Or, Nova Scotia. The optical study was made on material from a drill core. The variations in mineral content, in the FeO:MgO ratio, and in the optical properties of the pyroxene and plagioclase series are given in the form of tables and graphs. Differentiation of the type known as fractionation took place during the crystn. of the flow. This was brought about by the fractional crystn. of the plagioclase and pyroxene series together with the relative movement of these minerals with respect to the liquid. A. M. Brant

**Differentiation in the Dartmoor granite.** A. Brammall. *Nature* 126, 132(1930).—Graded and significant variations in the chem. compn. of granites from East Dartmoor are discussed. B. C. A.

**Eruptive rocks of the Oberwiesenthal, Erzgebirge.** R. Herre. *Chem. Erde* 4, 632–65(1930).—Petrographical descriptions with chem. analyses are given of phonolites and basalts from this locality in Saxony. B. C. A.

*Geology of the south coast of New South Wales. III. The monzonitic complex of* the Mount Dromedary district. Ida A. Brown. *Proc. Linnean Soc. N. S. Wales* 55, 637–98(1930).—Tables of complete chem. analyses of many specimens of the rocks are given. The igneous complex is intrusive into metamorphosed sediments of early Paleozoic age, the main intrusion being an outcrop over an oval area of about 25 sq. mi., probably in laccolithic form. The igneous complex consists of plutonic and hypabyssal types. A study of the field occurrence and assocns. of these igneous rocks and of their mineralogical and chemical compns. shows that probably they are all comagmatic, but that the degrees of consanguinity of the different groups vary. B. considers that the main monzonitic series composing the laccolith has been produced as a result of the differentiation of a monzonitic magma in place, by means of fractional crystn. and the sinking of crystals. The origin of the garnet bearing series is more obscure, it may be due to secondary differentiation of a basic phase of the magma, or the result of assimilation of limestone by the monzonitic magma, with subsequent differentiation. Direct evidence of the age of the intrusion is scanty, but the chem. similarity of the series as a whole to the monzonitic rocks of Milton and the latitic flows of the Illawarra District indicates a probable Permo-Carboniferous age. Alice W. Epperson

**The iron-rich norite at Akkavare (Sjaunja).** Per Geijer. *Geol. Foren. Forh.* 52, 391–7(1930).—Varieties of norite rich in Fe have been discovered at Akkavare, Sjaunja. The rock is generally massive, dark and with the size of the grain averaging 1 to 2 mm. for the main constituents. Five specimens are described in detail. The magnetite and ilmenite content varies from 10.7 to 28.8% by vol. in the different specimens. Wilhelm Segerblom

**Lamprophyrite of the petrographical province of Predazzo.** Silvio Vardabasso. *Ann. scuola ing. Padova* 4, 195–216(1928).—In the eruptive territory of Predazzo and

Monzone, the stratigraphical series and the volcanic rocks are crossed by numerous dark veins These may be put into 2 classes· (*a*) non-differentiated veins related to porphyrite and melaphyre traversing all sedimentary rocks remaining in the district (Triassic period), tuffs and lava but not the intrusive masses, (*b*) veins differentiated by the continuation of intrusive masses (monzonite, etc ), these are the most recent of all rocks in this part of the Dolomites The latter basic series, or lamprophyrites, contain in turn many types considered as representing an alk.-calcareous magma (pacific) and others an alk. magma. This is one of the most salient characteristics of this petrographical province. V gives 4 figures illustrating the compn. of camptonite, 3 for monchiquite, 4 for rizzonite, with a table of compn , and 2 for lamprophyrite with 3 analyses There is a bibliography of 34 references. S L. B ETHERTON

**Water content and degree of compactness of argillaceous rocks.** W. PETRASCHEK AND B WILSER. *Berg Huttenm Jahrb* 74, 57–65(1926) —The water content, other than that evolved at a red heat, diminishes with increasing metamorphism. B C. A.

**The mineralogy of some deposits of kaolinized volcanic ash from the slate belt of North Carolina.** JASPER L STUCKEY. *Am. Mineral* 15, 253–8(1930) —The deposits described lie in areas of acid volcanic rocks. Quartz, altered feldspar, sericite, kaolinite, epidote, rutile, titanite, hydromica, and halloysite were identified by microscopic means, while much fine-grained material could not be identified. Screen tests and chem analyses of the material are given. The origin of the deposits was fine-grained tuff or volcanic ash In the northern part they have been changed by severe metamorphism to sericite schist, and in the south have weathered to impure kaolin A M. B.

**Mechanical analyses of sediments by centrifuge.** PARKER D. TRASK. *Econ. Geol* 25, 581–99(1930) —An application of the centrifuge to the procedure of mech. analyses of sediments on the basis of Stokes' law is described The method consists in decanting the sand and detg the rate of increase in wt. of finer particles settling out, with time. This is done by sepg the suspension contg these finer constituents into a no of aliquots and detg wt. of material that settles from each aliquot after centrifuging for definite times and at specified speeds Curves representing the rate of fall are constructed by plotting the wt. of sediment that settled from the aliquots against the proper values for the time. From these curves, both the size distribution of the constituents and the percentile diams. are readily obtained Chief advantages of the method are: it is rapid and does not involve complicated app., it permits of presentation of the results as percentile diams.; and it gives the complete size distribution of the constituents down to any desired dimension, no matter how small A. W E.

**Sedimentation in the Channel Islands region, California.** PARKER D. TRASK. *Econ Geol* 26, 24–43(1931) —The mech compn. of the deposits of this region varies with the configuration of the ocean bottom Finer sediments accumulate in the basins and coarser on the divides, topography influencing sediments more than depth of water or distance from shore. Finer deposits of the Pacific Coast region are more coarse-grained than corresponding sediments forming off master streams, such as Orinoco, Mississippi or McKenzie. The $CaCO_3$ content of sediments is variable, but in general less in shallow water than in depressions, where it reaches a max of 16%. The org. content varies with bottom configuration and ranges from less than 1 to 7% in deposits in the bottom of Santa Cruz basin. Ignition loss is a rough index of the amt. of org matter. The C-N ratio of recent deposits does not vary greatly from 8 4 Consequently, the org content of sediments may be estd by multiplying the percentage of N by 14 Sediments of past geologic age contain about half as much N with respect to C as do recent deposits. ALICE W. EPPERSON

**Subterranean water conditions in the coastal regions of the Netherlands.** J. VERSLUYS. *Econ. Geol* 26, 65–95(1931) —Geologic history of the area is given, and the character of the deposits and their influence on ground water are described. Chem. action in the subsoil of the dunes is discussed Formation of water with excess of alkalies is explained by assuming that the sea-water has ceded alkalies to the soil, and that these, when the sea-water was displaced by calcareous fresh water, have in turn been exchanged for Ca ALICE W. EPPERSON

**Iron and manganese hydroxide sols in relation to the black coating on rocks and the formation of laterite.** W. KNAUST. *Chem. Erde* 4, 529–48(1930).—Sols of the hydroxides were prepd. with $H_3PO_4$ as a peptizing agent, and various expts were made to det. the conditions for their coagulation. The bearing of these expts on the deposition of Fe and Mn oxides as a coating on rocks and on the formation of laterite is discussed. B. C. A.

**Soils derived from the glacial boulder-marl in the Hamburg district.** E SCHMIDT. *Chem. Erde* 4, 475–500(1930) —Detns of the amt. of $CaCO_3$, of the size of particles,

and of the heavy minerals present in the boulder clay and the overlying soils are recorded. B. C. A.

Annual review of Swedish geological literature for 1929. R. SANDEGREN AND M. MAGNUSSON *Geol Fören Förh.* 52, 689–734(1930).—Continuation with 190 titles of the resumés described in *C. A* 23, 1598, 24, 1605 WILHELM SEGERBLOM

The unipolarity of pressed PbS (TREIV) 2. Quinquennial review of the mineral production of India for the years 1924 to 1928 (PASCOE) 9. The evolution of coal (BRIGGS) 21. *Method and cost of recovering quicksilver from low-grade ore* at the reduction plant of the Sulphur Bank Syndicate, Clearlake, Calif (BRADLEY) 9. Radioactivity and the thermal history of the earth (HOLMES) 3. Preparation and purification of the tri iodides of Sb and As for use in immersion media of high refractive index (FISK) 6 Structure of silicates (BRAGG) 6. *Relation between the contents of coal* in volatile matter and in ash (LE GRAYE) 21.

## 9—METALLURGY AND METALLOGRAPHY

D J DEMOREST, H W GILLETT AND RICHARD RIMBACH

*What the Bureau of Standards does for metallurgy.* RICHARD RIMBACH *Metals and Alloys* 2, 65–70(1931) A. J MONACK

Principal metallurgical products utilized in aeronautical construction. G R HAMEL. *Aciers spéc* 5, 550–8(1930) A. J MONACK

*Progress of metallurgy at Broken Hill, N. S. W.* M. R. MCKROWN. *Chem Eng Mining Rev* 23, 93–100(1930).—The equipment, operation and reagents used are described Slow speed crushers and vibrating screens are preferred. An all flotation treatment with an alk. current of 0.005% $Na_2CO_3$ is used. This process yields higher-grade Pb and Zn concentrates, low tune factor for flotation and lower costs. A N. H.

Quinquennial review of the mineral production of India for the years 1924 to 1928. C H PASCOE *Records Geol Survey India* 64 (1930).—Introduction. *Ibid* 1–3 Summary of progress. *Ibid* 4–25.—Detailed production figures for Indian minerals from 1924 to 1928 are given. Antimony. *Ibid* 26–8.—Stibnite lodes in gneissose granite occur in Punjab They carry 6 dwts. of Au per ton. Stibnite with cervantite occurs in the Northern Shan states. The tetrahedrite in the Sleemanabad Cu lodes is highly antimonial About 1000 tons per yr. of antimonial Pb, analyzing Pb 77, Sb 21% and Ag 6–8 oz. per ton, is produced in Burma. Copper. *Ibid* 75–88.—In Singhbhum, Cu lodes occur in muscovite and chlorite-quartz schists. At the surface they consist of quartz with malachite, chrysocolla and red oxides of Fe contg small quantities of Cu, possibly as red oxide, with sometimes small incrustations of liebethenite. In depth the ore is entirely chalcopyrite. There is a small chalcocite zone not far below the surface. In the Darjelling area, chalcopyrite occurs disseminated through slates and schists. Recent work has shown lodes in Sikkim in which Cu is assocd with Bi, Sb and Te Tetradymite and linnaeite are found. Typical minerals are chalcopyrite, pyrite, pyrrhotite, sphalerite and galena. Several occurrences are described. Bawdwin (Burma) ore analyzed Pb 13, Zn 8, Cu 7% and Ag 18 oz. per ton. Arsenic. *Ibid* 320–2.—The chief Indian source of As is the orpiment mines of Chitral where realgar, orpiment and fluorspar occur Bismuth. *Ibid* 344.—Native Ni and bismuthinite occur in wolfram and cassiterite-bearing veins of lower Burma. Cobalt. *Ibid* 379–80.—Cobaltite and danaite have been found disseminated among certain slates. The Ni speiss of the Burma Corp contains 3–4% Co. Nickel. *Ibid* 412–3.—Nickeliferous pyrrhotite, chalcopyrite and pyrite occur in various parts of India. It is a by-product in the smelting operations of the Burma Corp ALDEN H EMERY

Quinquennial review of the mineral production of India for the years 1924 to 1928. Iron. H CECIL JONES. *Records Geol. Survey India* 64, 111–46(1930).—Bihar and Orissa are the only parts of India where Fe ore is mined for the production of Fe and steel. In Burma limonite and hematite are produced for use as a flux in Pb smelting The main plants are described and analyses given of their raw materials and finished products. Ore occurrences are also described in detail. ALDEN H EMERY

The concentration of ores by flotation. H. L. SULMAN. *Bull Inst. Mining and Met* No 316, 31–6(1931), cf. *C. A* 24, 2699, 5006, 5263, 25, 901.—Discussion ALDEN H EMERY

Water concentration tests. BERNARD W. HOLMAN *Bull Inst. Mining and Met.* No. 316, 29(1931), cf. *C. A* 24, 2699, 25, 901.—Discussion. ALDEN H. EMERY

**Reduction of iron oxide ores in molten state by means of hydrogen and other gases.** Samuel L. Madorsky. *Ind Eng Chem.* 23, 99–103(1931).—Thirteen expts. were undertaken to reduce molten Fe oxide with $H_2$, water gas and CO. For each kg of Fe 1.19 cu. m. of $H_2$, 45% of the theoretical, was required. An Fe product is obtained at a cost comparable to that of other steel-making processes. C. H. Lorig

**Leaching copper ores: advantages of wet-charging.** John D. Sullivan and Alfred P. Towne. Bur. Mines, *Rept. of Investigations* 3050, 20 pp. (1931), cf. *C. A.* 25, 478.—Charging the ore into the leaching vat in the wet condition increases the extn. of Cu. Virtually identical extn. was obtained by upward and downward percolation when the solns. were not continuously circulated. In the latter case, extn. was greater on downward percolation. Virtually identical extn. resulted from flood and trickle leaching when the ore was wet charged. With dry-charged ore, extn. was greater from +100-mesh ore than from unsized material contg. fines, there was no difference when the ore was wet charged. Alden H. Emery

**Cyanidation of a copper-gold ore.** E. H. Smith. *Can. Chem. Met.* 15, 45–6 (1931).—The function of lime in cyanidation of Au ores is attracting much attention. Lime and alky. have no solvent action on the precious metals, but enter into numerous reactions occurring in the process. A pyritic ore ground in lime soln. yields CaS and $CaS_2O_3$, and gang constituents consume a certain amt. of lime. Each mineral in an ore removes lime from the mill soln. in an amt. dependent on the lime present, and this amt. is sp. for each mineral. Lime decomposes the $Zn(CN)_4$ or double cyanide formed in the pptn. processes. W. H. Boynton

**Method and cost of recovering quicksilver from low-grade ore at the reduction plant of the Sulphur Bank Syndicate, Clearlake, Calif.** Worthen Bradley. Bur. Mines, *Information Circ.* 6429, 17 pp. (1931).—The ore deposit consists of grains of cinnabar finely disseminated throughout a gang composed principally of altered basalt with subordinate amts. of elemental S (1–15%, av. 2%) and opal. Recovery is as follows: (1) screening (cinnabar mostly in fines) and sorting the low-grade ore to obtain a furnace feed contg. 8–10 lb. Hg per ton, (2) treatment in a rotary kiln, (3) pptn. of dust from gas stream, (4) condensing Hg from gas, (5) flotation of low-grade condenser mud and (6) retorting high grade condenser mud and high grade flotation concentrates. Costs per ton of ore treated for April, 1930, are: screening and sorting $0.835, furnace treatment $1.709, flotation $0.387, retorting $0.177, assaying $0.107, condensing $0.534, miscellaneous $0.359 and total $4.108. Alden H. Emery

**Milling methods and costs at the Homestake Mine, Lead, S. D.** Allen J. Clark. Bur. Mines, *Information Circ.* 6408, 25 pp. (1931).—The ore bodies occur in altered dolomitic limestone contg. cummingtonite and chlorite with pyrite, arsenopyrite and pyrrhotite. The Au content is about $5.00 per ton of ore. Amalgamation recovers 62.8% of the Au (chiefly coarse), cyanidation of sand 20.6%, and cyanidation of slime 9.6% more, a total of 93% recovery. Cost of crushing in mine and at hoists in 1929 was 3.8 cents per ton, milling 27.6 cents and cyanidizing 18.9 cents, a total of 50.3 cents per ton of ore milled. Detailed metallurgical data and costs are given. A. H. E.

**The Roan Antelope mill and smelter.** A. G. McGregor. *S. African Mining and Eng. J.* 41, pt. II, 373–4(1930). Alden H. Emery

**Lead smelting in shaft furnace with zinc-rich slags.** Karl Prior. *Metall u. Erz* 28, 25–33(1931).—High Zn content is unfavorable for operation of the shaft furnace. The constitution of shaft-furnace slags in general is discussed, as well as the forms in which Zn is found in the slag. Among these are the oxide, silicates, Zn spinel, Zn ferrites, zincates and sulfides. Operating conditions in the presence of high Zn content are discussed. H. Stoertz

**Copper and zinc in cyanidation sulfide-acid precipitation.** Edmund S. Leaver and Jesse A. Woolf. Bur. Mines, *Tech. Paper* 494, 63 pp. (1931).—All of the common Cu minerals except chrysocolla and chalcopyrite are sufficiently sol. in cyanide soln. to cause excessive reagent loss (2–3 lb. NaCN per lb. Cu) unless the cyanide combined with the Cu is regenerated. The $Na_2S$-$H_2SO_4$ method regenerates an av. of > 80% of the cyanide from solns. used to treat precious-metal ores contg. up to 0.5% cyanide-sol. Cu. Solns. used to treat cuprite or metallic Cu give large regeneration. The more complex the Cu mineral treated, the less cyanide will be regenerated from the resulting soln. The more nearly all the cyanide is combined with Cu and the less the cyanide is uncombined (free) the greater will be the regeneration. The amt. of $Na_2S$ used varies with the amt. of metals pptd. The acid consumption varies with the strength of the original soln. in both cyanide and lime. The Ag may be pptd. separately from the Cu before the soln. is acidified. The CuS must be removed from the acid soln.,

as it redissolves in alk. cyanide soln. Only a small quantity of Au is pptd by the $Na_2S$-$H_2SO_4$, most must be removed by Zn as usual. Cu in cyanide soln. up to 10 lb per ton does not diminish the activity of the soln. as a solvent for Au and Ag if the requisite free cyanide is present. The double Na-Cu cyanide soln., in the absence of free cyanide, is only a weak solvent for the precious metals and is more effective for Au than for Ag. Smithsonite, hydrozincite, zincite and calamine are sol. enough under the usual conditions of cyanidation to cause rapid accumulation of Zn in the soln. unless special precautions are taken to remove it. Willemite, sphalerite and franklinite are dissolved more slowly. From 1.5 to 4.0 lb. NaCN is needed per lb. Zn dissolved. The various Zn cyanide compds. are only weak solvents for the precious metals, even if $AgNO_3$ titration shows free cyanide. Addn. of excess CaO or caustic soda improves extn. by liberating free cyanide from the double salt. If most of the cyanide present in a soln. is combined with Zn, more free cyanide must be added to this soln. than to a fresh soln. for the 2 to have = activity as solvents. $Na_2S$-$H_2SO_4$ treatment will remove Zn and regenerate cyanide. When ores contg. sol. Zn minerals are treated, the soln. must contain free cyanide, or the soln. of Zn will decrease Ag extn. The Welch method was thoroughly tried and seems to apply only to Au ores or to Au-Ag ores contg. not over 0.1% of cyanide-sol. Cu and in which Ag occurs as a haloid mineral. A. H. E.

**Recovery of zinc from ferrite compounds in the electrolytic zinc process.** G. L. Oldright and D. P. Nicoloff. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* 6, 45 pp. (1929).—Zn ferrite formation increased with increasing time, temp. and fineness. Fe in Zn ferrite was more readily sol. than when present in $Fe_2O_3$. Replacement of ZnO in ferrite by other bases such as CaO and MgO is possible but not practical. Zn ferrite was readily decompd. by treatment with reducing agents at elevated temps., Zn was then sol. in $NH_3$ or $H_2SO_4$. High concns. of reducing gases make the Fe sol. in $H_2SO_4$. C will reduce ferrites at 800°. Pure CO should not be used below 600°, as $CO_2$ is needed at low temps. to prevent its decompn. to $CO_2$ and C. The best procedure was treatment for 2 hrs. at 550° with $CO_2$ contg. 35–50% CO. This makes 80% of the Zn and 39% of the Fe sol. in $H_2SO_4$. To make more Zn sol., higher proportions of Fe were dissolved. The rate of decompn. of ferrite with reducing agents, as well as its rate of soln. in $H_2SO_4$, HCl and $HNO_3$, depends upon the temp. and time of prepn. of the ferrite. By giving refractory ferrite a preliminary low-temp. roast, the subsequent rate of reduction can be increased. Alden H. Emery

**Purifying zinc by dry method.** D. M. Chizhikov. *Mineralnoe Suir'e i Tsvetnye Met.* 4, 1211–8(1929).—The processes of purifying Zn are described briefly. M. A. J.

**Memorandum on calcination of zinc carbonate ores in particular in a continuous-charged furnace (Jalabert method).** Gustave Piron. *Rev. ind. minérale* No. 241, 9–14(1931).—By eliminating the moisture and $CO_2$, the wt. is decreased 25–32%, according to the ore. The beneficiation of the ore increases its salability. However, calcined ore has to be kept covered in transportation and in storage. Lean calamines are calcined either in an ordinary reverberatory furnace or in an Orland or Spirek furnace. Best results from calcining are obtained in a shaft furnace, but lean ores cannot be treated in this furnace. The Jalabert furnace, designed to treat this class of ores with the advantages of the shaft furnace, is constructed of brick; ordinary bricks are used as high as the inlet air holes, and the upper part is made of a shell of refractory brick. Ventilation is induced by a blower. In calcining, the lean calamines are mixed first with a combustible in a proportion detd. by lab. tests. At Gustar, wood-charcoal dust is used in the proportion of 9% by wt. of the raw ore. The yield of calcined material varies from 68 to 73%. Calcination of Zn carbonate in the Jalabert furnace takes place under relatively the same conditions as in a shaft furnace and has the following advantages: (1) good utilization of inferior quality combustible that consequently reduces costs; (2) inexpensive construction and installation; (3) reduced labor, (4) continuous operation; and (5) perfect calcination. C. W. Owings

**A consideration of some of the problems of the chloride volatilization process.** Robert H. Bradford and Carrol Max Macfarlane. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* 3, 21 pp. (1929).—$CaCO_3$ was increasingly deleterious to chloride volatilization as its content in the gang of an ore increased above 20%. Water vapor was beneficial when treating ores with a high calcareous gang. HCl was a more active chloridizer than $CaCl_2$ or NaCl. HCl was prepd. by spraying a soln. of $CaCl_2$ or NaCl into the roasting furnace, $SiO_2$ being necessary with NaCl. An oxidizing atm. contg. 4–11% $O_2$ was best when chloridizing a Cu ore. A. H. E.

**Recovery of noble metals from waste.** A. Ievinš. *Acta Univ. Latviensis, Kim. Fakult. Serija* 1, No. 1, *Burtnica* 1–11 (in German 12)(1929).—Smelting gives better results than the Cl or CN processes for 1–3% content of noble metal, the efficiency

increasing with the richer charges The yield is increased by adding $CaCO_3$ and $MgCO_3$ and holding for sufficient time at 1350–1400°. ANN NICHOLSON HIRD

Platinum. PAUL M. TYLER AND R. M. SANTMYERS. Bur. Mines, *Information* 6389, 69 pp (1931) —The following subjects are discussed for Pt: properties, uses, alloys, substitutes, history, ores and minerals, occurrence (U. S and foreign, by states and countries), assaying, mining, concg, refining, production, marketing and prices. *Osmiridium* is briefly discussed ALDEN H EMERY

Fluxes for brass melting. E. T. RICHARDS *Giesserei-Ztg* 27, 433–5(1930) —Fluxes used in brass melting serve 3 purposes they accelerate the melting process, they protect the metal from oxidation, and they remove impurities Glass and sand mixts are the common com fluxes, used often with covers of charcoal, coke and NaCl In crucible melting, borax is used to dissolve $SiO_2$, $Al_2O_3$, CaO, etc., and to lessen the Zn loss Mixts of boric acid, borax and the alk. carbonates are strongly desulfurizing. Boric acid is gradually displacing borax as a flux, in spite of its higher cost. Potash and soda are used to remove S and As $KHSO_4$ is valuable for removing Al, but it introduces a little S into the brass. For the removal of Fe, the brass is treated with a mixt of 75% calcined soda, 18% KCN and 7% powd glass. For Pb-rich alloys, mixts of talc and quartz are recommended. CURTIS L. WILSON

Manufacture of wire bars from secondary copper. P. SIEBE *Giesserei-Ztg.* 27, 505–9(1930), cf *C A.* 23, 4915 CURTIS L WILSON

The production of high-test cast iron. II. RICHARD MOLDENKE. *Iron & Steel Can.* 14, 27–8, 41–2(1931), cf *C A* 25, 1192 E. H.

Processing 3-ton wrought-iron balls. A new departure. J D. KNOX. *Steel* 87, No 20, 43–6(1930) —The Aston process for making wrought iron and the new plant of the A M. Byers Co. near Pittsburgh, Pa., are described. LESLIE B BRAGG

The reductivity of over-crusted coke and the production of a carbon-poor forgeable channel iron in the foundry shaft furnace. E PIWOWARSKY *Die Giesserei* 17, 1149–52 (1930) —Expts. to det. the effect of impregnating coke with milk of lime on its reactivity. Thus, a current of $CO_2$ is allowed to react with coke at 900° and 1100°, and the amt. of CO formed is detd. These expts show that when coke is satd. with milk of lime CO is formed in greater amt, the reductivity of the coke being actually favored by the impregnation. Claims in the patent of June 2, 1919 (class 18a, Gr 3, C 38 289) are disproved Low-C Fe (1 6% C and less) has successfully been prepd. by P. in the cupola furnace J BALOZIAN

Agglomeration of blast-furnace dust and treatment of iron carbonate minerals by the Greenawalt process. ROBERT CORDONNIER. *Rev Metal.* 27, 467–78(1930) —A description of plant operations and the process for sintering blast-furnace dust and Fe carbonate ores are given C. H. LORIG

Deoxidation of steel with silicon. C. H. HERTY, JR., G R. FITTERER AND C. F. CHRISTOPHER. Bur. Mines, *Tech Paper* 492, 42 pp (1931) —The liquidus of the system $FeO$–$SiO_2$ has been studied over the range 45–100% FeO The m ps of synthetic $Fe^{++}$ silicates were detd. with the micropyrometer. Fayalite ($2FeO\ SiO_2$) melted at 1335°. Two eutectics, at 65 and 78% FeO, were found, their m ps were 1260° and 1240°, resp The deoxidation const. for the reaction $2FeO + Si \rightleftharpoons SiO_2 + 2Fe$ was detd. to be $K_D = (Si)\ (FeO)^2 = 1\ 65 \times 10^{-4}$ when all concns are expressed as wt % Fluxing of $SiO_2$ by dissolved FeO was shown to be an important factor in the deoxidation of low-C steel Steels high in $SiO_2$ are red-short in forging, while steels contg. $Fe^{++}$ silicates high in FeO forged without cracking The use of Si as a deoxidizer in steel making processes always results in the formation of $SiO_2$ or silicates, depending on the amt. of Si used and the concurrent use of other deoxidizers. If Si is used alone, the $SiO_2$ formed is extremely hard to eliminate. The oxidation of the metal in the basic open-hearth process increases as the C content decreases. The time required to eliminate silicates, resulting from deoxidation with Si, from the steel bath was proportional to the depth of the bath and inversely proportional to the size of the particles formed on deoxidation. Agitation of the bath assisted in cleaning it. High residual Mn had only a slight cleaning effect. Segregation of silicates in ingots from 20 lb. to 3 tons in wt. was studied. In top-poured steels the max. segregation was in the center of the ingot about 15% from the bottom. An annular zone of high-silicate segregation was found in the upper portion of these ingots and is due to crystn. phenomena. In bottom-poured ingots segregation is more irregular and is complicated by erosion of runner brick. ALDEN H. EMERY

Operation and metallurgy of a 200-ton tilting furnace for the Talbot process [of steel making]. W. ALBERTS *Stahl u Eisen* 51, 117–28(1931).—In continental practice, open hearth furnaces for steel making are considered economical up to 75–100 tons

capacity For larger sizes tilting furnaces are more economical because of the easy removal of the slag by tilting the furnace The construction and the operation of a 200 ton tilting furnace, which can be used for either the scrap iron or the pig iron-ore (Talbot) process, is described in detail In using the scrap iron process best results were obtained by tapping off $^{3}/_{4}$ of the content of the furnace at the end of the melt, while in using the Talbot process the most economical operation was attained by tapping off only 65–75 tons The chem. reactions during the melting process were followed by taking samples from the melt from various depths About 3 hrs was required to obtain the steel of the desired compn For deoxidation Fe-Mn gave better results when added as a liquid rather than as a solid The mech tests carried out on a great no of melts showed that the steel obtained by the Talbot process was of a very good quality Many references are given J. A SZILARD

Graphical calculation of cupola furnace mixtures with special regard to pearlite castings. BÉLA SZÖKE *Die Giesserei* 17, 1013–7(1930) —A theoretical paper in which is described a method using parallel coördinates for detg the wt of each constituent to be charged into a cupola furnace to obtain a given content of a given element (*e g*, Ni) in the Fe drawn-off The charged mixt is prepd. from 2 or 3 kinds of Fe, with known Si content Three examples showing the application of the method to various charges (2 pearlitic castings) are given. J. BALOZIAN

The method of running the Buess "rocking revolving" furnace. WILHELM BUESS *Die Giesserei* 17, 1121–2(1930) —A brief description is given of the Buess furnace for mixing various alloy mixts by revolving off-center The furnace is also suited for the production of high-quality cast Fe; it is provided with a device for observing the smelting process and for drawing-off samples without disturbing the melt When revolving at a speed of $^{1}/_{4}$ revolutions per min, the melt is thoroughly mixed and well degassified, and the thermal efficiency of the fuel is high The furnace burns either gaseous, liquid or powd fuels. J BALOZIAN

Firing with powdered coal in German tempering foundries. RUDOLF STOTZ *Die Giesserei* 17, 1112–21(1930) —A lecture. J. BALOZIAN

Structural metallography. H. B. PULSIFER. *Metals and Alloys* 2, 84–8(1931) —Surfacing and etching, etching reagents and metal-fine structure are discussed A J MONACK

Automatic metallographic polishing machine. W. F. DAVIDSON. *Metals and Alloys* 2, 89–91(1931) A. J. MONACK

Crystallographic investigation of some mechanical properties of metals. I. Y. KIDANI *J Faculty Eng Tokyo* 19, 1–6(1930) —The form of Al crystals after plastic bending has been investigated by means of Laue photographs II. *Ibid* 7–15 —Rotational slip occurs in the uniform bending of Al crystal plates B C. A

Kinetic measurments of transformation reactions in solid metals. W. FRAENKEL AND E WACHSMUTH *Z Metallkunde* 22, 162–7(1930) —The decompn of an alloy of 80% Zn and 20% Al as a result of the transformation occurring at 260° was studied by means of an especially sensitive dilatometer. The velocity of the decompn is expressed in terms of length (vol ) changes as a function of time It is found that the decompn in a quenched alloy near 0° begins at a very low rate, then auto-accelerates and finally comes to completion The velocity is greatly dependent upon the quenching temp · the higher this temp, the lower the velocity. An attempt is made to derive an equation expressing the vol of the reaction. The elec. cond. in quenched alloys first increases and then decreases The elec. cond curve over the temp range 200–360° shows variations at the transformation point, the meaning of which is somewhat uncertain, appearing most nearly like points of inflection. ROBERT F MEHL

Wear of metals. SAMUEL J. ROSENBERG AND HARRY K. HERSCHMAN *Metals and Alloys* 2, 52–6(1931) A. J. MONACK

The effect of cold-working on the density and electrical resistance of metals TARO UYEDA *Science Repts Tôhoku Imp Univ* 19, 473–98(1930) —When cold working consists of rolling or drawing, the internal stress cannot be measured. In these expts the tensile stress applied to test pieces of Swedish steel, Cu and brass was made in an Amsler testing machine The elec resistance, elongation and reduction in area were measured at const temp, and the changes in d and in sp elec resistance were calcd The d decreased in proportion to the stress up to the yield point, after which it decreased more rapidly. The sp. elec. resistance increased in proportion to the stress up to the yield point, after which the Cu and brass showed more rapid changes than the steels The rate of change of sp resistance decreased with increasing C content. The decrease in d. is attributed to an elastic origin up to the yield point; beyond this point it is attributed to minute cavities formed by internal slippings in the

metal. The increase in elec. resistance is attributed to the same cause above the yield point, below the yield point the increase is explained by the diminution of free electrons, which have become bound electrons around a nucleus caused by enlarging the space lattice CURTIS L. WILSON

What is this thing called fatigue? H. W. GILLETT *Metals and Alloys* 2, 71–9 (1931).—Review. A. J. MONACK

Some notes on blue brittleness. LELAND R. VAN WERT Am. Inst. Mining Met. Eng., *Tech. Pub.* No. 404, 11 pp. (1931).—Stress strain diagrams of low-C steels tested between 200° and 350° depart from the normal regularity of such diagrams secured by testing above or below this range. Under a uniformly increasing load, deformation does not proceed regularly. Periods of deformation alternate with periods of little yielding. This 3 stage cycle continues until fracture ensues. The relative lengths of the periods increase as loading proceeds. It is now believed that aging after overstrain and blue brittleness are the same phenomenon. An effect of aging after overstrain is recovery of the elastic limit. At 250° this aging may produce as complete recovery in a few sec. as in 2 weeks at ordinary temps. Aging after overstrain and blue brittleness are the result of dispersion hardening. High purity Fe gave a decidedly irregular curve at 300°, but without the sharp steplike characteristics usually obtained from steel or Fe contg. more impurities. It is believed that the recovery of elasticity on aging is more apparent than real, and that aging after overstrain affects the elastic properties of ferrite not by actual restoration of the true elastic limit, but by producing through dispersion hardening an effect that simulates recovery. When the apparent recovery becomes instantaneous at blue-heat temps., as with ferrite solns. with usual concns. of dissolved hardeners, or at lower temps. where high concns. result in a greater metastability, the stress-time diagrams take on the steplike character noted. H. C. PARISH

Directional properties in cold-rolled and annealed copper. ARTHUR PHILLIPS AND E. S. BUNN Am. Inst. Mining Met. Eng., *Tech. Pub.* No. 413, 18 pp. (1931).—In order to avoid serious directional properties in Cu, it appears desirable to limit the final reduction to 50–60% and the final anneal to 500–600°. It is believed, however, that the preliminary history of the material has considerable bearing on the problem. There is reason to think, for instance, that if the last annealing temp. were 800° instead of 550°, directional properties of a different nature and order would be encountered. H. C. PARISH

A new etching reagent for nitrided layers. O. HENGSTENBERG AND F. BORNEFELD. *Krupp. Monatsh.* 11, 265–6(1930).—The new etching method proposed consists first of brief treatment with a soln. of 1 g. HgCl in 20 cc. of concd. HCl and 80 cc. of alc., followed by etching with 10 g. of $MgCl_2$ and 1 g. of $CuCl_2$ in 40 cc. of concd. HCl and 100 cc. of alc. H. STOERTZ

Supplementary discussion of the drop experiments of Evans. E. MAAS AND E. LIEBREICH. *Korrosion Metallschutz* 6, 172–3(1930).—This is a reiteration of the belief in the convection currents explanation of the phenomena observed by Evans (cf. *C. A.* 24, 3744, 5705). B. E. ROETHELI

The hardness testing of electrodeposits and other thin metallic coatings. HUGH O'NEILL. *Trans. Faraday Soc.* 27, 41–51(1931).—The paper covers results obtained by indentation and by scratch tests, the same instrument being used as a *micro Brinell tester* and as a scratch hardness tester. The factors involved in the hardness testing of thin metallic coatings are reviewed: (1) *surface finish*—the author finds that for his scratch test described he can, in many instances, secure satisfactory results by the use of 000 emery and slight hand polishing with a soft cloth moistened with a non-scratching metal polish; (2) *thickness of deposit*—a graph is given of the calculated minimum thicknesses of coating which may be accurately tested with various indenting tools loaded so as to produce indentations or scratches of various sizes; (3) *optical difficulties in making measurements* are apt to be great when a shallow indentation of relatively large diameter is being measured; a 0.5 mm. ball is suggested for indentation tests; (4) *internal stress in the coating* is mentioned as a theoretical possibility which may cause a slight opening out of a scratch or indentation; (5) *undue softness of the base metal* may affect the hardness result unless the coating is thick enough to carry all the effects of the deformation: the author has successfully tested an Fe film (0.004 in.) stripped and mounted on glass with Canada balsam as a means of overcoming this difficulty; (6) *local variations in electrodeposits* make it desirable to select the same locality for test on a number of plates. A machine designed by the author (*C. A.* 22, 4433; 23, 5456) utilizing a polished 1 mm. hemispherical diamond has been found suitable for the indentation and scratch testing of coatings down to less than 0.0005 in. in

thickness provided they are not much harder than about 400 Brinell. In both the micro-Brinell and scratch tests, loads up to 1 kg. were used. In the indentation tests the results are expressed as "ball numbers" in kg per sq mm, obtained by dividing the load by the projected area of the indentation ($\pi r^2$) instead of the spherical area (as required for the Brinell no.) The use of this "ball no." is recommended as being a more scientific value than the Brinell no. and being considerably easier to calculate than the Brinell no. while not differing greatly from it. A similar "cone no." is used in recording the results of micro-indentation tests using a 120° diamond cone. The scratch hardness no. is given by $P_s = (8L/\pi w^2)$ kg per sq mm ($L$ = total load on diamond, w = width of scratch made by hemispherical diamond). The scratch hardness no., under the conditions used, does not vary greatly with the testing load. An empirical conversion curve for obtaining *approximate* Brinell nos. from scratch hardness nos. is given. Tables showing the results of applying both the above tests to various metals, and the scratch test to Cd deposits of various thicknesses, to electrodeposits of various metals 0.02 mm. thick, and to Ni deposits (on steel) from baths of different compns., are given. It is suggested that a 0.5 mm. hemispherical diamond indented on a machine of the above general type would be of still greater utility, as harder deposits could then be tested. EDWARD B. SANIGAR

**New method of making ball hardness tests of metals, and a plotting table for the simplification of Meyer (hardness) analysis.** HUGH O'NEILL. *Iron and Steel Inst. (London), Carnegie Scholarship Mem.* 19, 19–38(1930).—A crit. discussion of existing hardness-testing machines is followed by a description of a new diamond hardness test which uses an "unrecovered" indentation, dispenses with a measuring microscope, gives comparable hardness nos., has a const. rate of application of load and can be used for standard Brinell testing. The instrument is suitable for Meyer's hardness analysis. For hard materials a 1-mm. indenter is employed, while for soft metals and alloys a 10-mm. indenter is recommended. H. S. v. K.

**Testing chromium plate for resistance to abrasion.** HARRY C. WOLFE. *Metals and Alloys* 2, 60–1(1931). A. J. MONACK

*Materials of construction in aircraft engines.* R. R. MOORE. *Proc. Am. Soc. Testing Materials* 1930 (preprint) No. 33, 46–56.—A discussion of the various *steels, bronzes, brasses and light alloys* most commonly used in aircraft engine construction. Phys. properties and chem. analyses of the alloys are tabulated and the applications of each alloy and the reasons for its specific uses explained in detail. W. H. BOYNTON

**Ferrous metals used in airplane construction.** J. B. JOHNSON. *Proc. Am. Soc. Testing Materials 1930 (preprint) No. 33*, 3–9.—Cast Fe and cast steel have but a limited application in aircraft construction. Standards on the chem. compns. as adopted by the Society of Automotive Engineers, in some cases with slight modifications, are applied in the airplane industry in the cases of rods, bars and billets. Rolled sheets and strips, tubes and wire are used in the industry. W. H. BOYNTON

**Some notes on teeming speeds of ingots.** A. JACKSON. *Iron Steel Ind. and British Foundryman* 4, 167–70(1931).—A summary of the effects of teeming rates on 6-ton ingots. Rapid teeming rates tend to cause cracking. C. H. LORIG

**Multi-component systems involving iron. III. The system: iron-phosphorus-silicon.** W. HUMMITZSCH AND F. SAUERWALD. *Z. anorg. allgem. Chem.* 194, 113–38 (1930); cf. *C. A.* 24, 1049.—The system contg. an excess of Fe was examd. chemically, thermally and metallographically. $Fe_3P$–FeSi is quasi-binary. Fe–$Fe_3Si$–FeSi is an independent 3-component system. $Fe_3P$–FeSi is not quasi binary. A ternary eutectic at 1018° consisted of 6.35% Si, 7.45% P, 86.20% Fe. At 1110° there is an equil. of the form Liquidus $k$ + $Fe_3P$ = $Fe_3P$ + FeSi. The liquidus is 13.55% Si, 6.00% P, 80.45% Fe. Eleven diagrams are given and discussed, also a no. of photomicrographs. B. A. SOULE

**The expansion of iron.** W. SCHRECK. *Giesserei-Ztg.* 27, 1–3(1930).—Motor cylinders are cooled by water or air, but the pistons come in direct contact with hot gases and expand. On subsequent cooling the Fe does not contract to its original vol., thereby it suffers a loss of strength. The modern light construction demands stringent specifications. High Si causes pptn. of the C as graphite, with accompanying expansion. Mn, and especially Cr, hinder the pptn. In order to regulate the compn. accurately, the Fe should be melted in an elec. furnace. CURTIS L. WILSON

**The coefficient of expansion of cast iron.** F. ROLL. *Giesserei-Ztg.* 27, 4–7(1930).—A review of the effects of temp. and alloying elements upon the coeff. of thermal expansion of cast Fe. CURTIS L. WILSON

**Shrinkage in cast iron in relation to the production of some special castings.** R. T. ROLFE AND J. LAING. *Iron Steel Ind. Brit. Foundryman* 3, 263–7, 284(1930). E. J. C.

**Factors influencing the hardness of cast iron.** AL. L. NORBURY. *Metallbörse* 20, 1939–40(1930).—The influence of various factors upon the pptn. of fine graphite particles in the molten Fe is discussed. The addn. of graphitizing substances probably causes the pptn. of a large no. of finely divided graphite particles which are dissolved easier and quicker than the big flakes. Gray castings made with the addn. of such graphitizing substances show better strength values. Fe Si, Ca Si or Ni addns. have this effect. Mn and S by themselves favor the tendency toward hardening. Since they are always present at the same time, however, they neutralize each other through the formation of MnS. In order to neutralize the effect of S, an excess of 0.3% Mn over the quantity theoretically required for the formation of MnS is necessary. P seems to diminish the tendency toward hardening of thin pieces cast in sand molds. The tendency toward hardening is diminished by Al, Ni, Cu and Co, while it is increased by V, Cr, Se, Mo, Sn, Sb and W. LEOPOLD PESSEL

**Effects on cast iron of prolonged heating at 800–1100°F.** R. S. MACPHERRAN AND REXFORD H. KRUEGER. *Trans. & Bull. Am. Foundrymen's Assoc.* 2, 826–64(1931).—See *C. A.* 25, 60. C. H. LORIG

**Chromium in cast-iron mixtures.** T. F. JENNINGS. *Trans. & Bull. Am. Foundrymen's Assoc.* 2, 801–9(1931).—See *C. A.* 24, 4743. C. H. LORIG

**Effect of nickel and silicon on the properties of whiteheart malleable cast iron (with special reference to thin-walled malleable).** I. S. J. E. DANGERFIELD, F. JOHNSON AND E. R. TAYLOR. *Iron and Steel Inst.* (London), *Carnegie Scholarship Mem.* 19, 1–18(1930).—The effect of Ni on cupola melted white cast iron used for thin-walled malleable castings was investigated. The test bars, 3/16 in. thick, contained C 3.4, Si 0.65, S 0.2, P 0.05 and Mn 0.09%. The content of Ni varied from 0 to 3.66%. Ni improves the fluidity of the molten alloy. The tensile strength increases to a max. of 22.7 tons/sq. in. at 2.5% Ni and falls to 6.4 tons/sq. in. at 3.66% Ni. Bend tests give the best results at 0.7% Ni. The machinability is not impaired by the presence of Ni. In the annealed bars Ni causes a diminution in the size of the C nodules, and up to 2.8% a retardation in the rate of C migration, thus retaining more combined C in the form of an intercryst. network. This is attributed to a widening of the temp. interval of the $Ar_1$ range due to the Ni content. Above 2.5% Ni there is a rapid decrease in the percentage of combined and total C left in the annealed bars. With 3.6% Ni only 0.085% C is left and a severely burned material results. H. S. v. K.

**The influence of phosphorus, sulfur, nickel and chromium on the growth of cast iron.** O. BAUER AND K. SIPP. *Die Giesserei* 17, 989–95(1930).—Investigations to det. the influence of P, S, Ni and Cr on the primary growth (by annealing tests), and the carbide decompn. or the graphite sepn. from the solid soln. (metallographically) of cast Fe are described. The growth is promoted by Si, P and Ni and is retarded by Cr, Mn and S (in large amts.), while S in small quantities and C have no influence. Below the pearlite point P promotes the carbide decompn., and at high temps. the C sepn. from the solid soln. Cr and Mn tend to retard both these, while S in small quantities does not influence the carbide decompn. In large amts. S tends to act strongly against both this decompn. and the C sepn. Micrographs (18) are given. J. BALOZIAN

**Effects of alloys in cast iron.** R. C. GOOD. *Trans. & Bull. Am. Foundrymen's Assoc.* 1, No. 8, 15–28(1930).—A review is given of the effects of alloying constituents. The influence of C, Si, P, S, Mn, Cr, Ni, Co, V, Ti, Al, Cu, Mo, W and Zr is discussed. LEOPOLD PESSEL

**Some notes on cast-iron plating tools.** ROGER POWELL. *Iron Steel Ind. and British Foundryman* 4, 161–2(1931).—From service records the essential of a good plating tool appears to be a good chill 1½ to 3 in. deep. C. H. LORIG

**Microstructure of pig and cast iron.** H. PINAL. *Giesserei-Ztg.* 27, 436–47(1930).—A series of 133 photomicrographs showing the various structures of P, graphite, combined C and slag in pig Fe and cast Fe. CURTIS L. WILSON

**The properties of pig irons from various sources.** A. WAGNER. *Giesserei-Ztg.* 27, 403–12(1930).—Chem. analysis is not an exclusive criterion of the value of pig Fe, as many varieties of the same compn. exhibit different properties. The behavior of 17 types of pig Fe, such as English hematite, foundry and Swedish charcoal Fe was investigated by melting and remelting several times in crucibles, under as const. melting conditions as possible, and examg. specimens for tensile and bending strength, hardness and microstructure. The first melting resulted in materials of low tensile strength, 8.5–12 kg., and low bending strength, 18–19 kg. Repeated remelting improved the phys. properties: after the 4th melting, the tensile strength increased 100% without any appreciable change in compn. Numerous photomicrographs are reproduced. CURTIS L. WILSON

**The causes of blisters and pinholes in wet-process cast-iron enamel.** WALTER KERSTAN *Die Giesserei* 17, 965–72(1930) —Plant and lab expts were carried out to det. the causes of blisters and pinholes in cast-Fe enamels produced by the wet process These defects are shown to be due to the simultaneous action of various causes, principal among which are (1) incorrect compn of the frit, (2) phys defects in the cast Fe, (3) insufficient cleaning of the casting surface, and (4) various changes in the Fe structure during the baking of the enamel Cast Fe in which the graphite is finely divided is the most stable during baking and shows the least change in structure during the enameling process
J. BALOZIAN

**Etching figures appearing in iron and steel.** V.-N. SVECHNIKOV. *Rev métal* 27, 512(1930)
C. H LORIG

**The study of special steels—constitutional diagram of the 18 per cent Cr alloys with variable composition of nickel and carbon.** V. N KRIVOBOK. *Mining Met Investigations U S Bur Mines, Carnegie Inst Tech., Mining Met Advisory Boards, 4th Open Meeting of the Met Board,* Oct. 17, 1930, 4 pp —An outline is given of problems begun or to be carried out on 18% Cr-Fe alloys contg variable percentages of Ni and C
C. H. LORIG

**Mechanical properties of copper steels with special reference to the effect of heat treatment.** F NEHL. *Stahl u Eisen* 50, 678–86(1930) —The addn of more than 0 6% Cu to mild steel increases the yield point appreciably but tends to make the metal brittle, a tendency which is overcome by the addn of 0 4% Cr This alloy has a much higher tensile strength and yield point at high temps than Si steel and is more resistant to corrosion Quenching from above 800° and tempering at 450–550° increases the tensile strength of steels with more than 0 6% Cu without seriously reducing the ductility and resistance to shock Tables and graphs are given showing the effect of various heat treatments on the mech properties of several Cu steels after varying mech treatment
B. C. A

**Vibratory strength of nitrided steel.** O. HENGSTENBERG AND R. MAILÄNDER *Krupp Monatsh* 11, 252–4(1930) —A considerably higher vibratory strength is shown by the nitrided specimens as compared with the same steels not nitrided. This depends on the relative depth of nitrided layer and core as well as upon the type of steel The first breakdown always occurs at a point on the border of the nitrided layer, although this layer shows very little plastic deformation Small surface defects are without effect upon the vibratory strength of nitrided samples.
H STOERTZ

**Practical importance of the influence of different cooling conditions on the structure of steel ingots.** F LEITNER. *Stahl u Eisen* 50, 1081–6(1930) —The effect of varying wall thicknesses of the mold on the structure of plain C and Ni Cr steels has been examd The results show that a more fine grained and homogeneous macrostructure is obtained by retarded cooling and hence thin walled molds are to be preferred Even better structures are produced by retarding the radiation of heat from the mold by covering it with a heat insulating material or by using a double-walled mold with an annular air space between the walls
B C. A

**Drawing of rapidly quenched steel.** ANDRÉ MICHEL AND PIERRE BENAZET *Compt rend* 192, 163–6(1931) —A study is made of the influence of drawing time and temp on the transformation of austenite to martensite in a high speed steel contg C 0 72, Si 0 33, Mn 0 26, Cr 5 20, W 18 33, V 1 02 and Co 11 09% Co in steel increases the effect of secondary tempering
C H LORIG

**Drawing of special rapidly quenched steels.** ANDRÉ MICHEL AND PIERRE BENAZET. *Rev metal* 27, 501–8(1930) —Dilation characteristics of 16 alloy steels were detd to study the $\gamma \rightarrow \alpha$ transformation
C. H. LORIG

**The annealing of steel.** P CHEVENARD. *Metallbörse* 20, 1828(1930) —The hardening of steel was investigated by means of photomicrographic, magnetic and dilatometric methods Dilatometric curves were detd for the thermic cycles of growth with gradually increasing temps and also for the phenomena of isothermic growth under exact detn of the change of length as a function of the time. A special dilatometer with movable photographic plates was used Constant temp was insured by special construction The investigations were made on austenite, the only constituent that can be obtained in a pure state It was investigated in the state of complete superhardening A mixt of austenite martensite was investigated in a partially superhardened condition and the greatest hardness obtainable was detd in a quenched steel contg the max amt. of martensite The phenomena can be explained by the equil diagram but they are complicated by the simultaneous occurrence of the various reactions C could eliminate the influence of the simultaneous reactions which had caused the variations of results before. Austenite can lead to the formation of cementite

a reaction which causes contraction, or a mixt. of α-Fe and cementite may be formed under expansion. The formation of martensite, which follows that of austenite, is connected with a contraction that grows with the temp In quenched steels there is always a simultaneousness of these 2 phenomena, causing in certain sections of the expansion curve either an arrest in the contraction, a rise or a slowing down A direct transition of austenite into martensite during heating could never be observed. This secondary reaction in hardening always occurs in the second period of cooling This simultaneousness of the phenomena in martensite and austenite can also be observed by means of the elec cond LEOPOLD PESSEL

Solution of scale in pickling steel. E. L. CHAPPELL AND PAUL C. ELY. *Ind Eng Chem.* 22, 1200–1(1930) —In pickling welded pipe 95% or more of the scale goes into soln, the undissolved part consisting mainly of Fe silicates. The rate of scale soln is about equal to the rate of metal soln in the absence of an inhibitor The rate of scale soln, is about the same with or without an inhibitor Scale on pipe is more quickly and completely dissolved than scale in acid without metal. L. P.

Pickling solution for stainless and nickel steel. W E WARNER. *Machinery* 36, 626–7(1930). *Metals and Alloys* 1, 737.—Proportions given are: 9 parts water, 1 part $H_2SO_4$, 1 part HCl and 1 part $HNO_3$ G G

Economic pickling of thin metallic sheets. E. DWORZAK. *Przemysl Chem.* 14, 361–73(1930) —The rate of soln of thin sheets of Fe and Zn in 1–25% $H_2SO_4$ at 30–50° was studied with and without the addn of certain inhibitors. This rate for Fe was followed by measuring the vol. of evolved H In $H_2SO_4$ alone the rate of soln of Fe increases rapidly with temp. At 30° this rate is markedly greater in 35% than in 5% acid, but is nearly the same for all concns. at 50°, when 1 cc. H is evolved per 1 $cm^2$ of the surface per 20 min The addn of 1–15% naphthalenesulfonic acid (I) or "Passiv" to 15% $H_2SO_4$ reduces the rate of evolution of H markedly and causes the rates for various concns. of acid to remain different even at the higher temps. The effect of the addn of 0.1–2% "Vogel's compd," or "compd. K" (author's prepn.) is to repress the rate of H evolution still further, although the former ceases to function at 50° after 30–40 min. while the latter continues to maintain its inhibiting property The advantage of speeding up the pickling of Fe by increasing the temp. or concn of the acid is only apparent, because the increased rate of H evolution is not only a sign of an increased rate of consumption of Fe and acid but is also harmful to the metal The pickling process is speeded up appreciably by the addn of inhibitors. Their concn seems to have little effect on the rate of H evolution at the higher temps. $H_2SO_4$ alone removes the oxide scale on Fe sheet in small chunks. In the presence of I these chunks are larger In the presence of "Vogel's compd" or "compd. K" there is no $H_2$ observed at all until after several min. the whole surface of the oxides suddenly peels off. A study of the rate of soln. of Fe oxide scale in $H_2SO_4$ in the presence of the above inhibitors leads D. to conclude that evidently the negative catalytic effect of the inhibitors pertains to the soln. of metals in acids, and of those reactions which are accompanied by evolution of H, and not to the metal oxides. Tests show that the inhibitors increase the rate of soln of the scale, although in com. practice only a negligible amt. of scale is dissolved In pickling, the scale is forced away from the metal by H which is produced by the action of the acid on the metal A study of the efficiency of the utilization of acid showed that 40 kg 60° Bé $H_2SO_4$ is needed for pickling 1 T iron sheet, 1 sq m surface and 1 mm thick in 15% acid, whereupon 2.3% metallic Fe is dissolved The addn of 3% "Passiv" reduces this to 1.06%. The corresponding figure for "Vogel's compd" is 0.78%, and for "compd K" 0.53% A. C. ZACHLIN

Pickling of pipe using commercial inhibitors. E. L. CHAPPELL AND PAUL C. ELY. *Ind Eng. Chem* 22, 1201–3(1930) —The use, lab. control and practical evaluation of inhibitors are discussed. LEOPOLD PESSEL.

General principles underlying the use of alloy steel. R. WHITFIELD. *Iron and Steel Ind. and British Foundryman* 3, 347–50(1930) —A review. LEOPOLD PESSEL

The constitution of alloys. The application of physical methods. ALFRED SCHULZE *Giesserei Ztg* 27, 86–97(1930) —Of all the properties used to study the constitution of alloys, the elec. cond is the easiest to comprehend and the most sensitive toward slight changes in constitution. The change in elec. cond. for binary systems which show complete insoly. in the solid state, when plotted against the vol concn., is not quite linear; it is not the arithmetic mean, but the geometric mean, of the elec. conds. (and elec. resistivities). For complete miscibility in the solid state, the curve of elec. cond decreases rapidly and has in the middle a flat min. The resistance resulting from solid solns is independent of the temp. When a system shows partial soly. in the solid state, the elec. cond. curve decreases rapidly within the limits of soly. and then changes almost

along a straight line When a chem compd is formed, a distinct break in the elec. cond curve is noted at the concn of the compd The relation between concn, temp, and elec cond is shown on space models CURTIS L. WILSON

The thermal properties of various alloy groups. ALFRED SCHULZE. *Giesserei-Ztg* 27, 177–84(1930), cf preceding abstr —Next to the elec cond, the thermal expansion of alloys throws the most light upon their constitution The tube method of dilatometric analysis is both sensitive and exact For systems completely insol in the solid state, the coeff of thermal expansion is a linear function of the vol concn For complete soly in the solid state, the curve of the coeff of expansion is convex toward the concn axis This deviation from a straight line is explained as due to the fact that an atom of the one component displacing an atom of the other disturbs the space lattice so that the av distance between the atoms is not proportional to the concn For partial soly systems the coeff curve is similar to that of solid solns. within the soly limits, outside of which it is a straight line The thermal cond is similar to the elec. cond with respect to its relation to the constitution of alloys Magnetic and x ray analyses are also discussed CURTIS L WILSON

Structural and engineering light alloys for aircraft. R L. TEMPLIN, F. V. HARTMAN AND E C HARTMANN *Proc Am Soc Testing Materials* 1930 (preprint) No 33, 10–6 —The wrought and cast alloys of Al and Mg best suited to aircraft work and their respective advantages are discussed The designation of the various alloys available is indicated and the forms in which they are produced commercially given Data on nominal compn, heat treatment and mech properties are tabulated W H B

Alloys for drilling purposes N PRAVDYUK AND V. NEGREEV. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 12, 99–112, cf *C A* 24, 2406 —Analyses and descriptions are given of various alloys which were tested for hardness and resistance to wear Expts indicate that alloys contg W can be successfully applied to drilling V K.

Alloyed castings. E KOTHNY *Giesserei-Ztg* 27, 291–300, 323–7(1930) —A review of the effects of Ni, Cr, Ni Cr, Ti, Al, B, Ce, Co, Cu, W, Mo, V and Zr upon the constitution and the phys and chem properties of gray, chilled and malleable Fe castings A bibliography is appended CURTIS L WILSON

Processes involved in age-hardening G TAMMANN. *Z. Metallkunde* 22, 365–8 (1930) —The theory of age hardening is discussed generally. It is concluded that the increase in hardness and strength observed in age hardening alloys cannot be explained by the blocking of slip-planes by ppt alone, but that the chief effect must be a pre-pptn assocn of the pptg mols in the supersatd solid soln The importance of the form of the ppt. (Widmanstatten figure) and of the process of coagulation is discussed R F. MEHL

Age-hardening of alloys. W GUERTLER *Z Metallkunde* 22, 78–84(1930) —A review, chiefly of the theoretical aspects ROBERT F. MEHL

The age-hardening of Constructal. G WASSERMANN *Z. Metallkunde* 22, 160–2 (1930) —The changes in lattice parameter during aging of the alloy Constructal (Al with 5 88% Zn, 1 40% Mg 1 35% Mn, 0 28% Fe, 0 20% Si) was studied It was found that the lattice const., $a_0$ (the side of the unit face centered cube of the Al solid soln) decreased by 0 0015 A U upon room temp aging for one day or artificial aging at 80° for ½ hr Annealed wire showed the presence on the x ray spectrogram of $MgZn_2$ The strongest line of $MgZn_2$ may be found on the spectrogram after only ½ hour's aging at 80° It was not possible to prove the presence of $MgZn_2$ ppt. in alloys aged only at room temp ROBERT F. MEHL

Brinell hardness, elastic limit, and ultimate tensile strength of age-hardening aluminum alloys P MELCHIOR. *Z Metallkunde* 22, 175–6(1930) —The equations suggested by Bohner (*C A* 24, 1067) to express empirical relationship between these quantities are discussed and simpler and more accurate equations proposed ROBERT F. MEHL

The hardening problem in copper-silver, beryllium-copper and zinc-copper alloys M HAAS AND D UNO *Z Metallkunde* 22, 154–8(1930) —*Cu Ag* —Earlier work on the solid soly of Cu in Ag is summarized A new solid soly curve is established by measurements of thermal expansion (dilatometric) and of elec resistance and by microscopic studies on quenched and annealed alloys The maximums upon the dilatometric curve and the elec resistance curve correspond to the max upon the hardness curve *Be-Cu* —Dilatometric curves on the Cu rich solid soln are given Hardness measurements are in good agreement with the dilatometric. *Zn Cu* —A few dilatometric curves are given for alloys cooled from the $\beta$ field Throughout this work an attempt is made to trace the course of pptn by means of changes in volume and to correlate these changes

and therefore the various stages in the pptn process with the changes in hardness observed. ROBERT F. MEHL

**The alloys of aluminum.** L. POTIN *Rev. gén. sci.* 41, 474–7(1930).—A review. LEOPOLD PESSEL

**Cast aluminum bronzes. III. Shrinkage phenomena.** W. CLAUS AND F. GOEDERITZ. *Die Giesserei* 17, 1017–23(1930); cf. *C. A.* 24, 4197.—In studying the microstructure of cast Al bronzes, castings of 4.5, 7 and 10% Al, and a Si Al bronze are made in dry and moist sand and in chill molds pouring at 1230°. Shrinkage pipe is present in the core of the 7 and 10% Al bronzes when cast in either the dry or the moist molds. The 4.5% Al bronze shows small defects in the bottom of the casting, but no shrinkage pipe in the head. This bronze when cast in a chill mold gives a dense casting. Shrinkage pipes are shown by the 4.5, 7 and 10% bronzes when cast in chill molds. The Si Al bronze shows slag defects in the foot when cast in the sand molds, and a central porosity when cast in the chill mold. Lower pouring temps. (1050°) do not affect the shrinkage pipe in the 10% Al bronze when cast in the dry sand mold. J. BALOZIAN

**Ternary alloys of aluminum, silicon and copper.** G. G. URAZOV, S. A. POGODIN AND G. M. ZAMORUEV. *Mineralnoe Syr'e i Tzvetnye Met.* 4, 160–95(1929).—A study, by thermal analysis, of the Al triangle up to 21% Si and 40% Cu is given. The alloys in this range consist of mech. mixts. of Si, $CuAl_2$ and a solid soln. of Si and Cu in Al. The soly. of Cu is increased by Si in the interval 450–350°. The hardness of the ternary solid solns. was detd. Aging of the alloys at the ordinary temp. diminishes with increasing content of Si. The technical application of the results is considered. B. C. A.

**Bismuth alloys.** J. G. THOMPSON. *Metals and Alloys* 2, 92–4(1931).—See *C. A.* 25, 670. A. J. MONACK

**Crystal structure of the alloys of iron and manganese.** JAMES B. FRIAUF AND MAXWELL GENSAMER. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 6 pp.—X-ray analyses show α-Fe is present in Fe-Mn alloys up to at least 16% Mn. γ-Fe makes its appearance at room temp. in the forged alloys with 13% Mn. Another phase, the hexagonal close-packed arrangement, was found in forged alloys contg. 10 to 26% Mn. C. H. LORIG

**Constitutional diagram of iron-manganese alloys.** V. N. KRIVOBOK. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 3 pp.—A tentative constitutional diagram was constructed from data supplied by thermal analysis, metallographic studies and x-ray patterns. It is believed there are at least 6 different phases: α-Fe, γ-Fe, ε-Fe, α-Mn, β-Mn and γ-Mn. C. H. LORIG

**Heat treatment and metallography of the alloys of iron and manganese.** V. N. KRIVOBOK AND CYRIL WELLS. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 4 pp.—Dividing the Fe-Mn alloys into 6 groups, K. and W. discuss the microstructure of each group individually but briefly. C. H. LORIG

**Thermal analysis of iron-manganese alloys.** F. M. WALTERS JR., AND CYRIL WELLS. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 6 pp.—Thermal analyses were made in a gradient furnace on Fe-Mn alloys contg. 1.7, 4.4, 7.2, 10.2, 13.1 and 16% Mn with an av. of 0.02% C. A sudden change in thermal disturbance was observed in alloys contg. 13 and 16% Mn. C. H. LORIG

**Ternary alloys of lead.** S. J. NIGHTINGALE. *Brit. Non-Ferrous Metals Research Assoc. Develop. Rept.* D3, 12 pp. (1929).—The properties of Pb alloys contg. (*a*) 0.25% Cd and 0.5% Sb and (*b*) 0.25% Cd and 1.5% Sn are compared with those of pure Pb as regards their utility for the manuf. of pipe. The tensile strength of the alloys is 1.62 tons/sq. in. compared with 0.9 ton/sq. in. for pure Pb, the ductility 52–55% against 80% and the fatigue limit 0.74–0.57 ton/sq. in. against 0.18. The alloys are on the whole more resistant to corrosion than is Pb and withstand a considerably higher bursting pressure, so that a lighter pipe can be used for the same service than is the case with Pb. The working and soldering properties of the alloys are equally as good as those of lead and, taking into account their superior properties, are relatively less costly than Pb; they do not undergo intercrystalline corrosion or fatigue. B. C. A.

**Silicon-zinc-copper alloy.** E. VADERS. *Metal. Ind.* (N. Y.) 29, 103–10(1931).—See *C. A.* 25, 63. G. G.

**Useful titanium alloys.** W. KROLL. *Metallwirtschaft* 9, 1043–5(1930).—Fe-Ti

alloys can be rolled and may be used as alloy steels. With high Ti content they are susceptible to aging Their grain structure is very coarse Ni reduces grain size and increases the age hardening effects. The alloys are compared to those of Fe Be.
C. H. Lorig

Directional properties in cold-rolled and annealed copper. Arthur Phillips and F S Bunn *Am Inst Mining and Met Eng Tech Pub* No 413, 18 pp (1931).—The paper deals with the directional differences in the tensile properties of 2 kinds of sheet Cu tough pitch Cu contg 0 0295% Ag and electrolytic Cu deoxidized with P (residual P 0 0089%) The first series of tests was on the cold rolled Cu, reduced 10–90% Tensile tests were made on strip cut (1) in the direction of rolling, (2) at 90 degrees and (3) at 45 degrees to the direction of rolling In the second series the 3 kinds of strips cut from the rolled sheets were annealed over a temp. range extending from 300° to 800° The results seem to indicate that rather pronounced directional differences, particularly in elongation values, are produced by the combined effects of heavy reductions and high temps. of anneal. C. L. Mantell

Duplexing K. R. Binns. *Iron and Steel Ind and Brit Foundryman* 4, 194, 198 (1931).—Processes are described. C. H. Lorig

Parkerizing. E. Liebreich *Z. angew Chem* 43, 769–71 (1930).—The reactions underlying this process and the qualities of the coatings obtained are discussed.
Leopold Pessel

An inquiry into lead poisoning during coating with lead on metal. E Agasse-Lafont *Med Travail* 1, 277–9 (1930), *Bull Hyg* 5, 923–4.—Metals are coated by plunging the red hot metal into the metal powder or by sprinkling the powder on the hot metal and returning the metal to a hot furnace where it melts and spreads The powder may contain 66% of $Pb_3O_4$. The air is so laden with the powder that 6 6 g (contg about 4 g of Pb) were collected on each sq m of surface per hr Basophile granulated red cells were found in the blood of 90% and 80% showed the blue line They suffered from colic. Symptoms of plumbism were present after a few days' employment. George R. Greenbank

Risks in new methods of spraying. W. Rosenthal, D. Rosenthal and Erika. *Deut Med Wochschr* 56, 1444–67, 1487–9 (1930), *Bull Hyg* 5, 926.—The authors describe metallization" in which molten metal is blown onto a surface by compressed air Cellulose spraying is described in which turpentine, $C_6H_8$ and its much less dangerous homologs PhMe and $C_6H_4Me_2$ are used. Particular stress is laid on the dangers of MeOH as likely to produce optic nerve neuritis. Among the poisonous coloring matters discussed Pb and Si are the most dangerous The value of periodic medical examn is stressed, and the symptoms which if present should result in suspension of the worker are indicated Symptoms of poisoning by $C_6H_6$, Pb and Si are described.
George R Greenbank

Protecting iron from rust. Dieckmann. *Farbe u Lack* 1931, 87–8.—An address.
G G Sward

Corrosion-resisting cast iron. W. Ackermann *Giesserei-Ztg* 27, 263–6 (1930).—As corrosion is regarded as an electrochem process the homogeneous structure of solid solns is most favorable to resistance. Graphite accelerates corrosion. Si causes the pptn of graphite, but a cast Fe with 0 84% Si corrodes more rapidly than one with 2.25% Si The resistance of the higher Si casting is attributed not to the graphite but to the Si which is in solid soln. P up to 0 5% increases resistance, but more than 0 07% S is detrimental From 14 to 22% Si creates an acid resisting material, which is not recommended for alk. solns Ni, Cu and Cr reduce the rate of corrosion under certain conditions The addn. of Monel metal to cast Fe produces an austenitic structure and a resistance to corrosion almost equal to that of bronze. C. L. W

Corrosion-prevention methods as applied in aircraft construction. H. S. Rawdon *Proc Am Soc Testing Materials* 1930 (preprint) No 33, 30–6.—A résumé of present com. practice on corrosion prevention Steel structural parts are plated either with Cd or Zn followed by an iron-oxide primer and a lacquer or enamel. The inside of closed tubular members is coated with the primer In Navy practice duralumin is treated by the anodic-oxidation process prior to the application of a priming coat, followed by the finishing coat Army practice is to have a careful preliminary chem. surface cleaning followed by a priming coat and finishing coats Special precautions against 'crevice" corrosion involve the use of rubberized balloon tape, bituminastic paint or similar product between metal parts and wood, leather, etc., and the use of 'dope proof" paint or Al foil on top of the protective coating already applied. Duralumin and steel parts before assembly by riveting or bolting are coated with primer or Navy gray enamel on the contact surfaces Bare Al surfaces are cleaned by the use of a

mild etching soln., such as a dil. soln. of $H_3PO_4$. Another soln. is a caustic "dip" followed by neutralization with weak acid. Mild abrasives may be used, even sand blasting for heavier parts, each followed by chem. cleaning. W. H. Bouverton

**Corrosion exfoliations on aluminum sheet.** Leopold Pessel. *Metal Ind.* (N. Y.) 29, 72–3(1931).—The phenomenon of corrosion exfoliations, which is quite different from the commonly observed forms of corrosion of Al, can be observed on Al sheet exposed to continuous salt spray. This phenomenon is explained on the basis of the O concn. cell theory, under the assumption that min. crevices, formed as a consequence of the rolling process, are made the anodic areas because of the exclusion of O. The formation of a large vol. of Al hydroxide takes place in these sections causing the blister like rising of the adjoining metal. It was shown by expt. that Al sheet, sand blasted and sprayed with molten Al by the metal spraying process, will not show this type of corrosion. Leopold Pessel.

**The corrosion of copper and high-copper alloys by salt solutions with special consideration of conditions existing in the potash industry.** A. Raych and H. Kolb. *Korrosion Metallschutz* 6, 151–6, 174–8, 193–200(1930); cf. C. A. 24, 4750. Corrosion time curves obtained by the corrosion of Cu in 1.35 *N* KCl and 1.35 *N* $MgCl_2$ solns., while of a linear nature, show a kink after approx. 1 hr., coinciding with the time when a deposit of basic Cu chloride could be observed. Solns. of $Na_2SO_4$ and $MgSO_4$ were much less active toward Cu than the chlorides. The curves obtained show considerable spreads, making it difficult to draw a definite conclusion. A comparison between electrolytic Cu and 4% Al bronze showed that the linear relation between time and corrosion is found with Cu alloys, also. While the corrosion was greater with chlorides than with sulfates, there was also found a distinct relation between the nature of the anion and corrosion. In different salts having the same anion, the corrosion was the same at equal concns. of this anion. With increasing velocity of the liquids a slow increase of corrosion could be ascertained. The curve apparently approached a max. An app. is described in which the corrosion of Cu was accomplished in the absence of O. As was to be expected, the corrosion in solns. free of O was found to be only a fraction of that observed in the presence of air. In the absence of O the corrosion is practically not influenced by changes in concn., temp. and time of exposure. It is also equally intensive with chlorides and sulfates. In the absence of air, pure Cu and Cu alloys show the same behavior. Here too, no essential influence of concn., time and temp. could be found. Technical salt solns. were found to give practically the same result. The small difference in the corrosion values found in the presence and absence of air can be explained by the low O content of the solns. and by the tenacious retention of O in these concd. solns. For the *detn. of O in salt solns.* Winkler's Mn hydroxide method was modified for solns. contg. Mg salts by using $NH_3$ contg. $NH_4I$ and $NH_4Cl$ in place of NaOH. This method gave good results. The concn. of O in salt solns. was found to decrease with increasing concn. The influence of the temp. upon the O concn. was detd. by modifying the app. The solv. of O decreases with increasing temp., the relation being expressed by a linear curve, apparently up to the b. p. of the solns. No quant. relation could be found between O solv. and corrosion. The corrosion reaches a max. at 20% KCl. From there on influences favoring and counteracting corrosion are apparently active at the same time. Leaching solns. attack Cu much less than KCl solns. of moderate concn., this is explained by the lower solv. of O in the former. The temp. coeff. of corrosion in leaching solns. is also smaller. An experiment made to ascertain the attack by carried-over solid salts indicated the negligible degree of this factor. Solid $MgCl_2$, however, can, if in contact with Cu at increased temp., induce corrosion by splitting off HCl. The extent of corrosion of various Cu-bearing alloys was investigated. Al bronze was generally found superior to smelters Cu, electrolytic Cu, tin bronze and brass. While the latter showed greater resistance in one expt. with flowing KCl solns., the danger of severe local dezincification exists and suggests Al bronze as the more advisable material. Smelters Cu was found to be least resistant; electrolytic Cu came next, except in higher KCl concns., where Sn bronze showed greater attack. In an investigation of etched and copper-plated Cu sheets the influence of the surface condition upon corrosion was found to be negligible. Cold-worked Cu and Cu alloys were found to be more attacked than the soft annealed material. *Potential measurements* were made on electrolytic Cu, Al bronze and Sn bronze along with detns. of the corrodibility. No connection was found between the latter and the electro-chem. behavior. Electrolytic Cu, which showed the greatest corrosion, always had the noblest potential. In comparing the potentials of "soft" and "hard" electrolytic Cu with the corrodibility, it was found that the hardened metal, although of a lower potential, was less attacked. A soft and a hard Al bronze showed

the same amount of corrosion and yet a distinct difference in the potential In comparing normal and cold worked metal sheets the latter always showed a more neg potential and also greater corrosion By direct measurement of electrolytic Cu and Al bronze electrodes, the latter were always found to be anodic. The conclusion is that the potentials cannot be considered a general indication of the corrosion resistance of the material. Electrolytic Cu became more anodic with increasing concn. of KCl. Expts. were made to determine whether Toedt's methods of measuring corrodibility by residual currents could be applied in the case of electrolytic Cu and Al bronze. The combination Pt Al bronze gives a current 2-3 times as strong as the combination Pt electrolytic Cu, which stands in contradiction to the repeatedly detd greater corrosion resistance of Al bronze In other expts the quantity of residual current and the corrodibility were detd at the same time The latter was found to be 2-8 times as great as the values calcd. from the quantity of current. In other expts the quantity of current was found to be the smaller the greater the loss of weight due to corrosion No definite regularity can as yet be found in the relation between residual current and corrosion Corrosion expts. were made with a larger exptl installation. An app recirculating 150 l. of leaching soln is described. Al bronze was found to have the greatest resistance against corrosion, being about 7 times better than electrolytic Cu. In the expts. on a smaller scale this proportion had been found to be less pronounced. Sn bronze of 1.5% Sn showed a corrodibility similar to Cu. LEOPOLD PESSEL

Welding aluminum. FRED GROVE-PALMER. *Metal Ind.* (London) 33, 509–10, 533–4, 546(1928) E. J. C

Soldering and welding aluminum and its alloys. ERNST WEBER. *Giesserei-Ztg.* 27, 72–6(1930).—Al and its alloys are difficult to solder because (1) the thin skin of thermally resistant and chemically inert oxide hinders a firm alloying of the metal and solder, (2) the high sp. heat and thermal cond. of Al cause in spots a "quenching" of the liquid solder and (3) the strong electropos. nature of the metal sets up reactions in the presence of liquids or moist air Most modern Al solders consist principally of Sn with some Al and Zn. Many contain also Sb, Bi, Cd, Cu, Pb, Ni, Ag and other metals Soldered joints are tested in steam, boiling salt soln. or boiling water for several days. The tensile strength is 5 kg./sq. mm., which is lower than that of Al. In order to meet chem. and mech. specifications, autogenous welding is recommended. Al is one of the most weldable of metals, if the following characteristics are kept in mind (1) low resistance against oxidation, (2) high coeff. of expansion, (3) high thermal cond., (4) low m. p., (5) low tensile strength at high temps., (6) tendency to warp Modern fluxes consist of alk. chlorides, fluorides, bisulfates etc. A slightly reducing oxyacetylene flame gives good results Welded joints should be guarded against too rapid cooling CURTIS L. WILSON

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Reaction between metal receptacles and foodstuffs (BLEYER, SCHWAIBOLD) 12. Röntgenographic investigation of the system Cd-Mg (DEHLINGER) 2. Effect of internal stresses on the magnetic susceptibility of metals (HONDA, SHIMIZU) 2. The reactivity of metallurgical coke (DUFRAYNE) 21. Present position of the metallurgical coke industry in Central Europe (BERTHELOT) 21. A device for determining work input to a laboratory ball mill (GROSS, ZIMMERLEY) 1. Magnetic susceptibility and chemical investigation (SPENCER) 2. Surface protection of the light metals (LEIB, KOLKE) 26. Blast-furnace-slag portland cement (TOMARCHIO) 20. A recording dust concentration meter and its application to the blast furnace (SMOW, *et al.*) 1. Equilibrium diagrams of the Al–Mn, Cu–Mn and Fe–Mn systems (ISHIWARA) 2. The equilibrium Fe-Fe$_3$C-O (PISCAULT) 2. The heat of mixture in molten metals (KAWAKAMI) 2. Cr oxide [for metallurgical purposes] (Brit. pat. 326,671) 18. Washer for ores (Ger. pat. 516,145) 21. Clarifying plant for ore industry (Ger. pat. 516,454) 1. Alloy armouring for electric cables (Brit. pat. 326,408) 4.

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Aluminium: Facts and Figures. London: British Aluminium Co. Gratis. Reviewed in *Foundry Trade J.* 44, 161(1931)

FABIAN, V.: Praktische Härtereifibel. Aus der Praxis des Härtens. Berlin: Verlag Chemie G. m. b. H. 92 pp. M. 6. Reviewed in *Chimie & industrie* 24, 1031 (1930)

GIERDZIEJEWSKI, K. Kurs Odlewnictwa. [Foundry Course.] Tom. I. Warsaw: Ksiegarni Techniczne] Reviewed in *Foundry Trade J.* 44, 130(1931)

KELLER, JOHN F. Lectures on Steel and Its Treatment. 2nd ed., enlarged. Cleveland: Am. Soc. for Steel Treating. 329 pp. $3.50. Reviewed in *J. Western Soc. Eng.* 36, 60(1931).

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Powdered and Granulated Aluminium. London British Aluminium Co. Gratis.

Sömme, A La Lorraine métallurgique. Paris Berger-Levrault 249 pp. Reviewed in *Chimie & industrie* 24, 1030(1930)

Spektrographische Ausrüstungen für die metallurgische Analyse. Anleitung zur Wahl geeigneter spektrographischer Apparate für den Gebrauch in chemisch technischen Laboratorien London Adam Hilger, Ltd

Statistische Zusammenstellungen über Aluminium, Blei, Kupfer, Nickel, Quecksilber, Silber, Zink und Zinn. 31st year Frankfort C Adelmann A G. 91 pp

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Froth-flotation concentration of ores. Percy C Wright (to The Minerals Separation North American Corp.) Can 309,071, Mar 3, 1931 Ore in the form of a non-acid pulp is subjected to a froth flotation operation in the presence of dixanthogen

Mat (including a perforated sheet of rubber) for distributing air through liquids in ore flotation or other processes. Walter H Curry and Henry F Dietz (to Hewitt-Gutta Percha Rubber Corp.) U S 1,792,285-6, Feb 10 Structural features

Grading ores by weight for air blast hearths. Rembrandt Peale, Wm S Davies and Wm S Wallace Ger 513,787, Aug 18, 1923 Details of the app are given

Values from ores by leaching and electrodeposition R Sanz Carreras. Brit. 336,584, July 10, 1929 Ores contg Cu Ni and Co are leached with a dil $H_2SO_4$ soln contg NaCl (suitably about 5%) Any insol portion of the ore, which may contain arsenides and sulfocyanides, is oxidized in a furnace and again leached, and the solns obtained may be further treated together or separately The liquid, about 13–15°Bé., is electrolyzed for Cu recovery (various details of app and procedure being given) and the electrolyte is then evapd to 28°Bé and cooled to ppt alk. earth metal and Mg salts It is further concd to 38°Bé and cooled to crystallize Co sulfate, which may then be dissolved and subjected to a special electrolytic treatment to deposit Co in scales Ni is recovered from the remaining electrolyte

Apparatus for separating ore constituents by air currents. Alanson O Taylor. U. S. 1,792,404, Feb 10 Various structural details are described

Treating ores of metals. Meyer Mineral Separation Co Brit. 336,770, Sept. 30, 1929 Metalliferous material is heated in the presence of a so-called "reagent metal" (defined as a metal capable of existing in 2 or more states of oxidation, such as Fe, Cu, Ni or Mn) to an elevated temp somewhat below the decompn temp of the sulfate of the "reagent metal" and treated alternately with an oxidizing gas such as air and with an atm contg $SO_2$ and air The process is applicable to oxidized or sulfide ores contg Au, Ag, Pb, Ni, Mn, Cu, Co, Bi, Zn, Cd, Fe and similar heavy metals (which may themselves contain sufficient of the "reagent metal" or may be mixed with pyrites to supply the latter). If the ore is not amenable to sulfating, a halide such as NaCl may be gradually added to form chlorides Various details and examples are given.

Treating sulfidic ores. E J Kohlmeyer. Brit. 336,670, July 19, 1929 Sulfidic ores of metals such as Zn, Sn, Pb, Bi, Cd, As and Sb are blast smelted in a rotary furnace of such (described) construction that the flame is compelled to enter and leave by the same side, and air is blown on or into the melt until oxidation of the Fe present commences. In treating ore contg pyrites and ZnS, the oxidation to ZnO supplies sufficient heat that no further external heating is required A small proportion of lime may be added to form Ca ferrite with any Fe oxide produced and prevent stiffening of the melt, and a small proportion of coal may be added to prevent the Ca ferrite from taking up ZnO When Fe and Cu are present, a slag contg Cu Ca ferrite is formed; the Cu may be sepd as a mat from the slag by treatment with added S-bearing material such as pyrites.

Treating chromium ores. I. G Farbenind. A.-G. Brit. 336,970, July 22, 1929. Cr ores, such as those which are to be worked up with an alkali carbonate in the presence of lime, dolomite or bauxite, are preliminarily heated in an oxidizing atm. to above 800°, with or without adding a small proportion of an oxidizing agent such as $NaNO_3$ or $KNO_3$.

Treating titanium ores. Montan- und Industrialwerke vorm. Joh D. Starck. (Willy Glaser, inventor). Austrian 120,673, Oct 15, 1929 Ilmenite, rutile and like ores are heated in an autoclave under pressure with an excess of $H_2SO_4$ The reaction product is allowed to settle, and the liquid, comprising the excess of acid with some dissolved Ti and Fe, is sepd and used in treating a fresh batch of ore The solid resi-

due, comprising metatitanic acid and ferro-ferric sulfate, is sepd into its components by extn with water or mother liquor from a previous operation

Treatment of zinc-bearing material. WILLIAM C. HOOBY (to The New Jersey Zinc Co) Can 308,892, Feb. 24, 1931 ZnS concentrates contg insol compds of Mg and Ca are roasted to convert the Mg and Ca into sulfates and the ZnS into ZnO, and the product is leached to remove the sulfates of Mg and Ca

Treatment of zinc-bearing material. WILLIAM C. HOOBY (to The New Jersey Zinc Co) Can 308,893, Feb 24, 1931. A pulp of Zn concentrates contaminated with insol compds of Mg and Ca in objectionable amts is treated with $H_2SO_4$ in amt. sufficient to convert the compds of Mg and Ca to Mg and Ca sulfates while inhibiting the formation of $ZnSO_4$, the mixt is leached to remove such sulfates as have been rendered water sol, and the sludge is subjected to a "hydrosepn action" to remove undissolved $CaSO_4$ particles held in suspension

Roasting sulfide ores such as zinc blende. METALLGES A.-G Brit. 335 852, June 4, 1929 See Ger 502,586 (*C. A* 25, 479)

Agglomerating pulverulent hematites. BROR CHRISTIANSEN. U. S 1,792,413, Feb 10 The pulverulent ore is crushed to such fineness that the main portion of the mass has a grain size of 0 04 mm or less but not a colloidal or slimy consistency, and the material thus prepd is heated

Coked agglomerates. EARL H BUNCE (to The New Jersey Zinc Co) Can. 308,891, Feb 24, 1931. An intimate mixt. of zinciferous material and carbonaceous material with a moisture content of 6–12% of the dry wt is initially heated by direct contact with a gaseous heated medium passed therethrough of sufficient vol and high temp to form promptly a shell of coke on each agglomerate, and the heating is continued until coking is completed

Coked agglomerates GEORGE T. MAILER and ERWIN C. HANDWERK (to The New Jersey Zinc Co) Can 308,894, Feb 24, 1931 A mixt. of zinciferous material and carbonaceous material is subjected to an initial temp not exceeding 550° and the continued application of heat for 2–4 hrs at temps gradually increasing to the coking temp, whereby the agglomerates first undergo a drying stage without softening and next become plastic and finally become coked throughout The agglomerates possess satisfactory residue strength for vertical retort smelting

Casting metals under pressure. P HARSSLER. Brit. 336,129, Nov. 7, 1929 App and details of operation are described.

Continuous casting of metals between rolls, etc. H. HARRIS. Brit. 336,727, Aug 27 1929 Mech. features.

Casting metals with sheathings of other metals. I. SUGIMURA, K. MAGARISAWA and M YASUMOTO Brit 337,280, Jan 8, 1930 In casting a metal sheathing on a core metal having a higher m p, lower sp gr and greater surface tension than the sheath metal, when the 2 metals are non-alloying with each other (as in the case of cast iron or iron alloys with Cu, Cu alloys, Pb or Sn or of Zn or Al with Pb), the melted metals are mixed in a vessel in which they assume such a configuration that when poured into a mold the core metal is suitably covered by the sheath metal Various details of use of reducing agents, fluxes, etc, are described

Trough for centrifugal casting machines with horizontal rotary molds. AURELIO POSSENTI and CARLO SCORZA Ger 516 009, July 28, 1929

Apparatus for centrifugal casting of articles such as metal pipe. FRANK G CARRINGTON (to Ferric Engineering Co) U S 1,792,069, Feb 10 Structural features.

Centrifugal casting of metal pipes, etc. FERRIC ENGINEERING CO Brit. 337,105, Aug 22, 1929 App and various details of operation are described

Casting metal pipes in centrifugal molds. L. A CAMEROTA. Brit. 336,857, Dec. 5, 1929 Mech. features

Mold for casting hollow metal bodies MANNESMANNRÖHREN-WERKE. Ger. 513,994, Nov 5, 1927 Details are given.

Water-cooled molds. ANTON MOHR Ger. 513,930, Oct. 27, 1927 The molds are for casting roller plates, axles, rods and tubes

Casting aluminum and its alloys. VEREINIGTE ALUMINIUM WERKE A.-G (Hans Bohner, inventor) Ger 516,139, Sept. 7, 1929 Local variations in the compn of the cast metal are compensated, and castings of more uniform compn are obtained by feeding the casting with an alloy differing in compn from the casting Thus, an ingot may be cast from an Al alloy contg 5 95% of Cu, and the casting fed with an alloy contg 7 26% of Cu

Furnace for reheating ingots. OFENBAU-GES. M B H. Fr 694,653, April 28, 1930

Furnace suitable for the heat treatment of sheet steel, etc. RALF S. COCHRAN (to Surface Combustion Co.). U. S. 1,792,074, Feb. 10.

Metallurgical furnace suitable for steel treatment and decarbonization. FRED H. LOFTUS. U. S. 1,792,021, Feb. 10.

Continuous-process furnace suitable for carburizing metal articles such as those of steel. CHARLES T. WILLARD and RICHARD KAIER (to Singer Mfg. Co.). U. S. 1,792,456, Feb. 10.

Tube or muffle furnace for heat treatment of wire. H. B. BLYTHE. Brit. 336,947, June 22, 1929.

Heat-treating furnace for enamelled articles. JOHN C. CROMWELL (to Steel Sanitary Co.). U. S. 1,792,284, Feb. 10.

Gas-heated doorless hardening furnace for tools. ERICH REIMANN. Ger. 513,601, June 15, 1928.

Apparatus for removing the products from the bottoms of blast furnaces. KOHLENSCHEIDUNGS G. M. B. H. Ger. 513,611, June 28, 1927.

Apparatus for charging Scotch-hearth furnaces such as those used for smelting ores. HUGH R. MACMICHAEL (to American Smelting and Refining Co.). U. S. 1,791,677, Feb. 10. Structural features.

Bessemerization of mats. THE INTERNATIONAL NICKEL CO. Fr. 694,092, April 17, 1930. *Mats of Ni or alloys contg. Ni such as Monel metal are bessemerized to remove* S and reduce the mats by melting the mat in a convertor and introducing a mixt. of air and superheated steam. The mat is blown at a temp. of 1100–1500°, then carried to a temp. of 1500–1600° while continuing the blowing, the blowing mixt. being then almost completely free from air or O.

Reducing metallic compounds. GUSTAF N. KIRSEBOM. Fr. 694,283, April 22, 1930. Metallic compds. are reduced by the reaction of As on a molten alkali metal compd. such as NaOH, in the presence of the metallic compds. to be reduced. Pb, Cd, Sb and Bi may be obtained in this way from their oxides.

Extrusion manufacture of metal tubes, etc. P. MULTHAUPT. Brit. 336,688, July 26, 1929. In effecting the extrusion of liquid or plastic iron, steel or other metal, the matrix, mandrel, dies, etc., are formed of W or of an Fe-free alloy of W with C, Si, Zr and "metals analogous to W." Scale is removed by heated or high pressure gases.

Apparatus for cutting metals by fusion. L. J. HANCOCK. Brit. 336,433, Oct. 15, 1929. Structural features.

Apparatus for washing thin metal sheets. FRITZ GRAU. Ger. 516,208, Jan. 11, 1929.

Finely divided metals from carbonyls. I. G. FARBENIND. A.-G. Brit. 336,007, July 10, 1929. See Fr. 690,991 (*C. A.* 25, 1211).

Metal acetylides. DEUTSCHE GOLD-UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Brit. 336,516, Feb. 7, 1929. Acetylides such as those of the alkali metals or their alloys with each other are made by continuously exposing fresh surfaces of the molten metals or alloys to the action of $C_2H_2$ (suitably in a rotating tube from which the air has initially been displaced by N). For making mono-Na acetylide, 60 hrs. are required at a temp. of about 170–80°, for di-Na acetylide, a temp. of 210–20° is used.

Aluminum salts. E. HERZFELD and H. WALKER (to Colloid-chemische Forschungs A.-G.). Brit. 336,181, Jan. 7, 1929. Fe-free Al salts such as the sulfate are obtained from Fe-bearing solns. by pptn. with alc. The soln. and pptn. may be repeated.

Dezincing lead. JESSE O. BETTERTON (to American Smelting and Refining Co.). U. S. 1,792,210, Feb. 10. Precooled Cl gas is confined in a reaction tank, and molten lead to be dezinced *is continuously recirculated through the Cl while maintaining the* lower end of the tank sealed by the metal of the bath outside the tank to prevent escape of the Cl. App. is described.

Tin. WALTER PORTSCH and ROMAN VON ZELEWSKI. Ger. 513,697, Aug. 15, 1928. Sn is obtained from raw material by heating it to 250° with NaSH. Aq. tech. NaSH-soln. may be employed. In the example, zinc blende contg. about 10% Sn is heated with a 25% soln. of NaSH.

Tungsten. A. PACZ. Brit. 337,160, Oct. 3, 1929. In forming W ingots by compacting W powder and sintering, freedom from residual O is insured by mixing the powder with a more volatile metal such as Ag, compacting, sintering and volatilizing the added metal such as Ag to form a pure unworked W ingot suitable for use in the manuf. of filaments, spark points, elec. contacts, etc. Various methods are described involving admixt. of W and Ag compds., with or without a Th compd., followed by reduction and by volatilization of the Ag. Cf. *C. A.* 24, 5280.

Finely divided metals such as combined zinc and copper. WM. C. WILSON. U. S.

1,702,262, Feb 10 A metal such as Cu is reduced from one of its salts such as $CuSO_4$ by effecting intimate contact of the salt in a dispersed state with a precipitant metal (such as Zn in the case of $CuSO_4$), and the particle size of the liberated metal is controlled by the degree of comminution (less than 40 mμ) of the precipitant metal

**Magnetic testing system for testing materials such as sheet iron or steel, electric coils, etc.** James T Serduke (to General Elec. Co.) U. S. 1,792,249, Feb 10

**Rolling sheet, hoop or band iron.** Franz Jordan U. S 1,792,377, Feb 10 Various mech details are described for rolling an iron core between covering sheets of Al so thin that under the high roll pressures employed the Al is driven substantially completely into the pores of the iron core and forms substantially no exterior plating on the iron

**Iron and steel.** H Hagemann Brit. 336,054, July 18, 1929 In producing a non siliconized iron or steel which can be easily welded, the C content of the bath is reduced (suitably to about 0.02%), and there is afterward added, in the furnace or ladle, an Al Si alloy of such compn that it readily slags off Mn low in C may be added to facilitate working of the product, and the latter may contain C 0.02, Mn 0.5, Cu 0.09, P 0.02 and S 0.003% The Al Si alloy added may contain Al 30, Si 50, Fe 19 and C 0.25%, or an alloy may be used contg Al 18–22 and Si 40–50% Cf. *C. A.* 24, 2102

**Steel.** Poldihütte Austrian 120,668, May 15, 1927. Steel resistant to corrosion and capable of being forged contains C 0.2–1, Ni 20–25, Cr 12–20, Mn less than 0.5 and Si less than 0.5%, specifically C 0.5, Ni 22, Cr 15, Mn 0.4 and Si 0.3%

**Steel** André P Mahoux Fr 695,045, Aug 8, 1929 Steels are hardened superficially by creating an oscillating field between the metallic piece and the piece to be treated, the dielectric being composed of a carbureted or N atm

**"Stainless steel," etc** W F Martin and J. A Berlyn Brit 336,024, July 22, 1929 "Stainless steel" and similar Fe alloys contg high proportions of Cr or Ni (or mixts of metals adapted to form such alloys) are melted in a crucible in a furnace, the temp of which is increased gradually and substantially uniformly to the casting temp (especially at the temp range between 900° and the casting temp., which may be 1800–2400°) The heating may be at the rate of 100–400° per 15 min Deoxidants such as Al may be added, together with other materials such as Cr hydrate if desired, just before casting, and the metal may be cast into molds made of 2 parts molding sand and 1 part sea sand bonded with molasses, the cores being formed of molding sand 1 and sea sand 2 parts

**Manganese steels** Taylor Wharton Iron & Steel Co Brit. 336,091, Oct 4 1929 Steels contg Mn 10–15% and C 0.3–0.85% also contain up to 4% Ni and less than 0.4% Si, with or without 8% or less of Cr, and may be toughened by heating to 800–1150° and cooling in air

**Case-nitridation of steel.** Augustus B Kinzel (to The Electro Metallurgical Co of Can., Ltd.) Can 309,049, Mar 3, 1931 An article of ferrous material is heated to 700° for 2 hrs in the presence of $H_2$, then heated in the presence of V to 900° for 2 hrs., and then heated in the presence of $NH_3$ to 500–580° for a time sufficient to make a hard surface layer on the article

**Case-hardening by nitridation.** Augustus B Kinzel (to The Electro Metallurgical Co of Can., Ltd.) Can 309,047, Mar 3, 1931 Ferrous material is heated with Al to about 550° to form an aluminized coating and then subjected to a temp of about 510° in the presence of $NH_3$

**Case-hardening by nitridation.** Augustus B Kinzel (to The Electro Metallurgical Co of Can., Ltd.) Can 309,048, Mar 3, 1931 Fe and steel articles (contg alloying elements as Mn, Si, Cr and particularly V and Al) are case hardened by heating in a molten nitriding bath contg one or more metal cyanides (as mixts of NaCN and KCN, of NaCN and $Zn(CN)_2$, or of KCN and $Mg(CN)_2$) at a temp below 580°.

**Alloys.** W C. Heraeus G m b H Ger 516,490, May 20, 1930 Addn to 437,173 Ger 437,173 describes alloys for making pen nibs comprising Ru 40–60, Os 35–50 and Pt 5–15% There are now used alloys contg Ru 60–80, Os 10–35 and another metal of the Pt group 5–25%

**Alloys.** Theodor Kittl. Austrian 120,383 July 15, 1930 In fractionally crystg fused alloys so as to obtain alloys of different compn., the melt is slowly circulated during the crystn., with the result that larger crystals are obtained Circulation may be effected by elec induction heating

**Alloys.** Walther Mathesius and Martin W. Neufeld Ger. 513,623, April 27, 1926 Addn to 441,071 Pb is hardened by adding alkali or alk. earth metal, Mg or Al and 0.1% Bi, Cu or Sn The Pb alloy may contain 0.6 to 0.65% Na, 0.75

to 0.1% Ca, 0.2 to 0.25% Mg and 0.10% Al, the ratio Ca:Mg Al being kept at the value 8.2.1

**Alloys.** Karl Schmidt G m b H Ger. 516,200, Aug. 27, 1926. Al alloys for making pistons contain Si 20–35 and Cu up to 5, with or without Mg and (or) Mo up to 5%. Cf. *C. A.* 24, 3082.

**Alloys.** Georg Weck Ger. 513,513, Sept. 7, 1929. Objects resistant to HCl and $H_2SO_4$ are made from alloys contg. NiSb 0.5 to 70, Ni 0 to 30 and W or Mo 69.5 to 0%. The NiSb may be replaced wholly or partly by W.

**Alloys.** The International Nickel Co., Inc. Fr. 694,029, April 12, 1930. Alloys which are resistant to corrosion contain Fe 20–80, Ni 12–79, C 0.01–2 and Cu 1–32%. An example contains Cu 6, Ni 34, Fe 60 and C 0.2%. Fr. 694,930 describes an alloy contg. Cu 1–20, Ni 12–30, C 0.01–2% and Fe the rest. An example contains Ni 25.5, Cu 4.5, Mn 0.6, C 0.1% and Fe the rest. Cf. *C. A.* 25, 677.

**Alloys.** Soc. des Torpilles de St. Tropez Fr. 695,050, Aug. 9, 1929. An alloy for protecting Fe, etc., against corrosion contains Cd and Sn, Cu and Pb or Sb being optional addns. An example contains Cd 10, Cu 10, Sn 60 and Pb 20%.

**Alloy for bearing surfaces.** H. C. Hall Brit. 336,881, Dec. 30, 1929. "Commercial Zn" is alloyed with Al 8–18, Cu and Ni up to 1% each and preferably only traces of other metals. The Zn is added after melting the other metals together.

**Alloy for jewelry.** Victor Wyldes Can. 308,831, Feb. 24, 1931. To 5 lbs. 10 oz. of melted Cu are successively added 3 oz. fuller's earth, 7 oz. $Na_2B_4O_7$, 3 oz. ammoniated mercury, 12 oz. Sn, 3 oz. MgO and 1 oz. alc., and the mixt. is agitated and boiled. The resultant alloy simulates Au and is malleable, ductile, immune from tarnishing and suited for jewelry.

**Alloys for sealing to glass such as in vacuum tube and incandescent lamp manufacture.** N.-V. Philips' Gloeilampenfabrieken Brit. 337,086, Aug. 6, 1929. Ring- or disk-shaped members of metal to be sealed to material such as glass are formed of an alloy contg. Ni (preferably over 50%) together with other metals such as W, Mo, Ta, V, Nb, Co or Si, the coeff. of expansion of the alloy being at least approx. equal to that of the insulating material with which the alloy is to be sealed. One or more substances such as Cr, Al or Mg which facilitate the formation of a coherent film of oxide may be added to the alloy in proportion preferably less than 5%.

**Magnetic alloys.** W. S. Smith, H. J. Garnett and W. P. Randall. Brit. 336,048, June 22, 1929. Alloys substantially free from C and composed mainly of Fe and Ni are given a high and const. permeability by heating to 900° or over until completely annealed, cooling and further heating to not over 700° but to at least 50° above the magnetic change point of the alloy (and in the case of alloys contg. not more than 50% Ni preferably at least 100° above the change point). The alloy is preferably subjected to mech. straining between the 2 heat treatments, and the sp. resistance of the alloy may be increased by the addn. of up to 10% of one or more of the elements Mn, Cr, Cu, Mo, W, V, Al or Si. Various details and examples are given. Cf. *C. A.* 24, 1074.

**Aluminum alloys.** H. T. Tillquist and J. Härden Brit. 337,099, Aug. 17, 1929. See Fr. 680,050 (*C. A.* 24, 3983).

**Alloys of copper.** P. M. G. Metal Trust, Ltd. Fr. 690,875, July 26, 1929. Cu alloys are made by adding to Cu or a Cu alloy a hardening alloy contg. Fe, Si and Cu. The Fe constituent of the hardening alloy may be obtained by alloying steel and cast Fe, and the steel may include one or more of the metals Ni, Cr, Mo, W and V. The hardening alloy may also contain Mn or P or both. Examples are given. Cf. *C. A.* 24, 5712.

**Copper alloys.** Vickers-Armstrongs, Ltd., W. Machin and W. B. O'B. Goudiflock Brit. 335,950, April 4, 1929. Alloys such as those of high Cu content are made by adding to Cu or a Cu alloy a hardening alloy comprising Fe, Si and Cu (which may be prepd. in part from steel contg. also Si, Cr, Mo, W or V), and Mn and P also may be present in the hardening alloy. Various details are given, and a final alloy may comprise Cu 88, Zn 2 and hardening alloy 10%. The alloys may be heated to over 800° and quickly cooled in water or oil, in some cases being reheated to not over 450°.

**Copper alloys containing tin and zinc.** Michael G. Corson (15% to George H. Corey) U. S. 1,792,146, Feb. 10. Alloys of Cu contg. also Sn 4–18 and Zn 10–35% are treated, to improve their properties as lubricated wearing surfaces, by heating for a proper time and at a suitable temp. to bring about a uniform $\beta$ state of the alloy constituents, then quickly cooling to produce a hard acicular structure, reheating to a temp. above the eutectoidal transformation point for the alloy to produce a structure characterized by the presence of $\beta$ crystals uniformly distributed throughout a matrix of $\alpha$ crystals, and then cooling to effect stabilization.

**Magnesium alloys.** I. G. Farbenind. A.-G. Brit. 336,019, April 25, 1929 *Products such as high percentage Mg alloy castings are improved by heating at a temp* range in which the soly of the alloying component or components is increased and then subjecting them to cooling which is considerably retarded artificially especially in the range 300–100° Details are given of the treatment of Mg Al alloys contg 7 5% or more Al, Mg-Zn alloys contg. 1 8% or more Zn, and Mg-Pb alloys contg 18% or more Pb An alloy contg 8.2% Al may be heated to 410° for 72 hrs., then transferred to an annealing furnace and cooled down to 100° in 24 hrs (the cooling from 300° to 100° taking 18 hrs )

**Magnesium and its alloys.** I. G Farbenind. A -G Brit. 336,498, Jan 2, 1929 *Mg and Mg alloys are refined by treating the molten metal with a material such as* Mn, Cr, Mo or Si which on cooling combines with impurities such as Fe for sepn from the remaining melt. A small proportion of the added reagent such as Mn may remain in the product. Cf *C A* 25, 678

**Preventing corrosion of aluminum.** G. Adolph. Brit. 336,854, Nov. 29, 1929. To prevent attack of Al by alk solns , such as alk bleaching liquors, the latter are admixed with an alkali silicate, $H_3O_3$, compds such as Na perborate or percarbonate, or mixts of these

**Rust prevention.** Karl Daeves Fr 693,905, April 14, 1930 The formation of *white rust on galvanized objects or other metallic surfaces is prevented by exposing* the surfaces to the action of free air or the gases produced by the combustion of S before storing in closed spaces

**Rustproofing iron.** W. Böhmer. Brit. 335,868, Jan. 27, 1930. The cleaned surfaces are treated either with (1) a mixt. of $Pb_3O_4$, PbO, glycerol and waterglass, or (2) a mixt. of zinc white and waterglass, or (3) a $ZnCl_2$ soln. Specific formulas are given

**Rustproofing iron and steel by coating with phosphates.** Van M. Darsey (*to* Parker Rust-Proof Co ) U S 1,791,715, Feb 10 An iron or steel surface carrying *a phosphate coating contg a metal such as Cu having a potential different from that* of iron or steel is treated with a soln of a material contg the chromic acid radical such as K chromate

**Welding aluminum-steel.** H J. Schiffler. Brit 336,195, March 25,1929 Scale-resisting steels contg Al (and which may also contain other components such as Cr and Mo) are welded by electrodes or rods of scale resisting steel alloys not contg Al (but which may contain Cr, Ni and Mo) in order to produce a scale resisting weld Various formulas of alloys used are given

**Welding bronze.** L. J. Tibbenham Brit. 336,402, Oct. 1, 1929. A welding rod *for use in welding bronze by the blow-pipe flame is formed of bronze* with a coating such as $H_3BO_3$ 49, Na borate 9, metal oxides such as those of Fe and Cu 30 and Na silicate 12 parts

**Welding magnesium and its alloys.** I. G. Farbenind. A -G. Fr. 694,137, April 18, 1930 See Ger 508,352 (*C. A* 25, 680)

**Electrodes for spot-welding copper.** F. Krupp A -G. Brit. 335,876, March 26, 1929 Electrodes are used contg one or more carbides of W or similar high m p metal, *and they may also contain a small quantity of metals such as Fe, Co or Ni of lower* m p., *e g*, 6% of Co The material sold under the name "Widia" is suitable

**Weld iron.** Arturo Dossmann. Ger 513,732, *April 27*, 1928 Small iron waste is used as starting material and is prevented from oxidation by a coating of colophony or molasses before mixing with the wood charcoal or soot and limestone

## 10—ORGANIC CHEMISTRY

CHAS. A *ROUILLER AND CLARENCE J WEST*

**Catalytic addition of gaseous hydrochloric acid to unsaturated hydrocarbons.** W J Piotrowski and J Winkler. *Przemysl Chem 15, 25-36(1931)*.—*The* 20–40° fraction of cracked benzine was used as the starting point for this synthesis. It was characterized by $n_4^{15}$ 0 632, *amylene content 31% by wt Its complete distn curve* at 1° intervals is given Two hundred cc portions of this pentane amylene fraction with slight excess of HCl were passed over catalysts through a glass app for 4 hrs The yield was figured on the basis of change in $d_4^{15}$ and distn fractionation It was found advantageous to pass the raw materials over the catalysts held in 2 tubes, the 1st of which was kept at 70° and the 2nd at 150°, in which case a predominance of secondary chlorides was ob-

tained If the sequence of these temps. was reversed a mixt of all possible chlorides resulted. The presence of moisture interfered with the formation of secondary chlorides, and its absence never had any detrimental effects The catalysts here studied were the chlorides of bivalent, tervalent and quadrivalent metals mounted on activated charcoal and dried at 150° for several hrs to const. wt The catalysts themselves caused no polymerization in the benzine in the absence of HCl. The reaction between HCl and the hydrocarbons was vanishingly small without the catalysts, it was marked in the presence of activated charcoal The catalysts are classified in 3 groups (1) $CrCl_3$ and $FeCl_3$, which are inactive, (2) $HgCl_2$, $CuCl_2$, $CdCl_2$, $MnCl_2$, $BiCl_3$, $AlCl_3$ and $SbCl_3$, which are slightly active, (3) $ZnCl_2$ and $SnCl_4$, both of which are strongly active, $SnCl_4$ having given a practically quant formation of amylene monochlorides The catalysts are subject to poisoning by S compds. which should be removed by activated charcoal previously partially poisoned Sharp fractionation of the product showed it to be composed of $Me_2CClEt$, $Me_2CHCHClMe$, MeCHClPr and $Me_2CCHClMe$ A C Z

**Transformation of propylene into liquid hydrocarbons.** A Mailhe and Renaudie *J. usines gaz* 54, 565–9, *Compt. rend* 191, 851–4(1930); cf *C. A.* 24, 5283.—$C_3H_6$, heated over $SiO_2$ gel at 650°, furnishes a considerable proportion of liquid hydrocarbons, unsatd and aromatic, $C_6H_6$ and PhMe predominate Solid hydrocarbons, $C_{14}H_{10}$, $C_{16}H_{10}$, etc., were absent, their formation beginning at 700–20° Traces of Fe led to excessive formation of C and inactivation of the catalyst. K H Engel

**Synthesis of squalene.** P. Karrer and A. Helfenstein. *Helv. Chim. Acta* 14, 78–85(1931).—In a recent paper Karrer (*C. A.* 25, 519) suggests the sym formula $(Me_2C.CHCH_2CH_2CMe\ CHCH_2CH_2CMe\ CHCH_2)_2$ (I) for squalene rather than those proposed by Heilbron (*C. A.* 23, 3702) Such a structure may be considered as made up of isoprene residues and in this way looks plausible in the light of the Karrer proposed structure for lycopin and carotene On the assumption of the above structure K. and H. synthesized I by treating farnesyl bromide, $Me_2C\ CHCH_2CH_2CMe{:}CHCH_2CH_2CMe{:}CHCH_2Br$ (II) with K or Mg, whereby 2 mols. of II were joined through the elimination of Br from each The synthetic I forms a mixt. of 2 isomeric hexahydrochlorides with HCl as does I from natural sources. These hydrochlorides may be sepd by hot acetone into a hexahydrochloride m 143–5° (0.25–0.20 part) and one m. 108–10°, exactly as may be done when they are prepd. from natural I. Crystals of the hexahydrochloride m 143–5° from synthetic source were compared with those from a natural source and in both cases rhombic forms, chiefly $m(110)$ and $c(001)$ and seldom $b(010)$, were observed The angle $(110){\cdot}(1\bar{1}0)$ is about 59° so that $a:b = 0.56{\cdot}1$ in both. Optical orientation $n_\alpha \| b$, $n_\beta \| a$, $n_\gamma \| c$; optical character, neg. X-ray absorption of the powder of both prepns. gave 11 lines with Fe-K radiation which agree in position and intensity. The yields of I were poor (about 5%) because K. and H. could not prep. pure II. Probably the difficulty is due to the known tendency of halogen in similar compds. to migrate to a tertiary C atom or the reverse: $-MeC{:}CHCH_2Br \rightleftharpoons -MeCBrCH.CH_2$ In agreement with this assumption it was possible to prep from nerolidol, $Me_2C{:}CHCH_2CH_2CMe\ CHCH_2CH_2CMe(OH)CH\ CH_2$ (III), a mixt. of Br compds. which yielded I on treatment with K or Mg K. and H. regard I as a possible mother substance of cholesterol (cf. André and Canal, *C. A.* 23, 3364). Ten g. of farnesol (IV) or III (3 mol.) was added dropwise to a mixt. of 1 g dry pyridine (1/3 mol.) and 5 g. $PBr_3$ (1.2 mols.) at —5° and allowed to stand overnight at room temp., washed with ice-cold $NaHCO_3$ soln and extd. with ether. The ether soln was washed successively with dil $H_2SO_4$, $NaHCO_3$ and water, then dried and distd. A fraction $b_{4.7}$ 110–20° with 8.1% Br and one $b_{4.4}$ 125–30° (about 9 g.), with 17.3% Br were collected. Redistn. caused decompn. and lowering of the Br content This impure bromide (V) was used although the theoretical percentage of Br is 28.07. Other methods of bromination or chlorination of III or IV gave poorer yields of less pure material. Into 9 g. crude V at 100° was dropped 3 g. K and the temp raised to 135° for 0.5 hr.; the cold product was treated with abs ether and excess K removed by filtration through glass wool. The soln. was washed with dil. $H_2SO_4$ and then with water, dried and distd The fractions sepd were one of 3.5 g., $b_1$ 100–20°, the squalene fraction of 2 g., $b_1$ 210–40° and a residue of 1.5 g. which yielded no squalene hexahydrochloride (VI) with HCl The 2 g. squalene fraction yielded 0.05–0.15 g. of VI on treatment with HCl Impure V (15 g.) was treated with 1.7 g Mg and yielded 3 g impure I, which on conversion to VI gave 0.55 g. Impure V (28 g.) treated with 2.7 g. Mg yielded 6.8 g I and this gave 1.3 g. VI. One g. squalene, from natural sources gave 0.5 g VI; if the Br content of V is taken as a basis of its purity the yield of I from pure V is about 20%. Oden E. Sheppard

**Catalysis of polymerization by ozonides.** Ray C. Houtz and Homer Adkins. *J. Am. Chem. Soc.* 53, 1058–63(1931).—A mixt. of the ozonides of 2 octylenes has

been found to catalyze the polymerization of styrene, indene, $(CH_2CMe)_2$, a methylpentadiene and furfuryl alc. It has been found to be inactive as a polymerization catalyst toward stilbene, *o*-$HOC_6H_4CH_2OH$, $Me_2C{:}CHMe$ and the mixt. of octylenes from which it is made. The catalyst was active at room temp. and 100° and in a soln. in PhMe. The ozonide underwent a change on standing, especially during the first 2 days after its prepn., and lost a large part of its catalytic power. C. J. West

The halogenation of the paraffin hydrocarbons. Gustav Egloff, R. E. Schaad and C. D. Lowry, Jr. *Chem. Reviews* 8, 1–80(1931).—A summary of the work which has been done on the halogenation, particularly the chlorination and bromination, of paraffin hydrocarbons. An extensive bibliography is given. Problems for research are suggested. Louise Kelley

Preparation of alkyl iodides. Harold S. King. *Proc. Trans. Nova Scotian Inst. Sci.* 17, 242–3(1930).—In the prepn. of alkyl iodides by a modification of Adam's method the use of anhyd. alc. is not necessary (*Proc. Trans. Nova Scotian Inst. Sci.* 16, 87–91(1924)). The addn. of 10% by wt. of water to MeOH did not reduce the yield of MeI. A MeOH soln. of I is slowly run into the reaction flask contg. P and more MeOH and heated at 70–5°. The refluxing liquid passes over I on its return to the flask. Rachel Brown

Preparation of anhydrous alcohol, and the detection and determination of water in alcohol. P. Adickes (with W. Brunnert and O. Lücker). *Ber.* 63B, 2753–60(1930).—When $HCO_2Et$ is added to alc. NaOEt it is almost instantly saponified in the cold by the slightest traces of water in the alc. according to the equation $HCO_2Et + NaOEt + H_2O = 2HOEt + HCO_2Na$, with pptn. of the very difficultly sol. $HCO_2Na$. As $HCO_2Na$ can be detd. easily and accurately the reaction can be used for the 3 purposes indicated in the title. After this work had been started, it was found that Smith had made use of the same principle, employing $(CH_2CO_2Et)_2$ instead of $HCO_2Et$ (*C. A.* 21, 3328). $(CH_2CO_2Et)_2$ is much more difficult to saponify than $HCO_2Et$ and the anhyd. alc. he prepd. by its means contained 0.01 g. of the ester per l. With $HCO_2Et$, the equil. in the catalytic decompn. of $HCO_2Et$ by alc. NaOEt ($HCO_2Et = CO + HOEt$) lies practically completely on the CO side at the b. p. of the alc., and by using an excess of NaOEt, refluxing until equil. is established and distg. away a first fraction, an alc. can be obtained whose ester content is at least 10 times less than that of the alc. obtained with $(CH_2CO_2Et)_2$. When neutral $HCO_2Na$ is boiled a long time with alc. and the alc. is then slowly distd. off, the residue becomes slightly alk. because of loss of $HCO_2H$ as $HCO_2Et$; the alky. corresponds to 0.0037% ester in the alc. distd. off, or a water content of only 0.0009%. The process for prepg. anhyd. alc. consists simply in dissolving Na in the alc., adding $HCO_2Et$, heating under a reflux until no more CO is evolved and then adjusting the cooling water in the reflux so that the alc. distils off. The alc. so obtained contains 0.03% water and 0.00015% $HCO_2Et$. The soly. of $HCO_2Na$ in alc. in the presence of NaOEt is so small at 0° (0.05 in 100 g. alc.) that by addn. of NaOEt soln. and $HCO_2Et$ as little as 0.013% water in alc. can be detected qualitatively by the turbidity produced. For quant. detns., the $HCO_2Na$ can simply be filtered off when the quantity of water is large (2.5–3%), with smaller quantities of water the alc. and undecompd. ester must be distd. off (finally *in vacuo*); with very small quantities of water (0.1%) there must be applied a correction factor for the water or acid content of the $HCO_2Et$, detd. by running parallel detns. with different quantities of $HCO_2Et$. The $HCO_2H$ was detd. by weighing the HgCl pptd. from $HgCl_2$; the detn. cannot be carried out in alc. since the latter also reduces $HgCl_2$, although but slowly. With the larger quantities of water the detn. can be made volumetrically by filtering off the $HCO_2Na$ and titrating it with an oxidizing agent. The detn. can also be made by using a known quantity of $HCO_2Et$ and measuring the CO evolved by decompn. of the excess; in this case allowance must be made for the ester vapors carried along by the CO and for the water and acid content of the $HCO_2Et$, and the method is accurate enough only for water contents of 1% or more. C. A. R.

Preparation of absolute ethyl alcohol. E. Gordon Young. *Proc. Trans. Nova Scotian Inst. Sci.* 17, 248–55(1930).—A comparative study has been made, with reference to % yield and cost per l. of product, of 3 methods of prepg. abs. alc. for ordinary chem. procedures. By the carbide method (1) 100 g. 95% alc. was refluxed 2 hrs. with 25 g. $CaC_2$ and 1 hr. further with 1 g. $CuSO_4$. A 2nd treatment with $CuSO_4$ was necessary to remove odors. The yield was 95% of 99.7% alc. By the $C_6H_6$ method (2) 2000 cc. alc. and 1500 cc. $C_6H_6$ were distd. in a fractionating column with 22 bulbs, 300 cc. abs. alc. was obtained. By the CaO method (3) alc. was refluxed with varying amts. of CaO for varying periods of time. The time required was found to vary inversely with the amt. of CaO used. 1 l. 95% alc. refluxed with 300 g. fresh CaO for 4 hrs. gave an

80% yield. Conclusion: method 1 gives the best yield at a cost slightly higher than 3; method 2 is impracticable on a lab scale, method 3 is the cheapest. R. B.

Organic compounds of thallium. R. C. MENZIES. *Chem. News* 141, 305–6 (1930).—The Tl' atom replaces the H of many OH compds., including simple and polyhydric alcs. of the aliphatic series, with the formation of stable compds. which are generally less sol. than those of the alkali metals. In many cases all the H of the OH of the polyhydric alcs. and the H of the OH and the $CO_2H$ of the HO acids can be replaced, but well-defined Tl salts of the reducing sugars have not yet been prepd. because of the oxidation of the sugars with the reduction of the metal. However, with compds. in which the reducing groups are protected, well-defined Tl derivs. are obtained, although with α- and β-Me glucosides 1 of the 4 available H escapes replacement and with sucrose only 4 of the 8 available H are replaced. An explanation of these observations has not yet been found. C. J. PEDERSEN

Catalytic hydrogenation of esters to alcohols. HOMER ADKINS AND KARL FOLKERS. *J. Am. Chem. Soc.* 53, 1095–7(1931).—Et laurate, myristate, valerate, cinnamate, trimethylacetate and succinate have been hydrogenated over a Cu chromite catalyst with the formation of the corresponding alcs. in yields of 80–98%. The $CO_2Et$ group in $HOCH_2CMe_2CO_2Et$ was hydrogenated to a $CH_2OH$ group, and in addn. the mol. underwent cleavage between the 2 and 3 C atoms. The H pressure during the hydrogenation approximated 220 atm. and the temp. was 250°. C. J. WEST

Esters of sulfurous acid. I. WALTER VOSS AND ERICH BLANKE. *Ann.* 485, 258–83(1931); cf. *C. A.* 25, 63.—Dropping 1 mol. MeOH into 1 mol. $SOCl_2$ cooled in ice and salt and simultaneously passing through a rapid stream of $CO_2$ to stir the mixt. and remove HCl as formed, gives 50% of *Me chlorosulfinate*, MeOSOCl, $b_{10}$ 35°, $d_4^{18}$ 1.4186, slowly decomposing at room temp. into MeCl and $SO_2$ and immediately decomposed by water. *Et ester*, $b_{18}$ 32°, $b_{20}$ 41–2°, $d_4^{17}$ 1.2826 (68% yield), *iso-Pr ester*, $b_{24.5}$ 34°, $d_4^{18}$ 1.2005 (47% yield). $SOCl_2$ and 2.2 mols. MeOH with cooling give 70–5% $(MeO)_2SO$, $b_{760}$ 126°, $d_4^{24}$ 1.2073, di-Et ester, $b_{760}$ 158° (85% yield); Pr ester, $b_{760}$ 192–2.5°, $b_{18}$ 89° (90% yield), boiling 24 hrs. causes little change; iso-Pr ester, $b_{20}$ 78°, $b_{760}$ 169.5–70.5° (33% yield); *Bu ester*, $b_{18}$ 114–5°, $d_4^{22}$ 0.9944, $n_D^{19.8}$ 1.430511, 1.43808, 1.44268 for α, β and γ, $n_D^{11}$ 1.43244 (94% yield); *iso-Am deriv.*, $b_{18}$ 127–8°, $d_4^{16.2}$ 0.97203, $n^{12.6}$ 1.43547, 1.44315, 1.44820, 1.43757 for α, β, γ and D (72% yield); *cyclohexyl ester*, $b_{18}$ 182°, $d_4^{17.8}$ 1.0974, $n^{18.7}$ 1.48396, 1.49571, 1.4865 for α, β and D (54% yield); *di-Ph ester*, $b_{0.7}$ 143°, $b_{1.5}$ 152°, $d_4^{19.2}$ 1.2404, $n^{18.4}$ 1.56899, 1.58833, 1.57441 for α, β and D (34% yield). EtOSOCl and the calcd. amt. of MeOH and $C_5H_5N$ give *Me Et sulfite*, $b_{20}$ 53°, $b_{760}$ 141.5°, $d_4^{18}$ 1.1364, $n^{19.6}$ 1.41417, 1.42159, 1.42628, 1.41669 for α, β, γ and D. If $C_5H_5N$ is not used, a mixt. of $Me_2SO_3$, $Et_2SO_3$ and $MeEtSO_3$ results. $Me_2SO_3$ (0.2 mol.) and EtOH (1 mol.) with 0.1 cc. 12% EtOH-HCl as a catalyst, give 44% of $Et_2SO_3$. Similarly $Et_2SO_3$ and MeOH give $Me_2SO_3$. $MeOS(O_2)Me$ results in 67% yield from $MeSO_3H$ and MeI at 100°; $b_{35}$ 101–2°, $b_{751}$ 202–3°, $d_4^{21}$ 1.2975, $n^{17.8}$ 1.41384, 1.42027, 1.41576 for α, β and D. The kinetics of the hydrolysis of $MeOSO_2Me$ and $Me_2SO_3$ by water, acid and alkali are discussed. The following values were obtained for pure water ($H^+ = 1$) and ($OH^- = 1$). $MeOSO_2Me$, $2.98 \times 10^{-4}$, 0, $2.81 \times 10^{-4}$, $Me_2SO_3$, 0, $1.30 \times 10^{-3}$, 13.37; $Et_2SO_4$, $1.55 \times 10^{-3}$, 0, $9.5 \times 10^{-3}$, $Me_2CO_3$, 0, 0, 5.4. The Na derivs. of PhOH, *o*-$O_2NC_6H_4OH$ and β-$C_{10}H_7OH$ with 1.1 mols. dialkyl sulfite give 80% PhOMe, 88% β-$C_{10}H_7OMe$, 85% *o*-$O_2NC_6H_4OMe$, 88% PhOPr, 55% iso-AmOPh. With 3 mols. $Me_2SO_3$ the *o*-, *m*- and *p*-$C_6H_4(OH)_2$ give 89, 76 and 80% of the di-Me ethers, resp. PhOH and $Me_2SO_3$ with a few drops concd. $H_2SO_4$ or EtOH-HCl give 9.3% PhOMe; β-$C_{10}H_7OH$ gives 37% Me ether and 63% Et ether. One mol. $PhNH_2$ with the dialkyl sulfites gives the following yields of alkyl derivs.: 96% $PhNMe_2$; 52% $PhNEt_2$, 31% PhNHEt; 38% $PhNPr_2$, 44% PhNHPr; 15% $PhN(iso\text{-}Am)_2$, 74% PhNH(iso-Am). *Benzenesulfonethylanilide*, $b_{1.5}$ 188.5°, $d_4^{21}$ 1.1943, $n_D^{19.3}$ 1.57537; *p-toluenesulfonisoamylanilide*, m. 76–7°. $PhNMe_2$ and $Me_2SO_3$, heated at 135–40°, give 99% of *trimethylphenylammonium methanesulfonate* (I), $(PhNMe_2)OS(O_2)Me$, m. 188–9°; this also results from $PhNMe_2$ and $MeOSO_2Me$ at room temp.; on warming 24 hrs. with 12% KOH 53% of $PhNMe_2$ are split off; 5% MeONa splits off 96.5% in 5 hrs. $PhNMe_2$ and $Me_2SO_3$ on standing at room temp. for several weeks deposited 10% of a yellow, very hygroscopic product, m. 120–1°, which may be $(PhNMe_2)OSO\text{-}OMe$; this could not be changed into I by heating at 135°. *N-Methylpyridinium methanesulfonate*, red, very hygroscopic, m. 117–8°; $C_5H_5N$ and $Me_2SO_3$ at room temp. give the compd., $C_7H_{11}NO_3S$, m. 104–7°. The following yields of esters were obtained with

1 1 mols dialkyl sulfite and a drop of concd $H_2SO_4$ on warming 1–2 hrs: BzOEt 96, BzOBu 86, *p*-$BrC_6H_4CO_2Et$ 95, PhCH·CHCO$_2$Et 86, MeCH CHCO$_2$Me 82, $(CH_2CO_2Et)_2$ 90, $CH_2(CH_2CO_2Et)_2$ 81; salol, 65, di-Pt carbonates do not give esters under these conditions II. Preparation of acetals and glucosides. W. Voss *Ibid* 283–98.—Cyclohexanone (I) and $Me_2SO_4$ in MeOH, with MeOH-HCl as a catalyst, gave 79% of the *di Me acetal*, $b_{22}$ 64° In the same way PrCHO gave 87% of the di-Me and 72% of the di Et acetals, BzH gave 81% di-Me and 78% di-Et acetals; *p*-$MeOC_6H_4CHO$ gave 84% di Me acetal and I gave 63% of the di Et acetal These new acetals will be described later $Ph_2CO$ and $Me_2SO_4$ gave 95% of di-Me acetal, m 106–7°. BzH (10 5 g), 12 g $Me_2SO_4$ and 27 g BuOH (with MeOH-HCl) gave 80% of *benzaldehyde di Bu acetal*, $b_{14}$ 140–50°, $d_4^{19}$ 0 9280, $n_D^{19}$ 1 4790 The di iso-Am acetal was obtained in 76% yield The following yields of $Ph_2C(OMe)_2$ were obtained from 4 6 g $Ph_2CO$ with 0 1 mol reagent in MeOH with HCl as catalyst $Et_2SO_4$ 1 9 g; $HC(OEt)_3$ 2 9 g, $HSi(OEt)_3$ 3 9 g, $Me_2C(OMe)_2$ 1 9 g, $Me_2C(OEt)_2$ 1.4 g No acetal resulted with $Me_2SO_4$ in $C_6H_6$, $Et_2O$, etc, with HCl as a catalyst or in MeOH with AcOH or picric acid as catalyst *d* Glucose (36 g) with 25 g $Me_2SO_4$ and 100 cc. 3% MeOH-HCl, warmed about 2 hrs, gave 19 g α-Me and 2 8 g β-Me *d*-glucoside Starch (250 g) gave 96% of α Me glucoside *d* Galactose (36 g) formed 28.3 g of α-Me galactoside and only 0 1 g of the β-Me deriv *d*-Mannose gave only the α-Me deriv. Details are given for the prepn. of Me rhamnoside, α-Me and α Et *l*-arabinoside and α Et *d*-galactoside.

C. J. West

Reaction between multivalent alcohols or phenols and arsenic compounds, especially arsonoacetic acid. III. Bertil Englund *J. prakt Chem.* 129, 1–23(1931); cf *C A* 24, 1841.—By use of the previously described method the following values for $L_s$ have been detd for the reactions of arsonoacetic acid (I) with $HO(CH_2)_nOH$ in AcOH at 25° (values of *n* and $L_s$ given) 2, 0.205; 3, 0 060, 4, 0 052, 5, 0 0060, 6, 0 068, 7, 0 047, 8, 0 057, 9, 0 043, 10, 0 045 With $As_2O_3$ in BuOH contg 5% $H_2O$ values of $L_s$ were detd as follows MeCH(OH)$CH_2$OH, 0 128; $HO(CH_2)_3OH$, 0 012; *meso*-(MeCH(OH))$_2$, 0 288, *dl*-deriv., 0 240, pinacol, 0.340; $HO(CH_2)_4OH$, 0 013; $HO(CH_2)_5OH$, 0; $HO(CH_2)_6OH$, 0 11 With I in AcOH the alicyclic diols gave the following values for $L_s$, the 2 figures being for the *cis*- and *trans* forms $C_6H_8(OH)_2$, 0.375, 0 034; $C_6H_{10}(OH)_2$, 0 420, 0 087, hydrindene-1,2-diol, 0 485, 0 050, tetrahydronaphthalene-1,2-diol, 0 475, 0 022 The diglycol esters of $As_2O_3$ are relatively weak acids, with excess of glycol there result complex triglycol derivs, thus $HAs(C_4H_7O_3)_2$ has been isolated as salts of the acid While the glycol deriv of $As_2O_3$ and I show a double mol wt in $CHBr_3$, they are monomol in $Me_2CO$. The pinacol deriv (II) of I titrates as a monobasic acid in alc., using phenolphthalein as indicator, the other derivs studied ($HOAsG_2$, $HO_2CCH_2AsG_2$ and $HOAsPn_2$, where G and Pn represent glycol and pinacol) are unstable and decomp in EtOH Data are given for the hydrolysis of II by $H_2O$, this is complete in about 1 hr and in about half that time on the addn of a small amt of HCl, it is fairly resistant to alkali The elec. cond is also reported for 3 concns, 2 at 25° and 1 at 0°. The final value agrees well with that for $As_2O_3$ E also discusses tensionless hetero rings

C. J. West

Characterization of alkyl halides and organomagnesium halides. A. M. Schwartz and John R. Johnson *J Am Chem Soc* 53, 1063–8(1931).—The yields of RMgX from a series of alkyl halides are reported, these RMgX are characterized by transformation into the anilides of the corresponding acids with PhNCO, the cor. m. ps for these anilides are given. The application of this method to certain branched-chain alcs is limited by the fact that intramol rearrangements may lead to anilides that do not correspond in structure to the original alc. Thus, 3-methylbutan 2-ol and 2,2-dimethylpropanol both give the anilide of dimethylethylacetic acid, allyl alc gives the anilide of crotonic acid An optically active halide, *d*-2-bromooctane (in which the halogen is directly attached to the asym C atom), led to a completely inactive anilide.

C. J. West

Partly abnormal reaction of β-substituted allyl bromides on organomagnesium bromides. Charles Prévost and Jean Daujat *Bull soc chim* [4], 47, 588–94 (1930).—While with organomagnesium bromides the simple allyl bromide reacts thus $RMgBr + CH_2$ $CHCH_2Br = MgBr_2 + RCH_2CH$ $CH_2$ (Kirrmann, *C. A.* 20, 3443), β-substituted allyl bromides give rise to a desmotropism in this reaction RCH $CHCH_2Br + R'MgBr = MgBr_2 + RCH$ $CHCH_2R'$ or $MgBr_2 + RR'CHCH$ $CH_2$ (Prévost, *Ann chim* [10], 10, 121) The 3 reactions (1) LtMgBr + EtCH $CHCH_2Br$, (2) PhMgBr + EtCH $CHCH_2Br$ and (3) EtMgBr + PhCH $CHCH_2Br$ were studied in detail and the 5 theoretically expected *hydrocarbons*, EtCH $CHCH_2Et$ (I), $Et_2CH$ · $CH_2$ (II), EtCH $CHCH_2Ph$ (III) PhCH $CHCH_2Et$ (IV) and PhEtCHCH $CH_2$ (V).

were isolated. For the prepn of the β substituted allyl bromides (Bouis, *C. A.* 22, 213) the vinylcarbinols (Delaby, *Thesis*, 1923) were used To the Mg reagent the allyl bromide in $Et_2O$ is slowly added and the reaction is completed by several hrs. of refluxing By using a slight excess of the Mg reagent immediately after decanting it from excess Mg, formation of brominated products as well as doubling of the allyl bromide is avoided Although compds I–V are not new, the consts of II, IV and V were found to differ substantially from the literature Reaction (1) I and II are sepd by 4 distns The total yield is above 80% and 3–4 times as much II as I is formed II b 85°, $n_D$ 1.3966, $d_D$ 0 6918, mol refraction 33 94 Bromination yields the *dibromide* $Et_2CHCHBrCH_2Br$, $b_{15}$ 93 5° $n_{17}$ 1 5006, $d_{17}$ 1 5251, mol refraction 49 81 KOEt forms *isoamylacetylene*, b 87°, $n_D$ 1 4023, $d_D$ 0 7272, mol refraction 32 24 (cf Lespieau, *C. A* 24, 334) The *Ag salt* $Et_2CHC$ CAg is very sol in EtOH Reaction (2) III and V are sepd by 7 vacuum distns , 2–3 times as much III is formed as V, and the total yield is excellent V $b_{11}$ 71°, $b_{760}$ 191 5° (cor ), $n_D$ 1 5030, $d_D$ 0 8818, mol refraction 48 95 Reaction (3) IV and V are sepd by 3 vacuum distns In a total yield of 75–85% about twice as much IV is present as V. IV $b_9$ 87 5°, $b_{14}$ 94°, $b_{760}$ 217° (cor ), $n_{17}$ 1 5318, $n_D$ 1 5337, $d_{17}$ 0 8924, $d_D$ 0 8880, mol refraction 50 7, 51 0. Some *biannamyl* was identified as a by-product Data on I and III are also given G. Toennies

Highly polymerized compounds. XLVII. Morphology of highly molecular substances. II. Polyoxymethylene precipitates from solutions. Hans W. Kohlschütter *Ann* 484, 155–78(1930), cf *C A* 25, 15—K ppts aq $(CH_2O)x$ solns ($d_4^{19}$ 1 086) with $H_2SO_4$ and obtains 21 ppts , using various conditions of temp , amounts of $H_2SO_4$ and concns of $(CH_2O)x$ Also, the effects of added substances (*e. g.*, MeOH) and of the substitution of HCl and $H_3PO_4$ for the $H_2SO_4$ were studied The significance of the ppts is discussed C J West

Relation of the structure of ketones to their reactivity and affinity in acetal formation. II. Geo. J. Pfeiffer and Homer Adkins *J Am Chem Soc* 53, 1043–8 (1931); cf *C A*. 22, 383—$HCO_2Et$ and Na react as follows $3HCO_2Et + 4Na = 2CO + MeONa + 3EtONa$ (to be discussed in a later paper) The ratio of CO to $HCO_2Et$ is independent of the amt of $H(OEt)_3$ or of ketone acetal present in the mixt subject to analysis; however, the ratio is dependent upon the amt. of EtOH and the amt. and kind of ketone present A table is given showing the CO from $HCO_2Et$ in the presence of various amts of EtOH and ketones. The reaction of the various ketones with $HC(OEt)_3$ was carried out by mixing 0 1 mol of ketone and 0 1 mol $HC(OEt)_3$ in EtOH to give a total vol. of 49 ml , then adding 1 ml of EtOH contg 0 0136 g HCl; after 50–60 hrs 5 ml aliquots were removed and decompd with Na and EtONa; from the data the % acetal calcd and equil const., $K_E \times 10^4$, were detd $Me_2CO$, 94 8, 334; MeCOEt, 90 1, 0 83, $MeCOCH_2CH_2Ph$, 89 1, 0 66; MeCOPh, 86 2, 0.39, Me neopentyl ketone, 84, 0 28, $(iso\text{-}Pr)_2CO$, 65 4, 0 034; *tert*-BuCOMe, 50 1, 0 0101; *tert*-BuCOEt, 36 2, 0 0033; $Ph_2CO$, 33 7, 0 0026; *tert*-BuCOCHMe$_2$, 25 8, 0 0012, (*tert* Bu)$_2$CO, 17.2, 0 0004. These results show that any substitution in the Me groups of $Me_2CO$ results in a lowering of the extent of the reaction. The extent of conversion is decreased only slightly by the substitution of a $PhCH_2$ group for 1 of the H of $Me_2CO$. The effect of the replacement of a Me by Ph is marked, while 2 Ph groups reduce the % conversion to acetal to about 33% of the value for $Me_2CO$. The b p. and d. for the various compds are given C. J. West

Preparation of anhydrous pinacol. Harold S. King and W. W. Stewart. *Proc Trans. Nova Scotian Inst. Sci.* 17, 262–7(1930)—The dehydration of pinacol hydrate was carried out by 3 methods: (1) To 118 g pinacol, 108 g. water, and 700 cc $Et_2O$ cooled and shaken, 250 g coarsely powd $CaC_2$ was added. After standing, the mixt. was filtered and the filtrate distd with a 3 ft. fractionating column The fraction b 170–4° weighed 106 g and was pure anhyd pinacol In all, 90% of the hydrate was recovered. (2) Pure pinacol hydrate distd on an oil bath under the same conditions gave only 75–80% of anhyd pinacol (3) Pinacol (118 g ), 108 g water, and 200 cc $C_6H_6$ were distd at 68° until all the water was removed through a condenser connected with an automatic separator from which the $C_6H_6$ siphoned back to the distg flask The $C_6H_6$ soln was then heated on a metal bath to 170°. Anhyd pinacol in 96% yield remained in the flask The $C_6H_6$ dehydration method was used for the analysis of pinacol hydrate. It was found to contain 4 9% uncombined water when dried in the air for 24 hrs Rachel Brown

Identification of fatty acids. I. Reinhard Seka and Robert H. Müller *Monatsh* 57, 97–105(1931).—The reaction with $o\text{-}C_6H_4(NH_2)_2$ is proposed as a method of identifying fatty acids; the method seems to be applicable to acids up to $C_{11}$; the possible use with unsatd acids is being studied. $o\text{-}C_6H_4(NH_2)_2$ and $PrCO_2H$, heated at 140–50°

for 8 hrs., give *2-propylbenzimidazole*, $b_{14}$ 220°, m. 152-3°; *pentyl deriv*, $b_{14}$ 250°, m 155-6°, *heptyl deriv*, $b_{14}$ 280°, m 139-40, *nonyl deriv*, $b_{14}$ 280°, m 114-5°; *hendecyl deriv*, $b_{14}$ 300°, m. 101-3°, *pentadecyl deriv*, $b_{14}$ 300°, m 91-2°; *heptadecyl deriv*, $b_{14}$ 310°, m 90-1°, *iso-Pr deriv*, $b_{14}$ 180°, m 223-5°, *methylpentyl deriv*, $b_{14}$ 230°, m 158-9°.
C J West

**Selective hydrogenation of unsaturated acids and their constitution. II. Isolinolenic acid of silk worm pupa.** Yoshiyuki Inoue and Bunsuke Suzuki. *Proc Imp Acad.* (Japan) 7, 15-8(1931), cf *C. A* 24, 5283.—Oxidation of Me isolinolate with $KMnO_4$ in $Me_2CO$ contg $NaHCO_3$ gives $(CO_2H)_2$, caproic and azelaic acids, while the partially reduced acid gives pelargonic and azelaic acids. These results are the same as those obtained for linolic acid and so isolinolic acid is assigned the structure of octadeca-$\Delta^{9,10,12,13}$-dienoic acid, however, the 2 acids are not identical, for the Br deriv of linolic acid m 114°, while that of isolinolic acid is a liquid. Oxidation of the partially hydrogenated isolinolic acid in alk soln gives 2 dihydroxystearic acids, m 130° and 100°, elaidic and stearic acids. Thus the 2 acids may be represented by the following

$$Me(CH_2)_4CH{=}CHCH_2CH{=}CH(CH_2)_7CO_2H$$
Linolic acid

$$Me(CH_2)_4CH{=}CHCH_2CH{=}CH(CH_2)_7CO_2H$$
Isolinolic acid

These results are confirmed by measuring the velocity of hydrogenation, this runs in 2 stages and in both linolic acid is hydrogenated more rapidly. C J. West

**Partial hydrogenation of linolenic acid and its esters.** T. P. Hilditch. *Chem Umschau Fette, Oele, Wachse Harze* 37, 354-6(1930).—An answer to the Bauer and Ermann paper (*C A* 24, 5721) in which they state that no proof for a change in the ethylene bond during hydrogenation of linolenic acid was found and that the presence of suberic acid among the oxidation products by $KMnO_4$ may be due to secondary oxidation of the primary products. In answer it should be noted (1) The oxidation by $KMnO_4$ in acetone causes no secondary oxidation of the di $CO_2H$ degradation products which are probably immediately pptd and thus removed from the reaction, and oxidation of Me oleate, palmitoöleate, etc., produces only one di $CO_2H$ acid, azelaic acid (2) Partially hydrogenated Me oleate yielded not only azelaic and suberic acids, but also sebacic acid, $C_8H_{16}(CO_2H)_2$, whose presence would be difficult of explanation when a secondary destructive oxidation is assumed (3) While aq $KMnO_4$ oxidation of oleic acid may produce azelaic, suberic, nonylic, octylic and oxalic acids, Lapworth and Mottram (*C A* 19, 2930) have shown that the aq alk $KMnO_4$ oxidation of the Na salt of 9,10-dihydroxystearic acid, the primary oxidation product of Na $\Delta^{9,10}$-oleate yields almost equal amts of suberic, *n*-octylic and oxalic acids, the splitting taking place at the 8,9- and 10,11 and not at the 9,10-position. When oxidizing with $KMnO_4$ in acetone the primary formation of satd di HO acids does not occur and splitting is restricted to the 9,10-position. The observed differences are doubtless due to differences in the conditions under which hydrogenation occurred. B and E hydrogenated mainly at 20-120°, using 1 1-4 3% Ni for 12-30 hrs. while Hilditch and Vidyarthi hydrogenated mostly at 180-200°, using 0 3-0 6% Ni for 30-90 min., they also observed that there is less change in the ethylene bond at 100-5° than at 180-200° and probably still less at B and E's temp of 20°. Reply. K. H Bauer. *Ibid* 356.—Different hydrogenation conditions produce different results. The acetone $KMnO_4$ oxidation is more advantageous in this case than the $O_2$ oxidation. P Escher

**The parachor of some aliphatic acids of high molecular weight.** G B Semeria and G Ribotti Lissone. *Gazz chim ital* 60, 862-6(1930).—It is already known that with the Me esters of fumaric and maleic acids, of citraconic and mesaconic acids, of cinnamic and *allo*-cinnamic acids, etc., the parachor of the *cis* form is smaller than that of the *trans*-form. In expts. with the free acids, it was found that the same fact is true of each pair of ethylenic acids with 18 and 22 C atoms, so that following the concept of Sugden and Whittaker (cf *C A* 19, 3263), ordinary oleic acid (I) should have a *cis*-configuration and elaidic acid (II) and brassidic acid (III) *trans*-configurations. In the present paper, as with the results of Sugden (*loc cit*), the measurements of the parachors confirm the conclusions which can be deduced from other phys consts. Thus, Mascarelli and Toschi (*C A* 10, 597), found by f p measurements a *cis*-configuration for erucic acid (IV), a *trans*-configuration for III, and Keffler (cf *C. A* 24, 3702-3), from heats of combustion, considered I a *cis* form and II a *trans* acid. In view of this, the parachors of stearic acid (V) and of behenic acid (VI) were detd to ascertain whether there is a relation between the parachors of these satd acids and those of the corresponding ethylenic acids. The results show that the surface tension $\gamma$ of the satd

acids with 18 and 22 C atoms is nearly the same as that of the corresponding *tra* ethylenic acids, while it is smaller than that of the *cis*-ethylenic acids Moreover, parachors of the satd acids are greater than those of the corresponding unsatd aci while the parachors of the latter are the greater in the *cis*-forms To complete the vestigation *the parachor of 2,3-oleic acid* (VII) was detd, and since it was practic equal to that of II, the former has the *trans*-configuration as indicated by earlier ex (cf S., *C A* 19, 1245) The differences in the parachors of each pair of ethylene isom are small, but since these differences are systematic in both series and for differ temps they are not exptl errors Surface tensions $\gamma$ were detd by the method of m *boiling pressure* with the Sugden app (cf *C.A* 16, 2627; 18, 1771), and the parach were calcd by the formula $P = M\gamma^{1/4}/(D - d)$ of Sugden The following d give d, $\gamma$ and the parachor of the acids at 90° and at 95°, resp I, 0 848 0 84404, 27 94, 27 52, 765 07, 766 93, II, 0 84370, 0 83670, 26 56, 26 31, 760 44, 764 VII, 0 84843, 0 84039, 27 00, 26 89, 759 31, 763 70, V, 0 83602, 0 83102, 26 99, 26 777 79, 778 87 (cf 778 of Hunten and Maass, *C A* 23, 1549), IV, 0 8357, 0.8327, 28 27 77, 932 40, 938 91, III, 0 8324, 0 8294, 27 40, 27 28, 929 20, 934 36, VI, 0 8223, 0 82 27 77, 37 61, 950 07, 951 36 The exptl values of the parachors are not compa with those calcd theoretically, because the theoretical parachors are always differ from the exptl values when the no of C atoms comprising the chain is very high results show that I and IV have *cis*-configurations, and II, VII and III have the *tra* configurations C C Davi

Separation of glycerides. XVI–XVIII. Bunsuke Suzuki. *Proc. Imp Ac (Japan) 7, 9–11(1931), cf. C A. 23, 4928*.—XVI. With Yutaka Masuda.—By of the principle of fractional pptn with $CaCl_2$ from EtOH and extn of the petr eth insol portion with various solvents the brominated oil from the bones of the comn finback (*Balaenoptera physalus*), the following bromides were isolated (only m p give dilinoleno-zoömarin, 65°, clupanodono-linoleno-zoömarin, 132°, clupanodono-ara *dono-olein*, 95°; $C_{21}H_{40}O$-*clupanodono-linolenin*, 123°, *arachidono-linoleno-olein*, 14 triarachidonin, 218°; the following are oils linoleno-dizoömarin, stearo-linoleno-z marin, stearo-oleo-zoömarin, stearo-linoleno-zoömarin, oleo-dizoömarin, linoleo-diol XVII. With Shuzo Oe and Uzo Nishimoto.—The skin of the finback gave the foll ing bromides $C_{18}H_{37}O$-linoleno-stearidonin, 122°, $(C_{18}H_{37}O)_2$-stearidonin, 148°; ceto linoleo-stearidonin, 172°; *distearidono-zoömarin*, 168° (decompn.), *tristearidonin*, 1 (decompn), triolein and dieruco(?)-linolein XVIII. With Ryozo Yoneda and N Nishimoto.—The internal organs of the finback gave the following bromides clupa dono-$C_{21}H_{40}O$-linolenin, 105°; $C_{21}H_{40}O$(?)-linolenin, 98°; clupanodono-stearido zoömarin, 193°, diarachidono-gadolein, 220° (decompn); linoleo-dizoömarin, o C. J. Wes

The structure of synthetic mixed triglycerides. Ramkanta Bhattacharya Thomas Percy Hilditch. *Proc. Roy. Soc* (London) 129A, 468–76(1930).—Synth triglycerides were prepd. from various combinations of lauric, palmitic, and ste acids with unsatd acids (85% oleic and 15% linoleic). The curve of the molar p centage of the fully satd glycerides plotted against the molar percentage of satd. a in the synthetic mixt. gave corresponding values for a no. of natural animal fats cluding butter and tallow) and for some vegetable pericarp fats, while vegetable have *somewhat less fully satd glycerides than the synthetic fats for* a given rati satd to unsatd. acids. Vegetable seed fats are almost invariably assembled on differ principles, the glyceride structure being detd by a tendency to even distribution this case, fully satd glycerides rarely appear in appreciable quantity until the mo proportion of satd. acids in the mixed fatty acids reaches 60%. H J. Deuel, Jr

Origin of stereochemistry. Emanuele Paternò. *Gazz. chim. ital. 60, 91* (1930).—Certain misstatements in a recent book by Oddo ("Trattato di chimica ganica") are discussed. C. C. Davi

Stereochemistry of organic compounds. *II.* Spatial rearrangement of the a o in the pentaerythritol molecule. Ludwig Orthner and Gertrud Freyss. *A* 484, 131–54(1930); cf. *C A.* 22, 81.—Details are given for the prepn of the mono- and diacetone (II) derivs of pentaerythritol (III) (cf *C. A.* 22, 1327). I and Na $C_6H_4Me_2$, heated 3 hrs., then treated with MeI and again heated 2 hrs., give 43% of *mono-Me deriv* (IV), $b_{12}$ 129–30°; $Ag_2O$ and MeI with I give 70% of III; *p*-nitrobenzoa m. 90°. IV with NaOH in 70% MeOH gives 60% of the Me deriv. of III, m. 72°, in $Me_2SO_4$ and 5% KOH give a mixt. of the *di-Me deriv.* (V) of III, $b_{12}$ 139°, m (*dibenzoate*, m. 70°), and the *tri-Me deriv*, $b_{12}$ 103–4° (*p*-nitrobenzoate, m. 53–4 I and BzCl in $C_5H_5N$ give the *di-Bz deriv*, m. 110°, hydrolyzed by HCl in $Me_2CO$ the di-Bz deriv. (VI) of III, m. 75°; further action of BzCl gives the tetra-Bz deriv.

III, m. 94°, identical with that obtained from III and BrCl. I, $Ac_2O$ and AcONa in $CHCl_3$, heated 1 hr., give 80% of the *di-Ac deriv.*, m. 48–9°; hydrolysis at room temp. gives 25% of the *di-Ac deriv.* of III, b$_{0.6}$ 159°; on standing, the tetra-Ac deriv. (VII) and III sep. Cond. measurements are reported for I, V and VI in $H_2O$ and $H_2BO_3$. Dipole deins. are given for VII and II; $\mu$ was found to be 2.18 ± 0.03 and 2.26 ± 0.07, each × $10^{-18}$ e. g. s. The spatial structure of III is discussed and illustrated by diagrams. C. J. West

**Preparation of 1,3,9- and 3,7,9-trimethyluric acid.** Heinrich Biltz and Heinz Pardon. *Ber.* 63B, 2876–80(1930).—*8-Methoxytheobromine* (I), from the 8-Cl compd. with Na in MeOH, m. 282°, at once resolidifying (probably rearranging into 3,7,9-trimethyluric acid (II)) and then m. 370–80°. Heated 0.5 hr. at 290° (not higher), 10 g. I gives 5 g. II, m. 373–5° (decompn.), readily methylated by alk. $Me_2SO_4$ to tetramethyluric acid, m. 228°. 1,3,9-Trimethyluric acid (III) is prepd. by heating K 1,3-dimethylurate with *p*-$MeC_6H_4SO_3Me$ in *o*-$C_6H_4Cl_2$ at 150°, the crude product is purified by removing the more strongly acid 1,3-di-Me compd. by boiling up in dil. $NH_4OH$ or by just dissolving in 25% KOH and pptg. the III with $CO_2$; yield, 3.2 g. from 10 g. of the di-Me acid. The III decomps. 340°, as does that prepd. from 9-methyl *p*-uric acid (Strulé gives 347°). An attempt was made to prep. III from 8-chlorotheophylline (obtained in 8 g. yield in needles, m. 304° (decompn.), from 10 g. theophylline with $KClO_4$ in HCl), but the Cl compd. was unchanged by KOH or NaOH in boiling MeOH or by KOMe or NaOMe at 140° in sealed tubes. C. A. R.

**Preparation and properties of crystallized alkali salts of *l*-cystine.** Gerrit Toennies and Theodore F. Lavine. *J. Biol. Chem.* 90, 203–13(1931).—The Li, Na and K salts of *l*-cystine have been prepd. by pptn. of alc. alk. cystine solns. with MeCN. A method of recrystn. was not found and reppptn. under the conditions of prepn. did not improve the purity or cryst. form. However, analysis indicated that the original prepns. were fairly pure. The salts are very sol. in water and the aq. solns. are practically stable for several days, a noteworthy fact in view of the known instability of cystine solns. when boiled with excess alkali. $[\alpha]_D$, calcd. for cystine at 20°, for the Li, Na and K salts, resp., in water is −94.4°, −90.9° and −91.1°. A. P. Lothrop

**Condensation between aliphatic esters and ketones.** S. G. Powell and Keith M. Seymour. *J. Am. Chem. Soc.* 53, 1049–51(1931).—With the Claisen condensation, AcOEt and MeCOEt or $EtCO_2Et$ and $Me_2CO$ give 11 and 15%, resp., of $(MeCOCH_2)_2$. $EtCO_2Et$ and MeCOPr or $PrCO_2Et$ and MeCOEt give 9 and — % of 3,5-$(EtCOCH_2)_2$. AcOPr and $MeCOCHMe_2$ or iso-$PrCO_2Et$ and $Me_2CO$ give 14 and 6%, resp., of 2 methyl-3,5-hexanedione. Modifications of proportions and conditions did not change the course of the reaction in the cases studied. C. J. West

**Sugar oxidation and destruction. X. Formation of methylglyoxal from sugars and from related substances under the influence of hydrogen peroxide.** K. Bernhauer and H. Tschinkel. *Biochem. Z.* 230, 484–92(1931); cf. *C. A.* 24, 4268.—Under the influence of $H_2O_2$ in the presence of $FeSO_4$ in acid soln., MeCOCHO is formed from various sugars and especially from γ-Me glucoside. In the absence of $FeSO_4$ however, acids, particularly $HCO_2H$, are produced instead. XI. Formation of phenol-like compounds in the decomposition of sugar. K. Bernhauer and J. Nepf. *Ibid.* 493–500.—Phenol like substances are formed in very minute amts. and only under special conditions from carbohydrates. $KCO_2H$ when used in making the phenol fusion mixt. leads to the formation of *o*- and particularly of *m*-$HOC_6H_4CO_2H$ from phenol. XII. The formation of higher fatty acids in the destruction of sugar. *Ibid.* 501–4.—There is no evidence found that higher fatty acids result when sugars are acted upon by caned alkalies. S. Morgulis

**Glucuronic acid fermentation. II.** Teizo Takahashi and Toshinobu Asai. *Proc. Imp. Acad.* (Japan) 7, 5–8(1931).—See *C. A.* 24, 4319. C. J. West

**Course of addition of sodium enol alkylmalonic and sodium enol alkylcyanoacetic esters to unsaturated esters.** Arthur Michael and John Ross. *J. Am. Chem. Soc.* 53, 1150–72(1931); cf. *C. A.* 25, 82.—The course of the addn. of a deriv. of the Na enol malonic ester type to an α,β unsatd. ester proceeds according to the law of chem. neutralization. That addn. product is therefore formed in which the positive energy of the Na atom is best neutralized, since the max. energy degradation is thus realized. In the addn. of Na enol alkylmalonic esters to fumaric ester, the alkyl group migrates so that the addendum parts are alkyl and $C(CO_2Et)$ $C(ONa)OEt$; in the addn. of Na enol alkylcyanoacetic esters to crotonic ester, the addendum parts are similarly alkyl and $-C(CN)$ $C(ONa)OEt$. In the addn. to crotonic ester, the yield of addn. product was greater in the case of Na enol methylcyanoacetic ester (50%) than with Na enol ethylcyanoacetic ester (33%). However, the yield of addn. product is detd.

by several complex factors so that it is not possible from these expts. to make any statement regarding the relative ease of migration of the Me and Et groups in these addn. reactions The max chem neutralization of the Na is realized by the Na remaining attached to the carbonyl O atom in the malonic or cyanoacetic groups The Na atom, however, becomes better neutralized than it was in the addendum by the spatial negative *influence of the acquired* $CO_2Et$ *group* Esters of the type $CHX(CO_2Et)CHY$-$CZ(CO_2Et)_2$ (where X = R or H, Y = R, H or $CO_2Et$ and Z = R or H, also R is an alkyl or aryl radical), apparently form enolic Na derivs contg the group -CH C(ONa)OEt, but these immediately decomp to form ethylenic $\alpha,\beta$-esters and Na alkylmalonic esters The retrogression of the free ester (A) by Na is probably due to the formation of such an enolic Na deriv It would follow from this relationship that the Na atom involved in the addn reactions specified above cannot migrate during the addn process However, if the single $CO_2Et$ group of (A) can form an enolate, an amt. of Na corresponding to the relative acidity of the 2 enolic forms of ester (A) (Z = H), would migrate to the single $CO_2Et$ group according to the partition principle, and spontaneous retrogression would lead to the reformation of a further quantity of the Na enol deriv Thus, by this process, in agreement with the partition principle, an apparent balanced state would be achieved between the 2 possible stable Na derivs It has not been found possible to obtain addn to the $\gamma$ C atom of a $\beta,\gamma$ unsatd ethylenic ester or nitrile. Addn occurs in the case of allyl cyanide and styrylacetic ester at the $\alpha$- and $\beta$-C atoms with migration of an $\alpha$-H atom $CH_2(CO_2Et)_2$ and $(CHCO_2Et)_3$ with a little EtONa give 90% of the Et ester, $b_3$ 187°, of *propane* $\alpha,\beta,\gamma,\gamma$-*tetracarboxylic acid*, m 153°. The ester (22 g ) in an $Et_2O$ suspension of anhyd EtONa, methylated with 10 g MeI, gives 21 g of the *Et ester*, $b_2$ 180°, of *butane*-$\alpha,\beta,\gamma,\gamma$-*tetracarboxylic acid*, m 170°. *Pentane*-$\beta,\gamma,\delta,\delta$-*tetracarboxylic acid*, m 166°, results from the sapon of the ester obtained from the butane deriv and MeI with EtONa at 0° The propane deriv and EtI with EtONa give the *Et deriv* , $b_2$ 180°, of *pentane*-$\alpha,\beta,\gamma,\gamma$-*tetracarboxylic acid*, m. 177°. *Pentane*-$\alpha,\alpha,\beta,\gamma$-*tetracarboxylic acid* m 179° (decompn ). *Hexane*-$\beta,\beta,\gamma,\delta$ *tetracarboxylic acid*, m 170°, is formed from the Et ester of the last-named acid, MeI and EtONa at 0°. Addn of MeC(CN) C(ONa)OEt to MeCH·$CHCO_2Et$ gives 50% of the *Et ester*, $b_3$ 145–8°, of $\alpha,\beta$-*dimethyl*-$\gamma$-*cyanoglutaric acid*, which could not be crystd , the corresponding $\gamma$-*carboxy deriv* m. 142° and is not identical with the acid obtained from tiglic acid. $\beta,\gamma$-Dimethyl-$\gamma$-cyanoglutaric acid m 152° EtC(CN).C(ONa)OEt and MeCH·-$CHCO_2Et$ give 33% of the *Et ester*, $b_2$ 153°, of $\gamma$-*cyano*-$\alpha$-*ethyl*-$\beta$-*methylglutaric acid*, m 147°, this gives with HCl a mixt of $\alpha$ *ethyl*-$\beta$-*methylglutarimides*, m 92° and 102°; hydrolysis of the imide, m 92°, gives *cis*-$\alpha$-*ethyl*-$\beta$ *methylglutaric acid*, m. 88°. Complete hydrolysis of the above ester gives $\alpha$-*ethyl*-$\beta$-*methyl*-$\gamma$-*carboxyglutaric acid*, m 147°. MeC·CEtCO$_2$H and NCCH:C(ONa)OEt give 60% of the *Et ester*, $b_4$ 152°, of $\alpha$ *ethyl* $\beta$-*methyl*-$\gamma$-*cyanoglutaric acid*, m 132°; complete hydrolysis gives the $\gamma$-*carboxy deriv* , m 141°. Ethylation of $\gamma$-cyano-$\beta$ methylglutaric ester gives the *Et ester*, $b_4$ 152°, of $\gamma$ *ethyl*-$\beta$ *methyl*-$\gamma$-*cyanoglutaric acid*, m 139°; $\gamma$-ethyl-$\beta$-methyl-$\gamma$-carboxyglutaric acid could not be crystd $CH_2$·$CHCH_2CN$ and NCCH:C(ONa)OEt give 90% of $\beta$ *methyl*-$\gamma$-*carbethoxyglutaronitrile*, $b_2$ 160°; MeC(CN).C(ONa)OEt gives $\alpha,\beta$-*dimethyl*-$\gamma$-*carbethoxyglutaronitrile*, $b_4$ 152°. PhCH.$CHCH_2CO_2Et$ and $CNCH_2$-$CO_2Et$ with EtONa give *Et* $\beta$-*benzyl*-$\gamma$-*cyanoglutarate*, $b_2$ 193°; hydrolysis gives $\beta$-benzyl-$\gamma$-carboxyglutaric acid, m 158°, the Na deriv of the ester and MeI give *Et* $\gamma$-*methyl* $\beta$ *benzyl*-$\gamma$-*cyanoglutarate*, $b_2$ 194°, alk hydrolysis gives $\gamma$-*methyl*-$\beta$-*benzyl*-$\gamma$-*carboxyglutaric acid*, m 177° (decompn ), giving $\alpha$-*methyl*-$\beta$-*benzylglutaric acid*, m. 139°. PhCH·$CHCH_2CO_2Et$ and $MeCH(CO_2Et)_2$ with EtONa give the *Et ester*, $b_2$ 197°, of $\alpha$-*methyl* $\beta$-*benzyl*-$\gamma$-*carboxyglutaric acid*, which exists in 2 forms, m 197° and 118°; heating above their m p gives 2 $\alpha$-methyl-$\beta$-benzylglutaric acids, m 139° (cf. above) and 97°. PhMeCHCHO and $CH_2(CO_2H)_2$ in EtOH give a mixt of the *Et esters*, $b_{10}$ 156° and $b_{10}$ 175–82°, of $\gamma$-*methyl*-$\gamma$-*phenylbutenoic acid* (I), did not crystallize, and $\gamma$-methyl-$\gamma$-phenyl-$\alpha$-carboxybutenoic acid, m. 151°. I and $NCCH_2CO_2Et$ with EtONa give *Et* $\gamma$-*methyl*-$\gamma$-*phenyl*-$\alpha$-*cyano*-$\beta$-*acetiobutyrate*, $b_2$ 198°; alk. hydrolysis gives $\gamma$-*methyl*-$\gamma$-*phenyl*-$\alpha$-*carboxy*-$\beta$-*acetiobutyric acid*, m 162° (decompn ), giving $\gamma$-*methyl*-$\gamma$-*phenyl*-$\beta$ *acetiobutyric acid*, m 88°. C. J. West

$\alpha,\beta,\gamma$-Trimethylglutaric acids. F E. Ray. *J. Am. Chem Soc.* 53, 1174–5(1931); cf. *C. A.* 22, 945.—Polemical with Michael and Ross (*C. A.* 25, 82) regarding the identity of $\alpha,\beta,\gamma$-trimethylglutaric acid C. J. West

$\alpha,\beta,\gamma$-Trimethylglutaric acids. Arthur Michael and John Ross. *J. Am. Chem. Soc.* 53, 1175–6(1931).—Reply to Ray (cf. preceding abstr.). C. J. West

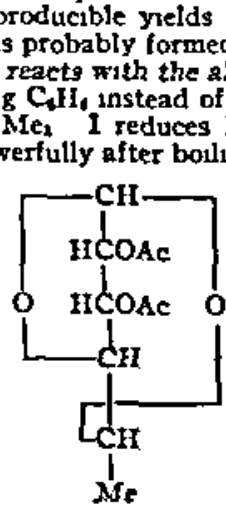
A supposed asymmetry of *meso*-tartaric acid. K. Scheringa. *Pharm. Weekblad* 68, 143–5(1931).—A theoretical discussion of the spatial configuration of *meso*-tartaric

acid and a possible asymmetry due to a mutual repulsion of the 2 carboxyls.
A. W. Dox

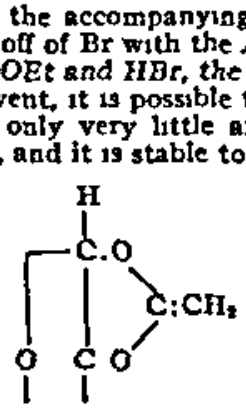
Iron nitrosyls and their behavior on oxidation. Hans Reihlen, E. Elben and J. Everet. *Ann* 485, 43–52(1931).—$(NO)_2Fe(S_2COEt)_2$ (I) (Manchot and Davidson, *C. A.* 23, 4417) results in 91% yield (on the basis of the Fe) or 95% yield (on the basis of NO) from 10 g $FeSO_4$ in 70 cc. $H_2O$ and 12–14 g K xanthate in 30 cc. $H_2O$ to which are added 50 cc $CS_2$ or $CHCl_3$ and the whole satd. with NO (av. absorption, 1500 ± 50 cc.), expts at 0–40°, addn of KOH or AcONa, or variation of the ratio of K xanthate to Fe from 0.5 to 4, always gave the same result. With EtOCOSK there results 35% of *dinitroso ferrous Et thiocarbonate* (II), $(ON)_2FeSCO_2Et$, brown black, much less stable than I and reacts much more quickly with acids and alkalies. I, on heating at 60–80°, gives a N free sublimate, *S,O-di-Et thiocarbonate*, $b_{18}$ 76°, $n_D^{19}$ 1.5375. The behavior of I and II on autoxidation is shown in curves. I in $C_6H_6$, on shaking with 1 atom of O, gives a compd contg about 30% of $(NO)O\,NOFe(S_2COEt)_2$.
C. J. West

Carbohydrates. X. Further 1,2-derivatives of glucose. Percy Brigl and Richard Schinle. *Ber* 63B, 2884–7(1930); cf. *C. A.* 24, 4509.—An entirely different and materially smoother method of prepg 2 methylglucose (I) (*C. A.* 24, 74) is described. Tetrabenzoylglucose di-Et mercaptal reacts with extraordinary ease with MeI and $Ag_2O$, yielding half its wt of *tetrabenzoyl-2 methylglucose di-Et mercaptal*, m. 88–9°, $[\alpha]_D^{19}$ 64.33–64.57° ($Me_2CO$), sapond. by NaOEt to 2 methylglucose di-Et mercaptal, m. 178°, identical with that obtained from glucose mercaptal with MeI and yielding with aq. $HgCl_2$ I, m. 158°, shows slight mutarotation in $H_2O$, $[\alpha]_D$ changing from 56.6–59.2° in 0.5° hr. to 64.9–65.6° in 48 hrs.; phenylhydrazone, m. 177°, $[\alpha]_D^{19}$ —13.3° ($C_5H_5N$) (heating with more $PhNHNH_2$ gives the Me-free glucosazone, m. 205°).
C. A. R.

Sugar anhydrides. II. Action of trimethylamine on acetobromo-*l*-rhamnose. Fritz Micheel and Hertha Micheel. *Ber* 63B, 2862–6(1930); cf. *C. A.* 23, 3669.—It was shown recently (*C. A.* 24, 2727) that acetohalogenosugars whose substituents on the 1- and 2 C atoms are in the *cis*-position can form quaternary $NH_4$ salts with $NMe_3$ while the *trans* derivs. do not. The acetohalogen derivs. of *d* mannose and *l*-rhamnose form no quaternary derivs., but while the mannose compd. can be recovered almost unchanged even after long continued action, acetobromorhamnose undergoes another reaction. In abs. alc. after a sufficiently long time almost all the Br is split off and seps. as $NMe_3HBr$. Tetraacetylethylrhamnoside is not formed, however; there are obtained chiefly a diacetylrhamnose anhydride (I), 2,3,4-triacetyl β rhamnose (II) and an unsatd. non-cryst. compd. The yields of these products vary considerably and it has not yet been possible to establish the conditions necessary for obtaining I, especially, in reproducible yields. I, to which the accompanying structure is assigned provisionally, is probably formed by splitting off of Br with the Ac group on C atom 4 as AcBr which reacts with the alc. to form AcOEt and HBr, the latter sepg. as $NMe_3$·HBr. By using $C_6H_6$ instead of EtOH as solvent, it is possible to isolate the very unstable AcBr·$NMe_3$. I reduces Fehling soln. only very little after sapon. of the Ac groups but powerfully after boiling with acids, and it is stable toward Br in AcOH and




(I)




(III)

$KMnO_4$ in $Me_2CO$. It has not been possible to obtain the corresponding carbohydrate in pure form, however. Cautious alk. sapon. gives sirups which after long standing in the air reduce Fehling soln. and deposit small quantities of *l*-rhamnose hydrate, while a dil. soln. of HCl in MeOH produces a change in rotation from —24.1° to —9.8° but yields no cryst. rhamnoside acetate. The simultaneous formation of II renders the isolation of I difficult. The mother liquors from I and II give a sirup which reacts

strongly with Br and $KMnO_4$, it may be a compd. of the glucal type or a ketene acetal-like product (III) derived from the tautomeric form of acetobromorhamnose. The easy elimination of AcBr from acetobromorhamnose indicates that the mobile 6-membered pyran ring is fixed in a position in which the Br atom is close in space to an Ac group; if no Walden inversion occurs at C atom 1 in the ring closure, this can result only in the formation of *(α1,4)(β1,5)-rhamnosan 2,3-diacetate* (I), since the Br is in the *trans*-position to the Ac groups on C atoms 2 and 3. The acetohalogenomannoses, which under the same conditions are stable toward $NMe_3$, have an $AcOCH_2$ group instead of the end Me group of the rhamnose. This end $AcOCH_2$ group probably favors a form of the pyran ring in which the Br and Ac groups are not close to each other. I (0.9 g. from 2 g. acetobromo-*l* rhamnose), m. 124–5°, $[\alpha]_D^{20}$ —21° ($CHCl_3$). C. A. R.

**Nitrogen-containing sugars. II. Synthesis of peptide-like compounds from amino sugars and amino acids. I. Glucosamine as the component.** Alfred Bertho, Fritz Hölder, Werner Meiser and Franz Hüther. *Ann.* 485, 127–51(1931); cf. *C. A.* 24, 3761.—Glucosamine-HCl (8.64 g.) in 400 cc. 0.2 *N* NaOH, treated during 20 min. with 4.52 g. $ClCH_2COCl$ with cooling gives about 5% of *chloroacetyl N-glucosamine*, m. 168–9°, $[\alpha]_D^{24}$ 24.8° (MeOH). Fehling soln. is easily reduced. The α-bromopropionyl deriv. (I) m. 200–1°, $[\alpha]_D^{20}$ 52.5° ($H_2O$) after 17 min., changing to a const. value of 35.2° in 18 hrs., crystn. of this prepn. tends to increase the component with the higher rotation, since the const. value for the product crystd. once is 23.78°. The α-bromoisocaproyl deriv. (II), m. 178° (decompn.), also shows mutarotation, the value of $[\alpha]_D^{22}$ changing from 39.67° ($H_2O$) after 30 min. to 24.70° after 24 hrs. I and MeOH-$NH_3$, on standing 3 months at 0°, give a mixt. of dehydroalanyl *N* glucosamine anhydride (III), m. 272° (decompn.), and *alanyl N-anhydroglucosamine anhydride* (IV), m. 199°. Concd. $NH_4OH$ at 0° gives principally III but a small amt. of IV. MeOH-$NH_3$ at 100° gives almost completely IV. III reduces Fehling soln. only after long heating; it does not liberate N in the Van Slyke app., $[\alpha]_D^{23}$ —38.0° ($H_2O$), it is unchanged after heating with MeOH-$NH_3$ 3 hrs. at 70–5° and 3 hrs. at 100°. IV likewise reduces Fehling soln. only after long heating and in the Van Slyke app. liberates 42% of its N after shaking 7 hrs. The *tetra Bz deriv.* of I m. 189°, $[\alpha]_D^{18}$ 86.7° ($CHCl_3$), does not reduce Fehling soln.; a small amt. of *tetrabenzoyl-(α-hydroxypropionyl)-N-glucosamine* is also formed, m. 238°, $[\alpha]_D^{25}$ 15.87° ($CHCl_3$). II also yields a *tetra-Bz deriv.*, m. 189°, $[\alpha]_D^{18}$ 103.1° ($CHCl_3$). *Hippuryl N glucosamine*, m. 200° (decompn.), it reduces Fehling soln. but does not react with MeI, $[\alpha]_D^{21}$ 43.47° ($C_5H_5N$). *p*-Bromohippurazide gives the *compd.* $C_{24}H_{21}O_5N_5Br_2$, m. 214°. Benzoylalanine azide gives *benzoylalanyl-N-glucosamine*, m. 222° (decompn.), $[\alpha]_D^{22}$ 59° ($H_2O$). C. J. West

**Acetylmonoses. VI. The ring structure of the mannose pentaacetates.** P. A. Levene and R. Stuart Tipson. *J. Biol. Chem.* 90, 89–98(1931); cf. *C. A.* 18, 76, 1274; 21, 1969, 3184.—Hudson (*C. A.* 24, 2726) has recently attributed different ring structures to *α-d-* and *β-d* mannose, and if this assumption is correct the α- and β-pentaacetates should also possess different ring structures. L. and T. find on examg. the 2 forms that this is not the case. Fifty g. of β mannose pentaacetate treated with AcOH and HBr gave 32 g. of 1-bromotetraacetyl-*d*-mannose (I), m. 53–4°, $[\alpha]_D^{25}$ 123.2° (in $CHCl_3$). Treatment of I (25 g.) with Zn dust and AcOH gave 12 g. triacetylglucal, m. 54–5°, $[\alpha]_D^{25}$ —16.3° (in abs. EtOH). The action of AgOAc on 17 g. of I gave 15 g. of a compd. m. 74, $[\alpha]_D^{26}$ +56.6° (in $CHCl_3$), which was found to be identical with *α-d*-mannose pentaacetate. Dry NaOMe acted on I to give the peculiar tetraacetylmethylmannoside of Freudenberg (*C. A.* 24, 4509), m. 104–5°, $[\alpha]_D^{27}$ —22.6° (in $CHCl_3$), while treatment with $Ag_2CO_3$ gave 2,3,4,6-tetraacetylmannose (II), m. 93°, $[\alpha]_D^{27}$ +26.3° (in $CHCl_3$). II strongly reduced hot Fehling soln., and on acetylation gave β-mannose pentaacetate, m. 117°, $[\alpha]_D^{21}$ —24.1° (in $CHCl_3$). It thus appears that the 2 pentaacetates are the α- and β-forms of the same ring isomer. H. W. Leahy

**The preparation and melting point of anhydrous β-maltose.** J. Gillis. *Natuurw. Tijdschr.* 12, 193–9(1930).—β-Maltose hydrate is dehydrated *in vacuo* below 100°, contrary to the results of deBruyn and van Leent (*Rec. trav. chim.* 13, 218(1894)). The m.-p. curves show that the anhyd. substance m. 108°, while the hydrated form m. 102–3°. The product obtained by deBruyn was probably a supercooled mixt. of about 56% of β- and 46% of α maltose. R. C. Hockett

**Autohydrolysis of diastatic dextrins.** Jean Effront. *Compt. rend.* 192, 198–201 (1931).—Reducing dextrins are formed during one of the primary phases of the process

of starch saccharification The maltose encountered in the course of the dextrin disappearance results from the breaking down of these reducing dextrins In the process of purification by solvents or dialysis autohydrolysis plays a dominant part, while the phenomenon of polymerization also occurs The final products are, therefore, always impure a condition similar to the one encountered in the study of the decompn of starch B. S LEVINE

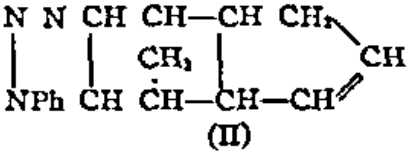
The supposed depolymerization of glycogen. ENDRE BERNER. *Ber.* 63B, 2760–4 (1930).—B showed recently (*C A.* 24, 5730) that the supposed depolymerization of inulin described by Vogel and Pictet and by Pringsheim, Reilly and Donovan is explained by the fact that inulin eagerly adsorbs such substances as alc., glycerol, glycol and $AcNH_2$ and thereby becomes easily sol in $H_2O$, analysis of the supposed depolymerizates showed that the adsorbed substances, together with the pure inulin, corresponded quantitatively to the relatively large observed f.-p depressions B now shows that this is also true of Reilly, Pringsheim and Donovan's glycogen prepns (*C A* 24, 3996) When well dried glycogen is dissolved in anhyd solvents, like fused $AcNH_2$, $HCONH_2$ or glycol and pptd with abs alc., it adsorbs large quantities of these substances, the adsorption being greatest when the $H_2O$ is removed as completely as possible, e. g., if the glycogen soln is heated some time *in vacuo* before the pptn The quantity of $AcNH_2$ adsorbed also decreases with increasing quantities of alc. used for pptn The ppts give up their alc. only slowly *in vacuo* over $CaCl_2$ but *in the air they* lose it more rapidly because the hygroscopic substances take up $H_2O$ and the adsorption of alc is thereby diminished *This explains why the $H_2O$ must be removed before good* adsorption will take place A prepn obtained by dissolving glycogen in $HCONH_2$ at room temp., pptg *and washing with* abs alc *and drying 2 days in vacuo over* $CaCl_2$ gave an apparent mol wt of 342 in $H_2O$ but contained 0.16% alc and 0.25% $HCONH_2$, *after standing several hrs in the air the apparent mol wt was 610 and a couple of hrs* later 960, the prepn now contained only 2% alc A prepn similarly obtained from a *soln of glycogen in $HCONH_2$ which had been heated 1 hr in vacuo* at 90–5° gave an apparent mol wt of 255 increasing, after 2 days in the air, to 317, it contained 4.13% alc and 6.27% $HCONH_2$, *and an aq soln of the same quantities of glycogen*, alc and $HCONH_2$ gave an apparent mol wt. of 364 A prepn similarly obtained from glycol gave in $H_2O$ the same opalescence as true glycogen solns and was colored by I in the same way The glycogen was prepd from calves' livers and after careful purification (finally by electro-dialysis) formed a friable powder of the compn. $C_6H_{10}O_5$ (ash less than 0.02%), $[\alpha]_D^{22}$ 194.5° in $H_2O$ The better it was dried, the less did it depress the *f. p of $H_2O$, pointing to the presence of alc., which, like $H_2O$, is removed* with great difficulty, only heating at 100–10° *in vacuo* gives a product of the compn $C_6H_{10}O_5$ which may account for the large depressions found by R., P. and D., who dried their glycogen only at 80° C A R

Cyclopropene series. I. Diphenylcyclopropenedicarboxylic acid. S. F. DARLING AND D. W. SPANAGEL *J. Am Chem Soc* 53, 1117–20(1931).—*Di-Me α-bromo-β γ-diphenyl γ nitroethylmalonate*, m. 117–8°, with AcOK in MeOH gives *di-Me 1,2-diphenyl 2 nitro 3,3 cyclopropanedicarboxylate*, m. 120°, refluxing with MeONa splits off $NaNO_2$, giving the *di-Me ester*, m. 140–2°, of *1,2-diphenyl-3,3 cyclopropenedicarboxylic acid*, m. 190° (evolution of $CO_2$), oxidation with $KMnO_4$ gives $CH_2Br_2$. Br and the ester give *di-Me 1 2-dibromo 1,2-diphenyl 3,3 cyclopropanedicarboxylate*, m. 194–5°. Melting the acid gives the *lactone*, $C_{15}H_{12}O_2$, m. 149–51°, hydrolyzed to *1,2-diphenyl 2-hydroxy-3 cyclopropanecarboxylic acid*, m. 146–8°, this is not oxidized by $O_2$ C. J. West

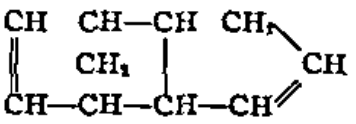
Polymerization and pyrogenic decomposition of phenylacetic anhydride. I. *Cyclobutane-α-dione*. P. KALNINS *Acta Univ Latviensis Kim Fakultat Serija* 1, No. 13–7, 455–67, 468(1930)(in German).—In the prepn and fractionation of $(PhCH_2CO)_2O$ *there is formed by decompn.*, a red substance, probably diphenylcyclobutane α-dione, while $PhCH_2CO_2H$ distils over This results by the unsym polymerization of the anhydride *with the splitting off of 2 mols* $PhCH_2CO_2H$ *The intermediate* product of the polymerization is colorless and easily changed into the red diketone The latter with EtONa undergoes a mol *rearrangement, similar to the benzilic acid* rearrangement, the product being $PhCH_2CHPhCOCO_2H$ This is 1 of the few examples of unsym polymerization, most of the polymerizations yielding sym compds The study is being extended to other anhydrides C. J. WEST

Polymerization of cyclic hydrocarbons. I. Polymeric forms of cyclopentadiene. KURT ALDER AND GERHARD STEIN (WITH HUGO FINZENHAGEN) *Ann* 485, 223–46 (1931).—Dicyclopentadiene (I) and $PhN_3$ give the *addn compd* (II), m. 130–1°, decompd by mineral acids with liberation of N. The dihydro deriv of I, m. 50–1°, does

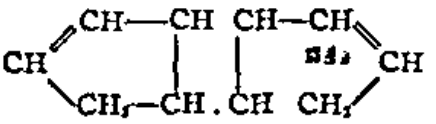
not react with $PhN_3$, thus indicating structure III as opposed to IV. Oxidation of the dihydro deriv of I with $KMnO_4$ in $Me_2CO$ gives 3,6-endomethylenehexahydrohomophthalic acid, m 137°, and cyclopentane-1,3-dicarboxylic acid, isolated as the anhydride, m. 163°. Decompn. of the bisnitrosochloride of I gives the unsatd. ketone (V), m. 216°; dihydro deriv., m. 109–10° (*semicarbazone*, m 223° (decompn.)); oxidation yields *cis-pentalan-1,3-dicarboxylic acid* (VI), m 230°. Excess $BzO_2H$ and I give the dioxide, m 189°, the action of 1 mol. $BzO_2H$ upon I in $CHCl_3$ at —12° gives a mixt. of *monoxides* (VII and VIII), while these cannot be sepd by crystn., VII adds $PhN_3$, giving a *triazole* (IX), m. 149°. From the petr ether mother liquor VIII, $b_{11}$ 100–10°, m. 79–80°, is isolated, catalytic reduction of VIII gives a *dihydro deriv*, m. 118–9° Tricyclopentadiene adds $PhN_3$, giving the compd $C_{21}H_{23}N_3$, m 199–200° (decompn.).



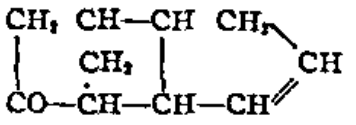
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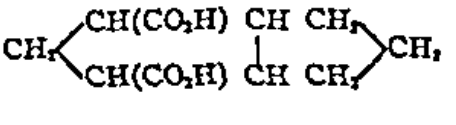
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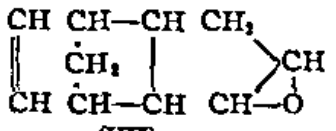
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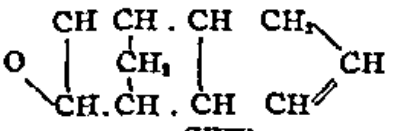
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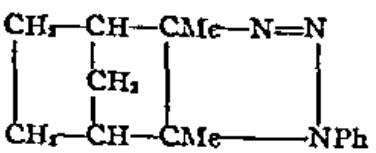
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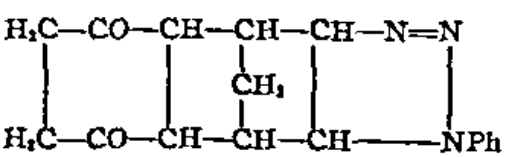
(VIII)

C. J. West

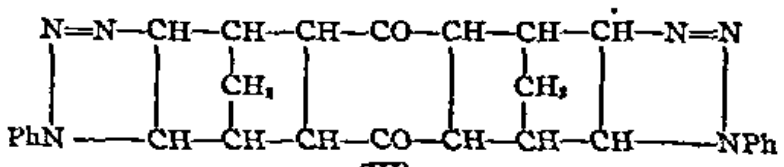
Graduated addition capacity of unsaturated ring systems. Kurt Alder and Gerhard Stein. *Ann.* 485, 211–22(1931).—The peculiar behavior of dicyclopentadiene toward $PhN_3$ lead to the study of other compds of this type. Santene and $PhN_3$ give an *addn compd* (I), m 86° $\Delta^4$-3,6-Endomethylenetetrahydro-*o* phthalic anhydride gives the *compd* $C_{15}H_{13}O_3N_3$, decomps. 225°. Dihydromonocyclopentadienequinone and $PhN_3$ give the *compd* II, m 194°; $PhCH_2N_3$ gives the *compd* $C_{16}H_{11}O_2N_3$, m. 141°, $N_3CHCO_2Et$ gives the *compd* $C_{15}H_{13}O_4N_3$, m 177° Dihydromonocyclohexadiene- and -butadienequinone do not react with $PhN_3$ Biscyclopentadienequinone and $PhN_3$ give the *compd* III, darkens above 200° and decomps 258°, the corresponding hexadiene and butadiene derivs did not react 3,6-Endoxo-$\Delta^4$-tetrahydro-*o*-phthalic anhydride and $PhN_3$ give the compd $C_{14}H_{11}O_4N_3$, decomps. 200°. *N,N'*-Dicarbethoxy-3,6-endomethylenetetrahydropyridazine and $PhN_3$ give the compd. $C_{17}H_{21}O_4N_3$, m. 126°.



(I)



(II)



(III)

C. J. West

Induction of the reaction between chlorine and benzene and ethylene. T. D Stewart and M H. Hanson *J Am Chem Soc* 53, 1121-8(1931), cf. *C. A.* 24, 3981.—$C_6H_6Cl_6$, *together with substitution products, is formed when* $C_2H_4$ is passed into a $C_6H_6$ soln of Cl in the dark A mixt of the various stereoisomers is obtained, with the α-form (m 157°) predominating The molar ratio of total Cl reacting to $C_2H_4$ reacting varies from 2 to 11 in the present expts. and is greater the lower the partial pressure of $C_2H_4$ This is explained on the basis of chain mechanisms for both the $C_2H_4$ Cl and $C_6H_6$-Cl reactions, the latter being induced by and acting as an inhibitor of the former In homogeneous soln the above ratio, with Cl in large excess, is approx 2 *A higher proportion of the Cl is used in substitution than in the heterogeneous reactions* No evidence of a Friedel Crafts type of reaction between the $C_6H_6Cl_6$ and $C_6H_6$ could be found In a mixt of $C_6H_6$, BzCl and Cl no BzPh was formed with introduction of $C_2H_4$ C. J. West

*cis trans*-Isomerism and steric hindrance. XII. o-Butylcyclohexanols. G Vavon and A Guedon *Bull soc chim* 47, 901-10(1930); cf. *C. A.* 24, 1355.—A study of the *cis* and *trans*-o-butylcyclohexanols (I) and their ethers was undertaken for comparison of their reaction velocities *o-Butylcyclohexanone (II) was prepd by* catalytic hydrogenation of o-$BuC_6H_4OH$ (III) followed by oxidation with $CrO_3$ The catalytic hydrogenation of III with Pt black yielded butylcyclohexane and 60% of I. The semicarbazone of II m 143–4°, from which was regenerated II, b 90–1°, $d_4^4$ 0.914, $n_D^4$ 1.4603 Catalytic hydrogenation of the semicarbazone in aq alc. contg HCl yielded the semicarbazide, m 96–7°, oxime *of II* m 43–4° *II also was obtained by condensation* of butanal with cyclohexanone (IV) and subsequent catalytic hydrogenation of the butylideneecyclohexanone in the presence of 5% NaOH according to the process of Grignard and Dubien (*C A* 19, 1247) The fraction $b_{18}$ 130–45° was not purified but directly dehydrated by distn. in the presence of 2% $(CO_2H)_2$ at 30–40 mm The fraction now $b_{20}$ below 100° gave with semicarbazide HCl a compd m 166° which is the semicarbazone of IV. The main fraction $b_{18}$ 105–20° was directly hydrogenated and yielded II. *A 3rd way of obtaining II is by the action of Mg and BuBr on o-chlorocyclohexanone* Bu cyclopentyl ketone (V), $b_{18}$ 104–6°, $d_4^{23}$ 0.893, $n_D^{23}$ 1.4479, is obtained as a by product. The structure of V is proved by its synthesis from cyclopentanealdehyde and BuMgBr and subsequent oxidation of the secondary alc obtained The formation of a 5-C ring from the 6-C system is emphasized *cis* I was prepd by Pt black hydrogenation of II in AcOH HCl *After hydrolysis of the acetate formed it* $b_{4-15}$ 101–2°, dinitrobenzoate, m 76°, acid phthalate, m 58–9°, phenylurethan, m. 64–5°. *trans* I, obtained in 87% yield by treating *II* with Na and alc., $b_{18}$ 111–2°, $d_4^{27}$ 0.9046, $n_D^{27}$ 1.4654; dinitrobenzoate 72–3°, acid phthalate, m 71°, phenylurethan, m 68°. The esterification of the *cis* form is slower than that of the *trans* isomer, hydrolysis with 0.1 *N* NaOH of the 2 acid phthalates at 39° gives *K trans/K cis* = 3.6 in $H_2O$, 2.5 in 75% alc E G-F

Oscillating, puckered, centroid model for the benzene ring. Maurice L. Huggins. *J Am. Chem Soc* 53, 1182-3(1931).—*Brief discussion.* C J. West

Directing influence of certain groups in the benzene nucleus. G Bargellini. *Mem accad Italia (Classe sci fis mat E nat)* 1, Chem. No 3, 15 pp (1930).—In a preceding paper (*C A* 23, 3910) the influence of OH, *O*-alkyl, $NH_2$ and acylamino groups in directing halogens entering the $C_6H_6$ nucleus were studied In the present paper the effect of $NH_2$ groups when para to each other and blocked by alkyl or acyl groups is studied Previous work has shown that when an OH group is blocked by an alkyl, and at the *p*-position an $NH_2$ *is blocked by an acyl group, then the first halogen enters* a position ortho to the alkoxy, but a 2nd halogen enters ortho to the acylamino group *E g.*, $MeOC_6H_4NHAc$ forms successively, acetyl 2 bromo- and then *acetyl 2,5-dibromoanisidine*, m 195° Its constitution was proved by oxidation which gives 2,5-dibromoquinone The rule is then that *when a deriv of p-aminophenol is halogenated, which has an O-alkyl group as well as NHAc, the first halogen enters ortho to the O-alkyl group and the second ortho to the NHAc group* A W. Contieri

Catalytic hydrogenation of organic compounds over copper chromite. Homer Adkins and Ralph Connor *J Am Chem. Soc* 53, 1091-5(1931).—Details are given for decomposing $CuNH_4$ chromate for the prepn of Cu chromite, which *is shown* to be quite superior in many respects to any catalyst hitherto used. Numerous aldehydes and ketones may be quantitatively and rapidly hydrogenated to the corresponding alcs., this holds true not only for aliphatic CO compds but also for aromatic ones and for keto esters and a keto alc. A carbinol group adjacent to a benzenoid ring may be completely reduced $NO_2$ groups may be quantitatively reduced to primary amines without the simultaneous formation of secondary amines An alkene linkage in a

hydrocarbon as well as in an acid or ketone may be hydrogenated without otherwise modifying the org compd. Pyridinoid rings and C to N double bonds, as in anils, may be readily hydrogenated. The furanoid ring in furyl alc. may be readily broken with the formation of 1,2- and 1,5-pentanediols in good yields. The new catalyst is not active toward cyanides or toward benzenoid nuclei. It is not nearly so sensitive as Ni to S- or halogen-contg impurities in the compd to be hydrogenated. Its lesser sensitivity toward deactivation probably accounts for the fact that it is much more active after it has begun to act than is Ni, despite the fact that Ni is active at lower temps. No special app. such as a reduction furnace is needed and the catalyst need not be freshly prepd. before use. The catalyst ready for use does not change on standing in contact with air or moisture. It is not rapidly deactivated during use. The rate of hydrogenation of $Me_2CO$ over Cu chromite is very much more rapid at higher pressures. With an av. pressure of 35 atms. the hydrogenation of 1.73 mols. with 1 g. of catalyst has proceeded to the extent of only 17% in 30 min., while at a pressure of 148 atms. 60% of the $Me_2CO$ was reduced and at 212 atms. the reaction was 95% complete in 30 min. At the end of 1 hr. the percentage of hydrogenation was 22, 92 and 100 for the 3 pressures given above. Zn chromite has also been used as a catalyst but it is much less active than the Cu compd. and has been found to catalyze condensation. C. J. West

**Organic syntheses facilitated by pressure.** Gilbert T. Morgan *Chemistry and Industry* 50, 104–9(1931).—A review with many references to the patent literature of important syntheses facilitated by pressure was presented by the Herter Memorial Lecturer in which the following were discussed: aromatic amines from phenols and $NH_3$, alkylanilines from anilines and alcs., alkali fusions of substituted naphthalenesulfonic acids, formation of hydrocarbons, alcs., aldehydes, ketones, etc., by pressure reactions in the gas phase from CO and $H_2$ with various catalysts, dehydration of alcs. to form ethers, gaseous polymerization of $C_2H_4$, hydrogenation in general, oxidation in general, $CO_2$ and phenols as in the Kolbe synthesis for salicylates, $CO_2$ and aromatic hydrocarbons in the presence of $AlCl_3$ to give benzoic acid, toluic acid, etc., anilines and $CO_2$ to form $CO_2H$ acids, ketones and urea derivs. In autoclaves pressures from 50 to 300 atms. may be developed without personal risk, providing the temps. are not excessive, above 360° care must be taken. It is best to assume that with every autoclave in const. use there will come a time when failure is to be expected. It is believed that a systematic study of high pressure reactions will in many cases lead to discoveries whereby the use of pressure will be partially or entirely avoided as in the amination of naphthols where a more efficient catalyst has led to a reduction from 50 to 5 atms. Under conditions of high temp. and pressure the oxides of C may be hydrogenated catalytically to yield a complex mixt. of alcs., aldehydes, acids and esters, these results are somewhat comparable with the transformations of photosynthesis. The more complex products of vital activity are missing from high-pressure syntheses probably because at the high temp. also involved, these substances are incapable of existence, more efficaceous catalysts by causing a lowering in the temp. might make the synthesis of such natural products possible. N. A. Lange

**Transformation of aldehydes into higher molecular amines.** A. Skita and G. Pfeil. *Ann.* 485, 152–73(1931); cf. *C. A.* 21, 2876.—Previous work has shown that $EtCH.NC_6H_{11}$(I) on reduction with Pt and H gives $PrCHMeCH_2NHC_6H_{11}$(II). The present study is an extension of this observation. Catalytic reduction of $MeCH{-}NC_6H_{11}$ at room temp. and with a pressure of 3 atm. of H is complete in 0.5 hr., giving 8% of the Et deriv. (*picrate*, m. 231°), and 38.7% of *N-butylcyclohexylamine*, b. 202–4° (HCl salt, m. 290°), the latter also results in 51.5% yield by reducing *N (2-buten 1-al)cyclohexylamine*, $b_{18}$ 90–1°. Reduction of I gives 49% of II, II also results from *N (2 methyl 2 penten-1-al)cyclohexylamine*, $b_{18}$ 118–9.5°, in 49% yields, using an equiv. amt. of EtCHO with I increases the yield of II to 76.4%. II *HCl salt*, m. 139°, *phenylurea*, m. 99°. *Butyralcyclohexylamine*, $b_{14}$ 85–7°, is reduced in 5 hrs., giving 75% of *N (2 ethylhexyl)cyclohexylamine*, $b_{14}$ 140–4°, this also results in 56% yield by reducing *N-2-ethyl-2-hexen 1-al)cyclohexylamine*, $b_{13}$ 139–43°; *HCl salt*, m. 95°, *picrolonate*, m. 225–6° (decompn.). Reduction of isovaleralcyclohexylamine gives 50% of the *N*-iso-Am deriv., $b_{11}$ 89–93° (*HCl salt*, m. 279–80°) and 15% of *N (2-isopropyl-5 methylhexyl)cyclohexylamine*, $b_{11}$ 143–5° (*HCl salt*, m. 105°, *acid oxalate*, m. 193.5–4.5°); *N (2-isopropyl 5 methyl 2 hexen-1-al)cyclohexylamine*, $b_{14}$ 146–52°, gives 61.5% of the same amine. Isovaleralethylamine is reduced in 3 hrs., giving 20% of the iso-Am deriv., and 16.4% of *N-(2-isopropyl-5-methylhexyl)ethylamine*, b. 213–20° (*picrolonate*, m. 221–2° (decompn.)). *N-Heptylcyclohexylamine*, $b_{18}$ 132–5° (*HCl salt*, m. 211–2°); *N (2-amylnonyl)cyclohexylamine*, $b_{17}$ 208–10° (42.3% yield), *HCl salt*, m. 90°, *acid oxalate*, m. 153°. *N (2-amyl 2 nonen-1-al)cyclohexylamine*, $b_{11}$ 208–11°, reduction gives 25.8% of the

amine Reduction of hydrocinnamalcyclohexylamine gives 15% of the 3-phenylpropyl deriv. and about 10% of *N-(2 benzyl 5-phenylamyl)cyclohexylamine*, whose *HCl salt* m 169–70° and *acid oxalate* m 172°, this also results in 69% yield by reducing *N (2-benzyl 5 phenyl 2 penten-1-al)cyclohexylamine*, $b_{14}$ 265–70° (partial decompn) Catalytic reduction of a mixt of I and AcII in AcOH gives, in addn to $C_6H_{11}NH_2$, its Et, Bu and 2-methylamyl derivs, 29 5% of *N-(2 methylbutyl)cyclohexylamine*, $b_{14}$ 90–101° (*HCl salt*, m 234°, *phenylurea*, m 118°), this also results in 61% yield by reducing *N (2 methyl-2 buten-1-al)cyclohexylamine*, $b_{14}$ 100–5° I and BzII give 11% of *N-(2-methyl 3-phenylpropyl)cyclohexylamine*, $b_{14}$ 165–72° (*HCl salt*, m 184°, *phenylurea*, m 116°), this also results in 60 5% yield from *N-(2 methyl 3-phenyl 2 propen 1-al)-cyclohexylamine*, $b_{14}$ 168–76° I and furfural give 8 7% of *N-(2 methyl-3 furylpropenyl)-cyclohexylamine*, $b_{11}$ 167–75° (*HCl salt*, m 180°); 0 7% of its *dihydro deriv*, $b_{12}$ 156–61°, and 8% of the *tetrahydro deriv*, $b_{12}$ 143–50° (*acid oxalate*, m 165°) The same compds are obtained on reducing *N-(2-methyl-3 furyl 2-propen-1-al)cyclohexylamine*, $b_{12}$ 158–62°, in 7.3, 1.8 and 10 75% yield, resp *Furfuralcyclohexylamine*, $b_{14}$ 131.5–5 5°, reduction gives the *N furomethyl deriv*, $b_{14}$ 123–4°; *phenylurea*, m. 113°. Isobutyral-cyclohexylamine and HCHO give 64 8% of *N (2,2-dimethyl-3 hydroxypropyl)cyclohexylamine*, $b_{12}$ 123–5°, m 38°, *HCl salt*, m 221°, *phenylurea*, m 150°, *di-Ac deriv*, $b_{14}$ 198–9° This also results in 37 8% yield by reducing *N-(2,2-dimethyl 3 propanol 1-al)cyclohexylamine*, $b_{12}$ 108–10° These results indicate that the reaction proceeds through the hydrolysis of the amine to the aldehyde, which then forms a Schiff's base with the amine and as such is reduced Only in the case of I is practically complete hydrolysis observed The reaction does not occur with aromatic aldehydes of the type of BzII but does with the fatty-aromatic aldehydes, such as $PhCH_2CH_2CO_2H$

C J. West

The manufacture of acetaldehyde. A Ullrich. *Metallbörse* 21, 315–6, 363–4, 413(1931) —A review of patents E H.

*Removal of hydrogen halides from organic halides.* C. R. Noller and R. Dinsmore *J Am Chem Soc* 53, 1185–6(1931) —N. and D report that they have been investigating the reaction of org halides with tert amines (cf Semb and McElvain, *C A* 25, 1252, who report the action on sec. amines) The main reaction other than quaternary salt formation appears to be the removal of halogen acid, although rearrangement of the salt to alkylpyridine hydrohalides has not been excluded

C. J. West

*Fluosilicates of organic bases. II.* C A. Jacobson. *J. Am. Chem. Soc.* 53, 1011 5(1931), cf *C A* 23, 117 —The *fluosilicates* of the following compds were prepd and the crystals photographed *o Tolidine*, m 208–9°, *di-α naphthylamine*, m. 218° (decompn) *di β naphthylamine*, m 236.3°, *di m nitroaniline*, m 200°, *diphenylamine*, m 169°, *m-phenylenediamine*, m 243–4°; *p-phenylenediamine*, decomps on heating, *diethylaniline*, m 165.3°, *dinitrosodiphenylamine*, m 124 5° (decompn); *di-p-amino azobenzene*, m 220° (decompn), *di-p-aminobenzoic acid*, m 240–5°. The soly in EtOH at 25° is given C J West

Mechanism of chemical reactions. II. Mechanism of the synthesis of secondary and tertiary amines by reduction. Karl Kindler, W Peschke and W. Dehn *Ann* 485, 113–26(1931), cf *C A* 17, 2278 —$PhCH_2NH_2$ gives almost quant $(PhCH_2)_2NH$ on reduction with Pd and H in 90% EtOH for 3 hrs $PhCH_2CH_2NH_2$ (I), similarly treated, gives only 10% of the sec amine This reaction is assumed to proceed as follows $RCH_2NH_2 \longrightarrow RCH{:}NH \longrightarrow RCH_2N{:}CHR \longrightarrow (RCH_2)_2NH$ A mixt *of I and* $PhCH_2OH$ *in* $C_6H_4Me_2$, reduced as above *for 3 hrs*, gives a mixt *of 6%* $(PhCH_2CH_2)_2NH$ but principally $PhCH_2CH_2NHCH_2Ph$ (II) Here it is assumed that the $PhCH_2OH$ is reduced to BzII, which then reacts to give $PhCH{:}NCH_2CH_2Ph$ (III) and this is reduced to II. III, prepd from BzII and I, is nearly quant reduced to III in 5 min. $PhCSNH_2$ (IV), on reduction with Al Hg in moist $Et_2O$, gives 85% of $PhCH_2NH_2$ and 8% $(PhCH_2)_2NH$, while $PhCH_2CSNH_2$ (V) gives 26% of I and 66% $(PhCH_2CH_2)_2NH$ In 55, 90 and 145 min, resp, 84, 94 and 99% of IV and 35, 41 and 31% of V, resp, were reduced at 20° in moist $Et_2O$ Both primary and sec amines result on reduction of $PhCH_2CH(OH)NH_2$ and $PhCH_2CH{:}NH$ Reduction of $PhCH_2CH(OH)NMe_2$ with Al Hg gives $PhCH_2CH_2NMe_2$, b 204–6°. In the reduction of $PhCH_2CN$ in AcOH-$AcONH_4$ with Pd and H, the Schiff base is an intermediate product and the final product contains about 60% of $(PhCH_2CH_2)_2NH$. The amt. of sec. amine formed is much larger in a neutral or alk medium than in an acid medium PhCN in AcOH is catalytically reduced at 35° and 2 5 atm H in 20 min, giving 99% of primary amine (VI), in 96% EtOH, 70% is reduced after 180 min., giving 96% VI and 4% sec. amine, $PhCH_2CN$ is 95% reduced in AcOH after 420 min, giving 50% primary and 40% sec

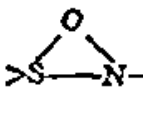
amine; in EtOH, 50% is reduced in 180 min., giving 17% primary and 68% of sec. amine. $PhCH_2CN$ and $Pr_2NH$, catalytically reduced in EtOH, give a mixt. of 21% of $(PhCH_2CH_2)_2NH$ and 60% of $Pr_2NCH_2CH_2Ph$. C. J. West

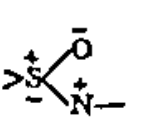
**Derivatives of anesthesin.** L. Coniglio. *Rend accad sci. Napoli* [3], 36, 56–60 (1930).—New derivs. were prepd. by condensing anesthesin, *p*-$H_2NC_6H_4CO_2Et$ (I), with $Me_2CHCHBrCOCl$ (II), BzCl (III), phthalyl chloride (IV) and AcCl (V). The aim was to study the pharmacol. action of the derivs. in relation to the new radicals introduced into the mol. *N-α-Bromoisovaleryl deriv.* was prepd. from 0.60 g. I and 7.96 g. II; mixed in a separatory funnel with about 50 cc. of a 2% soln. of equal parts NaOH and KOH, the caseous white mass was filtered, washed repeatedly with $H_2O$ and dried. The product was sol. in all org. solvents, a pure material, m. 115°, was obtained by dissolving in acetone and pptg. with petroleum ether. *N-Bz deriv.* from 0.60 g. I and 5.62 g. III, according to the Schotten-Baumann method, washed with $H_2O$ and dried *in vacuo* over $H_2SO_4$, it crystallizes in white needles from alc., sol. in acetone, $CHCl_3$, AcOH and $Et_2O$, insol. in $H_2O$, m. 15°. *N-Phthalyl deriv.*, $C_6H_4(CO)_2NC_6H_4CO_2Et$, from 0.60 g. I and 7.12 g. IV in benzene and cooled, the white mass filtered, washed with $H_2O$ and dried *in vacuo* over $H_2SO_4$, long needles from alc. crystallize out, sol. in warm AcOH and acetone, very sol. in cold $CHCl_3$, insol. in $Et_2O$ and in $H_2O$, m. 152°. *N-Ac deriv.* from 0.60 g. I in 20 cc. benzene and 3.12 g. V warmed on the water bath and cooled, filtered, washed repeatedly with $Et_2O$ and dried over $CaCl_2$, sol. in alc. from which it is pptd. with $Et_2O$, sol. in $H_2O$, acetone, AcOH, slightly sol. in $CHCl_3$, insol. in $Et_2O$ and MeOH, m. 181°. The pharmacol. properties are being investigated. P. M.

***p*-Bromoanilides of isobutyric and isovaleric acids.** Marguerite Kuehn and S. M. McElvain. *J. Am. Chem. Soc.*, 53, 1173–4(1931).—The derivs. were prepd. from the acid chloride and *p*-$BrC_6H_4NH_2$, *p-bromoisobutyranilide*, m. 150.1°; *p-bromoisovaleranilide*, m. 128–9°. C. J. West

**The organic sulfonic and sulfinic acids.** Julius v. Braun and Karl Weissbach. *Ber.*, 63B, 2836–47(1930).—In contrast to the large amount of work which has been done on the imidocarboxylyl chlorides, no attempts had ever been made to prep. the imidosulfinyl chlorides, RSCl NR', and the only expt. in the field of the $SO_2H$ acids recorded in the literature indicated that the relations are materially different from those in the $CO_2H$ acid series. $PCl_5$ reacts with $PhSO_2NHPh$ only after long heating and the $-SO_2NH-$ group is not attacked, only chlorination of the Ph nucleus taking place. $PhSO_2NHEt$ also reacts only at 100° and very slowly, forming (probably as the result of chlorination outside of the $-SO_2NH-$ group) a very difficultly separable oily mixt. boiling in a high vacuum within wide limits (100–70°). The hope that in the absence of aromatic residues the results would be more clear-cut was completely fulfilled. Expts. on monoalkylamides of $BuSO_2H$, iso-$AmSO_2H$ and cyclohexylsulfonic acid gave the following results: $PCl_5$ reacts with compds. like $BuSO_2NHEt$ considerably more sluggishly than with the amides of non-aromatic $CO_2H$ acids but, without recourse to extreme conditions, gives compds. having the expected compn. BuS(O)Cl NEt and whose properties were, at first, surprising, the compds. are stable to heat and can therefore be distd.; their Cl is strikingly unreactive; with $H_2O$ and alc. they react only very slowly, with amines almost not at all. The action of an excess of $PCl_5$ results in a very slow chlorination of the C atom adjacent to the $-S(O)Cl<$ group, but with still more Cl under more vigorous conditions the grouping $>C\ S(O)Cl\ N-$ is finally converted into $>C\ SCl_2\cdot N-$, in which the 2 new Cl atoms (but only these) are as reactive as the Cl in the imidocarboxylyl chlorides, even cold $H_2O$ converts the compds. back into the $>C\ S(O)Cl\ N-$ derivs. It is believed that these properties are due to the "imidosulfonyl chlorides" really having a 3-membered ring structure (I) or, from the standpoint of the modern theory of semi-polar union, the structure II. It had been hoped that this might be confirmed by a detn. of the parachor, but the usual parachor consts. do not hold for this type of compds. and the values obtained differed widely from those calcd. If the peculiar behavior of the "imidosulfonyl chlorides" is due to the presence of O, the $SO_2H$ derivs. should show no such anomaly, and as a matter of fact compds. like $BuSONHEt$ react readily with $PCl_5$ to give HCl, $POCl_3$ and liquid chlorinated products reacting violently with $H_2O$ and which cannot be distd. without decompn. even in a high vacuum. The prepn. of a no. of amides of non-aromatic sulfinic acids was used to study a question in this field which hitherto had been tested experimentally only with $PhSO_2H$, viz., the dismutation of these acids ($2\ RSO_2H + RSO_2H = RSO_2SR + RSO_3H + H_2O$). The distn. without decompn. of the $BuSO_2H$, iso-$AmSO_2H$ and cyclohexylsulfonic acid made it possible to follow the reaction quantitatively. While the mol. of $RSO_2H$ which is oxidized at the expense of the other 2 mols. cannot be replaced by *o*- or *p*-$C_6H_4(OH)_2$ as O acceptor, it can be replaced by mercap-

tans $2RSO_2H + HSR' = RSO_2SR + 2H_2O + R'_2S_2$ Sulfinic esters and sulfinyl chlorides, unlike the free acids, are relatively very stable but the conversion of the chlorides into thiosulfonic acids can be readily effected with Na mercaptides or, even more conveniently, with dithiocarbamates as O acceptors $2R_2NCS_2H\ NHR_2 + 2ClSOR = [R_2NC(S)S]_2 + 2ClH\ NHR_2 + R'SO_2SR'$. Sulfenyl chlorides react according to the equation $2R_2NCS_2H\ NHR_2 + 2ClSR' = [R_2NC(S)S]_2 + 2ClH\ NHR_2 + R'_2S_2$. *The AlkSO$_2$H derivs were prepd* by treating the alkyl bromides in $Et_2O$ with Mg and $SO_2$ and converting the resulting acids into the chlorides with $SOCl_2$, the $AlkSO_2H$ derivs by oxidizing the crude $(AlkSO_2)_2Mg$ with $KMnO_4$ and converting the $AlkSO_2H$ into the chlorides with $PCl_5$. The liquid $BuSO_2H$ no longer dissolves clear in $H_2O$ after standing a short time at room temp; at 100° (in N) the disproportionation is complete in about 1 hr and the $H_2O$ insol part $b_{4.2}$ 126–8° and has the compn of *Bu butylthiosulfonate*, while the strongly acid, $H_2O$ sol part is *butylsulfonic acid*, $b_{4.2}$ 145°. *Butylsulfinyl chloride*, light yellow, $b_{4.2}$ 38°, $b_{12}$ 78°, fumes in moist air, is energetically hydrolyzed by $H_2O$, is stable in the absence of O, even on heating, but in dry air slowly changes into $BuSO_2Cl$ The *Et ester*, $b_{12}$ 85°, and *ethylamide*, $b_{12}$ 108–10°, show the same oxidizability and non-dismutation *iso Am isoamylthiosulfonate*, $b_{12}$ 176–80°. *Isoamylsulfonic acid*, $b_{4.2}$ 176–8°. Isoamylsulfinyl chloride, $b_{4.2}$ 60–2°, $b_{12}$ 91–2°. *iso-Am ester*, $b_{12}$ 98°, remains unchanged at 100° in N *Ethylamide*, b 120° in a high vacuum *Cyclohexylsulfinic acid*, yellowish oil solidifying on strong cooling to crystals, m 33–5°, and having approx the compn of a *monohydrate Cyclohexyl cyclohexylthiosulfonate*, faintly yellow, $b_{4.2}$ 184–6° Cyclohexylsulfonic acid, $b_{4.2}$ 178–80°, readily absorbs $H_2O$ to form a monohydrate, m 92°, the m p given by Borsche and Lange for the acid. *Butylsulfonethylamide*, $b_{4.2}$ 120–2° *Ethylimidobutylsulfonyl chloride*, $b_{4.2}$ 124–6°. *Isoamylsulfonethylamide*, faintly yellow oil, *imido chloride*, $b_{4.2}$ 128–30° (with 2 mols $PCl_5$ is obtained a *di Cl compd*, $b_{4.2}$ 128–30°, which is as resistant to hydrolysis as the mono-Cl compd and probably has the structure $C_4H_9CHClSCl\ O\ NEt$) *Cyclohexylsulfonethylamide*, $b_{12}$ 183–5°, m 72°, *imido chloride*, $b_{4.2}$ 131–2°, m. 73–4°. With 4 mols $PCl_5$ is obtained a brownish oily *compd* $C_8H_{13}NCl_2S$, $b_1$ 140–50°, quickly converted by cold $H_2O$ into a *compd* $C_8H_{13}ONCl_2S$, m 150°, in which both Cl atoms are very firmly held *Cyclohexylsulfonpropylamide*, m 78°, reacts so slowly with $PCl_5$ that even after 2.5 hrs at 100° with 2 mols $PCl_5$ it gives only 60% of a mono-Cl compd $b_{4.2}$ 145–60°, the *heptylamide*, $C_6H_{11}SO_2NHC_7H_{15}$, m 72°, behaves in the same way. $p$-$O_2NC_6H_4SCl$, $b_{4.2}$ 125°, with piperidine piperidyldithiocarbamate in $Et_2O$ yields 1 mol. piperidine HCl and a mixt. of $(p\text{-}O_2NC_6H_4)_2S_2$ and piperidylthiuram disulfide which could not be sepd anywhere nearly quantitatively but distn in a high vacuum gave a product sepd by crystn. from alc into the $(O_2NC_6H_4)_2S_2$ and dipiperidylthiourea.


(I)


(II)

C. A. R.

Separation and synthetic preparation of phenol. Tadashi Mizoshita. *Abstracts from Rept Central Lab S Manchuria Railway Co* 1929, *36*.—High temp coal tar yields only 0.1897% PhOH and 0.569% cresols 1 PhCl + $2Na_2CO_3$ gives 84% PhOH by heating under pressure at 320° for 2 hrs with Cu as the catalyst. *V. F. Harrington*

*N-o*-Chlorobenzoyl-*o*-chlorobenzenesulfonamide. E Wertheim *J. Am Chem Soc* 53, 1172–3(1931).—*o* $ClC_6H_4SO_2NH_2$ and *o* $ClC_6H_4COCl$, heated at 180–90° for 1 hr., give *N-o-chlorobenzoyl-o-chlorobenzenesulfonamide*, m 154–5°. Attempts to prep from this diphenic sulfinide failed, Cu and NaI in AmOH gave an impure compd., m. 255–8°, with 8.67% S, which had a bitter taste. C. J. West

Methylation of alcoholic hydroxyl from the standpoint of the electron theory. Julius v Braun, Ernst Anton and Karl Weissbach *Ber.* 63B, 2847–61(1930).—The old valence doctrine does not serve to explain why the proximity of a Ph nucleus or a double bond to the HO group in such compds as $PhCH_2OH$, $PhCH{:}CHCH_2OH$, dioxindoles, morphine, codeine and the 2 methylmorphimethins makes the HO group so easy to methylate, as compared with the alcs., with $Me_2SO_4$ and alkali, but the electron theory offers a plausible explanation. The pair of electrons in a homeopolar combination XY is shifted nearer to the one or the other of the partners in the union, depending on the chem. nature of X and Y and on the near and, to some extent also, the more distant surroundings The Ph nucleus and the double bond, which

exert an attraction on electrons, must produce in a compd Ph C . C O H or —CH CH C C O H a shifting of the electrons toward the left, imparting to the end H atom a weak positive charge and making it more reactive If this basic assumption is correct, it follows that (1) the inductive or attractive influence of a Ph nucleus or a double bond must diminish greatly with the distance from the HO group, (2) an influence as strong as, or stronger than, that of a Ph nucleus or C C bond must be exerted by every dipole with its + side turned toward the HO group (*e g*, the groups $\bar{O}{=}\overset{+}{C}<$, $\bar{N}\ \overset{+}{C}-$, etc ), (3) the effect must be most pronounced when in the chain contg the HO group there is an element having the character of a positively charged ion (*e g*, $\bar{A}c\ \overset{+}{N}\ C$ C O H) The behavior of the morphine alkaloids mentioned above suggested that it is not the aromatic nuclei or the double bonds which activate the H of the HO group but that under the influence of the $Me_2SO_4$ the N is converted into a quaternary form and it is the $NH_4$ ion which acts on the HO group. To test these views a long series of comparative expts was made, the values given below represent the % yield of Me ether obtained from the different HO compds under identical conditions $PhCH_2OH$ (I), 64, $PhCH_2CH_2OH$ (II), 10, $Ph(CH_2)_3OH$ (III), 5, $Ph(CH_2)_4OH$ (IV), 0, $PhCMe_2OH$ (V), 0, PhCH CHCH$_2$OH (VI), 53, O CH CH CH C-$CH_2OH$ (VII), 70, $CH_2$ $CHCH_2OH$ (VIII), >20, PrOH (IX) 0 AmOH (X), 0, $C_7H_{15}OH$ (XI) 0, $C_4H_{10}N(CH_2)_2OH$ (XII), 100, $Me_2N(CH_2)_2OH$ (XIII), 100, $PhNMe(CH_2)_2OH$ (XIV), almost 100, $C_4H_{10}N(CH_2)_4OH$ (XV), about 60, $C_4H_{10}N(CH_2)_5OH$ (XVI), 0, $Me_2N(CH_2)_5OH$ (XVII), 0, 2 dimethylamino-3-hydroxytetralin (XVIII), 100, 2 $\beta$ hydroxyethylpiperidine (XIX), 100, dihydrocodeine (XX), almost 100 5,2-$Me(Me_2N)C_6H_3$-$CH_2OH$ (XXI), 60, tropine (XXII), 0, $Me_2NCMe_2CH(OH)Me$ (XXIII), 0, $PhSO_2NMe(CH_2)_2OH$ (XXIV), 0 $NC(CH_2)_2OH$ (XXV), >50, $EtSO_2CH_2CH_2OH$ (XXVI), 100; $Me_2SICH_2CH_2OH$ (XXVII), 50, $Me_2SICH_2CH_2CH_2OH$ (XXVIII), ?, MeCH(OH)$CO_2H$ (XXIX), 15?, PhCH(OH)$CO_2H$ (XXX), 70 PhCH($CH_2OH$)$CO_2H$ (XXXI), 40, phthalide (XXXII), 40, phenylparaconic acid (XXXIII), 40 Comparison of compds I–IV shows how rapidly the influence of the Ph on the HO group decreases with the distance between them This is also true of the 2 unsatd ales tested (VI, VIII) Satd aliphatic ales are resistant toward $Me_2SO_4$ and alkali (IX, X and XI) The furan ring is similar to the $C_4H_4$ ring (VII) CN and the more strongly dipolar $SO_2$ have as great or a greater effect than the aromatic nucleus of the C C bond (XXV, XXVI) In compds with basic N together with HO, the effect is greater than in aliphatic aromatic ales (XII compared with II, XIII and XIV with III) The influence of N is still strong on a $\delta$-HO (XV) but is no longer shown on $\epsilon$ HO groups (XVI, XVII) That the influence of the N is due to its forming a quaternary salt is indicated by the behavior of XXI and XXIV; its greater influence, as compared with that of the Ph nucleus or C C bond, is shown by the fact that XX is methylated to about the same extent as codeine The non-methylation of XXII is thought to be due to the branching of the chain between the N and the HO, the base XXIII and the carbinol V behave similarly That it is not the secondary nature of the HO or the position of the N in the ring that prevents the methylation of XXII is shown by the behavior of the alkamines XVIII and XIX. The electron attraction should be weakened by increasing the vol of the ionized atom X $\overset{+}{C}$ C O H, to test this point, the sulfonium compds XXVII and XXVIII were studied but no clear picture of the methylation of XXVIII could be obtained, XXVII, however, acted as had been expected Of the simple aliphatic HO acids, only XXIX gave results which were at all definite, they indicated that the influence of the C O is not inordinately great, as also indicated by comparison of XXX with I and of XXXI with II. In the reaction between $Me_2SO_4$ and an activated HO group it may be assumed that as the result of an attraction of the positively charged S by the weakly negatively charged O in the OH group there is formed an intermediate addn product $\begin{matrix} R \\ \diagdown \\ O \\ \diagup \\ H \end{matrix}$ $SO_2(OMe)_2$ which then in some way undergoes further reaction The extraordinary ease with which alkamines and HO acids are methylated is of practical interest for purposes of prepn and in questions of structure The HO bases prepd from compds of the type ArCH CH— by addn of Br, boiling with $H_2O$ and treatment with amines are formed through an oxide

ArCH CH O which may give either ArCH(NHR)CH(OH)— or ArCH(OH)CH(NHR)-

No means of distinguishing between these two possibilities was hitherto available, but methylation will give an ether which must be identical with or different from the compd ArCH(OMe)CH(NMe$_3$I)— obtained by treating ArCHBrCHBr— with MeOH, then with NH$_2$Me and methylating exhaustively. By this means it was found that the hydroxymethylamino base (XXXIV) obtained by Mannich from isosafrole really has the structure $CH_2O_2C_6H_3CH(NHMe)CH(OH)Me$ which he assigned to it without any real proof The methylations were carried out under as nearly identical conditions as possible, the substance dissolved or suspended in 10 parts $H_2O$ at 5° was treated with 6 mols $Me_2SO_4$ and 14 mols 10% NaOH, shaken 5 min and allowed to stand (the temp rose to 50–5°) 15 min The methiodide of XII forms a red *chloroplatinate*, m. 223°, and a *chloroaurate*, m 243°, the methiodide of the Me ether gives an orange *chloroplatinate*, m 234° (decompn), and a *chloroaurate*, m 108°. *Methiodide* of the Me ether of XIII, m 221°, *chloroplatinate*, decomps 235°. *Methiodide* of XIV, m 132°, *Me ether*, m 119–21° *Methiodide* of XV Me ether, semi-oily. XVIII, m 31°, *Me ether methiodide*, m 223°, *methochloride*, m 230°, *chloroplatinate*, light orange, m 229°. XXIX with $Me_2SO_4$ forms a quaternary salt which cannot be pptd out, the compn of the *chloroplatinate*, $C_{18}H_{40}O_2N_2Cl_6Pt$, m 212°, shows that both the HO and NH groups are methylated, with MeI is obtained a *methiodide*, decomps 235°, the compn of whose *chloroplatinate* $C_{19}H_{42}O_2N_2Cl_6Pt$, yellow, m 204°, shows that the HO group has remained intact. *Me ether* of XXI, $b_{15}$ 120–5°, *picrate*, m 155°, *chloroplatinate*, m. 172°; *methiodide*, m 115° (effervescence) (the corresponding derivs of XXI m 157°, 180°, 147°, resp) *Methiodide* of XXIII, m 172° (foaming) XXIV, from $PhSO_2NNaMe$ and $Cl(CH_2)_2OH$ on the $H_2O$ bath, $b_{1.5}$ 194°, $b_{0.5}$ 167° Ephedrine with $Me_2SO_4$ readily yields the quaternary salt of the *Me ether;* the corresponding *iodide*, $C_{12}H_{20}ONI$, m 190°, smoothly loses MeI when heated *in vacuo*, yielding the *Me ether*, $b_{15}$ 116°; *picrate*, m 166–8°. *α* Methoxy *β* bromodihydrosafrole (XXXV), obtained from isosafrole dibromide (XXXVI) with MeOH, and which certainly has the MeO group on the *α* C atom, gives with $Me_2SO_4$ and then KI an unusually hygroscopic quaternary *iodide* (XXXVII), yielding a *chloroplatinate*, m 216° while the hydroxybromoisosafrole from XXXVI and $H_2O$ yields, together with a little XXXVII, chiefly the non hygroscopic *methiodide*, m 190°, of XXXIV; *chloroplatinate*, m 198° *β Hydroxydiethyl sulfone* (XXVI), from $EtSO_2Na$ and $ClCH_2CH_2OH$ in alc on the $H_2O$ bath, $b_{12}$ 193–5°, m 46°; *Me ether*, $b_{12}$ 142–4° *Dimethyl β hydroxyethylsulfonium iodide* (XXVII), from $MeSCH_2CH_2OH$ and MeI, m 60–2°, absorbs moisture from the air (*chloroplatinate*, red brown, m 80–1°) *γ-Hydroxypropyl homolog* (XXVIII), m 52–5° (*chloroplatinate*, orange, m 115°) XXIX with $Me_2SO_4$ gave a small quantity (1.5 g from 10 g XXIX) of a compd, $b_{12}$ 95–6°, having the compn of the *Me ether* of XXIX. The Me ether of XXX, m 71°, $b_{0.4}$ 121–2° *Me ether* of XXXI, $b_{0.2}$ 134–6°, m 62°, *chloride*, $b_{0.5}$ 88°, reacts readily with $C_6H_6$ and $AlCl_3$ to give the *ketone* $PhCH(CH_2OMe)COPh$, yellowish, $b_{0.2}$ 139–41°, converted by coned HCl into the *ketone* $PhCH(CH_2Cl)COPh$, light yellow, $b_{0.4}$ 139–40° with some loss of HCl XXXII gives the *acid o* $HO_2CC_6H_4CH_2OMe$, m 93–4°, $b_{0.2}$ 121–5°, does not form a chloride with $SOCl_2$ but loses MeCl with regeneration of XXXII. XXXIII gives a *compd* $b_{0.2}$ about 155°, m 95–6°, having the compn of (*α methoxybenzyl*) *succinic anhydride*, and giving the *acid* m 140°, when pptd from $Na_2CO_3$ with acids

C. A R

**Derivatives of chloroacetylated phenols and phenol-alcohols.** A. Lakner *Magyar Chem Folyoirat* 35, 151–5(1929).—$ICH_2CO$ derivs of di-HO derivs of $C_6H_4$ like $ClCH_2CO$ derivs, are hydrolyzed by $NH_3$ With $AgNO_3$ halogenoacetylphenols react vigorously at 96°, affording dinitro derivs and Ag halogenoacetate, AgCN behaves analogously The following are described *chloroacetates* of *pyrocatechol*, m 56°, $b_{15}$ 185–6°, *resorcinol*, m 76°, $b_5$ 191–2°, *quinol*, m 126°, *iodoacetates*, m 48–9°, 59–60°, 112–3°, resp Quinol chloroacetate forms with $PhNMe_2$ an equimol *compd*, m 152–3°, decomp 156–7° *Phenylethyl aminoacetate*, m 115°, *phenylpropyl aminoacetate*, m 105°

B C A

**Propargyl ethers of phenol.** Charles D. Hurd and Frank L. Cohen *J Am Chem Soc* 53, 1068–77(1931).—PhC CBr (I) was obtained from PhC·CCOCl and EtOH, giving the Et ester and reacting this with PhMgBr The yield of the ester is 65% and of the ketone 85%, the ketone $b_{18}$ 200–2° and m 53–5°. $PhC CCPh_2OH$ results in 65–70% yield from BzPh and PhC CNa MeC CH and EtMgBr give a Grignard reagent which reacts with $Me_2CO$ to give 47% of *2 methyl-3-pentin 2-ol* (*trimethyl propargyl alc*) (II), $b_{18}$ 75–7°, $n^{20}_D$ 1.4193, a by-product is *2 methyl 1-penten-3-ine*,

$CH_2 \cdot CMeC \cdot CMe$ (III), b. 75–7°, $n_D^{20}$ 1.4002. 1-Phenylethinylcyclohexan-1-ol, $b_{11}$ 166–9°, m. 58–60°. PhC CNa and *p*-$Me_2NC_6H_4Bz$ give 50% of *α,γ-diphenyl-α-p-dimethylaminophenylpropargyl ale*, m 144–5°. II gives a *chloride*, light yellow, $b_{11}$ 57–61°, $n_D^{20}$ 1.4143 (33% yield) *γ-Methylpropargyl chloride* (*1-chloro-2-butine*), light yellow, b 81–4° (44% yield) *Triphenylpropargyl Ph ether* (IV), from the chloride and PhONa in 70% yield, m 90–90.5°, *trimethylpropargyl Ph ether* (V), viscous yellow oil, $n_D^{20}$ 1.3408, *γ-methylpropargyl Ph ether* (VI), $b_{11}$ 123–6°, $n_D^{22}$ 1.3894 (57% yield) IV, heated slowly and uniformly to 310°, gives PhOH and *9 phenylethinylfluorene*, yellow, m 98–100°, this was also prepd from 9-chlorofluorene and PhC CNa Both V and II decomp on heating into PhOH and III. When refluxed, VI changed primarily into a tar, the apparent mol wt. of which was 400 No simple allenes were found although they may have been the precursors of the tars C J West

**Bromine derivatives of certain mixed ethers and some of their reactions.** L. Chas Raiford and Louis H Howland *J Am Chem. Soc* 53, 1051–7(1931).—*Pentabromophenyl alkyl ethers iso Pr*, m 86° (nearly quant yield), *Bu*, m 79–80° (quant yield), *iso-Bu*, m 92–3° (45% yield), *sec-Bu*, m 57–8° (25% yield), *iso-Am*, m 64–5° (quant yield), no reaction was obtained with *tert* Bu or *α*-Am halides Four methods were studied for splitting the ethers (1) glacial AcOH soln of ether and $PBr_3$ to which the calcd amt. of $H_2O$ was gradually added was heated under a reflux, (2) the mixt in (1) was heated in a sealed tube at 135–50° for 12–15 hrs., (3) Br was dropped into a $C_6H_6$ soln of the ether contg I as a catalyst, (4) the ether, excess Br and about 1% Al as $AlBr_3$ reacted at room temp for 2 days Of the tri Br derivs of the Ph alkyl ethers, only iso-Pr and *sec* Bu were completely split by (1), these were also split by (3) (others not studied), Me, Et, Pr, iso-Bu and iso-Am were completely split by (2) but showed no reaction with (1) Of the penta-Br derivs., iso-Pr and *sec* Bu were completely split by (1), Me, Et, Pr, Bu, iso-Bu and iso-Am were completely split by (2), Me, Et and iso-Pr showed no reaction with (3), the following % of $Br_4COH$ were obtained in (4). Me 80; Et 40, Pr 40, iso-Pr 60, Bu 30, iso-Bu 20, *sec*-Bu 70, iso-Am 30 *2,4-Dichlorophenyl allyl ether* (I), $b_3$ 144–5°, *3,5-di-Br deriv* (II), $b_{18}$ 145°, *2,6-di-Br deriv* (III), $b_{18}$ 132–3°; *penta Br deriv* (IV), m 167–8°. I and Br in $CHCl_3$ at 0° give the *β,γ-di-Br deriv*, $b_{18}$ 188° (95% yield), II gives the *2,3,4,5 tetra-Br β,γ-di Br deriv*, m 123–4° (97%); III gives the *β,γ-di-Br deriv*, m 48–9°, as does IV, m 122–3° (96 and 94%, resp.). Alc. KOH transforms these into derivs of *Ph propargyl ethers 2,4-di Cl*, liquid, decomps on distn *in vacuo*, *2,4-di-Br*, m 65°, *2,6-di-Br*, m 58–60°, *2,4,6-tri-Br*, m 136–7°, the yields are 97–9% The *Ag salts* (with 1 mol. $AgNO_3$) of these ethers were prepd, as well as the *Cu* and *Hg salts* of the 2,4 di-Br and 2,4,6-tri-Br derivs The HBr evolved in the bromination of Ph alkyl ethers may split them unless AcONa is present. The splitting is most complete when the alkyl group is connected through a sec. or tert. C atom Ph allyl ethers contg 2 or more Br atoms in the nucleus could not be rearranged by heat C. J. West

**Effect of substituents on certain physical properties of benzene picrate.** O. L. Baril and E. S. Hauber. *J. Am. Chem. Soc.* 53, 1087–91(1931).—The addn of HO groups to benzene picrate (I) lowers the m p and deepens the color of the picrate formed, the addn of Me groups to I raises the m p of the product and deepens the color of the picrate less than the HO group The addn of Me groups to a side chain of I gradually increases the m p. and deepens the color of the picrate, this increase is more rapid than when a corresponding no of Me groups are substituted in the ring The sym tri-HO and tri-Me derivs. of I are the darkest and the color of the picrates become lighter as we approach the 1,2,3-derivs The same deepening of color was obtained with the *Me derivs of* $C_{10}H_8$ *Unsatn in the side chain yields a very unstable* picrate *In the* following list of *picrates* the color and m p are given. $C_6H_6$, 83.9°, PhMe, light yellow, 88.2°; PhEt, light yellow, 96.6°; PhPr, yellow, 103.5°, *o-*, *m-*, and *p*-$C_6H_4Me_2$, lemon-yellow, 88.5, 90–1.5° and 90.5, resp., 1,2,3 $C_6H_3Me_3$, yellow, 89.5°, 1,2,4 $C_6H_3Me_3$, yellow, 96–7°, 1,3,5-$C_6H_3Me_3$ bright yellow, 96.6°, 1,2,3,4-$C_6H_2Me_4$, golden yellow, 92–5°, $C_6HMe_5$, golden yellow, 131°, $C_6Me_6$, orange-yellow, 170°, all except the last 3 of these are unstable, decompg in the air PhOH, yellow, m 83.1°, *o-*, *m-* and *p*-$C_6H_4(OH)_2$, orange-yellow (*o-* and *m-*) and light yellow, m 122°, 89–90° and 115–7°, resp., 1,2,3 $C_6H_3(OH)_3$, lemon-yellow, 128–9°, 1,2,4-$C_6H_3(OH)_3$, orange-red, 96°, 1,3,5-$C_6H_3(OH)_3$, brown, 101–3°, *o-*, *m-* and *p*-$MeC_6H_4OH$, orange-yellow, yellow and bright red, m 88°, 61.6° and 64–5°, resp., orcinol, orange-yellow, 92°, 1,2,4-, 1,3,2- and 1,4 2 $Me_2C_6H_3OH$, chrome-yellow, orange-yellow and orange, m 83.8°, 50–3° and 81–2°, resp $C_{10}H_8$, yellow, 149°; *α-* and *β*-Me derivs, lemon-yellow, 140–1° and 115–6°, resp; *α-* and *β* Et derivs, lemon-yellow and yellow, m. 97.4 and 69–70°, resp; *α-* and

β Pr derivs., yellow, m 140–1° and 89–90°, resp; α- and β Bu derivs., orange-yellow, m 104–5° and 71–3°, resp., 1,4 and 2,6-di Me derivs., orange-yellow, m. 139–40° and 141–2°, resp., 1,2,6 tri Me deriv., orange yellow, m 121–2°, α- and β $C_{10}H_7OH$, orange-yellow, m 188.5° and 155.5°, resp., anthracene, ruby red, m. 138°; hexa-Me deriv., dark brown, m 203°, phenanthrene, orange-yellow, m 132.8°, acenaphthene, orange red, m 160.5°, stilbene, red, m 90–1°, fluorene, red brown, m. 77°, pyrene, red m 220°

C. J. West

Phenyl ethers. Manfred Oesterlin *Monatsh* 57, 31–44(1931).—PhONa and *p*-$BrC_6H_4OMe$ with Cu at 200–10° for 4 hrs give *p-methoxydiphenyl ether*, $b_{14}$ 163–5°, $AlCl_3$ in $C_6H_6$ splits off the Me group, giving the *p-HO deriv* (I), m 84°, bromination (KBr and $KBrO_3$ with concd $H_2SO_4$ in $CS_2$) gives 82% of the *p'-Br deriv* (II), m 85° I in KOH and *p*-$BrC_6H_4OMe$ with Cu at 210° for 4 hrs. give *p-methoxy-p'-phenoxydiphenyl ether*, m 82° $AlCl_3$ gives the *p-HO deriv*, m 87°. *p*-$MeOC_6H_4OH$ and *p*-$BrC_6H_4OMe$ with Cu and 80% KOH give 65% of *p,p'-dimethoxydiphenyl ether*, m 102°, the *di-HO deriv*, m 160° *p*-$MeOC_6H_4OH$ and *p*-$C_6H_4Br_2$ with KOH and Cu at 200–10° for 5 hrs. give *di(p-methoxyphenyl) hydroquinone ether* $(p\text{-}MeOC_6H_4O)_2C_6H_4$, this also results from II and *p*-$MeOC_6H_4OH$ with Cu and KOH at 210° for 4 hrs. The *di p-HO deriv*, m 188° *p*-$MeOC_6H_4OH$ and $(p\text{-}BrC_6H_4)_2O$ give *p-di(methoxyphenyl)dioxydiphenyl ether*, $(MeOC_6H_4OC_6H_4)_2O$, m 164° *p*-$O_2NC_6H_4OPh$, m. 61°, $NH_2$ deriv., m 84°, Ac deriv., m 131° nitration gives *p-acetylamino-m nitrodiphenyl ether*, yellow, m 104°, reduction gives the *m-$NH_2$ deriv*, m 124°, di $NH_2$ deriv., m 66°. *p-Amino-m-nitrodiphenyl ether*, red-orange, m 47–8°, then solidifies and m 81°, the reduction product is the di $NH_2$ deriv., m 66°, HCl salt, m 210°, 3,3-dinitrobenzil gives *2,3-di-(p-nitrophenyl)-6 phenoxyquinoxaline*, light yellow, m. 195–6°. *p*-$ClC_6H_4NO_2$ and *p*-$HOC_6H_4OPh$ with Cu and KOH at 150° for 5 hrs give *p-phenoxy-p'-nitrodiphenyl ether*, yellow, m 94°, *p-$NH_2$ deriv*, m 84°, *Ac deriv*, m 148°, nitration gives *p-phenoxy p'-acetamido m' nitrodiphenyl ether*, m 121° sapon and reduction give *p-phenoxy-m',p'-diaminodiphenyl ether*, m. 95° *p*-$MeOC_6H_4OH$ and *p*-$ClC_6H_4NO_2$ give *p-methoxy-p'-nitrophenyl ether*, yellow, m 111–2°, *p'-$NH_2$ deriv*, m 81–2°; *HCl salt*, m 212°, *sulfate*, m 220°, *Ac deriv*, m 131°, nitration gives the *m'-nitro deriv*, m 106°, *p-methoxy-m' nitro-p'-aminodiphenyl ether*, m 76–7°, *m',p'-di-$NH_2$ deriv*, m 105°. *p-Di-(nitrophenyl)dioxydiphenyl ether*, m 136°, *di $NH_2$ deriv*, m 109°, *di Ac deriv*, m. 205–6°.

C. J. West

Diphenyl ether series. II. Preparation and structure of some sulfonic acids and related derivatives. C. M. Suter. *J. Am. Chem. Soc.* 53, 1112–6(1931), cf *C. A.* 23, 4460.—Bromination of Ba phenoxybenzene-4,4'-disulfonate and treatment of the ppt with $Na_2CO_3$ soln gives 57% of the *Na 4-bromophenoxybenzene 4'-sulfonate, p-toluidine salt* m 245–7° Further bromination of the Na salt gives 84% of $(4\text{-}BrC_6H_4)_2O$ $Ph_2O$ and $Ac_2O$, shaken with 95% $H_2SO_4$ and heated 1 hr on the $H_2O$ bath give 93% of the mono $SO_3H$ acid (cf Quilico, *C. A.* 22, 1765), *p-toluidine salt*, m 221–2°, bromination of the Na salt gives $(4\text{-}BrC_6H_4)_2O$, fusion of the Na salt with NaOH gives little or no 4 $HOC_6H_4OPh$ With $PCl_5$, heating 10 hrs. at 170–80° gives 54% of *4 phenoxybenzenesulfonyl chloride*, $b_{12}$ 205–7°, m 45–6°, amide, m 128–9°, *anilide*, m 86–8° 4 $BrC_6H_4OPh$ and 95% $H_2SO_4$ give a mono-sulfonate, $ClSO_3H$ gives *4 bromophenoxybenzene 4' sulfonyl chloride*, m 81–2°, also obtained in 91% yield by bromination of 4 $PhOC_6H_4SO_2Cl$, *amide*, m 131–2°, *anilide*, m 108–9° *Phenoxybenzene-4,4'-disulfonyl chloride* m 128–9°, *diamide*, m 158–60° Reduction of the sulfonyl chloride with $Na_2SO_3$ and $Na_2CO_3$ gives *4 phenoxybenzenesulfinic acid*, m 100–1°, which drops to 91–3° in 48 hrs Reduction of the chloride with Zn and $H_2SO_4$ gives 60% of *4 thioldiphenyl ether*, $b_{12}$ 178–80°, m 21–2°, oxidation of the Na salt with air or with I in EtOH gives the disulfide m 47–8°

C. J. West

3,5-Dimethoxyaniline. Reinhard Seka and Walter Fuchs *Monatsh* 57, 63–70(1931).—3,5-$(MeO)_2C_6H_3CO_2Me$ (I), m 43°, and liquid $NH_2$ in a bomb tube at room temp for 4 weeks give 92% of the *amide*, m 148–9°, which may also be prepd from the acid chloride and $NH_3$, the Hoffmann degradation gives about 52% of *3,5-dimethoxyaniline*, $b_{12}$ 177°, m 46°, *HCl salt*, m 210°, *chloroplatinate*, golden yellow, decomps 223°, *picrate*, yellow, decomps 167–70°, *Bz deriv*, m 139°, *anisoyl deriv*, m 119–20° I and $N_2H_4\cdot H_2O$, boiled 8 hrs., give 50% of the *hydrazide*, m 168.5° (*HCl salt* m. 210°), the azide, m 50–1°, decomps about 70° and with $H_2SO_4$ gives $(MeO)_2C_6H_3CO_2H$, *urethan* m 43.5°

C. J. West

The behavior of *p*-acetophenetide toward chlorine and bromine. E. Burešš and J. Kovařovičová. *Časopis Českoslov. Lékárnictva* 10, 197–202, 233–9(1930).—Chlorination of *p* acetophenetide (I) in glacial AcOH at ordinary temp and pressure gave 2,3,5,6-tetrachloro-*p* acetophenetide (II), m 226°, while bromination of I resulted in 3,5-di

bromo-*p*-acetophenetide (III), m 175° The entrance of the halogens caused an increase in stability, and a decrease in basicity and in case of replacement of $NH_2$. Sapon of II gave 2,3,5,6-tetrachloro-*p*-phenetide, m 96°, from which the following *ethoxybenzenes* were prepd 2,3,5,6 tetrachloro, m 56° 2,3,4,5,6 penta-Cl, m 75°; 2,3,5,6-tetrachloro-4 bromo, m 81°, 2,3 5 6-tetrachloro-4 iodo, m 79° and 2,3,5,6-tetrachloro-*p*-quinone Sapon of III yielded 3 5-dibromo-*p*-phenetide (IV), m 54°, the constitution of which was detd by conversion to 3 5 dibromophenetole (V), b 267°. Attempts to replace the $NH_2$ group in IV by OH or CN were unsuccessful, but the following *3,5-dibromoethoxybenzenes* were prepd $Me_3N$, m 84°, BzNH, m 159°, EtNH, m 91°, $Ac_2N$, m 108° 4 Br m 72° 4 I m 99° 4 Cl, m 42–4°, and the picrate of IV, m 145° Nitration of III yielded 3 bromo-5-nitro-*p*-phenetide, m 108° Nitration of V gave 3,5-dibromo-1-ethoxy-4 nitrobenzene, m 128°, which on reduction yielded IV. 3,4,5-Tribromo-1-ethoxy 2 nitrobenzene m 52–3°, was prepd WILLIAM J. HUSA

**Dehydration with potassium hydroxide of the ethylol group adjoining the benzene nucleus. III. Dehydration of the α,α-alkylarylethanols.** SEBASTIEN SABETAY. *Bull soc chim.* [4], 47, 614–20(1930) cf *C A* 24, 1099.—In the distn of alcs. of the phenylethyl alc type over anhyd KOH the secondary and tertiary alcs are much more stable than the primary ones that easily form the corresponding unsatd hydrocarbon S shows that of *hydratropic alc.*, $PhCHMeCH_2OH$ (I), and *methylbenzylcarbinol*, $PhCH_2CHMeOH$ (II), only I is dehydrated, to *α-methylstyrene*, $PhCMe{:}CH_2$ (III), by anhyd KOH while *dehydration with "porosite"* (Ramart Lucas and Amagat, *C A* 22, 1582, and Fourneau, *C A* 16, 2495) forms a mixt. of III and $PhCH{:}CHMe$ By heating 10 g of I over 5–7 g anhyd KOH 2 layers form, the upper one of which is distd off, extd with $Et_2O$, dried and rectified, finally over Na III $b_{18}$ 159–60°, $n_D^{21}$ 1.5350, $d_{21}^{21}$ 0.9065, mol refraction 40.56. It tends less to polymerization than styrene and forms a liquid *dibromide*. The identity of III was established by comparing it with III prepd from $PhMe_2COH$ according to Staudinger and Breusch (*C A* 23, 3213) as well as with "porosite" (cf references above) *α-Ethylstyrene*, $PhEtC{:}CH_2$ (IV), was similarly prepd by the action of anhyd KOH on $PhEtCHCH_2OH$. IV $b_{18}$ 177–80°, $n_D^{21}$ 1.5262 Its *dibromide* seems to be liquid Dehydration of II under the same conditions yields only traces of $PhCH{:}CHMe$ G TOENNIES

**New method of synthesis of phenylpropargyl alcohol and its homologs substituted in the ring.** L. BERT *Compt rend.*, 191, 493–5(1930).—Instead of condensing PhC CH with HCHO, which will give very poor yields, B prepd PhC $CCH_2OH$ in the following way (the figures under the arrows indicate the % yield obtained)

$$PhBr \xrightarrow[94]{Mg + (C_2H_5)_2O} PhMgBr \xrightarrow[100]{CH_2ClCH{:}CHCl} PhCH_2CH{:}CHCl \xrightarrow[84]{KOH\text{-}BuOH}$$

$$PhCH{:}CHCH_2OBu \xrightarrow[83]{HCl} PhCH{:}CHCH_2Cl \xrightarrow[60]{AcONa} PhCH{:}CHCH_2Ac \xrightarrow[100]{Br} PhCH\text{-}$$

$$BrCHBrCH_2OAc \xrightarrow[66]{KOH} PhC{:}CCH_2OH$$

The com cinnamyl acetate, which is employed in perfumery, can be used as a starting material F R GREENBAUM

**Reduction of Schiff bases.** L. ZECHMEISTER AND J TRUKA *Ber* 63B, 2883–4 (1930).—Mg in MeOH can be used advantageously for the reduction of the –CH N– group in Schiff bases to $-CH_2NH-$ The reaction takes place in a neutral soln and even when the product is decompd with $H_2O$ there is no marked alky The base is dissolved in almost anhyd MeOH, an at least 5-fold excess of Mg ribbon is added (the reaction being regulated by cooling or heating, as needed), then the MeOH is distd off, the residue decompd with ice $H_2O$ and the $Mg(OH)_2$ dissolved out with 30–50% AcOH. The following amines were obtained in 70–90% yield in this way: $PhCH_2NHPh$, m. 37–8°, *p*-$MeOC_6H_4CH_2NHPh$, m 64.5°, *o*-$HOC_6H_4CH_2NHPh$, m 108°, $PhCH_2CH_2CH_2NHPh$, m. 193–5°, 3,4 $CH_2O_2C_6H_3CH_2NHPh$, m 78°; *p*-$Me_2NC_6H_4CH_2NHPh$, m 62°; *p*-$MeC_6H_4NHCH_2Ph$, m 318–20°, α-$C_{10}H_7NHCH_2Ph$, m 67°, α-$C_{10}H_7NHCH_2C_6H_4OMe(p)$, m. 80°, β $C_{10}H_7NHCH_2Ph$, m 68°, β $C_{10}H_7NHCH_2C_6H_4OMe(p)$, m. 104.5°. C A R.

**Acyl derivatives of *o*-aminophenol. VI.** C. B. POLLARD AND R. E. NELSON. *J. Am. Chem. Soc.*, 53, 996–1001(1931), cf. *C. A.* 23, 4940.—A study of the diacyl derivs. of $o\text{-}H_2NC_6H_4OH$, when 1 of the acyl groups was always the $PhCH_2CO$ radical,

is reported When both acylating agents were of the type ClCOR, isomeric diacyls were obtained depending on the order of the introduction of the acyl groups In 5 cases out of 8 complete rearrangement occurred during sapon., 1 case showed partial rearrangement and in 2 cases rearrangement did not occur. Apparently relative acidity and wt are not the controlling factors in this type of rearrangement. When 1 of the acylating agents was an alkyl chlorocarbonate, the same diacyl deriv was obtained regardless of the order of introduction of the groups. *o-Phenylacetylaminophenol* (I), m 149–50° (60% yield), *o butyrylamino deriv*, m 80–1° (58% yield); *o-(m-bromobenzoylamino) deriv*, m 180° (60% yield), *m Cl isomer*, m. 156–8° (52% yield) I and AcCl with a drop of $H_2SO_4$ give 60% of the *acetate*, m 101–2°; *o*-AcNHC$_6$H$_4$OH and PhCH$_2$COCl give 45% of *o-acetylaminophenyl phenylacetate*, m 99–100°, sapon. of either gives PhCH$_2$CONHC$_6$H$_4$OH, showing that rearrangement occurred in the second case *o-Phenylacetylaminophenyl propionate* (II), from I and EtCOCl, m. 98–9° (40% yield), *butyrate* (III), m 91–2° (40% yield), *valerate* (IV), m 80–2° (50% yield), *isovalerate* (V), m 87–8° (50% yield), *chloroacetate* (VI), m. 106–7° (50% yield); *benzoate* (VII), m 110–1° (60% yield), *m-chlorobenzoate* (VIII), m. 146–8° (65% yield) *o-Propionylaminophenyl phenylacetate*, m 71–2° (35% yield), sapon. of this or of II gives PhCH$_2$CONHC$_6$H$_4$OH (IX), the *o butyrylamino deriv*, m 40–8° (40% yield), gives PrCONHC$_6$H$_4$OH on sapon, while the isomeric III gives IX; the *o-valerylamino deriv*, m 71–2° (40% yield), gives BuCONHC$_6$H$_4$OH (X) on sapon, while the isomeric IV gives 65% IX and 35% X; *o isovalerylamino deriv*, m 56–7° (55% yield), gives iso-BuCONHC$_6$H$_4$OH, as does V, on sapon; *o-chloroacetylamino deriv*, m 113–4° (55% yield), or VI yields IX on saponification, *o benzoylamino deriv.*, m 108–9° (75% yield), yields BzNHC$_6$H$_4$OH on hydrolysis, while the isomeric VII gives IX; *o-(m-chlorobenzoylamino) deriv*, m. 150–2° (55% yield), or VIII give on hydrolysis ClC$_6$H$_4$CONHC$_6$H$_4$OH; *o-(m bromobenzoylamino) deriv*, m 157–9° (55% yield), gives the corresponding Br deriv. on hydrolysis The *phenylacetate of Me o-hydroxycarbanilate*, m 105–6° (60% yield), yields on hydrolysis 50% each of IX and MeOOCNHC$_6$H$_4$OH, the *Et deriv*, m 62–3° (40% yield), gives EtOOCNHC$_6$H$_4$OH, the *iso-Bu deriv*, m. 72–3° (53% yield), gives the iso-Bu deriv C. J. West

Reduction potentials of some higher benzologs of the quinones. Louis F Fieser and Emma M Dietz *J Am Chem. Soc.* 53, 1128–33(1931).—A potentiometric study of the benzologs of anthraquinone and phenanthrenequinone leads to the following conclusions The potentials of the benz- and dibenzanthraquinones lend support to the *o* quinonoid theory of the structure of anthracene. Hydroxychrysenequinone constitutes an exception to the rule that when a quinone can exist in 2 forms, the 1 of lower potential will predominate The following values for the reduction potential at 25° ($E_0$ (av.) in v.) are reported 1,2-benzanthraquinone, 0.228, 1,2,7,8-dibenzanthraquinone, 0.264 1,2,5,6-dibenzanthraquinone, 0.268, (1,2)*Bz*-3 metho-1,2,5,6-dibenzanthraquinone, 0.257, 5,6-chrysenequinone, 0.465, 6,12-chrysenequinone, 0.392, 12-hydroxy 5,6-chrysenequinone, 0.391, 12-EtO deriv, 0.418, 1,2-benz-3,5-anthraquinone, 0.430 picenequinone, 0.474 C. J West

Configurational relationships of phenylated carbinols. III. P. A. Levene and A Walti *J Biol Chem* 90, 81–8(1931), cf. *C. A.* 24, 4008.—A direct chem. method is found for the correlation of the configuration of Me(PhCH$_2$)CHOH with *sec* aliphatic ales The method is based on the condensation of optically active ethylenic oxides with aliphatic or aromatic radicals by the Grignard reaction. Condensation of *d* MeCH—CH$_2$ O (I) with C$_6$H$_5$MgBr gave *l* MeCH(OH)C$_6$H$_5$, $[\alpha]_D^{25}$ —1.75° (without solvent), and its *α-naphthylurethan* gave $[\alpha]_D^{25}$ —4.28° (in abs. alc.). PhMgBr and I gave *l* Me(PhCH$_2$)CHOH, $[\alpha]_D^{25}$ —19.8° (without solvent); *α-naphthylurethan*, $[\alpha]_D^{25}$ —31.6° The latter carbinol was oxidized to the corresponding ketone which was then identified by the *semicarbazone*, m 188°. L and W. conclude that the direction of rotation is detd by the position of the heavier group, provided the Ph group is not less than 1 C atom from the asym C atom H W. Leahy

Beckmann rearrangement. IV. Unsaturated ketoximes. Karl v. Auwers and Maria Seyfried *Ann* 484, 178–211(1930); cf *C. A* 19, 1405; 23, 4701.—PhCH:CHBz (I) with NH$_2$OH in alk soln gives 3,5-diphenylisoxazoline, m. 75°, and a mixt of alkali sol hydroxyaminooximes The oxime (II) of I, m 115–6°, was prepd by the use of NH$_2$OH·HCl this was unchanged by boiling with 2 *N* NaOH for 10 hrs The Beckmann rearrangement gives PhCH:CHCONHPh (cf Henrich, *C. A.* 1, 1411) II yields a dibromide, m 156°, which splits off HBr when heated above its m. p., giving 3,5-diphenylisoxazole (III) Beckmann rearrangement gives a *dibromohydrocinnamic*

*anilide*, m 179°. PhCHBrCHBrBz could not be transformed into the oxime PhCH:CBrBz yields an oxime, m 151° (*C. A.* 23, 4701), which gives III with EtOH-KOH. The Beckmann rearrangement product, probably PhCH CBrCONHPh, was obtained only as a brown smeary product *p*-MeOC$_6$H$_4$COCH CHPh (IV) and PhNHNH$_2$ in AcOH give *1,5-diphenyl-3-p-anisylpyrazoline*, m 140.5–1.5°, the concd H$_2$SO$_4$ soln becomes blue-violet on addn of FeCl$_3$, NH$_2$OH in alk soln gives *3-p-anisyl-5-phenylisoxazoline*, m 104.5–5.5°, oxidized by CrO$_3$ in AcOH to the isoxazole (V), m 121°, this is also obtained from *p*-MeOC$_6$H$_4$COC : CPh and NH$_2$OH HCl, while free NH$_2$OH gives 3 phenyl 5-anisoylisoxazole, m 127–8° IV and NH$_2$OH HCl in EtOH give *benzal p-methoxyacetophenone oxime*, m 140–2°, *Ac deriv*, m 134–5°. Beckmann rearrangement gives *cinnamic p-anisidide*, m 152–3° *p*-MeOC$_6$H$_4$COCBr CHPh, b$_{15}$ 230–3°, with NH$_2$OH in NaOH gives V, NH$_2$OH HCl gives the *oxime*, m 153° The relative rates of decompn of the ketone and oxime by EtOH-KOH are 10 min., 17, 86%, 20 min., 50, 95%, 30 min., 66, 95%, 15 hrs., 100, 95% Beckmann rearrangement gives a brown smear, from which *p*-MeOC$_6$H$_4$CO$_2$H was isolated after hydrolysis *β Bromobenzal p-methoxyacetophenone*, from PhC : CCOC$_6$H$_4$OMe, yellow, m 65–6°, NH$_2$OH and alkali give V; NH$_2$OH HCl gives 50% of the oxime (VI), m 115–6°. The relative rates of decompn of the ketone and oxime by alkali are 10 min., 10, 11%, 20 min., 95, 51%, 30 min., —, 68%, 15 hrs., 95, 85% The relative rates of decompn of the *α* and *β*-bromo oximes with 2% NaOH are 2 min., 10, 11%, 7 min., 45, 14%, 12 min., 70, 16.5%, 17 min., 95, 16.5% The Beckmann rearrangement of VI gives *β-bromocinnamic p-anisidide*, m 144° *Benzal p-ethoxyacetophenone dibromide*, m 151–2° V. Substituted cinnamaldoximes and cinnamonitriles. *Ibid* 212–35.—*cis*-PhCH CBrCHO (I) is oxidized to *trans* PhCH CBrCO$_2$H by alk. Ag$_2$O or by O$_2$ in CHCl$_3$. The oxime (II) of I, m 144°, results in acid, alk. or neutral medium, warming with EtOH H$_2$O KOH gives PhC : CCH NOH, m 108°, Ac deriv of II, m 81–2°, heating II with Ac$_2$O gives *cis*-PhCH CBrCN (III), b$_{15}$ 138–40°, $d_4^{19.1}$ 1.4624, $n^{19.1}$ 1.61984, 1.62983, 1.65669 for *α*, He and *β*, this also results from the acid amide and POCl$_3$ at 70–2°. *Dibromocinnamonitrile*, m 92–3°, also gives III with EtOH-KOH II and PCl$_5$ in dry Et$_2$O, allowed to stand 10–24 hrs., give the *trans isomer* (IV), b$_{15}$ 148–50°, m 33–5°, $d_4^{53.5}$ 1.4263, $n^{53.5}$ 1.60386, 1.61348, 1.63904 for *α*, He and *β*, IV was also obtained from the *trans* acid amide, m 120–1°, and POCl$_3$ at 70–2° Attempts to change III to IV or IV to III failed The relative rates of reaction of III and IV with EtOH-KOH are 2 min., 42.3, 78% decompose, 10 min., 99.6, 42.6% III or IV and 10% EtOH KOH give *β-ethoxycinnamonitrile*, b$_{15}$ 146–8°, $d_4^{18.4}$ 1.0601, $n^{18.4}$ 1.55988, 1.56718, 1.58641, 1.60482 for *α*, He, *β* and *γ* Addn of EtOH to PhC : CCN gives an *isomeric nitrile*, b$_{11}$ 163–5°, $d_4^{17}$ 1.0543, 1.54569, 1.55169, 1.56756 for *α*, He and *β* Both forms give BzCH$_2$CN with dil. H$_2$SO$_4$ and show little difference in their reaction with Br in CS$_2$ PhC : CCHO and HBr in AcOH give *β-bromocinnamaldehyde*, b$_{13}$ 144–6°, $d_4^{20}$ 1.492, $d_4^{18.65}$ 1.4937, $n^{18.65}$ 1.62865, 1.63884, 1.66649 for *α*, He and *β*, it slowly decomposes in the air, giving off HBr. Heating with 1.1 mols. AcOK in abs. EtOH for 7 hrs. splits off 24.4% of the Br. *oxime*, m 81°, sepd. by means of the Na salt into 2 isomers, m 63–6° and 103° (*Ac deriv*, m 68–9°) The relative rates of decompn of the aldehyde and oxime by 5% EtOH-KOH are: 5 min., 30.5, 2.2% 10 min., 77.2, 4.4% C. J. West

**Reduction of the mixture of aldehyde or ketone with nitrite. II.** A. Ogata and S. Hirano. *J. Pharm. Soc. Japan* 50, 1141–52 (1930), German abstr. 147–8; cf. *C. A.* 24, 4758.—Reduction of the mixt. of equiv. quantities of BzH and NaNO$_2$ in alc. AcOH or HCO$_2$H with excess Zn dust gave PhCH$_2$NH$_2$, (PhCH$_2$)$_2$NH, *α β-diphenyl-α-hydroxy-β-benzylaminoethane* (I) and NH$_3$ as end product. I, C$_{21}$H$_{21}$ON, m 151°, sol. in hot alc., but insol. in H$_2$O HCl salt, m 226–8°, *Bz deriv*, m 135–6° The formation of *benzylamine* is due to the formation of an intermediate compd., *benzaldoxime*, followed by reduction, while *dibenzylamine* is due to the reaction between PhCH$_2$NH$_2$ and unreacted BzH, followed by reduction F. I. Nakamura

**Isomerization of the hydroxy aldehydes. IV. Transformation of benzylbromoacetaldehyde and benzylglycolaldehyde.** S. Danilov and E. Venus-Danilova. *Ber.* 63B, 2765–75; *J. Russ. Phys.-Chem. Soc.* 62, 1697–1711 (1930), cf. *C. A.* 24, 1093.—*Benzylbromoacetaldehyde* (I), from PhCH$_2$CH$_2$CHO and Br in CS$_2$, is an unstable oil readily resinifying and polymerizing on standing, but it yields a cryst. *monohydrate*, m. 87.5–8°, which permitted of studying the conversion of I into *benzylglycolaldehyde* (II) and the acid (III) Heated with H$_2$O and freshly pptd. BaCO$_3$ I gives II in quite good yields, together with 4% PhCH$_2$CH$_2$CO$_2$H (IV). With Ag$_2$O are obtained 20% II, 9.4% III, 5.6% of a condensation product (V) of I and 31% IV. PbO$_2$ yields chiefly halogen-contg. condensation products of I and 22.6% IV. The structure of II is es-

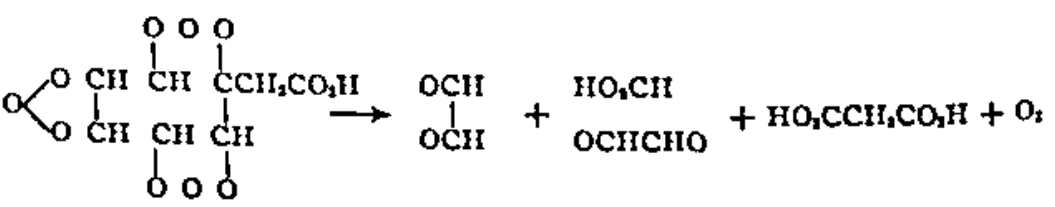
tablished by its prepn., its derivs. and its oxidation products. $KMnO_4$ in aq. $C_5H_5N$ gives $PhCH_2CHO$, $Br_2OH$ and III. Its isomerization into the HO ketone is accompanied by the formation of a diketone $PhCH_2CH(OH)CHO$ (II) ⟶ $PhCH(OH)COMe$ (VI) + $PhCOCOMe$ (VII). II, $b_4$ 120–1°, m. 51.5–2°, reacts with $NH_3$-$AgNO_3$, fuchsin-$SO_2$ and Fehling soln., mol. wt. in freezing $C_6H_6$ 143.7, *oxime*, m. 123°, *semicarbazone*, m. 136.5°, *phenylosazone*, yellow, m. 137°, *benzoate*, m. 70°, mol. wt. in freezing $C_6H_6$ 252.6. III, m. 97.5°, mol. wt. in freezing $C_6H_6$ 150. VII, $b_{15}$ 113–5°, dioxime, m. 238–9°. VI, $b_{15}$ 130–2°, mol. wt. in freezing $C_6H_6$ 155–61, semicarbazone, m. 194°. With $PhMgBr$ VI yields $PhMeC(OH)CH(OH)Ph$, m. 103°, gives with concd. $H_2SO_4$ a deep red color destroyed by $H_2O$ and is oxidized by $CrO_3$-AcOH to $PhCOMe$ and $Br_2OH$. C. A. R.

**New *p*-bromophenacyl esters.** S. G. Powell. *J. Am. Chem. Soc.* 53, 1172 (1931).—The following *p-bromophenacyl esters* were prepd.: *trimethylacetate*, m. 76.5°, *isocaproate*, m. 77.3°, *enanthate* m. 69.2°, *isoheptylate*, m. 75.5°, *pelargonate*, m. 63.5°. C. J. West

**Oximes of α,β-unsaturated ketones and the Beckmann rearrangement.** A. H. Blatt. *J. Am. Chem. Soc.* 53, 1133–41(1931).—Certain α,β-unsatd. ketones, when treated with $NH_2OH$·HCl, yield oximes of the general configuration RCH:CHCR′:NOH. These oximes undergo a *trans* shift in the Beckmann rearrangement and when dissolved in concd. $H_2SO_4$ rearrange in a different manner to yield the isomeric isoxazolines RCH—$CH_2$—CR′=NO. The so-called stable oximes of these α,β unsatd. ketones are in reality isoxazolines and are formed through a process which does not involve either the true oxime as an intermediate or the simple 1,4 addn. of $NH_2OH$ to the ketone. *Benzal-o-chloroacetophenone oxime* m. 110–24° when heated at the rate of 2° per min., even though the oxime was pure, $PCl_5$ in excess in abs. $Et_2O$ gives *cinnamic o-chloroanilide*, m. *136–7°*, also obtained from the acid and *o*-$ClC_6H_4NH_2$. *Boiling the* oxime with MeOH-KOH for 5.5 hrs. removes only 2.3% of the Cl. *Benzal p-bromo acetophenone oxime* m. *138–50°*, *there was no evidence of isoxazoline formation* with EtOH-KOH or $NH_2OH$, $PCl_5$ gives the *p-bromoanilide of cinnamic acid*, m. 191°, bromination of the oxime gives a *di Br deriv.*, m. 155° (decompn.); with EtOH-KOH it eliminates HBr, giving *3 p-bromophenyl 5-phenylisoxazole*, m. 178–9°; this also results in 50% yield by heating the oxime at 150° or by heating in glacial AcOH. It was also obtained from $PhCHBrCHBrCOC_6H_4Br$ and $NH_2OH$·HCl, the *isoxazoline*, m. 138–9°, results from the oxime and concd. $H_2SO_4$ or from the ketone, $NH_2OH$·HCl and KOH. C. J. West

**Methods of manufacturing vanillin.** J. Schwyzer. *Chem.-Ztg.* 54, 817–8, 839–40(1930).—Explicit details of the 4 practical methods for the manuf. of vanillin are given. The methods are (*a*) chlorination of PhOH, treatment with $Ba(OH)_2$ to form *o*-$C_6H_4(OH)_2$, treatment of this with *m*-$O_2NC_6H_4SO_3Na$, $CH_2O$ and Fe filings to give 3,4-$(HO)_2C_6H_3CHO$ followed by methylation, (*b*) treatment of piperonal with $PCl_5$ and hydrolysis of the product to 3,4-$(HO)_2C_6H_3CHO$, followed by methylation, (*c*) sulfonation of $PhNO_2$, reduction by electrolysis or by Zn and HCl, and treatment with guaiacol, $FeSO_4$ and $CH_2O$, or treatment of guaiacol with MeOH, $Me_2NC_6H_4NO$ and $CH_2O$, or guaiacol is treated with alloxan prepd. by the action of $Cl_2$ on uric acid, sapon. with NaOH, treatment with $SO_2$, then with *p*-$Me_2NC_6H_4NH_2$, and finally with NaOH, (*d*) formation from clove oil. C. H. Peet

**The action of ozone on benzoic acid and phenyl aliphatic acids.** H. Rupe and H. Hirschmann. *Helv. Chim. Acta* 14, 49–56(1931).—$Br_2OH$ and phenyl aliphatic acids add on a mol. of $O_3$ at each of the double bonds of the benzene nucleus to form triozonides. These compds. are white camphor like substances at low temps. and oils at room temps. They are not very stable and tend to decomp. with explosive violence at room temp. They decomp. with water to form, probably, 1 mol. $O_2$, 2 mols. glyoxal, 1 mol. $HCO_2H$ and 1 mol. of a dibasic acid. The yields of these hydrolysis products are poor. The yields of the ozonides are also poor as apparently much of the phenyl aliphatic acids are completely oxidized. The triozonide of Ph$CH_2CO_2H$ (I) probably decomps. with water as follows:



Ten g of I was dissolved in 100 cc $CCl_4$ and at 0–15° treated with 10–12% $O_3$ for 24 hrs. The white ozonide was filtered and washed with ice-cold abs. ether and decompd. with water on the water bath. The clear soln gave 1.1 g of $(CH{\cdot}NNHCO{\cdot}NH_2)_2$ (IV), decomps 300° $HCO_2H$ was identified by its odor and the sepn of about 0.5 g. which reduced $HgCl_2$ and HgO $CH_2(CO_2H)_2$ was identified by formation of PhCH CHCH $C(CO_2H)_2$, m 202–3° instead of 208° as given by Rupe (*Ber* 37, 3123) and by the solid acid isolated in about 0.1 g yield, giving off $CO_2$ when melted. I (1.7 g) was recovered unchanged In 1 expt 10 g of $PhCH_2CH_2CO_2H$ (II) in 100 cc. $CCl_4$ was treated at 0–15° with 10–12% $O_3$ for 24 hrs The white ozonide after decompn with water yielded 4.2 g of IV, 0.8 g $(CH_2CO_2H)_2$ and only 0.1 g of II was recovered unchanged Ten g of BzOH (III) in 80 cc $CHCl_3$ and 20 cc $CCl_4$ was treated at 0–15° with 10–12% $O_3$ for 20 hrs III gave the best yields of ozonide but this ozonide was the least stable One sample of 3.5 g exploded in the desiccator The ozonide from the above sample on decompn with water yielded 0.62 g IV and 0.5 g $(CO_2H)_2$ and 5.5 g III was recovered unchanged III is more resistant to the action of $O_3$ than either I or II. ODEN E SHEPPARD

**Condensation products of phenylacetic hydrazide.** REINHARD SEKA AND ST. PETER HEILPERIN *Monatsh* 57, 45–51(1931).—$AcCO_2H$ and $PhCH_2CONHNH_2$ (I) in $H_2O$ give 76.6% of the *hydrazone*, $PhCH_2CONHN{:}CMeCO_2H$, m. 168°, the mother liquor contains *diphenylacetic hydrazide* (II), $(PhCH_2CONH)_2$, m 236–7° With $AcCH_2CO_2Et$ and I only II is formed Levulinic acid gives the *phenylacetic hydrazone*, m 119°; the mother liquor contains II. Galactose likewise gives a *hydrazone*, m. 192–3° (58% yield) $Ac_2$ and I give a *monophenylacetic hydrazone*, m 138°, sol. in $H_2O$, and a *diphenylacetic hydrazone*, $C_{16}H_{16}O_2N_4$, decomps 254°. Benzil gives a *diphenylacetic hydrazone*, $C_{16}H_{16}O_2N_4$, m 198–9°. C. J. WEST

**Several new 4'-sulfo-*o*-benzoylbenzoic acid derivatives and the corresponding anthraquinone compounds.** IVAN GUBELMANN, H. J. WEILAND AND O. STALLMANN. *J. Am. Chem. Soc.* 53, 1033–6(1931).—2 $HO_2CC_6H_4COC_6H_4SO_3Na$-*p*, nitrated with a mixed acid (100 g mixed acid contg 70% $HNO_3$, 22% $H_2SO_4$ and 8% $H_2O$ with 480 parts of 25% oleum) in 100% $H_2SO_4$, the acid being added over 6–8 hrs at 15–20° and the reaction then heated at 35° for 3 hrs., gives the *5'-$NO_2$ deriv.*; 100 g of the free acid, heated with 25% oleum at 150°, give 80 g of *2-nitroanthraquinone-7-sulfonic acid*, with $NaClO_3$ in dil HCl there results quant the *7-Cl deriv*, light yellow, m. 251–2°; reduction gives nearly quantitatively the *2-$NH_2$ deriv*, light orange, m 302–3°. 5,2-$H_2N(p\text{-}HO_3SC_6H_4CO)C_6H_3CO_2H$, by reduction of the above $NO_2$ deriv., gives with oleum 2,7-$H_2NC_6H_3(CO)_2C_6H_3SO_3H$, which may be transformed into the 2,7-di-$NH_2$ deriv. by $NH_4OH$ and $As_2O_3$ at 180°. Further proof is offered by the m. p. of the corresponding di-HO deriv and its di-Ac deriv C. J. WEST

**Some new water-soluble organomercury compounds.** JOHN H. WALDO. *J. Am. Chem. Soc.* 53, 902–6(1931).—MeHgI and *o*-$HSC_6H_4CO_2H$ in EtOH-NaOH give 80–5% of *methylmercurithiosalicylic acid*, m 174° (all m ps. cor.), *Et deriv*, m. 111°; *iso-Am deriv*, m 78°; *p-ethylmercurimercaptobenzoic acid* does not m. 250°; the *sulfonic acid* was also prepd The following compds were prepd. but analyzed only for Hg: *phenylmercurithiosalicylic acid*, m 228.5° (decompn.), *benzyl deriv*, m 144.5° (decompn.); *α-ethylmercurimercaptobutyric acid*, m 76°; *p-ethylmercurimercaptophenylacetic acid*, m 116.7°; *p-ethylmercurimercaptobenzenesulfonic acid*, m. above 300°. These compds are sol in $NaHCO_3$ and form with the alkali metals sol. salts whose solns are in general stable and do not give an immediate ppt. of HgS with $(NH_4)_2S$. Therapeutic data are given the alkaryl derivs are less toxic than the aryl; the salts of $CO_2H$ derivs are less toxic than the $SO_3H$ derivs.; some decrease in the therapeutic index is produced by a change from the *o*- to the *p*-position on the $C_6H_4$ ring and by alkyl instead of alkaryl derivs. The aryl compds are decidedly less stable, either in soln. or dry, than the alkaryl compds. C. J. WEST

**Pyromellitic acid. Benzodiketohydrindene and benzodipyridazine derivatives.** REINHARD SEKA, HANS SEDLATSCHEK AND HEINRICH PREISSECKER. *Monatsh.* 57, 86–96(1931).—$O(CO)_2C_6H_2(CO)_2O$ (I) and quinaldine, heated at 250° until the mass is solid, give the *condensation product* (II), $C_{30}H_{18}O_4N_2$, dark reddish brown, decomps. 265°, insol in EtOH, and the yellow brown, EtOH-sol *compd*, $C_{30}H_{19}O_4N$, decomps. about 125°. Sulfonation of II with 50% oleum at 170° gives a product similar to quinoline yellow, which dyes wool and silk a pure yellow. I and α-$C_{10}H_7NH_2$ give *pyromellitic dinaphthylimide*, m 431° $N_2H_4 \cdot H_2O$ (4 mols) gives the *dihydrazide*, light yellow, decomps about 450°; its *tetra-Ac deriv.* m 235–8°. 1,4,2,5-$Bz_2C_6H_2(CO_2H)_2$ and 10 mols $N_2H_4 \cdot H_2O$ in abs. EtOH, heated 24 hrs at 120°, give 90% of *1,6-diphenyl-4,9-dihydroxybenzodipyridazine*, carbonizes at 445°; 1,5,2,4-$Bz_2C_6H_2$-

$(CO_2H)_2$ and 6 mols $N_2H_4$, $H_2O$ give the *1,9-diphenyl-4,6-dihydroxy deriv.*, decomps. 430° $(MeC_6H_4CO)_2C_6H_2(CO_2H)_2$ and $N_2H_4$, $H_2O$ give the *1,9-dixylyl-4,6-dihydroxy deriv.*, carbonates at a high temp. 2-Benzoylanthraquinone-3-carboxylic acid and 3.8 mols $N_2H_4$, $H_2O$ in abs. EtOH, heated 9 hrs. at 120°, give the *hydrazide*, light yellow, decomps. 374°. 1,2,4,5-$C_6H_2(COCl)_4$ and MeONa in $C_6H_6$ give 88% of *tetra-Me pyromellitate*, m. 138°; the *tetra-Ph ester*, m. 179.5°, results in 24% yields.

C. J. West

The influence of impurities on some physical and crystallographic properties of hemimellitic acid. V. Agafonov. *Compt. rend.* 192, 99–101(1931). cf. *Compt. rend.* 124, 855(1897).—After 2 recrystns. of hemimellitic acid, $C_6H_3(CO_2H)_3$ (I), there can still be isolated small quantities of Ca hemimellitate (II) and another compd. (III), both of which are monoclinic and have smaller birefringence than I. The refractive indices for the D line are I, $n_g$ 1.4316, $n_m$ 1.6358, $n_p$ (calcd.) 1.6744; II, $n_g$ 1.52, $n_p$ 1.68; III, $n_g$ 1.515, $n_p$ 1.63. The pure I is triclinic and the axial ratios are 1.705 : 1 : 0.6185. The ds. and solubilities at 20° of the 3 compds., and a full description of the crystals of I, are given. Microscopic observation of the process of crystn. shows that small quantities of II and III are included within the crystals of I and are probably the cause of its polychroism in the ultra violet, since according to A., polychroism is always due to the presence of impurities or polymers in regular orientation.

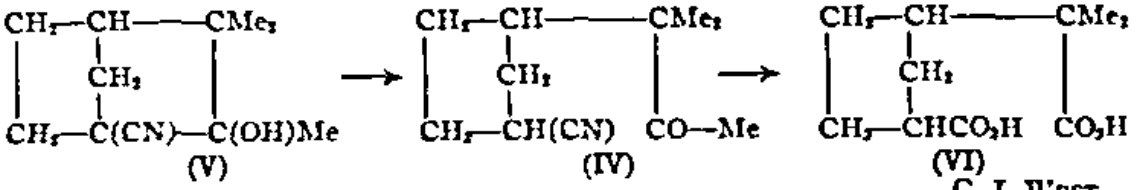
K. V. Thimann

Sclareol and its derivatives. Maurice-Marie Janot. *Compt. rend.* 191, 847–9 (1930).—Sclareol (I) obtained from the essential oil of *Salvia sclarea* L. appears to be $C_{19}H_{36}O_2$. It $b_{15}$ 188–9° and $b_{15}$ 218–22° to give by condensation a solid product, which is transformed slowly at room temp. and instantaneously at 45° into crystals, m. 104–5°. I is not saponified by alc. KOH or by KOH in $PhCH_2OH$. Heated to near its m. p. it loses 45% of its wt. in 72 hrs. It gives no test for MeO, is acetylated with difficulty, giving only a 50% yield, and is benzoylated in the presence of pyridine with difficulty. It gives $CO_2$ and $CO(NHPh)_2$ when heated to 150° with OCNPh. Alc. I gives a violet color with saccharose and furfural, and a garnet red color with $PhCH_2CHCHO$, vanillin and piperonal (Ekkert, *C. A.* 22, 2384). In $CS_2$ contg. $Ag_2CO_3$ I adds Br to give 3 compds. (1) a cryst. deriv., m. 122–4°, contg. 35.33% Br, and (2) and (3), hexagonal crystals m. 134–5° and 140–3°, resp. I adds H in alc. in the presence of colloidal Pd to give 98% of a cryst. deriv. m. 114–5°, mol. wt. 270. Oxidation with $KMnO_4$ in HOAc gives sclareolic acid besides other compds. and oxidation with $H_2CrO_4$ gives a non-acidic compd. m. 124–5°. Alc. I shows no absorption in the ultra-violet. The sp. rotatory data of the various compds. are given.

C. J. Pedersen

Camphor and terpenes. VI. So-called camphor cyanohydrins. J. Houben and E. Pfankuch. *Ann.* 483, 271–304(1930); cf. *C. A.* 21, 1808.—H previously showed that camphorimine easily adds HCN, giving a camphor cyanohydrin. Passerini (*C. A.* 20, 595) claims to have isolated the same compd. from pernitrosocamphor and KCN. A re-examn. of P.'s compd. (I) shows that it is camphene-1-carboxamide. From I is prepd. a Ag salt and a Me ester, $C_{12}H_{19}NO_2$, m. 102°. The *dl*-, *d*- and *l* forms of I may be obtained by starting with the proper camphor; thus, the *d* form prepd. from the pernitrosocamphor from *d*-camphor, HCN and $Et_2N$ in $Et_2O$ has $[\alpha]_D$ +78.5°. Sapon. of I with alkali gives camphene-1-carboxylic acid, the *d* form has $[\alpha]_D^{19}$ 95.5°. When the *d* and *l* forms are mixed in petroleum ether, the *dl* form seps., showing that the 2 acids differ only in optical properties. $O_3$ oxidizes the acid to camphenilonecarboxylic acid (II) and camphenonic acid (III), m. 133–4°. II gives an *oxime*, m. 171.2°. The action of $O_3$ on I gives the amide of III. III with aq. alkali gives camphenecamphonic acid, the *dl* form m. 133–4° and the *d* form m. 142–3°. Reduction of the acid gives *dihydrocamphene-1-carboxylic acid*, m. 174–5°, $[\alpha]_D^{20}$ −16.7°. Reduction of I gives the corresponding amide, m. 189°. I and $Ac_2O$, boiled 2 hrs., give *d camphene 1-carboxylic nitrile* (IV), $b_{15}$ 108–10°, m. 38–40°, $[\alpha]_D^{18}$ 40.5°. The acid with $SOCl_2$ and $NH_4OH$ gives I, m. 208°. The camphor cyanohydrin of H. and P. (V) is not saponified by concd. HCl or 48% HBr, with $HNO_3$ it gives IV and a blue-green oil, which gives with MeOH KOH *d*-camphene-1-carboxylic acid and a small quantity of the amide, there also results an oxynitrile, which is dehydrated by $Ac_2O$ to IV and with EtOH $H_2O$-KOH gives *3 (α,α-dimethylacetonyl)pentamethylenecarboxylic acid* (VI), $b_{15}$ 180–8°, $[\alpha]_D^{18}$ −2.6°, *semicarbazone*, m. 200–2°. Further degradation with NaOBr gives camphenecamphonic acid (VII), m. 134–5°, identical with that obtained from III. The oxynitrile is a *camphene hydrate-1-carboxylic nitrile*. *d*-Camphene-1-carboxylic acid and HBr in AcOH give the *dl-Br hydrate*, m. 118–20° (decompn.), $[\alpha]_D^{19}$

—15 5°, dil alkali or $K_2CO_3$ gives the *camphene hydrate-1-carboxylic acid*, m 142–3°, $[\alpha]_D^{17}$ —17°; the $H_2O$ is split off by boiling with 0 1 *N* $H_2SO_4$ for 15 min ; the *Me ester*, m 59–60°, $[\alpha]_D^{19}$ —19 5°, MeOH-KOH gives VI. *d*-Camphene 2-carboxylic acid and HBr in AcOH give the *Br hydrate*, m 165–6°, the corresponding *hydrate* m 221°, *Me ester*, m 61–2°, $[\alpha]_D^{18}$ 24 5° *dl Camphene-bromohydrate-1-carboxylic nitrile* m 150–1°, attempts to prep the hydrate gave only the unsatd. compd



(V) (IV) (VI)

C J. West

π-Camphor derivatives. II. Identity of dihydroteresantalic acid with 7-π-apocamphanecarboxylic acid. Torsten Hasselström *J Am Chem Soc* 53, 1097–103(1931), cf *Ann Acad Fenn* 30, 12(1929).—The lactone of 2-hydroxy-7-π-apocamphanecarboxylic acid, with alk $KMnO_4$, gives *ketodihydroteresantalic acid* (*2-keto 7-π-apocamphanecarboxylic acid*), m 269–70°, $[\alpha]_D^{18}$ —55° (10% EtOH); *semicarbazone*, m 204–5° (decompn ), heating the latter with EtONa at 170–80° for 15 hrs gives a good yield of 7-π apocamphanecarboxylic acid (dihydroteresantalic acid), m 228–9° (cor ), nearly optically inactive, this is identical with the compd obtained by complete synthesis in part I The crude mixt of Me chlorodihydroteresantalate, reduced with Al Hg in moist $Et_2O$ at room temp , and finally with Na and EtOH, gives dihydroteresantalol (π-borneol), m. 171°, oxidation with $K_2Cr_2O_7$ and $H_2SO_4$ gives dihydroteresantalal, whose semicarbazone m 212–3° (decompn ), further oxidation with $KMnO_4$ in NaOH gives dihydroteresantalic acid, m 229–30°, identical with the acid prepd as above. The addn of HCl to teresantalol, m 114°, gives a liquid and a solid form of chlorodihydroteresantalol, the solid part (2-chloro-7-π-borneol) m 125–6° (decompn ) and on reduction with Na and EtOH gives π-borneol C. J. West

Optically active α-pinenes. F. H Thurber and R. C. Thielke *J. Am. Chem Soc.* 53, 1030–2(1931) —Details are given for the prepn. of pinene nitrosochlorides, the 3 forms, *dl*-, *d*- and *l*-, m 115°, 89.5° and 90°, resp , and have $[\alpha]_D^{20}$ ($C_6H_6$) 0°, 396 2° and 366 8°, they decompose at room temp. to a brown oily mass in about 3 weeks, but are stable for a much longer time at —20°, the regenerated α pinenes show the following properties. $b_{760}$ 155–6°, $d_{19}$ 0 8591, $n_D^{20}$ 1.4663, $[\alpha]_D^{20}$ 51 14° and —51 28° The HCl compds m 132° (cor ) and the active forms have $[\alpha]_D^{20}$ (1% EtOH soln ) 33 52° and —33.24°. Contrary to previous reports the *dl*-pinene yields an inactive HCl deriv. and the active pinenes yield active HCl derivs. whose rotations are equal and opposite in sign C. J. West

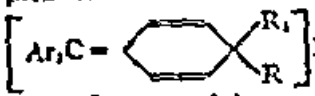
Stereochemistry of derivatives of biphenyl and analogs. Francis Lions *J. Am. Chem. Soc.* 53, 1176–9(1931) —L. outlines certain researches in the 2- and 4-phenylpyridine and 2-phenylquinoline series, phenylpyrroles, phenylindoles and biphenyl derivs. Failure to obtain these substances in enantiomorphous forms has prevented publication; this note is offered because of the work of Adams (*C. A.* 25, 105) in the field of phenylpyridines C. J West

Bistibyls. I. Tetraphenylbistibyl. Attempts to obtain tetraphenylbibismuthyl. *F. F. Blicke, U. O. Oakdale and F. D. Smith J Am Chem Soc 53, 1025–9(1931).—Diphenylstibyl iodide*, m 68–70°, results from the chloride and NaI in $Me_2CO$; a PhBr soln. does not absorb O, although a mixt. with $Ph_3CBr$ does. The iodide reacts with Cu in PhBr, giving the bistibyl but this apparently undergoes decompn. or is rendered inactive toward O by the Cu halide or by combination with unchanged $Ph_2SbI$. The iodide in abs. EtOH with $NaH_2PO_2$ gives *tetraphenylbistibyl*, m. 121–2°, which reacts instantly with I, giving $Ph_2SbI$; it also absorbs the calcd amt of O to give $(Ph_2Sb)_2O_3$ $Ph_2BiI$ in PhBr, shaken with Ag, Hg, Zn and Cu bronze, did not give solns which absorbed O $NaH_2PO_2$ did not appear to react with an EtOH soln at room temp , and on heating gave a black product. $(Ph_2Bi)_2$ could not be obtained. C. J. West

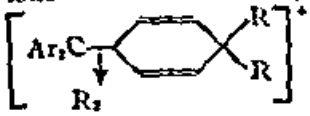
Action of phenol on benzoyldiphenylmethyl bromide. C. Frederick Koelsch *J. Am. Chem. Soc* 53, 1147–50(1931), cf Schuster, *C. A.* 25, 943.—S reported that $Ph_2CBrBz$ and PhOH give $Ph_2C(OPh)Bz$ (I), which reacted with PhMgBr to give $Ph_2C(OPh)C(OH)Ph_2$ (II) Repetition of the reaction shows that the reaction really gives *p*-$BrC_6H_4OH$ and $Ph_2CHBz$ (S 's I). $Ph_2CHBz$ and KOH give $Ph_2CH_2$ and BzOK,

while $Ac_2O$ and $H_2SO_4$ give $Ph_2C$ C(OAc)Ph $Ph_2CHBz$ and PhMgBr give PhCHCPh OH, m 232–3° (S 's II), which decomposes with KOH to $Ph_2CH_2$ and BzPh
C. J. West

Constitution of colorless and colored triphenylmethane derivatives. I Lifschitz *Ber* 64B, 161–82(1931), cf *C A* 24, 100, 1368, 4020.—In an earlier paper (Lifschitz and Girbes, *C A* 22, 3855) L. has formulated his theory as to the constitution of derivs of $Ph_2CH$. In the present paper he answers criticism of his theory by Hantzsch, Dilthey and others, criticizes H 's theory as to the nature of halochromes, shows the untenability of certain of D 's views, and develops his own theory further, adding special proofs for certain phases of it. H. has shown that the substances $Ar_2C$ X belong to 2 optically different series, between which there is no optical transition. H considers these series isomeric, if they are, the colorless and colored $Ph_2C$ derivs should have the same mol. wts. Since there is no proof of this, L. states that the assumption of isomerism has no foundation. Another defect of H 's theory is that it cannot explain the most characteristic property of halochrome salts—their peculiar light absorption. In most of the compds. $Ar_2C$ X, the C X bond is heteropolar, $Ar_2C^+X^-$. This may give the electrolyte $[Ar_2C \cdot R]X'$, whose free ions may be stable or may undergo further change. Anion X' may be solvated, or may form complex ions with suitable mols., such as metal halides. The cations may form



(I), the real mother substance of the halochrome carbonium ions. Because of their quinoid nature these can form deeply colored mol. compds., such as

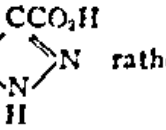
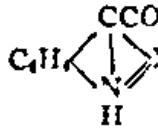


, which are analogous in structure to meriquinoid compds.

Structure I belongs to various so-called halochrome compds. with dye like absorption. L's theory is thus shown to explain the facts satisfactorily. Retaining a coördination no. of 4 for C as assumed by Werner, and without using the forced deductions of H., it is possible to explain the influence of the solvent on the color of $Ph_2CH$ derivs. The first step in the formation of the colored forms is substitution; the final step is addn. with the formation of mol. compds. of quinoid ions. Where the latter is not possible, and complex formation with the compd. itself enters in, the reason lies in the nature of the medium. In the substances mentioned the chromophor which shows the visible color is the quinone C atom in the ring. Solns. of halochrome derivs. of the same triphenylcarbinol contain not the same complex, as H. thought, but different complexes with the same chromophor. With the exception of neutral perchlorates all the isolated halochromes are mol. compds., and it can easily be shown that complex formation produces the color. L 's theory also explains satisfactorily the electrolytic behavior of $Ph_2CH$ derivs., and is further strengthened by the results obtained in detns. of the mol. wts. of such derivs.
Louise Kelley

The synthesis of *N*-methylhydroxynaphthindolequinone and *N*-methylnaphthisatinquinone. Zenjiro Kitasato and Chuzaburo Sone *Bull. Chem. Soc. Japan* 5, 348–54(1930), cf *C A* 22, 1779.—To study the origin and properties of such indigoid substances as nandazurin I methylhydroxynaphthazolequinone (VIII) has been synthesized as follows. 2,3-dibromo-α-naphthoquinone and $NaCH(CO_2Et)_2$ give bromo-α-naphthoquinonemalonic ester (I), 5 g. of which suspended in 15 cc. abs. alc. and treated with 5 g. 33% alc. $MeNH_2$ gives crystals. $H_2O$ dissolves a yellow substance, 1 methyl 3-carbethoxy α naphthazolequinone (II), decomps. about 220°, and leaves a red substance, 2 bromo-3 methylacetamido-1,4 naphthoquinone, m. 165°. Two g. of II with 120 cc. 7% NaOH gives VIII, m. over 300°, 1 g. of which with 10 cc. concd. $H_2SO_4$ and 6 cc. 10 *N* $HNO_3$ give 1 methyl 2,3-ββ naphthazoledione-4,9 quinone, m. 268°. To elucidate the mechanism of the above reactions the following reactions were conducted. 6,3,4 $Br(MeO)_2C_6H_2CH(CO_2Et)_2$ and 2 bromo-3-carbethoxy-1,4 naphthoquinone both give an amide with $MeNH_2$, m. 183° and 164–5°, resp.
V. F. Harrington

Tervalent nitrogen. I. The constitution of indazolecarboxylic acid. Taro Hayashi *Bull. Inst. Phys. Chem. Research* (Tokyo) 9, 911–5(1930) (*Abstracts* 8 (in English), published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 14, Nos. 275–6).—Crude *indazolecarboxylic acid* (I) (Auwers *C A* 14, 65) gives, by treating it with 0.5 *N* KOH, 0.5 *N* $H_2SO_4$, hot AcOEt and PhMe, white crystals, m. 266–6.5°, whose EtOH soln. is optically inactive. *Brucine salt*, m. 236–6.5°, $[\alpha]_D^{15}$ —102°, crystals from a mixt. of pyridine and EtOH (*a*) and $H_2O$ (*b*) show following specific rotations

(*a*) $[\alpha]_D^{15.5}$ —104°, (*b*) $[\alpha]_D^{15.8}$ —86°, $[\alpha]^{16.6}$ —90° *Cinchonine salt*, m 233.5–4°, $[\alpha]^{17}$ 18.1°, $[\alpha]^{17}$ 17.7° *Quinine salt*, m 245–6°, $[\alpha]^{16.6}$ 200° The Me ester of I, methylated with MeI, followed by sapon and recrystn from 30% EtOH (K v Auwers, *loc cit*) gives *1 methylindazolecarboxylic acid* (II), m 213.4° Similarly, on methylation with $(MeO)_2SO_2$ and purification with MeOH, there results *2-methylindazolecarboxylic acid* (III), m 225–6° I, II and III show similar absorption curves but the absorption band of I is displaced to the side of shorter wave lengths From these results I would seem to have the formula  rather than  , which contains an asym C atom

K. KONDA

**Condensation of aldehydes and phenols. V. *m*-Chlorobenzaldi-β-naphthol.** OTTO DISCHENDORFER AND HEINRICH MANZANO *Monatsh* 57, 20–30(1931); cf. *C A* 25, 290 — β $C_{10}H_7OH$ (10.2 g) and 5 g *m* $ClC_6H_4CHO$ in AcOH-cooled HCl, after standing 24 hrs., give *? chlorobenzaldi β naphthol* (I), crystg with 1 mol AcOH, m 178.9° *Na salt* needles *di Ac deriv* m 216.7° *di Bz deriv* m 164°, $Me_2SO_4$ gives a *mono-Me ether*, m 168° I in EtOH and 10% NaOH, treated with Br as long as a yellow ppt forms, gives *dehydro ? chlorobenzal β naphthol* $C_{21}H_{13}ClO_2$, light yellow, m 199° I, AcOH and cooled $H_2SO_4$, warmed 1 hr. on the $H_2O$ bath, give *ms (?-chlorophenyl)dinaphthopyran* or *9 (? chlorophenyl) 1 2 7,8 dibenzoxanthene* (II), m 191.2°, sol. in warm cooled $H_2SO_4$ with a golden yellow color and a green fluorescence; II also results in 78% yield by warming the mixt. of $C_{10}H_7OH$ and $ClC_6H_4CHO$ in AcOH-HCl 1 hr. on the $H_2O$ bath II in AcOH HCl, oxidized with $MnO_2$ and treated with solid $FeCl_3$, gives *ms 3-chlorophenyl dinaphthopyrylium chloride ferrichloride*, red needles, m 225–6°, *mercurichloride*, red needles with green metallic luster, m 272°, *perbromide*, red needles, m 207.6° (decompn.), *perchlorate*, bright red needles with green luster The $FeCl_3$ salt in $Me_2CO$ contg a little $H_2O$ gives *ms-? chlorophenyl dinaphthopyranol*, m 254–5°, sol. in cold cooled $H_2SO_4$ with an orange red color *Et ether*, m 215–6°, *Me ether*, m 217–8°, the ethers result from the $FeCl_3$ salt and the corresponding alc.

C. J. WEST

**The structure of organic molecular compounds with principles of two- and three-dimensional variation.** EDUARD HERTEL AND GEORG II RÖMER *Z physik Chem.*, Abt. *B*, 11, 77–89(1930).—X-ray investigation of org. mol. compds. shows that not all can be built up on the principle of 3 dimensional variation A 2 dimensional variation explains anthracene-1,3,5-$C_6H_4(NO_2)_2$. A 1-dimensional variation explains [fluorene]$_2$[1,3,5-$C_6H_4(NO_2)_2$]. The crystal structures of 1,3,5-$C_6H_3(NO_2)_3$ and 2,4,6-$MeC_6H_2(NO_2)_3$ are discussed

FOSTER D. SNELL

**Structure of nitrofuran and the mechanism of nitration in the furan series.** B. T. FREURE AND JOHN R. JOHNSON *J. Am. Chem. Soc.* 53, 1142–7(1931).—2 Nitrofuran, prepd. by the decarboxylation of 5-nitrofuroic acid, is identical with the compd. obtained from furan by nitration, the latter had been incorrectly formulated by Marquis (*Ann. chim. phys.* 4, 216(1905)) to be 3-nitrofuran Evidence is presented to support the view that the intermediate nitroacetates, produced in the nitration of various furan derivs. in $Ac_2O$ soln., are ring structures rather than open chain enols The mechanism of the nitration process is suggested tentatively to be a 1,4 addn. to the furan ring, without scission of the O bridge Me furoate yields a *nitroacetate*, $C_8H_9NO_7$, m 96.3° (cor.), on catalytic hydrogenation 2.5 mols. H are absorbed water decomposes the compd.; warming with $C_5H_5N$ gives Me 5-nitrofuroate, m 81.6° (cor.)

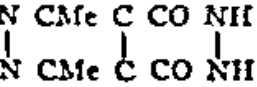
C. J. WEST

**Local anesthetics in the pyrrole series. II.** F. F. BLICKE AND E. S. BLAKE. *J. Am. Chem. Soc.* 53, 1015–25(1931), cf. *C A* 24, 1183.—In certain types of compds. at least, the following substitutions may be made in local anesthetics without loss, in a qual. sense, of anesthetic activity the substitution of 2 pyrryl or Bz and 4 aminobenzoyl and the replacement of the $NMe_2$ and $NEt_2$ by the 1-pyrryl or the 1 pyrrolidyl nucleus β (1-Pyrryl)ethyl alc. (I), $b_{12}$ 110–3°, and K in $C_6H_6$ heated until the metal disappeared and then treated with BzCl, gave 78% of the *Bz deriv.*, $BzOCH_2CH_2NC_4H_4$, m 53–5°. The K deriv. of I and *p*-$O_2NC_6H_4COCl$ in $Et_2O$ $C_6H_6$ give the *4-nitrobenzoate*, slightly yellow, m 92–4° catalytic reduction with Pt oxide in abs. EtOH gives the *4-aminobenzoate*, m 87–8° The *2-pyrroyl deriv.* m 73–4° *p*-$H_2NC_6H_4CO_2CH_2CH_2Cl$ and pyrrolidine, heated for 8 hrs. at 115–20°, give β *(1-pyrrolidyl)-ethyl 4 aminobenzoate*, m 99–100° γ-(1-Pyrryl)propyl alc., $b_{12}$ 220–31°, gives a *Bz deriv.*, $b_4$ 165–70°, the *4-nitrobenzoyl deriv.* m 68–70°, the *4-aminobenzoyl deriv.*

m 114-6°, the *2 pyrroyl deriv* m 69-70°. *γ (1-Pyrrolidyl)propyl 4-aminobenzoate* m 84-5°. The K deriv of MeEt(Me$_2$NCH$_2$)COH (II) and BzCl give stovaine *Methylethyl(1-pyrrolidyl)methylcarbinyl benzoate*, from the carbinol, BzCl and $C_6H_6$ on heating 3 hrs on the water bath The *2 pyrroyl deriv* of II m 104-5°. *Dimethyl 1-pyrryl methylcarbinol*, $b_{4-5}$ 86-8°, gives oily Bz and 2 pyrroyl derivs *Diethyl 1 pyrrylmethyl carbinol*, $b_4$ 108-10°, the Bz deriv was oily The corresponding Et deriv $b_{4-5}$ 125-8°, *the Bz deriv. was oily* The *4 (2 pyrroyl) 1 methyl derivs* of the stable and labile forms of 2 2,6 trimethyl-4 hydroxypiperidine were prepd from the 2 forms of 1 methyl vinyldiacetone alkamine (K deriv ) and pyrroyl chloride, both m 106-7° but a mixed m p was 80-3° Notes are given on the prepn of pyrrolidine C J West

**The preparation of hydroxyproline.** Harriette K. Klabunde *J. Biol Chem* 90, 293-5(1931) —Hydroxyproline is readily obtained as a by-product during the isolation of proline from the products of the hydrolysis of gelatin by 33% $H_2SO_4$. In *Town's procedure (C. A 23, 162) for the sepn of the hydrolysis products* proline and hydroxyproline occur in fraction 3, the Cu salts are sol in both $H_2O$ and MeOH It is sepd from proline by its insoly in abs. alc and can be isolated as the picrate from the alc -insol residue Yields of 18 20 g can be obtained from 1 kg of gelatin A P Lothrop

**Heterocyclic ring systems. III. Ring closure reactions of heterocyclic *o*-dicarboxylic acids.** Reinhard Seka and Heinrich Preisfcker. *Monatsh* 57, 71-80 (1931), *cf C A 20, 386*.—Di Et 2,5-diphenylfuran-3 4 dicarboxylate (1 mol ) and 7 mols $N_2H_4$ $H_2O$, heated in I tOH 24 hrs at 100-20°, give 76% of the *cyclohydrazide*, $C_{12}H_{12}O_2N_2$, the corresponding 2 5-di Me ester reacts with the destruction of the ester Di Et 2 5-dimethylpyrrole-3,4 dicarboxylate and 4 8 mols. $N_2H_4$ $H_2O$, heated 12 hrs at 140-50°, give 80% of the *cyclohydrazide*, begins to carbonize at 295°, decomps 359°, crystals from $H_2O$ with 1 mol solvent the corresponding *2,5-di Ph deriv* m 324° (82% yield) *Pyrazolinedicarboxylic dihydrazide*, decomps 170°, carbonizes 280° (86% yield), *dibenzohydrazone*, m 218°, *the ring system is very labile and could* not be isolated *2 N Phenyl 1,2,3 triazole-4,5-dicarboxylic dihydrazide*, m 225° (60% yield), *dibenzohydrazone*, m 240°, heating *in vacuo* for 2 hrs gives the *cyclohydrazide*, m 317° Imidazole-4,5-dicarboxylic acid does not give an anhydride or a cyclic hydrazide IV. Splitting of the furan ring systems with hydrazine hydrate. *Ibid* 81-5.—Di Et 2 5-dimethylfuran-3,4 dicarboxylate and 2 4 mols $N_2H_4$ $H_2O$ in abs EtOH, heated 24 hrs at 100-20°, give the *compd* $C_8H_{14}O_2N_4$, begins to carbonize at *315-20° tetra Ac deriv*, m 140°, *tetra Bz deriv*, m 190° *The same compd.* is obtained by the action of $N_2H_4$ $H_2O$ upon $(EtO_2CCHAc)_2$ The compd is believed to be 3 6-dimethyldihydropyridazine-4,5-dicarboxylic cyclohydrazide,



C. J. West

**Bis(5-phenyl-2-pyrrole)indigo.** W. Madelung and L. Obermann. *Ber.* 63B, 2870-6(1930) —Posner (*C. A* 21, 87) considers the indigoid dyes to be intramol. quin hydrones (I), the secondary valences coming into play between the carbonyl O and the *aromatic nucleus and the NH* serving only to make the aromatic *nucleus* capable of entering into such a secondary valence union It might be pointed out, however, that Friedlander and Kielbasinski's bis(5-phenyl 2-thiophene)indigo (*C. A* 7, 2193), in which the conditions demanded by P's' theory are not fulfilled, is nevertheless very similar in color and properties to the normal thionaphtheneindigo It seemed of interest to study more closely the relationship of a pyrroleindigo to the normal indoleindigo and *bis(5 phenyl 2 pyrrole)indigo* (II) was accordingly synthesized It seemed that the logical starting *material would be a phenylated deriv of 3* hydroxypyrrole (designated as *pyrroxyl* by analogy with indoxyl) which should readily be converted by appropriate oxidizing agents into the corresponding indigo K phenylglycidate, $NH_2CH_2CO_2H$ and KOH on the water bath yield 80% of the *di K salt*, needles with $3H_2O$ from *MeOH*, m 96°, crystals with $4H_2O$, m 86°, from $H_2O$, of *α hydroxy-β (carboxymethylamino)hydrocinnamic acid* (III), m 235° Attempts to apply the Heumann reaction to this acid were only partially successful in that the product of the KOH fusion yielded a very small quantity of an acid (not isolated) which on heating with water gave an oil which must have been the desired pyrroxyl for treatment with $FeCl_3$ and water gave a small quantity of the corresponding II. KOH fusion is not practicable as a method of prepn., however, for by far the greater part of the III is completely destroyed. *Attempts to bring about the ring closure by thermal decompn*

of the Ca or Th salt of III were likewise only partially successful $Ac_2O$ with th salt of III, however, yielded 33% of *phenylacetylpyrroxylic acid* (*5-phenyl-1-acety hydroxypyrrole 2-carboxylic acid*) (IV), m. 150°, decarboxylated by boiling 4 hrs. water in a $CO_2$ atm to the *pyrrole* (38% yield), m 88°, gradually becoming red in the air This with $Ac_2O$ and a drop of concd $H_2SO_4$ gave 33% of *5-phenyl- diacetoxypyrrole*, pale red, m 181°, also obtained in small yield by heating III w $Ac_2O$ With $FeCl_3$ and HCl IV gave 80% II, *brown-violet needles from* $C_6H_5N$, somewhat above 300° with evolution of a red vapor, also insol in most org. solv *in the cold somewhat in hot* $C_6H_6$ *and* AcOH, *easily* in hot $C_5H_5N$, the intensely soln in AcOH is turned pure blue by mineral acids, the $H_2SO_4$ soln is orange yell A $10^{-4}$ *M* soln in $C_5H_5N$ shows extinction below 560$\mu\mu$, lightening at 480–50 a $4 \times 10^{-4}$ soln in 50% $H_2SO_4$ lightening at 580–620$\mu\mu$, a $2 \times 10^{-5}$ soln of the ace lightening at 540–560$\mu\mu$ With complex forming metallic chlorides it forms c plexes of different colors (blue with $SnCl_4$ in $C_6H_6$, brown yellow with $TiCl_4$) w remain in soln, while dry HCl ppts a blue HCl salt. The alk $Na_2S_2O_4$ vat has a slight affinity for cotton and imparts a very weak violet-red color *Bis(5-Ac) de* brown red, m 220°, sol in AcOH and $C_6H_6$ with intense red color, no longer has basic properties or the ability to form metal compds *The properties of II show* clusively that P s' theory as to the structure of indigo is incorrect C A I

*Reaction of aliphatic imido ethers with hydrazine.* Wilfrid Oberhumm *Monatsh* 57, 106–11(1931) —HN CHOEt and anhyd $N_2H_4$ in abs. $Et_2O$ give 25–3 of 1-amino-1,3,4 triazole, besides $NH_4Cl$ and $N_2H_4$ HCl, with salts of $N_2H_4$ in abs Et only about 3% of the triazole was isolated C. J Wes

*2-N-Phenyl-5-C-phenyl-1,2,3-triazolecarboxylic acids.* Mario Gallotti w G. Barro and L Salto *Gazz. chim. ital* 60, 866–72(1930) —In an analogous to the transformation of phenanthrene to diphenic acid (I), the oxidation of *2-N-phe* 1,2 naphtho-1,2 3-triazole leads to *2-N* phenyl 2,3-triazolylphenyl-*o*,4 dicarbox acid (II) (cf. Charrier and Gallotti, *C. A.* 19, 2205, 2954), but *2-N-phenyl-5-C-phe*

*1,2,3 triazole-4-carboxylic acid*, PhC(:N NPh N:C)$CO_2H$ (III) (see later) cannot *prepd in this way because when II is heated alone or with soda lime or with Na* it does not simply eliminate a $CO_2H$ group or both $CO_2H$ groups (as with I) with for

tion of III or *o*-$HO_2CC_6H_4$C(:N NPh N:CH) (IV) The reaction is much more c plicated, with formation of an anhydride deriv, whose constitution is not yet explai It was of interest, therefore, in explaining the genetic relations between II and III IV, and their possible transformation into *2-N*-phenyl 5-*C*-phenyl-1,2,3-triazole to attempt to prep. II, III and IV by some other method The present paper deser the synthesis of III and unsuccessful attempts to prep. II. EtPhCO, treated *iso-AmNO₂ in the presence of a little anhyd HCl, extd with dil. NaOH, the ext* wa with $Et_2O$, AcOH added to the aq residue and the ppt. recrystd from dil Et yields 55–60% of BzC(:NOH)Me (VI) The latter and $PhNHNH_2$ yield, after crystn of the product from EtOH, almost 100% of *phenylhydrazone o* PhC(:NNHPh)C(:NOH)Me (VII), lustrous, m 210°. VII (24 g), added to A (70 g) at 50–5°, after several min (when clear brown) made ice-cold and when solid cold water (12 vols) added, agitated for some time, the ppt. washed with cold w and recrystd from 95% EtOH, yields the *Ac deriv*, PhC(:NNHPh)C(:NOBz) (VIII), lemon yellow, m 137° VIII (30 g) and aq $Na_2CO_3$ (14 g in 650 cc), he *40 hrs on a boiling water bath, cooled, satd aq* $KMnO_4$ added until permanently excess $KMnO_4$ destroyed by aq $NaHSO_3$ and dil. $H_2SO_4$, extd with $Et_2O$, and the evapd, yields 50% of *crude 2-N phenyl-4-C-methyl 5-C-phenyl-1,2,3-triazole* ( IX (15 g) and alk. $KMnO_4$ (26 g and 66 cc. of 10% NaOH in 330 cc. water), refl for 100 hrs. (until homogeneous), decolorized with EtOH, filtered, the residue wa with boiling water, the combined filtrates concd, aq HCl added, the ppt. recry from boiling water, BzOH eliminated by subliming at 180° and the residue recry repeatedly from water, yield III, m 208–9°, stable above its m p, but at 230° comps. to an orange-yellow *substance* which sublimes at a still higher temp. decompn is more extensive than merely the elimination of $CO_2$, for in this ca would have been formed III is a strong acid, turns blue litmus red, decomps bonates (*with lively effervescence*) *and forms alk. salts extremely sol in water* difficult to obtain in a cryst. state. Prepd like VI, a 45–50% yield of *o*-$MeC_6H_4C$ (:NOH)Me is obtained, and this with $PhNHNH_2$ yields almost 100% of the *phe hydrazone oxime*, *o*-$MeC_6H_4C$(:NNHPh)C(:NOH)Me (X), m. 175–7°. Following same procedure as with VII, X (18 g) and $Ac_2O$ (55 g) yield almost 100% of th

*deriv* of X, *o*-$MeC_6H_4C(NNHPh)C(NOAc)Me$ (XI), light yellow, m. 140°. XI (50 g) and aq $Na_2CO_3$ (30 g in 1200 cc), heated 40 hrs on a water bath, and treated as before with $KMnO_4$, yields about 50% of crude *2 N phenyl-4-C-methyl-5-C-tolyl-1,2,3-triazole*
C. C. Davis

A new synthesis of substituted thioxanthydrols. J. Reilly, P. J Drumm and B Daly *Proc Roy Irish Acad* 39B, 515-22(1930); cf *C A*. 21, 1253, 2885, 22, 706.—$(p\text{-}MeC_6H_4)_2O$ (I) reacts with $C_6H_4(CO)_2O$ (II) or $B_2Cl$ (III) and $AlCl_3$ to give only monosubstituted derivs. $H_2SO_4$ does not act upon the substituted *o*-benzoylbenzoic acid formed with II to yield a substituted anthraquinone but gives 2,7-dimethyl fluoran (IV) instead The product from the reaction of I with III is 9 phenyl 2,7-dimethylxanthydrol instead of the expected ketone so the formation of IV probably proceeds through a xanthydrol. Exactly similar results are obtained with $(p\text{-}MeC_6H_4)_2S$ (V) instead of I save that the condensation of V with III proceeds less smoothly. V, $b_{14}$ 186° m 57 3°, was obtained in 70% yield by diazotizing $p\text{-}MeC_6H_4NH_2$, destroying the excess $HNO_2$ with $CO(NH_2)_2$ and slowly adding the diazonium chloride with vigorous stirring to $p\text{-}MeC_6H_4SH$ (VI) (1 mol) in dil NaOH (1 mol) at 60–70°, keeping the mixt at this temp for 1 hr after addn is complete (Explosive diazo thioethers result at lower temps) $(p\text{-}MeC_6H_4)_2S_3$ (VII), m 45.6°, was prepd by adding 3.3 g $Br_2$ to 5 g VI in 100 cc $Et_2O$ at 0° It dissolves in concd $H_2SO_4$ to give violet to blue colors, whereas V gives only a faint green, hence it is probable that the violet color obtained by Dilthey and others (*C A* 24, 91, 1855) with V was really due to VII. 2-*o*-Carboxybenzoyldi *p*-tolyl sulfide (VIII) was prepd by the Friedel and Craft reaction and by heating *p* $MeC_6H_4SK$ with *o* $(2,5\text{-}ClMeC_6H_3CO)C_6H_4CO_2K$ in the presence of a trace of Cu powder The Ag salts were sparingly sol in $H_2O$ but sol in dil $NH_4OH$ and the m ps and the mixed m ps were the same, 207°. VIII gave an oxime, m. 129°, and warmed with concd $H_2SO_4$ gave 2,7 dimethylthiofluoran, m 222°. 9-Phenyl-2,7 dimethylthioxanthydrol (IX) (from V and III), m 207°. It dissolves in AcOH with a pink color which becomes reddish orange on heating It dissolves in $H_2SO_4$ to a reddish orange soln with a brownish yellow fluorescence and the color is not destroyed nor is there pptn on dilu with $H_2O$ Addn of anhyd $FeCl_3$ to an HCl satd soln of IX in AcOH forms a carmine red ferrichloride, m 202°. Satn of a soln of IX in anhyd $Et_2O$ with HCl gives deep red prisms of the chloride HCl of IX which is readily sol in $CHCl_3$ and in $PhNO_2$ but insol in $Et_2O$ and in PhH This compd. probably has a quinonoid rather than a sulfonium structure (cf *Ber* 37, 2937; *C. A*. 4, 1172) IX is slowly reduced by boiling in alc HCl to the corresponding thioxanthene, m. 157°, but reduction by Zn in 80% AcOH is much more rapid $PhNEt_2$ reacts with IX to give 4'-diethylamino-9,9 diphenyl 2,7 dimethylthioxanthene, colorless needles, m 211°.
C. H Peet

Purely aliphatic *streptо*-pentamethin dyes. W. König and W. Regner. *Ber*. 63B, 2823–7(1930).—That compds. of the type $Alk_2N(CH)_{n-1}{}^{+-}NAlk_2X^{-+}$ or, rather, $[Alk_2N^{+-}{=}CH{-}CH{=}CH{-}^{+}CH{=}^{+}NAlk_2]X^-$ are not only colored but have sufficient color strength and fiber affinity for practical dyeing purposes had not as yet been definitely proved, although indications of this had been obtained with the pentamethinium salts ($n$ = 3) Zincke, at the beginning of his classical work on the cleavage of pyridine, had attempted to prep the salts $[R_2N^{+-}{=}CH{-}CH{=}CH{-}CH{=}CH{-}NR_2^{+-}]X$ (I, $R_2N$ = $Me_2N$ and $CH_2CH_2CH_2CH_2CH_2N$) but obtained them only in the form of very difficultly sol $HgCl_2$ addn compds., and he distinctly expressed the opinion that the salts themselves are so unstable that they cannot be isolated as such, and as the yellow color of the $HgCl_2$ compds. might to a certain degree be produced by the $HgCl_2$ the question whether these salts are real dyes remained unanswered The desired evidence has now been supplied by the synthesis of the well-crystd *perchlorates* (I, X = $ClO_4$) By the BrCN $C_5H_5N$ method they are formed only to a minor extent, together with many other products, which renders their purification difficult, they can also be obtained from $NHMe_2$ or piperidine with various di *N* arylaminopentamethinium salts but these methods are far inferior to that depending on the treatment of the Zincke aldehydes, ArAlkNCH CHCH CHCHO, with $NHMe_2$ or piperidine in the presence of 1 equiv of $HClO_4$. The 2 perchlorates are, in solid form, yellow with beautiful blue surface luster, they are relatively stable, easily dissolve in $H_2O$ and alc with green yellow color and dye tannated cotton similarly to the auramines as regards tone and depth of color The absorption curves of the 2 salts are almost identical the $NMe_2$ compd shows a single main band with a max at 412$\mu\mu$ which is materially more persistent and narrower than the corresponding

band complex of auramine perchlorate; at around 300$\mu\mu$ the dye is extraordinarily transparent Colorimetric comparison of alc solns of the $Me_2N$ compd and com. auramine G showed relative strengths of about 85 100 The fastness to light of the color on tannated wool was at least equal to that of auramine and the fastness to acids and alkalies was greater A further striking property of the new salts is their strong *luminescence under the Hanauer quartz lamp (intense green and orange-yellow for the* $Me_2N$ and piperidine compds, resp), this fluorescence is shown only by the solids, not their solns, and is limited to the perchlorates The *1,5-bisdimethylaminopentamethinium perchlorate* m 165°, the *1,5-bis-N-piperidino salt* m 111° C A R

**Linear pentacene series. XX. Optical absorption of pentacene compounds.** Guido Machek *Monatsh* 57, 201–24(1931), cf *C. A* 24, 5019.—Details are given, in tables and as curves, of the absorption of pentacene 6,13 monoquinone, pentacene-5,7,12,14 diquinone, 1 8-dihydroxypentacene-5,7,12,14-diquinone, the 6,13 di HO deriv, the 1,8-di-Br deriv, the 6,13 di Br deriv and the 1,11-di-$NO_2$ deriv in $C_6H_6$ and $C_5H_5N$ and of the 1,11 di Br deriv, the 2,9 di-Br deriv, the 1,8- and 1,11-diamino derivs, and the 1,8-di $NO_2$ deriv in $C_5H_5N$ The influence of the solvent and of the substituents of the absorption spectra is discussed C. J. West

**Alkali-organic compounds. VIII. Reactions between lithium alkyls, pyridines and condensed pyridine systems.** K Ziegler and H Zeiser *Ann.* 485, 174–92 (1931), cf *C A* 24, 5752.—Quinoline and a 1 32 *N* BuLi soln in $C_6H_6$ give an addn. product (I) which, on decompn with $H_2O$, gives 90% of *2 butyl-1,2-dihydroquinoline* (II), $b_{0.6}$ 128°, $b_{14}$ 160–2°, $d_4^{20}$ 0 997, $n_\alpha^{20}$ 1 5699, $n_{H_e}^{20}$ 1 5772, *picrate*, deep red, m 140–60°. Thermal decompn. of I gives 50–60% of *2 butylquinoline* (III), $b_{14}$ 153° after purification through the *picrate*, m 162–3°, the crude III also yields a *picrate*, m. 145°, probably that of the 4-Bu deriv. III has $d_4^{20}$ 1 003, $n_\alpha^{20}$ 1.5699, $n_{H_e}^{20}$ 1 5766. Heating II in 5 parts $PhNO_3$ gives 70–80% III PhLi gives principally 2-phenylquinoline and a little 4-Ph deriv. Isoquinoline and BuLi give an unstable dihydro-1-butylisoquinoline, which $b_{0.4}$ about 135° and on dehydration by boiling in $PhNO_3$ gives 70% of *1 butylisoquinoline*, $b_{14}$ 154–7°, b 283–4°; *picrate*, m 185 5°. PhLi gives the 1-Ph deriv. Acridine and BuLi give 9-butyl 9,10-dihydroacridine. 2-Butylpyridine and BuLi give *dibutylpyridine*, b. 243–4°; *chloroplatinate*, yellow, m 192 5–3°. Quinaldine gives a Li deriv, which yields with PrBr III; $PhCH_2Cl$ gives 2-(β phenylethyl)quinoline, m 28°. Allyl chloride gives *2-(3-butenyl)quinoline*, $b_{14}$ 152 5–4°, $d_4^{20}$ 1 023, $n_\alpha^{20}$ 1 5853, $n_{H_e}^{20}$ 1 5920, *picrate*, yellow, m 143°. $Ph_2CO$ gives *1,1-diphenyl 2-(2 quinolyl)ethanol*, m 165°; $H_2SO_4$ in AcOH splits off $H_2O$ and gives *2-(β,β-diphenylvinyl)quinoline*, m. 103–3 5°. The Li compd. of picoline and $PhCH_2Cl$ give 2 (β phenylethyl)pyridine C. J. West

**Ultra-violet absorption spectra of the quinoline group.** C. Stanton Hicks. *Australian J. Expll Biol. Med Sci.* 7, 171–81(1930).—Cinchonine, quinine, cinchotoxine, hydrocupreine, quinoline, cupreine, methylquinine, ethylquinine, ethylhydrocupreine, eucupine, yohimbine and euquinine were studied. The quinoline nucleus is the detg factor in the absorption characteristics of the group The absorption curves of stereoisomers were practically identical Substitution in the quinoline HO group, reduction of the vinyl group, esterification, or opening of the quinuclidine nucleus, exert little or no effect upon the curves. The absorption curve of yohimbine is similar to that of *indole and quinoline* C G King

**The alkyl-*py*-quinolines. (Generalization of the Skraup's reaction applied to α-alkylglycerols.)** Raymond Delaby and Mlle. Jeanne Hiron. *Compt. rend.* 191, 845–7. *Bull soc chim.* [4], 47, 1395–400(1930).—The alkyl-*py*-quinolines were obtained in low yields by means of the Skraup's reaction modified by the authors They are clear yellow liquids possessing a strong odor, and were found to be mixts. of α- and γ-isomers, the former being present in greater quantities The phys properties of the following quinolines and their derivs are: α-ethyl-, α propyl and α-butylquinoline, resp, $b_{14}$ 128–31°, 142–5°, 150–5°, $d_{17}$ 1 050, 1 038, 1 020 (at 18°), $n_D^{23}$ 1 5979, 1 5886, 1 5709, picrate, m 148°, 150°, 143°, chloroplatinate, m 188°, oily, 163 5°; chloromercurate, m. 118°, 112°, —, iodomercurate, m 135°, —, —, iodobismuthate, m. 205° (decompn), 180°, 163°. C. J. Pedersen

**Methoxylated phenylquinolines or 2-phenyl-4-hydroxyquinoline.** Reinhard Seka and Walter Fuchs *Monatsh.* 57, 52–62(1931).—These compds. were prepd. as a preliminary step to the synthesis of certain flavones. PhNHBz gives 68 5% of a chloroimide, $b_{18}$ 200–10°, m. 40°, which condenses with $CHNa(CO_2Et)_2$ in $Et_2O$, by heating 16 hrs. at 130–50°, giving 27.6% of the Et ester, m 261–2°, of 2 phenyl-4-ketoquinoline-

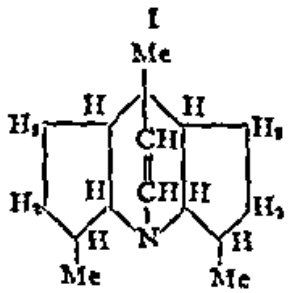
carboxylic acid, which reacts with $PCl_5$ and $NH_3$ to give the *amide*, m 209°, and with $N_2H_4$ $H_2O$ to give a *pyrazolone compd*, $C_{14}H_{11}ON_4$, m 317°. *p*-$MeOC_6H_4NHBz$, m 156.5°, gives a chloroimide, $b_{18}$ 220°, m 63–4°; $CHNa(CO_2Et)_2$ gives 20.5% of the *Et ester*, m 245°, of *2-phenyl-4 keto-6 methoxyquinoline-3-carboxylic acid*, m 235°; sublimation at 12 mm splits off $CO_2$, giving *2-phenyl-4 keto-6 methoxyquinoline*, m 287°. *p*-$MeOC_6H_4NHCOC_6H_4OMe$ *p*, m 202°, yields a *chloroimide*, $b_{18}$ 215–25°, m 109°; condensation with $CHNa(CO_2Et)_2$ gives the *Et ester*, m. 205–6°, of *2 p-methoxyphenyl-4 keto 6 methoxyquinoline-3 carboxylic acid*, m. 252°, the AcOH soln shows a pale bluish yellow fluorescence. Sublimation in a high vacuum gives 70% of *2-p-methoxyphenyl-4 keto 6-methoxyquinoline*, crystg with 1 mol $H_2O$, m. 295°.

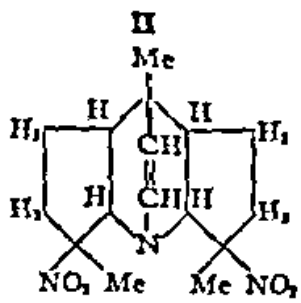
C. J. West

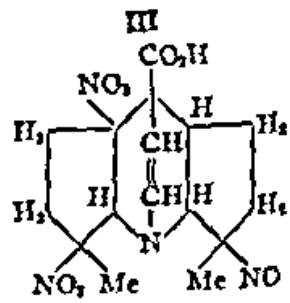
**Pyrimidines. CXX.** Action of ozone on uracil. Treat B. Johnson and Robert B. Flint. *J. Am. Chem. Soc.* 53, 1077–81(1931), cf. *C. A.* 24, 2462.—Uracil is not readily attacked by $O_3$ in glacial AcOH or 85% $HCO_2H$ at room temp.; if, however, the pyrimidine is suspended in either solvent and washed $O_3$ is bubbled into such a suspension for several hrs., the uracil is finally completely destroyed, the 2 major products are oxaluric acid and *formylglyoxalurea*, $C_4H_4O_4N_2$, m. 162°, which does not yield a phenylhydrazone, the *Ag salt* crystallizes with 1 mol $H_2O$, it reduces Fehling soln. and Tollens reagent, dil. $H_2SO_4$ gives HCHO and $CO(NH_2)_2$. Part of the uracil mol. is completely broken down with the formation of $CO(NH_2)_2$, $(CO_2H)_2$ and $HCO_2H$. **CXXI.** Action of ozone on some derivatives of uracil. *Ibid* 1082–7.—4 Methyl uracil and $O_3$ give 67% of *acetylglyoxylurea*, m. 150°, $CO(NH_2)_2$ and $(CO_2H)_2$. 4 Phenyl uracil gives benzoylglyoxylurea. Thymine gives 40% of $H_2NCONHCHO$, $AcCO_2H$ was not detected. 5-Bromouracil gives parabanic acid. 5-Nitrouracil reacts slowly (28 hrs.), giving parabanic and oxaluric acids. 1,3-Dimethyl 5-bromouracil gives *dimethyloxaluric acid*, m. 124–5°. These results show that the pyrimidine ring is destroyed with the formation of characteristic ureide constructions and simple oxidation products. In no case is the urea configuration of the respective pyrimidines destroyed by the $O_3$ treatment. The application of ozonization makes possible an improved technic for detg. the structure of uracil compds. The advantages gained explly. become apparent when one is called upon to sep. and identify the products of oxidation.

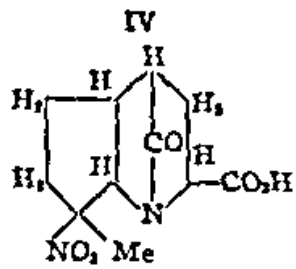
C. J. West

Nitrogen compounds in petroleum distillates. III. Structure of a hydroaromatic base of the formula $C_{14}H_{21}N$. W. C. Thompson and J. R. Bailey. *J. Am. Chem. Soc.* 53, 1002–11(1931), cf. *C. A.* 24, 1804.—The base (I), after purification through the picrate, $b_{744}$ 278.2°, $d_4^{20}$ 0.9391, $n_D^{20}$ 1.5129, optically inactive, *picrate*, yellow, m. 151°, *acid sulfate*, m. 106°, *HCl salt*, m. 251°, *nitrate*, crystals with 1 mol $H_2O$,



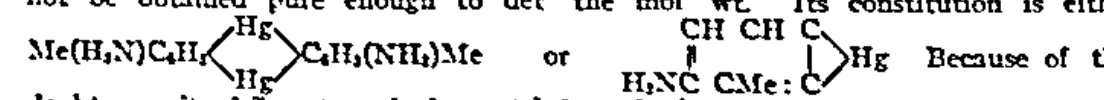




m. 79°, is dehydrated at 110° and then m. 141°, soly. in $H_2O$ at 30° 1.20, *chloroplatinate*, decomps. 240°, *zinc chloride salt*, m. 171°; *mercurichloride*, softens at 250° and then decomps. without melting. I does not contain a *N* alkyl group and cannot be dehydrogenated by $Hg(OAc)_2$ in 50% AcOH or by other methods. Br gives only a

loose Br addn product Oxidation with $KMnO_4$ gives only $(CO_2H)_2$ I is not reduced by Na and abs EtOH, Sn and HCl or HI and red P I is regarded as *decahydro-3,5,8-trimethyl-4,8-ethenopyrrindacine* Nitration of I gives a mixt. of 4 products when heated at 170° for 3 hrs., *3,5-di NO₂ deriv* (II), m 116.5° (*picrate*, m 231°), *decahydro-3,5-dimethyl-3,5,7a trinitro-4,8-etheropyrrindacine-8-carboxylic acid* (III), yellow, m 347° (decompn) *octahydro-7-methyl 7-nitro-1,4-carbenylpyrrindine-3-carboxylic acid* (IV), m 189–90° (decompn), readily oxidized with alk $KMnO_4$, berberonic acid, m 240–1° (decompn) C J West

Oxidation of heterocyclic arsenic compounds by iodine. G A Razuvaev and V S Malinovskii *Ber* 64B, 120–30(1931), cf *C. A.* 24, 2132.—A new method for the *detn of As* in alkyl and aryl derivs. of 9,10-dihydrophenarsazine (I), in 10-chloro-9,10-dihydrophenarsazine (II), in 9,10-dihydrophenarsazine oxide (III) and in phenoxarsine oxide (IV) A soln of the sample in 15–20 cc. EtOH was dild with $H_2O$ until cloudy, and titrated with alc I (0.1 *N* for 0.3–0.5 g samples, 0.02 *N* for 0.1 g sample) to a bright yellow color During titration $H_2O$ was added 2 or 3 times so that the total vol. was 60–100 cc The color appearing on the addn of the 1st portions of I disappeared at once on shaking Toward the end of the titration, 10–30 sec was required for disappearance of the color Finally 1–2 drops of I soln gave a bright yellow color which lasted 24–48 hrs. This method is good for all derivs. of I which are not colored or contaminated with colored substances. The oxidation products must also be colorless or nearly so The method is not good for I, since a brown color developed and obscured the end point. With IV, which is insol in EtOH, the method was modified With both IV and II, the addn of $NaHCO_3$ during the titration was advantageous. The results obtained by this new method were within the permissible limits of error Before the oxidation products could be studied it was necessary to remove the HI also formed This was done (1) by neutralization with NaOH, or (2) by pptn with an excess of freshly pptd $Ag_2O$ and removal of the ppt. of AgI and $Ag_2O$ by filtration The products were obtained on concn of the soln and with a nearly theoretical yield in each case Method 1 gave mainly the di OH derivs. of the 10-R derivs. of I; method 2 gave the corresponding oxides. The products usually contained some $H_2O$ of crystn or hygroscopic moisture, which was removed by drying *in vacuo* (5–10 mm) over $P_2O_5$ The di OH derivs. dried *in vacuo* at 70–150° gave the oxides. The following oxidation products were isolated: di-OH deriv of 10-Me deriv. of I, m. 210–15° (80% yield), the corresponding oxide (also obtained by drying the di-OH deriv. over $P_2O_5$) decomps without melting at 256–7°, the di OH deriv of the 10-Et deriv of I m. 141–3° when contg $H_2O$, it m. 141–183° when $H_2O$-free; the corresponding oxide m 230°, the di OH deriv. of the 10-Pr deriv of I m 93°, the corresponding oxide m 111–2°, the di OH deriv. of 10-iso-Am deriv. of I m. 95–6°; the corresponding oxide m 101–2°, hygroscopic; the 10-Ph deriv of I was not obtained, the product being always the oxide, m. 280–300° (decompn) Oxidation of III gave phenarsazinic acid (V); of II gave V; of IV gave phenoxarsinic acid, m 221–2°; of $AsPh_3$ gave triphenylarsine dihydroxide, m 112–4° These oxidation products gave dark red or cherry-red solns in concd $H_2SO_4$ The following derivs. of I were prepd 10-Pr deriv., from MgPrI and II, m 81–2°, 10-iso-Am deriv., from iso-AmMgBr and II, m 76–8°; 10-Ph deriv., from PhMgBr and II, m 148.9° Louise Kelley

The formation of a closed heterocyclic ring of mercury atoms. II. L. Vecchiotti and M. Pancera *Gazz. chim. ital.* 60, 904–9(1930); cf *C. A.* 25, 957.—The constitution of the Hg ring compds. prepd. in the previous expts. (cf V., *C. A.* 23, 3447) by the action of $Na_2S_2O_3$ on $PhNH_2$ derivs. contg 2 nuclear AcOHg groups was not definitely established, and in view of this and because of their interesting character, the expts. were continued with the prepn of other compds. 2,3,4-Me(AcOHg)·$C_6H_2NH_2$·3,4-Diacetomercuro-*o*-toluidine (cf V. and Copertini, *C. A.* 24, 348) (6 g) and aq $Na_2S_2O_3$ (10 g in 10 cc.), let stand 1 month in darkness, filtered, the residue washed with water and dried over $H_2SO_4$ yield *3,4-bimercuri-bi-o-toluidine* (I), m. 200°, could not be obtained pure enough to det the mol wt. Its constitution is either



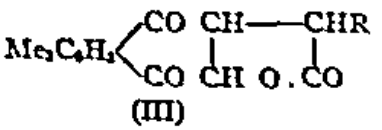
Because of this doubt, a quite different method was tried to obtain a compd., the identity of which could be more easily established. *o*-$C_6H_4Br_2$ (50 g), 2% Hg-Na (500 g), dry gasoline (50 g) and AcOEt (5 g), refluxed 5 hrs. at 120°, filtered hot, the gray product in the residue sepd mechanically from the Hg, dried in air, washed with boiling water, dried recrystd from boiling cumene (because of the insoly. in all ordinary solvents) and washed with EtOH and then with $Et_2O$, and dried *in vacuo* over $H_2SO_4$, yields *1,2-bi-*

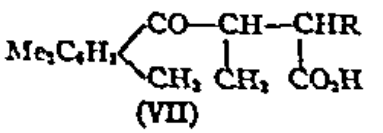
*mercuribiphenyl* (II), turns light brown when heated, but does not m up to 300°. Its analysis corresponds to $C_6H_4Hg$, so that it is either $C_6H_4\langle{}^{Hg}_{Hg}\rangle C_6H_4$ or $C_6H_4{\cdot}Hg$ To decide between these 2 formulas, its decompn was studied II and glacial AcOH, refluxed for a long time, filtered hot, the filtrate cooled, and fractionally crystd and the product dried *in vacuo* over $H_2SO_4$, yield a *bis(acetomercuri)benzene*, $(AcOHg)_2C_6H_4$ (III), does not m up to 300° The mother liquor from this crystn, neutralized with KOH and steam distd, the distillate extd with $Et_2O$ and the $Et_2O$ evapd from the ext yields $C_6H_6$. This is in accordance with the 1st formula of II given above, and with the reaction $C_6H_4\langle{}^{Hg}_{Hg}\rangle C_6H_4 + 2AcOH \longrightarrow III + C_6H_6$. III (6 g) and I (7.68 g) in aq KI (6 g in 60 cc), intimately mixed, let stand 24 hrs at room temp, steam-distd, the distillate extd with $Et_2O$, the ext evapd, the residue cooled with ice, the solidified product dissolved in a min of boiling EtOH, the soln made ice-cold and the ppt dried *in vacuo* over $H_2SO_4$, yields *o* $C_6H_4I_2$, m 27° (cf Körner and Wender, *Gazz chim ital* 17, 491) This proves conclusively that II has the 1st formula given above C C Davis

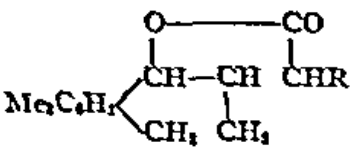
**Attempted synthesis of a tricyclic system present in morphine.** Richard H Manske *J Am Chem Soc* 53, 1104–11(1931) —An attempt, thus far unsuccessful, to effect the synthesis of a portion of the morphine nucleus, is reported Details are given of the prepn of phenylsuccinic and β phenylglutaric acids Reduction of $EtO_2C$-$CHPhCH_2CO_2Et$ with Na and EtOH gives *2 phenylbutane-1,4-diol*, $b_4$ 165°, sets to a solid glass at −10°, *bisphenylurethan*, m 113°, dry HBr in $Ac_2O$ gives the *di-bromide*, $b_{16}$ 173–5°, loses HBr readily and in several days turns turbid and dark, NaCN, followed by hydrolysis, gives *β phenyladipic acid*, m 146°, with $PCl_5$ and then $AlCl_3$ in $CS_2$ there results *1-keto-1,2,3,4 tetrahydronaphthalene-4-acetic acid*, but the yield was so small that it was not obtained in a state of purity, there also resulted a small quantity of *4,9-diketo 1,2,3,4 tetrahydroacenaphthene*, m 140°. *3-Phenylpentane 1,5-diol*, $b_4$ 174°, *bisphenylurethan* m 112–3°, the *dibromide*, $b_{16}$ 177–82°, loses HBr readily and with EtOH PhONa gives *3 phenyl 1 5-diphenoxypentane*, m 72°. *γ-Phenylpimelic acid*, m 84°, $PCl_5$, followed by $AlCl_3$, gives 53% of *1-keto 1,2,3,4 tetrahydronaphthalene 4 propionic acid*, m 108–9°, the *Me ester* is a viscous oil, there also results in this condensation *hexahydrobenzonaphthene α,α'-dione*, m 111°; *dioxime*, m 253–4° β Phenylglutaric acid, $PCl_5$ and $AlCl_3$ give *hydrind-1-one-3-acetic acid*, m 155°, *Me ester*, $b_{16}$ 175–80°, m 54° In the reduction of esters with Na, the use of EtOH is as satisfactory as the toluene method, in the case of the ester contg $PhO(CH_2)_3CN$, there results *α phenoxybutyr δ-phenoxybutylamide*, m 94–5°. $PhO(CH_2)_4OH$ is obtained in 77% yield with the Na-EtOH reduction, $HO(CH_2)_4OH$ is obtained in 75% yield C J West

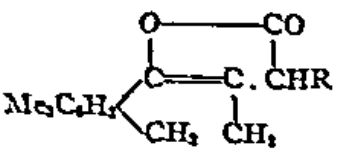
**Syntheses in the field of the santonin derivatives.** A E Chichibabin and M N Shchukina *Ber* 63B, 2793–806(1930) —This paper is published because of the appearance of the communications of Clemo, Haworth and Walton (*C A* 24, 4046) and of Berg (*C A* 24, 4300) The method chosen for the synthesis of santonin and related substances is closely analogous to that used for the synthesis of pilopic acid (*C A* 24, 3015) Succinic esters and their homologs are condensed with oxalic esters to oxalosuccinic esters $R'O_2CCHRCH(CO_2R')COCO_2R'$, which are reduced to the HO esters, $R'O_2CCHRCH(CO_2R')CH(OH)CO_2R'$, and these on heating yield the lactonic acid esters O CO CHR CH($CO_2R'$) $CHCO_2R'$ which contain 3 asym C atoms and may therefore exist in 4 optically inactive stereoisomeric forms By condensation of the anhydrides or chloroanhydrides of these lactonic acids with aromatic compds (especially *p*-xylene and 2,5-$Me_2C_6H_3OMe$) it was planned to prep the products of incomplete condensation, 2,5-$Me_2C_6H_3COR'$ (I) and 2,5,4 $Me_2(MeO)C_6H_2COR'$ (II) (R' = —CH O CO CHR $CHCO_2H$), and those of complete condensation (III and IV) (IV = III with $Me_2(MeO)C_6H$ instead of $Me_2C_6H_2$) I and II on reduction should yield the dibasic acids $Me_2C_6H_3CH_2CH_2CH(CO_2H)CHRCO_2H$ (V) and $Me_2(MeO)C_6H_2CH_2CH_2CH(CO_2H)CHRCO_2H$ (VI) which by ring closure should give the tetrahydronaphthalene derivs VII and VIII. Reduction of the ketone C O group in VII and VIII and subsequent lactone formation should give compds with structures (IX and X) which, when R = Me, have been shown by the work of C., H and W to be the structures of hyposantonin and desmotroposantonin Me ether. IX and X

are also obtained by the method successfully used by C., H. and W., *viz.*, ring closure of VII and VIII to the unsatd. lactones, XI and XII, and reduction. Reduction of the two ketone C:O groups in III and IV should give compds. (XIII and XIV) having the structures which recently have usually been assigned to hyposantonin and desmotroposantonin Me ether. Sapon. of the MeO group in X and XIV would give the compds. (XV and XVI) having the 2 structures which have been given to desmotroposantonin. XIII and XIV can also be obtained in a more round-about way: reduction of I and II to $Me_2C_6H_3CH_2R'$ (XVII) and $Me_2(MeO)C_6H_2CH_2R'$ (XVIII) (R in R' (see above) = Me), ring closure to the tetrahydronaphthalene derivs. (XIX and XX) and the reduction of the C:O groups to $CH_2$. All these syntheses might be rendered difficult by the presence of the 3 asym. C atoms but it was hoped that the intermediate products corresponding to the stable hyposantonin and desmotroposantonin might also be stable and therefore the most easily formed modifications. The work has not yet been completed and the results so far obtained are published now to reserve the right of further investigation along this new broad road to the synthesis of santonin-like lactones. From $EtO_2C$-$CHMeCH_2CO_2Et$, $(CO_2Et)_2$ and NaOEt was obtained 80–90% $EtO_2C$-$CHMeCH(CO_2Et)COCO_2Et$ (probably a mixt. of stereoisomers), converted by reduction with amalgamated Al in moist $Et_2O$ into 85% of a mixt. of esters of 3 stereoisomeric HO acids. On distn. *in vacuo* elimination of EtOH and lactone formation occurred and 200 g. of the reduction product after 15 fractionations yielded 88 g. liquid ester $b_{12}$ 182–3°, $d_{20}$ 1.1717, $n_D$ 1.4498, 18 g. $b_{12}$ 186–7°, $d_{19}$ 1.1747, $n_D^{20}$ 1.4507 and 13 g. solid ester, $b_{12}$ 200–4°, m. 70°. Of these *di Et 3-methylbutanolide-1,2-dicarboxylates*, the first yielded with boiling HCl a free *acid*, m. 179–82°, which with AcCl gave, along with dimethylmaleic anhydride, the *anhydride*, m. 162°, *anilide*, from the anhydride and boiling $PhNH_2$, m. 212–4°. The ester $b_{12}$ 186–7° gave an *acid*, m. 186°, which strongly depressed the m. p. of the preceding acid and was for the most part unchanged by boiling AcCl, the small quantity which did react giving the above anhydride. The 2 acids are apparently *cis trans* isomers. The solid ester gave an *acid*, m. 185°, forming with AcCl an *anhydride*, m. 201° which partly isomerizes into the 162° anhydride on distn. *in vacuo* and yields the same anilide with $PhNH_2$. The 162° anhydride with *p*-xylene and $AlCl_3$ gave the *acid* I, m. 171–3°, converted by heating 5 min. in concd. $H_2SO_4$ on the $H_2O$ bath into an *isomer*, m. 150°, which is obtained directly from the chloroanhydride of the 181–2° acid with *p*-xylene and $AlCl_3$. I and its isomer with amalgamated Zn and concd. HCl gave the *compd.* V, m. 161–3°, but with amalgamated Zn and AcOH they yielded a *compd.* 2,5-$Me_2C_6H_3COCH_2CH(CO_2H)CHMeCO_2H$, m. 169–72°, which is reduced to V by the Clemmensen method. The *chloroanhydride*, m. 182° (decompn.), of I, heated at 160–85°, yields the *diketone* III, light yellow, m. 137–9°, reacts neutral to litmus, sol. in boiling 10% but only difficultly in 0.1 *N* NaOH. The 162° anhydride with 2,5-$Me_2C_6H_3OMe$ gives the *ketolactonic acid* II, m. 207–8° (together with a small quantity of a substance m. 156°), which is reduced by the Clemmensen method to the compd. VI, m. 131°, converted by demethylation with HI into the cryst. product from which was obtained, by the method of C., H. and W., their unsatd. lactone m. 250–2°.


(III)


(VII)


(IX)


(XI)

C. A. R.

Sulfur sugars and their derivatives. XV. Nature of the sugar of mustard oil glucosides. Wilhelm Schneider, Hellmuth Fischer and Walter Specht. *Ber.* 63B, 2787–98(1930); cf. *C. A.* 23, 4932.—It has been established that the natural mustard oil glucosides are *S* glucosides of the type RN:C(OSO$_2$M)SC$_6$H$_{11}$O$_5$ (M = K, an org. base, etc.) and it only remained to det. whether they are α- or β glucosides. From their negative rotation and the fact that all plant glucosides hitherto investigated have been found to be derivs. of β glucose, it was to be expected that these *S* glucosides would also belong to the β series, although Wrede had reported that the thio-

sugar obtained from sinigrin is not identical with the thioglucose synthesized by Schneider and collaborators which, from its method of prepn. and reactions, seemed to be beyond doubt a β-compd. The subsequent prepn. in pure cryst. form of the Na salts of the 2 mutameric thioglucoses and the exact characterization of the optical behavior of the free thiosugar undermined the ground on which Wrede based his conclusion that the thiosugar from sinigrin is the α form and again left open the question of its configuration. Since the 2 typical glucosidases, emulsin and yeast maltase, cannot be used, the mustard oil glucosides being hydrolyzed only by myrosinase, which is sp. for them alone, and since the synthesis of these glucosides has not yet been effected, their configuration could be settled only by detg. that of the glucose set free by their cleavage. Preliminary expts. along these lines on sinigrin have already been described (S. and Becker, *C. A.* 24, 2466). *Contrary to this preliminary announcement, however,* the initial rotation of the glucose liberated by myrosinase is not unequivocal. It was found that it is impossible to prep. an optically inactive myrosinase soln. and its rotation is so affected by $NH_3$ as to render it impossible to recognize with certainty any mutarotation effect of the sugar split off. The expts. described in the present *paper, however, confirm the results given in the preliminary note* and lead to the same conclusion on a firmer exptl. basis. The mustard oil glucosides are smoothly and rapidly decompd. by aq. $AgNO_3$, with pptn. of allyl mustard oil $AgSO_4$ in the case of sinigrin and a mixt. of the mustard oil and sinapic acid Ag compds. in that of *sinalbin,* and if the $HNO_3$ set free is at once neutralized by carrying out the reaction in the presence of Ba or Ag carbonate, the reaction is practically complete in 0.5 hr. and the mutarotation of the liberated glucose is not unduly accelerated by the acid. $Hg''$ salts can also be used, although not so satisfactorily, for the decompn. From sinigrin, m. 127–9°, $[\alpha]_D^{19}$ −16.4° ($H_2O$, *c* 2.622), *with 3 mols. $AgNO_3$ was obtained a glucose* soln. with $[\alpha]_D^{20}$ changing from 81.0° 40 min. after adding the $AgNO_3$ to 64.7° after 120 min. and 53.7° *for* $t = \infty$ (20–30 hrs.). Sinalbin, m. 84–5°, $[\alpha]_D^{22}$ −8.76° ($H_2O$, *c* 0.2967), gave a glucose soln. with $[\alpha]_D^{20}$ 93.7°, 52.4° (const.) after 40 and 120 min., resp. With $Hg(OAc)_2$ the decompn. is so slow that at the end of 1 hr. the rotation is still rising because of the increasing concn. of sugar with high rotation, and only after 2 hrs. does the mutarotation begin to manifest itself by a decrease in the rotation. These results show plainly that *the sugar split off is the α form,* and would seem to confirm Wrede's conclusion that sinigrin and sinapin are α glucosides. The synthetic Na β glucothiosate should then give with $AgNO_3$ β glucose with a low initial rotation, but as a matter of fact there was obtained a glucose soln. with $[\alpha]_D^{22}$ changing *from* 68.5° after 45 min. to a const. value of 48.5° (that the final value is somewhat lower than the equil. value, 52.5°, for glucose is due to the fact that the colloidal glucothiose Ag compd. is adsorbed on the $BaCO_3$-$Ag_2S$, if the decompn. is carried out in the absence of $BaCO_3$ the mutarotation is considerably accelerated but leads to const. values very *close to 52.5°*). *In the desulfurization of β glucothiose by $AgNO_3$, the glucose is therefore* split off as α glucose, and as the reaction is entirely analogous to that with the mustard oil glucosides the latter are certainly β glucosides. This is confirmed by the formation of β,β-diglucosyl disulfide octaacetate, m. 140°, $[\alpha]_D^{21}$ −158.7° in $(CHCl_3)_2$, from sinigrin heated on the $H_2O$ bath with about 2.2 mols. of 0.1 *N* NaOH, cooled to *room temp., neutralized, immediately treated with 0.1 N I as long as it is* used up, evapd. *in vacuo* and treated with $Ac_2O$ in cold $C_5H_5N$. C. A. R.

Digitalinum verum. H. Kiliani. *Ber.* 63B, 2866–9(1930).—For the hydrolysis of *Digitalinum verum* (I) K. had previously always used a dil. HCl contg. alc. *and* then treated the sugar soln., after removal of the digitaligenin, with Br to sep. the oxidation product of the digitalose as digitalonolactone (II) from the *d* gluconic acid formed at the same time, but the yield of II was very small (never more than 10%). It therefore seemed desirable to devise another cleavage method for such glucosides, especially since the use *of HCl contg. alc. leads to the formation of considerable* quantities of ethylsugars, which greatly interfere with the sepn. and identification of the individual sugars. K. had left, from his earlier work, several kg. of digitalis by-alkaloids which, *he found* still contained considerable quantities of I. This he extd. by a *method* similar to that used before but differing in the relative proportions of substance and solvents employed, he will publish the details of this method after he has tested it on a com. by product to be soon supplied to him. The 90 g. of crude I he obtained by his new method was purified by the method previously described but for its hydrolysis he used an acid contg. AcOH instead of alc. (35 cc. glacial AcOH, 55 cc. $H_2O$ and 10 cc. concd. HCl), the solvent action of the AcOH on both the glucoside and the genin is

about the same as that of the alc., no ethylsugars are formed and, because of the dilu. and the presence of HCl, the danger of acetylation is exceedingly small. Details of the hydrolysis and of the working up of the sugar soln. for II are given. The yield of II is regularly around 40%. Attention is called to an error in Haworth's book, *The Constitution of Sugars*. C. A. R.

**Strophanthin. XIX. The dehydrogenation of strophanthidin and gitoxigenin.** Walter A. Jacobs and Elmer E. Fleck. *Science* 73, 133–4(1931), cf. *C. A.* 24, 5773.—The Se method of dehydrogenating is used and gives promising results pointing toward the structure of the hydrocarbon upon which these aglucones are built. Four fractions were obtained from strophanthidin and 2 from gitoxigenin. The hydrocarbon obtained from fraction II from gitoxigenin resembles the $C_{21}H_{18}$ hydrocarbon obtained from fraction 4 from strophanthidin. W. H. Tiffany

**Unedoside, a new glucoside hydrolyzable by emulsin, from the fresh leaves and branches of Arbutus unedo L.** M. Bridel and (Mlle.) C. Bourdouil. *J. pharm. chim.* [8], 12, 241–53; *Bull. soc. chim. biol.* 12, 910–20(1930); cf. Bourquelot and Fichtenholz, *C. A.* 4, 2948.—Unedoside (I), obtained with a yield of only 0.1 g. per kg. of fresh leaves or branches, is sol. in water (3% at ordinary temp.) and 95% alc. and insol. in $Et_2O$, crystallizes from $Me_2CO$ contg. 7% water in long prisms, m. 225.5°, loses only 0.35% of its wt. *in vacuo* at 50°, $[\alpha]_D$ −112.43°, $[\alpha]_{546.1}$ −133.92°, reducing power, 0.853 that of dextrose, similar to that of verbenaloside (verbenalin, Bourdier, *C. A.* 2, 661, 1595), the latter differs, however, by a higher m. p. and lower $[\alpha]$. Upon hydrolysis with $H_2SO_4$ I gives a black ppt. caused by the decompn. of the nonglucidic product *unedol*, the rotation becomes pos., but the reducing power diminishes by more than 20%. Following hydrolysis of I with emulsin, unedol does not form a black ppt. as with $H_2SO_4$, but the soln. turns red brown, unedol ppts. and the reducing power of the soln. diminishes, hence I is the only glucoside whose hydrolysis is characterized by a *loss* of reducing power. Unedol has been crystd., it also possesses reducing properties. A bibliography of 8 references is added. S. Waldbott

**Chlorophyll. XV. Phyllo- and pseudophylloerythrins.** H. Fischer, Otto Moldenhauer and Oskar Sös. *Ann.* 485, 1–25(1931); cf. *C. A.* 25, 961.—*Phylloerythrin (I) gives with MeOH-KOH a quant. yield of the K salt*, $C_{33}H_{33}N_4O_3K$, *sol.* in $H_2O$ but insol. in all org. solvents, 12% HCl gives I. Heating I with *m*-$C_6H_4(OH)_2$ gives a porphyrin spectroscopically identical with pyrroporphyrin. I in AcOH-coned. HCl treated with $H_2O_2$ gives a Cl deriv., probably a mixt. of $C_{33}H_{33}N_4O_3Cl_3$ and $C_{33}H_{33}N_4O_3Cl$. I and $H_2NCONHNH_2$ in $C_5H_5N$ yield the *semicarbazone*, small needles, $C_{34}H_{37}N_7O_3$, for which the spectrum in $C_5H_5N$ is given, the max. is at 631.2, the *Me ester*, $C_{34}H_{35}N_7O_3$, forms deep red prismatic needles. $N_2H_4$, $H_2O$ and I give a *hydrazone*, prismatic needles with a red violet surface luster; the spectrum is shifted to the violet; *after short exposure to light the spectrum of I is again seen*. *I also yields an oxime*, $C_{33}H_{34}N_4O_3$, prismatic needles; the *Me ester*, m. 270° (decompn.), forms deep red needles. Reduction of I by heating with EtONa and $N_2H_4$, $H_2O$ 6 hrs. at 165–70° gives *desoxophylloerythrin* (II), $C_{33}H_{36}N_4O_3$, prisms or prismatic needles with blue-violet surface luster; HCl no. about 1.5, the spectrum is given in pyridine-ether and HCl; *Me ester*, m. 264° (cor.), *Fe complex*, $C_{34}H_{35}N_4O_3FeCl$, prismatic needles, *Cu salt*, tablets from $CHCl_3$–MeOH. Reduction of the semicarbazone of I with EtONa at 168° gives a porphyrin spectroscopically identical with isopheoporphyrin $a_5$. Pseudophylloerythrin *(III) with ice-cold oleum for 15 min. gives I; while 2 mols. I crystallizes with 1 mol. $CHCl_3$*, III does not do so, even after heating with $HCO_2H$ 24 hrs., showing that III is unchanged by this treatment. Oxidation of III with $H_2O_2$ gives rhodoporphyrin and a 2nd product, probably isochloroporphyrin $e_5$. III gives an *oxime* (*Me ester*) and a *semicarbazone*. The di-Me ester of diacetyldeuteroporphyrin yields a *dioxime*, needles, and a *semicarbazone*, for which the spectra are given. Reduction of this ester gives a mixt. of hemo- and mesoporphyrins. II does not react with EtONa and $N_2H_4$ at 170°. 3,4′-Dimethyl-4,3′-diethyl-5-bromo-5′-bromomethylpyrromethene-HBr and *3,3′,4′,5′* tetramethyl-4 propionic acid pyrromethene-*HBr*, on fusion with $(CH_2CO_2H)_2$ at 210° give *1,3,5,6,7-pentamethyl 2,4-diethyl-8 propionic acid-porphin*, whose *Me ester*, $C_{39}H_{48}O_2N_4$, m. 242° (cor.), its spectrum is entirely different from that of II. The Fe and Zn salts of III are reported. C. J. West

**The enzymic hydrolysis of gelatin in its relation to the formation of diacipiperazines.** A. Blanchetière, *Compt. rend.* 191, 1479–81(1930); cf. *C. A.* 23, 1619, 2698, 4219.—A relation has been pointed out between the N of the diacipiperazines formed in fermentative hydrolysis of proteins and the N content of certain amino acids known to be resistant to hydrolysis. Gelatin differs much in chem. behavior from ovalbumin and gliadin. In peptic digestion, the ratio of diacipiperazine N in

gelatin as compared with that in ovalbumin is 0.64 while the corresponding ratio of amino acid to ovalbumin is 0.97. In comparative expts., the ratio of diacipiperazine N in gelatin to that in gliadin is 0.295 while the corresponding ratio of amino acid to gliadin is 0.471. This is interpreted to indicate that the diacipiperazine N is less in gelatin than in certain resistant anhydrides of amino acids, and also that gelatin has less N linked by cyclopeptidic structure than has ovalbumin or gliadin. *N. M. N.*

**Ergosterol and some of its derivatives.** Z. DE BOE. *Bull. acad. roy. méd. Belg.* 10, 336–75(1930); *cf.* Castille, *C. A.* 24, 5320.—A critical review, with 34 references, of the literature on the *isomerization, reduction* and *oxidation derivs.* of *ergosterol A* (I) and a study of certain isomerizations and reductions of I. "*Iso-ergosterol*" was prepd. according to Reindel (*cf. C. A.* 21, 1464) and, confirming Heilbron (*C. A.* 24, 1388), shown to consist of a mixt. of *isoergosterol B* (II) and *ergosterol B* (III), both of which possess a secondary alc. group and 3 double bonds and correspond to $C_{28}H_{42}O$. II, crystd. from MeOH-EtOAc (4:1) or EtOH, m. 135–6°, has $\alpha$ —66° and forms an *acetate* (IV), m. 112°. III m. 145–6° and turns on standing into II. Sapon. of its *acetate* (V), m. 139°, yields mainly II. The ultra-violet absorption spectra of II-V in $C_6H_{14}$ and EtOH-$Et_2O$ are described. A mixt. of II and III was also obtained by the action on I of dry HBr at 0°, while by boiling I with $H_2SO_4$ in EtOH only II was formed. From a soln. of I in dry pyridine and BzCl kept at 0°, *ergosterol benzoate*, m. 164–5° after recrystns. from MeOH and $Et_2O$, was isolated. Its absorption spectrum in EtOH and $C_6H_{14}$ is described. By heating I with BzCl to 150–70°, *isoergosterol benzoate*, m. 125–6° after recrystn. from MeOH-EtOAc, is formed. Sapon. with KOEt yields a mixt. of II and III. From the absorption spectra the conclusion is drawn that the isomerization of I into II and III consists of a shifting of double bonds such as




By refluxing I in AmOH in presence of Na and avoiding air oxidation, *dihydroergosterol A*, $C_{28}H_{46}O$ (VI), free of I and m. 208–9° after crystn. from dry MeOH-EtOAc or dry $Et_2O$, was obtained, while crystn. from ordinary EtOH gave the *dihydrate* of VI, m. 205° and retaining 2 $H_2O$ even after 6 hrs. at 120° over $H_2SO_4$. From the MeOH-EtOAc filtrates *isodihydroergosterol A*, $C_{28}H_{46}O$ (VII), m. 173–4°, was isolated. Sapon. of the *acetate* of VI, m. 181°, gave VII. These relations are confirmed by a study of the absorption spectra. A similar reduction of III could not be realized, but when III was refluxed in AmOH in presence of Na, *α-isoergosterol B*, m. 188–90°, possessing 3 double bonds and 1 secondary alc. group, could be isolated. Sapon. of its *acetate* m. 112° gave II. The corresponding absorption spectra are reported. It is shown that Heilbron's observations on the alleged isomerization of VI (*C. A.* 24, 623) by HCl gas are merely due to a m. p. depression caused by transformation of I, present in impure prepns. of VI, into III; no isomerization being observed with pure VI. An attempt to reduce I by HI and red P at 230° led to a non-cryst. material free of alc. groups, evidently contg. only 1 double bond and possibly consisting of a mixt. of *ergostane*, $C_{28}H_{48}$, and *ergostene*, $C_{28}H_{46}$. The same mixt. seems to be formed by the same reduction of II.

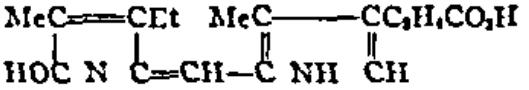
C. TOENNIES

**Soy-bean lecithin. II. Lecithins of the α-series.** YOSHIKUNI YOKOYAMA AND BUNSUKE SUZUKI. *Proc. Imp. Acad.* (Japan) 7, 12–4(1931); *cf. C. A.* 25, 520.—The α-lecithins obtained as double salts with $CdCl_2$ were brominated and fractionated by means of petr. ether, $Et_2O$ and $CHCl_3$. 4 bromides were isolated, the first 3 being only *palmito-linoleo-α-lecithin*, *oleo-linoleo-α-lecithin*, *dioleo-α-lecithin* and *dilinoleo-α-lecithin*, m. 113–4°, these structures were established by hydrolysis and identification of the fatty acids.

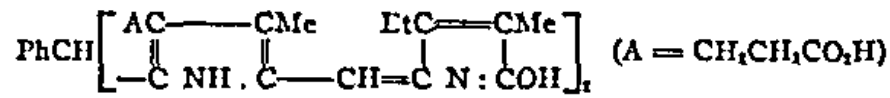
C. J. WEST

**Neo-, xantho-neobilirubic acid and partial synthesis of mesobilirubin and mesobilirubinogen (urobilinogen).** H. FISCHER AND RICHARD HESS. *Z. physiol. Chem.* 194, 193–228(1931).—Bilirubin, the biol. degradation product of the blood pigment, contains 33 C, its cleavage product, *bilirubic acid*, obtained by energetic reduction, contains 17 C and represents, therefore, only 0.5 of the bilirubin mol. The other half has hitherto escaped identification. This unknown half of the bilirubin mol., *neobilirubic acid* (I), has now been isolated and identified. The method employed for the cleavage of bilirubin was the resorcinol fusion used by Schumm (*C. A.* 23, 153)

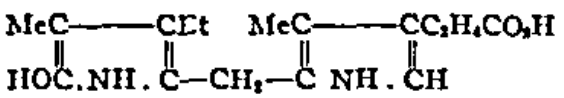
for breaking off the unsatd side chains of hemin Bilirubin itself did not give satisfactory results under this treatment, but its hydrogenation product, mesobilirubin, yielded a yellow cryst product *neoxanthobilirubic acid* (II) The relationship between II and I is that of pigment and leuco compd The synthesis of mesobilirubin was effected by condensing 2 mols of II with 1 $CH_2O$ This supplies the additional C atom of the bilirubic acid half of the mol , the other half being neobilirubic acid itself *Neoxanthobilirubic acid* (II), m 229° (*Me ester* m 190°), was prepd by adding mesobilirubin to boiling resorcinol, pouring the molten mass into $H_2O$, extg the ppt with $CHCl_3$ and recrystg from MeOH It contains a free CH since it yields a cryst *monoazo dye*, m 193° (decompn ), with $PhN_2Cl$ Bromination converts it into a *mono-Br deriv.*, darkens 171° but does not m below 350° in which the Br is substituted on a pyrrole nucleus. With $C_6H_4(CO)_2O$ at 180–90° it forms an orange-yellow *phthalide*, m 298°. On reduction with Na-Hg it yields the leuco compd I, which gives an intense Ehrlich reaction and on treatment with MeOH at 190° reverts to II. On oxidation it yields methylethylmaleic imide, m. 67°. It contains 1 $CH_2$ less than xanthobilirubin The probable formula of II is



While bilirubic acid breaks down into cryptopyrrole and cryptopyrrolecarboxylic acid, a substance of the above structure should yield cryptopyrrole and hemopyrrolecarboxylic acid Both of these products were actually obtained and identified The pyrrole ring contains a reactive CH which condenses with aldehydes, 2 l. With BzH the product is *bis(neoxanthobilirubic acid)phenylmethane*, m 257°, represented by the formula

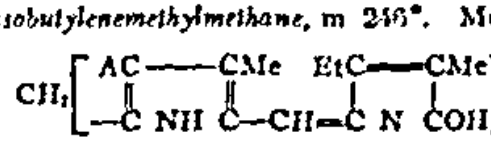


In the Gmelin reaction this product gives a sequence of colors similar to that of bilirubin It is the first synthetic product to give this characteristic reaction When reduced with HI-AcOH it yields *benzylneobilirubic acid*, m. 187°. The other product should be I, but it has not yet been identified. Other aldehydes give similar condensation products with II; *o* $O_2NC_6H_4CHO \longrightarrow$ *bis*(II)-*o-nitrophenylmethane*, m. 259°, *p*-$Me_2NC_6H_4CHO \longrightarrow$ *bis*(II)-*p-dimethylaminophenylmethane*, m 239°, 4-methyl-3,5-dicarbethoxy 2 formylpyrrole $\longrightarrow$ *condensation product*, m 239°, AcH $\longrightarrow$ *bis*-(II)*methylmethane*, m 267°, $CH_2O \longrightarrow$ *bis*(II)*methane*, m 310°. This last product coincides with *mesobilirubin* in cryst. form, m p , mixed m p. and Gmelin reaction. It gives the same *Me ester*, m. 190°, which forms the same red *HCl salt*. Both mesobilirubin and the synthetic product are reduced by Na–Hg to the leuco deriv., *mesobilirubinogen*, both give an intense diazo reaction, and with $Zn(OAc)_2$ yield *urobilin*, m. 192°, with its characteristic fluorescence The crystallographic identity is complete All of the above aldehyde condensation products are yellow and well crystd Condensation products were also obtained with MeAc and with camphor. Reduction of II by HI-AcOH or by Na-Hg gives the leuco compd *neobilirubic acid* (I), m 185°. This gives a sharp m -p depression with bilirubic acid which m 187°. Like II it contains a free CH and condenses with aldehydes. The condensation product with BzH, m 248°, is identical with that obtained from mesobilirubin and BzH (Me ester m 212°). The PhCH deriv. is reduced by HI-AcOH to *benzylneobilirubic acid*, m 189° The latter cannot be brominated, but with Br-AcOH it undergoes oxidation to *benzylideneneobilirubic acid*, m. 248°. These 2 substances represent pigment and leuco compd. Bilirubic acid, on the other hand, does not condense with BzH since the pyrrole rings are completely satd The formula for I is

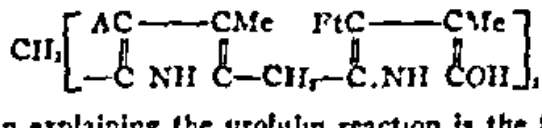


Reduction of mesobilirubin by HI-AcOH gives both halves, I and bilirubic acid, in 50% yield They may be sepd by $CHCl_3$ in which the former is difficultly and the latter easily sol The condensation products of I and II with aldehydes represent 2 distinct types, similar to those obtained with simple pyrroles, *viz* , the tripyrrylmethanes and the dipyrrylmethenes. MeAc condenses first to mesityl oxide and

this with II to *bis*(II)*isobutylenemethylmethane*, m 246°. Mesobilirubin is



and its leuco compd., *urobilirubinogen*,



The main difficulty in explaining the urobilin reaction is the fact that dehydrogenation does not give mesobilirubin Air oxidation gives, instead, urobilin Perhaps the formation of urobilin consists in dehydrogenation to a trimethin pigment in which numerous possibilities of isomerism exist Such a structure would be extremely unstable and inclined to formation of resins All this confirms the supposition that hemin consists of 4 pyrrole rings which are linked by 4 methin bridges Hemin contains 34, bilirubin 33 C atoms A connecting CH group thus steps out and is replaced by 2OH in the opened porphin ring, and the new bis(hydroxypyrro)methin pigment, the hypothetical structure of urobilin but with $C_2H_5$ in place of Lt groups, would then occur as intermediate product in the formation of bile pigment There still remains however, the possibility of a more complete breakdown of the blood pigment and a resynthesis to bilirubin from the resulting fragments A. W. Dox

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The structure of quinoid compounds and of a molecular compound of the quinhydrone type (Hertel, Römer) 2. The crystal structure of the diphenylpolyenes (Hengstenberg, Kuhn) 2. A determination of the molecular weight of methylbiuret by means of x rays (Hengstenberg, Kuhn) 2. A powder spectrometric study of urea (Wyckoff) 2. Vapor pressures of some hydrocarbons (Linder) 2. Studies in x ray diffraction III Aromatic hydrocarbons in the solid and liquid states (Krishnamurti) 3 The primary oxidation of bituminous coal (Fuchs, Horn) 21. Anodic oxidation of AcOH in $H_2SO_4$ solution (Schreiner) 4. Polymerization and thermal decomposition of $C_2H_2$ (Schläpfer, Brunner) 2. The dehydrating action of coal ash (Tanaka) 18 Frangularoside (Bridel, Charaux) IID. Composition and properties of certain red and yellow plant pigments (Bilger) IID.

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Bodroux, Fernand Cours de chimie organique à l'usage des candidats aux certificats d'études physiques, chimiques et naturelles. Paris: Vuibert. 242 pp.

Wertheim, Edgar Essentials of Organic and Biological Chemistry. Easton, Pa. The Chemical Pub Co, Inc. 175 pp.

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Condensing hydrocarbons. Imperial Chemical Industries, Ltd. Fr *694,350*, Apr 23, 1930 Aromatic or unsatd hydrocarbons are prepd by passing hydrocarbons contg at least 2 atoms of C per mol through a heated space at a temp of at least 1000° or 1100°, preferably 1200°, and at a volumetric speed of 50 or 100, preferably more The treatment may be carried out in several steps with removal of aromatic hydrocarbons between the steps, the temp and speed increasing from step to step The walls of the reaction chamber may be made of agglomerated SiC or graphite or an alloy resistant to heat If it is desired to favor the production of $C_{14}H_8$ the walls may be made of sillimanite

Synthetic hydrocarbons. Henry C. Wade. Fr. 694,924, Mar. 29, 1930 Liquid synthetic hydrocarbon products are prepd by vaporizing crude petroleum or portions thereof having relatively high b ps or liquefied coal or like materials, and during this treatment leading the vapor through a spiral path with speed and without pressure, and through a zone contg a metallic catalyst at a moment when the hydrocarbon reaches the atomic state and along with steam to produce nascent H and free C which combine The vapors are condensed or fixed in the state of gas by a suitable heat treatment. An app is described

Hydrogenating aromatic hydrocarbons and their derivatives. I. G. Farbenind A.-G. Brit. 326,583, July 10, 1929 Compds such as $C_6H_6$, naphthalene or their hydroxy or ammo derivs are hydrogenated at temps below 350° in the presence of mixed catalysts immune from poisoning from S and the like and which comprise oxides or hydroxides or sulfides of metals of group 6 of the periodic system in admixt. with

metals of group 8 or heavy metals of group 1 (as such or in the form of their compds.) deposited on carriers of large surface. Examples are given of the use of sulfides of Pt and of W deposited on active silica, oxides of Ni and Mo and $CaCO_3$ deposited on active charcoal, and sulfides of Co and Mo deposited on Florida earth

**Hydrocarbon derivatives.** I. G. Farbenind. A.-G. Fr. 695,095, May 5, 1930. Hydrocarbon derivs. contg. in the mol. more than one halomethyl group are prepd. by the reaction on polynuclear hydrocarbons, of an aq. soln. of $CH_2O$ satd. with hydracids. Examples are given of the prepn. of di(ω-chloromethyl)naphthalene, m. 130–140°, chloromethyl derivs. of $C_{14}H_{10}$ and a product corresponding to $C_{14}H_{10}(CH_2Cl)_2$, m. 117.5°.

**Halogenation of paraffin hydrocarbon series.** N. V. Bataafsche Petroleum Maatschappij. Dutch 23,383, Jan. 15, 1931. For the halogenation of satd. aliphatic hydrocarbons an enameled reaction vessel is used, this prevents both corrosion and C liberation.

**Halogenated isocyclic compounds.** I. G. Farbenind. A.-G. Brit. 335,948, April 3, 1929. Isocyclic compds. substituted in the nucleus by Cl or Br or both are prepd. by reaction on isocyclic compds. with HCl or HBr or both in oleum or chlorosulfonic acid or their mixts. in the presence of halogen carriers such as S, I, Sb, As, Bi, Hg or their compds. Temp. conditions may be chosen to avoid or favor side-reactions such as prepn. of halogenated sulfonic acids or halogenated quinones. Among the starting materials which may be treated are benzene, naphthalene, anthracene, pyrene, perylene and their nitro, amino and halogen derivs., benzanthrones, dibenzanthrones, *ms*-benzodianthrones, *ms* naphthodianthrones, *allo-ms*-naphthodianthrones, *ms*-anthradianthrones, anthanthrones, dibenzopyrenequinones or isomeric compds.

**Converting olefins into higher olefins and aromatic hydrocarbons, etc.** I. G. Farbenind A.-G. Brit. 336,234, May 4, 1929. Starting materials such as $C_2H_4$, $C_3H_6$, $C_4H_8$ or gas mixts. contg. them such as casing head gases or gases produced in cracking mineral or tar oils are brought into contact with elementary Si or a Si-contg. material such as ferro-Si contg. a large proportion of Si, in the form of small pieces or bricks (suitably at 350–800° and under pressures which may be up to 1000 atm. or more). App. is preferably used which resists $H_2S$ and which does not cause deposition of C, such as "V2A" steel or steels contg. Mo and W. Various details and examples are given.

**Separating olefins.** N. V. Bataafsche Petroleum Maatschappij. Fr. 694,323, Apr. 23, 1930. The concn. of one constituent of a fluid mixt. is increased by effecting the fractionated distn. of the mixt. in the presence of a solvent having a selective attraction toward one of the constituents. Thus, to sep. a mixt. of olefin hydrocarbons and paraffins $NH_3$ is added. An example is given of the sepn. of butylene and butane.

**Oxidation products from hydrocarbons, waxes, etc.** I. G. Farbenind. A.-G. Brit. 337,130, Sept. 12, 1929. An app. is described for producing oxidation products from solid or liquid hydrocarbons, waxes and the like by the action of oxidizing gases, in which cooling liquid is sprayed on the outer surface of the reaction vessel which is surrounded by a pressure-tight cooling jacket.

**Oxygenated organic compounds from carbon oxides and hydrogen by catalytic reactions.** H. Dreyfus. Brit. 337,014, July 24, 1929. Compds. such as EtOH, HOAc, acetaldehyde, MeOAc and higher homologs are made by use of catalysts comprising ferrites, ferrates, cobaltites or cobaltates such as those of alkali or alk. earth metals or of Al, preferably at temps. of 200–600° (suitably 250–350°) under 50–500 atm. or higher pressure. There may be used coke-oven gases, producer gas or water gas which may be preliminarily treated if desired to effect formation of synthetic products such as MeOH or EtOH in the presence of a catalyst such as ZnO or a basic chromate. The catalysts may be used in connection with Zn, Mg, Ca, Al, Cr, Mo, V, W or U or their oxides or other compds. Cu may be present, and the app. used may be of Cu or steel lined with Cu or of steel contg. Mo, W, Co or Ni.

**Organic bases.** I. G. Farbenind. A.-G. (Otto Nicodemus and Walter Schmidt, inventors). Ger. 516,765, Sept. 27, 1928. Addn. to 479,351 (*C. A.* 23, 4709). Org. bases, generally of the pyridine series, are prepd. by passing $C_2H_2$ and the vapor of an aliphatic primary or secondary amine at 250–400° over a catalyst comprising an inorg. or org. salt capable of combining with $NH_3$, or a metal oxide such as $Fe_2O_3$, ZnO or $Al_2O_3$. Examples are given.

**Organic isocolloids.** Lászlo Auer and Lajos Susztek. Fr. 694,339, Apr. 23, 1930. The phys. properties of org. isocolloids composed of unsatd. org. acids of high mol. wt. or contg. such acids, are modified by incorporating therein, by soln. or dispersion, soaps of alkali or alk. earth metals, Zn, Mg, etc., and heating to a relatively

low temp The treated products may be vulcanized Examples are given in which linseed oil, K or Na soap and linseed oil acids are heated to about 200°. An after treatment with S gives products which are useful *in varnish and rubber manuf.* Cf *C A* 25, 618

**Organic isocolloids.** LASZLÓ AUER. Fr. 694,340, Apr. 23, 1930. The soly. of modified or unmodified org isocolloid substances is altered by dissolving or dispersing in such substances, agents favoring soln., i. e., agents which are themselves sol in the solvent in which it is desired to render the isocolloid sol or more sol Thus, castor oil is heated with $NH_4I$ *in vacuo* for 5 hrs at 200° to give a dark colored soft paste which is sol in acetone Other examples are given

**Organoarsenic compounds.** I G FARBENIND A.-G Brit 337,290, Feb 11, 1929 *N*-Alkyl-, aralkyl-, or -alkylene-3,4 benzimidazolonearsonic acids are prepd by treating *o*-aminoalkylamino-, *o*-aminoaralkylamino- or *o* aminoalkyleneamino-benzenearsonic acids with a chloroformic acid ester and decompg the product with an acid (preferably with heating) Details are given of the production of 1-methyl-, 1 propyl and 1 allyl 2,3 dihydro-2 ketobenzimidazole-5-arsonic acids by interaction with 1 t chloroformate of 4 methylamino-, 4 propylamino- and 4-allylamino-3-amino-benzenearsonic acids, resp

**Separating organic liquids.** GENERAL TECHNICAL CO., LTD. Fr. 695,005, Aug 2, 1929 The constituents of mixts of org liquids of different b ps are sepd by passing the mixts through a tube or tubes, preferably filled with contact material, a counter-current of vapors, of a non miscible liquid being circulated, the temp of treatment being slightly higher than the b p of the non miscible liquid An example is given of the sepn of a mixt of hydrocarbons using a counter-current of steam

**Catalysts for reducing or dehydrogenating organic compounds.** I. G. FARBENIND A G (Hellmut Langheinrich, inventor) Ger 516,251, May 7, 1926 Oxygenated compds of Mo or W are treated with $NH_3$ (or gases contg $NH_3$) at 450–600° and at atm or raised pressure The compds obtained from molybdates or tungstates of Cu, Ag, Fe and Ni are particularly suitable Examples are given

**Alcohols.** I G FARBENIND A.-G Fr 694,424, Apr. 25, 1930 Alcs are prepd by treating sugars with H in the presence of catalysts other than Pt and in the presence of OH ions Examples are given of the prepn of sorbitol and mannitol from glucose in the presence of activated Ni and CaO, etc

**Alcoholates.** CHRISTIAAN VAN LOON Ger. 513,677, July 22, 1926 Alkali metal alcoholates of polyhydric alcs are prepd by evapg aq solns of the alc. and an alkali hydroxide at high temp and reduced pressure The reaction is preferably carried out in a current of indifferent gas Thus, a soln contg 1 mol glycol and 1 mol concd NaOH is evapd in a water bath *in vacuo*. The product contains 26.2% Na Other examples are given

**Phenolic aldehydes.** SCHIMMEL & CO A.-G. Ger 513,678, Oct. 18, 1925 The ozonides of the corresponding propenyl compds are reduced by hyposulfite Thus, isoeugenol in $CHCl_3$ is satd with $O_3$, and the resulting ozonide treated with $Na_2S_2O_3$ to give an 84% yield of vanillin. Other examples are given

**Esters.** I G FARBENIND A.-G (Erwin Schwabe, inventor). Ger 516,135 Aug 6, 1925 In the manuf of esters from acids that are relatively non-volatile and alcs that are insol or difficultly sol in water, a reaction mixt. is used contg only a small excess, if any, of acid or alc. and also contg a water insol solvent for the alc., preferably a solvent b near 100° The distillate obtained from the mixt seps into 2 layers, the aq layer being removed and the layer of solvent and unreacted alc. being returned to the reaction vessel. The prepn of isobutyl phthalate with the use of toluene as the solvent is described in an example Cf *C A.* 24, 2141

**Esters of carbonic acid.** I G. FARBENIND A.-G (Gerhard Steimmig and Max Wittwer, inventors) Ger 516,281, Nov 15, 1928 Carbonic esters of glycols are prepd by treating α, β- chlorohydrins with alkali carbonates or bicarbonates Thus, glycol carbonate, $\overline{CH_2OC(O)OCH_2}$, may be prepd by warming ethyleneechlorohydrin 1 mol with $NaHCO_3$ 1 mol for a few hrs while stirring Other examples are given also

**Esters such as fatty acid glycerides.** I G FARBENIND A.-G Brit. 336,276, July 4, 1929 In the production of esters of polyhydric alcs such as glycerol with acids such as those of linseed or olive oil, the component of lower b p is led in vapor or mist form (and suitably with a carrier gas such as H, for simultaneous hydrogenation, N or $H_2O$ vapor) at reduced pressure into the liquid higher-boiling component at a temp above the b p of the lower-boiling component, and catalysts may be used such as Mg oleate, $H_3PO_4$ or $ZnCl_2$. Cf *C. A.* 25, 115

**Vinyl ethers.** I G. FARBENIND. A.-G. (Otto Ernst and Walter Berndt, inventors). Ger 513,679, May 24, 1927. Vinyl ethers of aromatic hydroxy compds. of a phenolic character, without substituents with OH groups linked to aliphatic residues, are obtained by treating the aromatic compds. with vinyl halides, especially the chloride, in the presence of bases and, optionally, catalysts Thus, PhOH, NaOH, water and vinyl chloride are fused together at 180–200° to give an 80% yield of vinyl phenyl ether of sp gr 0 977 (20°) and b 155-6° Other examples are given. Cf *C. A* 25, 302

**Ethers of α-naphthylmethyl alcohol.** I G FARBENIND A.-G (Gustav Reddelien and Hans Lange, inventors) Ger 516,280, Apr 3, 1929 α-(Chloromethyl)naphthalene is treated with aliphatic or aromatic ales. in the presence of an acid binding agent. Examples are given of the prepn. of *methyl α-naphthylmethyl ether*, $b_{11}$ 134°, *ethyl α-naphthylmethyl ether*, $b_{11}$ 144.5°, *butyl α-naphthylmethyl ether*, $b_{11}$ 167°, and *benzyl α naphthylmethyl ether*, $b_{11}$ 220° Cf Ger 508,890 (*C A* 25, 716)

**Hydrogenating phenols.** I G FARBENIND A.-G Brit. 336,616, April 17, 1929. Hydroaromatic hydrocarbons are prepd. from phenols by hydrogenation at temps of 250–400° under pressures above 50 atm. with catalysts comprising oxides or sulfides of metals of the second to seventh periodic groups (preferably those of the sixth group) in admixt. with Cu, Ag, Au or metals of the eighth group or their oxides or sulfides. Numerous details and examples are given

**Dioxanes.** I G FARBENIND A.-G Ger 516,844, Dec. 28, 1927. Addn. to 500,223 (*C. A.* 24, 4307). Single or mixed homologs of dioxane or mixts. of dioxane therewith are prepd. as described in Ger. 500,223, using as initial materials the mixts of glycols obtainable from cracking gases, the by products obtained in etherifying such mixts., or the single higher glycols isolated from the mixts. Examples are given. Cf. *C. A.* 25, 524.

**Indanones.** I. G. FARBENIND. A.-G. (Fritz Mayer, inventor). Ger. 515,110, June 11, 1927. Addn. to 513,204 (*C. A* 25, 1260). Indanones are prepd. from xylenes, halotoluenes or dihalobenzenes by condensing these with a halide of β-chloropropionic acid, and treating the resulting ketone as described in Ger 513,204. Thus, *7 methyl-6-chloro-3-indanone*, $b_{11}$ 188°, is obtained from *o*-chlorotoluene. Other examples are given also

**Naphthenates of alkaline earth and heavy metals.** I. G. FARBENIND. A.-G. Brit. 335,863, Feb 22, 1929 In the prepn. of naphthenates such as those of Co, Pb, Mn, Zn, Ca, Pb-Mn or Co-Zn, naphthenic acid is saponified with KOH and the resulting soln. is treated with a suitable alk. earth or heavy metal salt (all operations being carried out at boiling temp ) and the ppt. thus formed may then be dried at 130° in the same vessel.

**Dialkyl sulfates.** ÉTABLISSEMENTS LAMBIOTTE FRÈRES. Brit. 336,681, June 25, 1929. For making dialkyl sulfates, the corresponding ether (derived from the alc. such as MeOH or PrOH and $H_2SO_4$) is caused to react with oleum, preferably in theoretical proportions and at temps. below 50° (suitably 30°). Various details of procedure are given.

**Sulfonamides.** IMPERIAL CHEMICAL INDUSTRIES, LTD , N. BENNETT, H. DODD and W. C. SPRENT. Brit. 336,512, Jan. 17, 1930. Monoalkylxylenesulfonamides are made by direct alkylation of xylenesulfonamide with MeCl or EtCl under pressure in the presence of caustic alkali Various details of procedure are given.

**Alkali salts of aromatic sulfohaloamides.** CHEM. FAB VON HEYDEN A.-G. (Curt Philipp, inventor). Ger 515,465, June 20, 1928 Addn. to 514,094 (*C. A.* 25, 1261) The reagents necessary for the method of Ger 514,094 are mixed in the dry state, and made into tablets if desired. The reaction is effected by dissolving the mixt. in water One mol. of the alkali may be dispensed with by using the sulfonamide in the form of its monosodium salt.

**Aluminum gluconates.** CHEMISCHE FABRIK VORM. SANDOZ. Brit. 336,922, Feb 15, 1929 Sol. Al compds. forming stable solns. are obtained by reaction of Al compds. such as the sulfate with gluconic acid or its salts such as alk. earth metal gluconates (preferably in the presence of alk. earth metal hydroxides) The product may be evapd. to dryness or pptd. with alc. and the acid salts obtained may be neutralized with $NH_3$ or other alkali, or a neutral salt may be obtained directly by reaction of an alkali aluminate soln with gluconic acid Cf. *C. A.* 24, 5437.

**Lead alkyl compounds.** STANDARD OIL CO OF ILL. Ger. 505,688, Aug. 27, 1926. A Pb-Na alloy is heated with the desired dialkyl sulfate with free halogen or a metal halide as a catalyzer. Thus a Pb-Na alloy contg. 10% Na is heated with $(Et)_2SO_4$ in toluene with KI in water as the catalyst, to give $Pb(Et)_4$ on distn.

**Metal carbamates.** I. G. Farbenind. A.-G. Brit. 336,749, Sept. 19, 1929. Reaction is effected between $NH_4$ carbamate and finely divided (preferably dry) metal oxides such as those of Zn, Mg or alk. earth metals, in the absence of solvents, at temps. not usually substantially above 100° (suitably about 60-80° in most cases), and if desired in the presence of a stream of an inert gas such as $NH_3$, air or N. The alk. earth metal carbamates thus produced may be converted into cyanamides by heating to about 700° and treating with a stream of $NH_3$.

**Pyrazolone derivatives.** I. G. Farbenind. A.-G. (Hans Grotowsky, inventor). Ger. 515,782, Apr. 5, 1927. Addn. to 514,421 (*C. A.* 25, 1684). The method of Ger. 514,421 is modified by using, instead of a prepd. benzylidene imine or a stoichiometric mixt. of the corresponding aldehyde and amine, a mixt. contg. a substantially lower proportion of the amine. Examples are given.

**Triazine derivatives.** I. G. Farbenind. A.-G. Fr. 694,756, Apr. 30, 1930. See Brit. 334,887 (*C. A.* 25, 1266).

**Hexahydrodiphenylamine compounds.** I. G. Farbenind. A.-G. Brit. 337,103, Aug. 21, 1929. Two- or three-nuclear condensation products, obtained as described in Brit. 313,421 (*C. A.* 24, 1123) from cyclohexanone or its alkyl derivs. and aromatic amines or their products of acylation, are subjected to catalytic hydrogenation under pressure (with a base metal catalyst such as Ni and preferably in the presence of a diluent such as decahydronaphthalene). Details are given of the production of 4-amino-hexahydrobiphenyl from 4-aminotetrahydrobiphenyl, 4-amino-3-methylhexahydrobiphenyl from 4-amino-3-methyltetrahydrobiphenyl and of similar reactions, and catalysts are described contg. Ni, Co, Ce, Bi and Cu in various mixts. which may be carried on pumice or silica gel.

**Condensation products.** I. G. Farbenind. A.-G. (Arthur Löttringhaus, Heinrich Neresheimer and Wilhelm Schneider, inventors). Ger. 513,530, Feb. 23, 1926. Addn. to 487,870 (*C. A.* 24, 1807). Condensation products are obtained by converting benzanthrone, or derivs. with a free or halogenated *Bz* 1 position, or derivs. with S- or O-contg. substituents into the corresponding ketohalides and then condensing these with other benzanthrone ketohalides, benzanthrone or derivs. Thus, benzanthrone in $PhNO_2$ is treated with $PCl_5$ and concd. $H_2SO_4$. The benzanthrone ketochloride obtained is then condensed with benzanthrone in $C_2H_2Cl_4$. Other examples are given. Cf. *C. A.* 25, 1263.

**Condensation products.** Henkel & Cie. G. m. b. H. Ger. 513,797, Oct. 14, 1927. In condensing polyhydric alcs. and their ketonic derivs. with aliphatic, aromatic mixed or hydroaromatic ketones, by heating to a high temp., the reaction is carried out without addn. of solvents, and in the presence of a small quantity of aq. or gaseous mineral acid or acid salt. Examples describe the condensation of glycerol with cyclohexanone and methylcyclohexanone. Cf. *C. A.* 24, 5044.

**Halogenated fatty acids.** I. G. Farbenind. A.-G. Brit. 336,623, July 15, 1929. Satd. or unsatd. fatty acids contg. more than 8 C atoms per mol. and which may contain OH groups are treated with halogens or with a mixt. of a chlorate and HCl to introduce at least 3 halogen atoms per mol. one at least of which replaces a H atom by substitution. Examples are given of the production of trichlorinated, tetrabrominated and hexachlorinated ricinoleic acid, trichlorinated oleic acid, pentachlorodihydroxy stearic acid, heptachlorinated ricinoleic acid, tetrachlorinated oleic acid and hexachlorinated stearic acid, etc. The products are oils, usually having adhesive properties, or plastic or resinous materials. Cf. *C. A.* 24, 3517.

**Aromatic dicarboxylic acids.** Rütgerswerke A.-G. (Johannes Stelisch and Ernst Guttman, inventors). Ger. 516,282, May 5, 1929. The oxidation of aromatic *o*-diketones to dicarboxylic acids, *e. g.*, the oxidation of phenanthraquinone to diphenic acid, is effected in aq. alk. suspension with $H_2O_2$, or in aq. suspension with $Na_2O_2$ or like metal peroxide. An addn. of MeOH or EtOH accelerates the reaction. Examples are given.

**Sulfonic acids of the fatty series.** H. Th. Böhme A.-G. Fr. 694,692, Apr. 30, 1930. Sulfonic compds. of higher fatty acids and their alkali salts are prepd. by treating the corresponding α-bromo fatty acids with an alkali sulfite. Thus brominated lauric acid is dissolved in aq. $NH_3$ and the soln. is boiled under reflux with a concd. aq. soln. of $(NH_4)_2SO_3$, giving the $NH_4$ salt of the α-sulfolauric acid. The products are wetting, purifying, emulsifying and foaming agents.

**Sulfonic acids, naphthenic acids, etc.** N.-V. de Bataafsche Petroleum Maatschappij. Fr. 694,578, Apr. 26, 1930. Purified sulfonic, naphthenic and like acids are prepd. by dissolving the initial material in water and treating with an amt. of tar oil, etc., sufficient to permit the substances to be purified, to sep. with the tar oil, after

which the aq soln is decanted and the tar oil is removed from the purified products by distn Cf *C A* 24, 629

**Aliphatic acids and esters such as acetic acid and methyl acetate.** BRITISH CELANESE, LTD, and W BADER *Brit. 337,053, July 27, 1929* *MeOH or other* liquid aliphatic alc is mixed with one or more acid catalysts such as $H_3PO_4$ and the mixt is subjected to the action of CO at 200–450° and at pressures up to 300 atm Esters in the reaction products may be saponified with $H_2O$ in the presence of $H_2SO_4$ (or, preferably, $H_3PO_4$) at 150–300° to produce an acid and an ether App and various details of procedure are described

**Concentrating acetic acid.** MARTIN MUGDAN and JOSEF WIMMER (to Consortium Elektrochemische Industrie, G m. b H.). U. S 1,792,113, Feb. 10 See Fr. 671,283 (*C A*. 24, 2143)

**Concentrating aqueous solutions of formic and acetic acids.** JAMES NELSON, LTD Ger. 513,574, July 13, 1927 See Brit. 281,827 (*C A* 22, 3669)

**Acetic and formic acid.** IMPERIAL CHEMICAL INDUSTRIES, LTD Fr 694,016, Apr 16, 1930 Aq solns of AcOH or HCOOH are concd by passing the vapors thereof over active C at a temp of 120–130°, whereby the acid is absorbed in preference The absorbed acid is sepd from the C by raising the temp and reducing the pressure.

**Carboxylic acid chlorides.** FRANZ HENLE (to I G Farbenind. A.-G.). U. S. *1,792,163, Feb 10* *In prepg carboxylic acid chlorides such as acetyl chloride, chloro*acetyl chloride, propionyl chloride or butyryl chloride by reaction of the corresponding free acids with sulfochloride compds such as Na chlorosulfonate or *p*-toluenesulfochloride, the reaction is rendered more efficient and almost quant. yields are obtained by adding to the reaction mixt. a "solid extender" such as NaCl, and other substances may be added such as a neutral sulfate, a pyrosulfate, kaolin or sand Several examples with details of procedure are given

**Acetic anhydride and other aliphatic anhydrides.** H DREYFUS Brit. 336,960, *July 22, 1929* *For producing the anhydride, the vapor of the corresponding acid is* contacted with an oxide or acid of As or Sb or a salt of such an acid such as arsenates or antimonates of Na or K or Mg arsenate, which may be placed in tubes on a carrier. Various details and modifications of procedure are described

**Ethylene from acetylene.** I. G FARBENIND. A.-G Brit. 336,999, May 24, 1929. Te or a compact form of Ni is used as catalyst in forming $C_2H_4$ by hydrogenation of $C_2H_2$ The Te may be used either in compact form or distributed on a carrier. Cf *C A* 24, 4523.

**Absorbing ethylene in sulfuric acid.** N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Brit. 336,603, June 4, 1929 Various compds of Os, Ir, Pt, Ru, Rh, Pd, Cu, Fe, Co or Ni are used in the $H_2SO_4$ as catalysts in absorbing $C_2H_4$ or treating crude gases contg $C_2H_4$ such as natural gas or cracking gases, to obtain a soln which may be hydrolyzed, distd. or otherwise treated for the production of esters, alcs., ethers, etc. Various compds of the catalytic metals may be added to the soln and then converted into sol complex compds. by passing CO or nitric oxide through the soln. Solvents such as EtOH, HOAc, $PhNO_2$ or ether may be added to the $H_2SO_4$ and froth-forming or emulsifying agents also may be added Brit 336,604 relates to a process of generally similar character for the absorption of olefins contg more than 2 C atoms such as propylene or diallyl or crude gases contg. these or similar compds Various *details and modifications of procedure and examples are given*

**Absorbing ethylene in sulfuric acid.** N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Brit. 336,633, June 4, 1929 The absorption is catalyzed by the presence of one or more of the metals Pt, Pd, Os, Ir, Ru or Rh or their compds, in finely divided form and preferably on a carrier such as carbon black, silica gel or decolorizing clay (suitably in the form of a colloidal ppt).

**Dichloroethylene.** CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G M. B. H. Fr. 694,054, Apr. 16, 1930. Dichloroethylene is prepd. by passing trichloroethane over heated catalysts composed of salts of heavy metals such as Fe or Cu or alk earth compds such as $BaCl_2$

**Oxidizing propylene.** IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,726, *Apr. 29, 1930* *Isopropyl alc. and isopropyl acetate are obtained by absorbing propylene* in a mixt. of concd $H_2SO_4$ and glacial AcOH and hydrolyzing the sulfuric esters formed

**Methanol.** H. DREYFUS. Brit. 335,962, June 5, 1929 In synthesizing MeOH from CO and H, the reaction gases are passed first over one or more masses of ZnO with or without Cr oxide and then over one or more MeOH catalysts which are sensitive to S poisoning such as catalysts contg. Cu or Mn or their compds Various details of procedure are described and water gas may be used as an initial material

**Methanol synthesis.** ALWIN MITTASCH, MATHIAS PIER and CARL MÜLLER (to I G Farbenind A.-G.) U. S. 1,791,568, Feb. 10. In synthesis of MeOH from H and C oxides in the presence of a catalyst such as potash lime or potash-alumina more than 2 vols. of H for each vol. of CO and more than 3 vols. of H for each vol. of $CO_2$ are employed. Several examples are given. Cf. *C. A.* 25, 715.

**Butanol and higher alcohols.** N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 330,811, Feb. 17, 1930. For producing BuOH and higher alcs., EtOH vapor under pressure (preferably 130–300 atm.) is heated to not over 400° (preferably not much over 325°) in the presence of a catalytic mass contg. MgO together with a smaller quantity of Cu oxide.

**Tetrahydrofurfuryl alcohol.** E. I. DU PONT DE NEMOURS & Co. and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 337,296, Jan. 25, 1930. Furfural is heated under pressure in the presence of H, a Ni catalyst and water (suitably at 50–150° and under 100 lbs. per sq. in. pressure). The catalyst is preferably prepd. by pptg. a soln. of Ni nitrate with $(NH_4)_2Cr_2O_7$ and $NH_3$ and partially reducing the ppt. with H at 500–550°.

**Formaldehyde.** BAKELITE CORP. Brit. 336,282, July 10, 1929. In the catalytic oxidation of MeOH, formation of by-products is restricted by adding a basic agent such as $NH_3$, to the reaction mixt. at any stage of the process prior to the distn. of the crude product obtained by absorbing or condensing the mixt. leaving the catalyzers, so that the distillate is rendered substantially neutral. Brit. 336,283 relates to the inhibiting of by-product formation in similar processes by rapidly cooling the hot gaseous product leaving the catalyzers by bringing it into contact with an aq. liquid (preferably so proportioned that the temp. of the liquid does not exceed 50°) and the concn. of the formaldehyde is kept substantially below 30%. Various details of procedure are described. Cf. *C. A.* 24, 866.

**Acetaldehyde.** GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. Fr. 694,382, Apr. 24, 1930. AcH is prepd. by passing $CH_4$ and $CO_2$ through an elec. field produced by elec. currents of high frequency and tension. Contact substances may be placed in the field.

**Urea.** A. B. LAMB. Brit. 335,913, June 27, 1929. In a cyclic process, liquid $NH_3$ and liquid $CO_2$ are continuously and separately introduced into a heated autoclave maintained under pressure, and the melt contg. urea is continuously withdrawn from the autoclave, unconverted $NH_3$ and $CO_2$ are sepd. from the melt by distn. and are sepd. from each other, and after being dried, compressed and liquefied they are reintroduced in liquid form into the autoclave. Various details of app. and procedure are described and producer gas (with conversion of its CO into $CO_2$) may be used as a starting material (the $NH_3$ being produced by catalytic synthesis from N and H). Cf. *C. A.* 25, 305.

**Thiourea.** I G FARBENIND A.-G. Brit. 336,111, Oct. 19, 1929. Ca cyanamide is treated with $H_2S$ in the absence of liquids or in the presence of small quantities of liquids sufficient to form a paste (such as water or MeOH, EtOH, aniline, alkyl amines, EtOAc or other esters, pyridine or hydrocarbons such as $C_6H_6$ or their halogen derivs.) and in some cases alk. substances such as $NH_3$ and gaseous amines are added. The materials may be subjected to high pressures and to stirring and the temp. usually should not exceed 100°. The thiourea is extd. from the reaction mixt. by a selective solvent such as acetone, pyridine or its homologs, mixts. of alcs. and ethers or of alc. and $C_6H_6$ or of alcs. and $CHCl_3$, $CCl_4$ or $C_6H_6$, or in some cases by aq. mixts. such as aq. alcs. Various details of procedure are described. Cf. *C. A.* 24, 4524.

**5-Halo-2-amino-1-alkoxy- and -1-aralkyloxybenzenes and intermediates.** WILHELM FITZKY (to General Aniline Works). U. S. 1,792,156, Feb. 10. By the gradual addn. of halogenating agents such as $SO_2Cl_2$ or Br, sufficient for the introduction of 2 halogen atoms, to suspensions (suitably in $C_6H_3Cl_3$ or $PhNO_2$) of *o,o'*-dialkoxy- and *o,o'*-diaralkyloxydiphenylureas (obtainable by causing the corresponding amino compds. to react with phosgene in the presence of an acid binding agent) there are formed dihalogen compds. of the general formula 4,2 $X(RO)C_6H_3NHCONHC_6H_3(OR)X$-2,4 wherein R stands for alkyl or aralkyl and X stands for halogen. These compds., when splt. up by means of a caustic alkali or $NH_4OH$ are converted into 5-halo-2-amino-1-alkoxy- and -1 aralkyloxybenzenes such as 5-chloro-2 amino-1 methoxybenzene, m. about 52°, 5-bromo-2 amino-1-methoxybenzene, m. 60–1°, 5-chloro-2-amino-1-ethoxybenzene, m. 32°, 5-chloro-2-amino-1-butoxybenzene, bu. 160°, and 5-chloro-2 amino-1-benzyloxybenzene, m. 46–7°. Details of procedure for making all these compds. are given.

**1-Phenyl-2-methylamino-1-propanol (ephedrine).** KNOLL A.-G. CHEMISCHE FABRIKEN and W. KLAVEHN. Brit. 336,412, July 30, 1929. 1-Phenyl-1,2 propane-

dione (acetylbenzoyl) is treated with a reducing agent (suitably activated Al in the presence of water) in the presence of methylamine

**Flavanthrone, etc.** W. Smith, L. J Hoolby, J Thomas and Scottish Dyes, Ltd Brit 336,983, April 16, 1929 1,1'-Dianthraquinonyls contg Cl, Br or sulfone groups in the 2,2'-positions are condensed with substances contg reactive H atoms such as $NH_3$, monomethylamine, aniline, aminoanthraquinones, phenols, mercaptans or Na phenate or similar compds When $NH_3$ is used condensation is followed by ring closure of the 2,2' diamino 1,1' dianthraquinonyl to form flavanthrone Various examples are given

**4,10-Diaminoperylene.** F. Bensa. Brit 336,141, Dec 22, 1928 See Fr. 686,213 (*C. A* 25, 525)

**Isatin and its derivatives.** Georg Kränzlein, Arthur Wolfram and Emil Hausdörfer (to General Aniline Works) U S 1,792,170 Feb 10 Cyanoformaryl ides of the general formula RNHCOCN in which R stands for a substituted or unsubstituted aromatic residue having at least one free *o* position to the imino group are transformed into isatins by ring closure with a condensing metal chloride such as $AlCl_3$ or $ZnCl_2$ Examples are given of the treatment of cyanoformanilide, cyanoform(2 methyl-3 chloroanilide) (yielding 6 chloro 7 methylisatin) cyanoform(3,5-dichloroanilide) (yielding the 4 6 dichloroisatin) *N* cyanoformyl(β naphthylamine) (yielding a 2,1 naphthisatin, m 219°), cyanoform(3,5-dimethylanilide) (yielding 4 6-dimethylisatin), and *N*-cyanoformyl(1-chloro-2 naphthylamine) (yielding 1 chloro 2,3-naphthisatin, m 262°)

**Benzyl chloride.** Imperial Chemical Industries, Ltd Fr 694,429, Apr. 25, 1930 $C_6H_5CH_2Cl$ is obtained by treating the crude liquids from the manuf of benzyl cellulose with HCl The liquids are given a preliminary treatment with an alk substance such as $Na_2CO_3$ to remove Fe or other metals After removal of $C_6H_5CH_2Cl$ the residue is treated with Cl to give a mixt of $C_6H_5CH_2Cl$ and BzH

**Vinyl chloride.** I. G Farbenind. A.-G Fr 694,575, Apr 26, 1930 Vinyl chloride is prepd by treating ethylene chloride with KOH dissolved in MeOH.

# 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

## A—GENERAL

FRANK P. UNDERHILL

**Studies in the physical chemistry of muscle globulin. II. Some physico-chemical properties of muscle globulin [myosin].** John T. Edsall *J. Biol. Chem.* 89, 289-313(1930); cf. *C. A.* 22, 2174.—The muscle globulin is prepd by extg fresh, finely ground muscle with an excess of a 1.2 *M* KCl soln buffered with $K_2HPO_4$ and $KH_2PO_4$ The soln should have an ionic strength of 1 2 to 1 5 and $p_H$ 5 1 to 5 5. The protein is collected and purified by changing the ionic strength of the ext. several times, thus causing either a redissolving or reppin When pptd., muscle globulin settles out as micellar particles which cone to a thick jelly like mass on centrifugation The pptd. protein has its isoelec point at $p_H$ 5 1 to 5 5 and between $p_H$ 6 2 and 6 6 is the zone of minimal acid- and base binding capacity. Myosin is almost completely insol in the absence of salts or even in the presence of salts at low ionic strengths As the phosphate soln approaches $p_H$ 7 4 there is a sudden rise in soly. between ionic strength 0 25 and 0 30 Myosin can be sepd from serum globulin by pptn in dil. salt solns Myosin requires greater concns of neutral salts to ppt it than pptd fibrinogen but somewhat less than is needed by euglobulin At $p_H$ 7 and 0° it is completely pptd. by 4 4 to 4 6 *M* NaCl. *Increasing the temp decreases the soly of myosin in* coned. salt solns In the absence of salts myosin is insol. from $p_H$ 4 5 to 8 and at all salt concns it is insol. from $p_H$ 5 to 6 In moderate salt concns it is sol if the $p_H$ is alk. to 6 0 and as the acidity becomes greater than $p_H$ 5 the protein dissolves without the presence of a neutral salt. Alk. to $p_H$ 10, it is also sol in the absence of salt. The viscosity of myosin is of a higher order of magnitude than that of the blood proteins of myogen Even coned. ppts of proteins contain 98 to 99% $H_2O$ and this $H_2O$ can not be removed unless the protein is denatured in the process In the nearly complete absence of salt, and in the presence of small quantities of alkali, gels of the protein of a peculiar character are formed. Finally myosin is compared to the proteins studied by other investigators

J. R. Adams

Studies in the physical chemistry of muscle globulin. III. The anisotropy of myosin and the angle of isocline. ALEXANDER L. VON MURALT AND JOHN T. EDSALL. *J Biol Chem* 89, 315–60(1930); cf *C. A.* 22, 2174 and preceding abstract.—Highly anisotropic protein in myosin produces double refraction of flow This is brought about through the orientation and elastic deformation of these particles. The app for the detn of the angle of isocline and the double refraction is described The age of the myosin has no effect on the angle of isocline For intermediate and high concns. at low temp it is between 77.5° and 78.5° and approaches 45° as a lower limit with increasing dilu For const temp and varying concn or const. concn and varying temp characteristic curves are obtained for the relation between the angle of isocline and angular velocity Myosin soln possesses rigidity which is not affected by age The gel formed from myosin is a thixotropic gel and gives two different crosses of isocline, one with an angle of 45° and the other 61° to 63°. The measurements of angle of isocline have been interpreted as an indication that the myosin particles are of uni form shape and size IV. The anisotropy of myosin and double refraction of flow. *Ibid* 351–86.—A description is given of the app used to prove that myosin solns. contain anisotropic particles and that anisotropy is connected with the chem structure of the protein Double refraction and angular velocity are found to be related by characteristic curves, which vary with protein concn., are reproducible for any given prepn over a period of time and there appears to be no aging effect. The general form of these curves is the same for all prepns examd. Denaturing agents produce rapid and com plete destruction of the double refraction of flow. Double refraction is ascribed pri marily to the orientation of anisotropic protein particles, due to the shearing stresses which arise during flow Three tentative hypotheses are suggested to explain the observed facts The Gans effect also indicates that the protein particle is anisotropic. The evidence also indicates that the anisotropic protein particles are of uniform size and shape The properties of myosin solns suggest that they may contain rod shaped particles The double refraction of myosin would indicate its probable location in the anisotropic disk of the cross striated muscle fiber, and its general physicochem properties suggest that it may play a part in the functional activity of the muscle. J. R. A.

Light and catalase. II. KOEPPE. *Strahlentherap* 34, 598–604(1929).—Blood catalase is regarded as storing radiant energy. B. C. A.

Micellar modifications of human serum by weak electrolytes. P. PONTHUS *Compt rend soc biol* 103, 1140–2(1930), cf *C. A.* 24, 4813.—The effect of weak electrolytes on human serum is analogous to that obtained by strong electrolytes, acids or neutral salts As the acidity increases, micellar vol., as measured by the viscosity of the serum increases to a max value and then diminishes With an increased content of bile salts in serum, the micellar vol as shown by decreased viscosity constantly decreases The cond of the serum increases constantly with increased acidity, but remains const. when the concn of the bile salts in the serum varies. B. C. B.

The mechanism of the acidification of tissue culture medium. M. MAGATH. *Compt rend soc biol* 103, 1180–1(1930).—The decrease in $p_H$ in tissue culture media from approx $p_H$ 8.0 to $p_H$ 7.0 is explained by glucolysis. $CO_2$ accumulates as a result of the action of lactic acid on bicarbonates Carrel's method for regulating the $p_H$ of tissue culture by controlling the $CO_2$ content of the air around the tissues works satisfactorily B. C. BRUNSTETTER

Nucleic acid. I. Enzymes which split nucleic acid. YUTAKA JOYO *Acta Schol Med Univ Imp Kioto* 13, 162–75(1930).—The leaves and roots of green vegetables and seeds, in general are richer in nuclease than are the fruits A study of the P:N ratio shows that the base sugar compds are more difficultly broken down than are the phosphoric acid sugar compds. Nucleic acid is rapidly attacked by plant nucleases, the hydrolysis reaching a max in 3 to 4 days and continuing at an almost const rate Plant nucleases split yeast nucleic acid about 3 to 5 times as readily as they do thymus nucleic acid The optimal $p_H$ for the reaction is 6.2 while a rapid decline in decompn occurs in weakly alk medium The relationship between the setting free of purine bases and of phosphoric acid remains const at different $p_H$ values The nucleases are stable in acid or alk medium and are more or less completely adsorbed by fuller's earth or kaolin The reaction does not influence the completeness of this process. Animal nucleases were shown to be present in almost every organ but especially in the liver, pancreas, spleen, kidneys and small intestine while they occurred only in traces in the blood, muscles and the brain II. The decomposition of nucleic acid through B. proteus. *Ibid* 176–81.—*Proteus vulgaris*, grown on agar media, was transferred to a sterile medium contg nucleic acid and allowed to incubate for 7 days The following

compds. were proved to be present in the bacterial digest of yeast nucleic acid either by m. p., elementary analyses or both: succinic acid, hypoxanthine, xanthine and uracil; cytosine was not found. With thymus nucleic acid the same products were obtained and also thymine. No cytosine was isolated from the animal nucleic acid. III. The partial hydrolysis of nucleic acid through plant nuclease. *Ibid* 182–6.—On the digestion of yeast nucleic acid with an ext. of soy-bean powder, guanosine, adenosine and cytidine were isolated but no uridine. These mols. were proved to contain pentoses. On digestion with an ext. of spinach, adenosine was also proved to be present. When thymus nucleic acid was treated with soy-bean nuclease, guanine hexoside was formed. H. J. Deuel, Jr.

Denaturation of proteins by urea. W. Ramsden. *Nature* 126, 685(1930).—The rate of denaturation of approx. isoelectric egg albumin by urea has a neg. temp. coeff. H. J. Deuel, Jr.

The structure of the hemocyanins. I. The isolation of "hemocuprin," the copper component of hemocyanin (Octopus vulgaris). Adolf Schmitz. *Z. physiol. Chem.* 194, 232–47(1931), cf. *C. A.* 24, 5771.—Hemocyanin, the blue pigment in the blood of molluscs and crustacea, may be coagulated without loss of respiratory function, and in this respect differs from hemoglobin. The moist coagulum retains the property of binding and again releasing O, as shown by alternate coloration and decolorization, but when completely dried it undergoes an alteration by which this property is destroyed. The Cu complex, however, is not split out unless the substance is treated with alkali. The linkage between metal component and protein is therefore more stable and of a different nature than that existing in hemoglobin. It is very resistant to acids, in fact more resistant than that of the metal itself, since the latter appears as ion before the entire complex is liberated. In the prepn. of the Cu component the finely powd. denatured hemocyanin is treated with *N* NaOH. The substance swells and soon takes on a reddish violet color. The color then gradually disappears but the soln. finally becomes dark and a green ppt. forms. The reaction is complete after 24 hrs. at 37°. After removal of the mother liquor which contains the protein component, the pptd. *hemocuprin*, as Na salt, is dissolved in hot $H_2O$ or hot dil. EtOH to a dark wine-red soln. and repptd. by weak acids as a difficultly sol. green substance. Analysis gave the following values: C 45.04, H 6.90, N 12.58 and Cu 6.27%. P and S were absent. The substance has not yet been crystd.; hence the calcn. of an empirical formula was not attempted. The behavior of the substance toward solvents, the high H content which excludes an aromatic ring structure, and finally the spectroscopic behavior of the Na salt and the pyridine soln. of the acid show that a porphyrin structure is not present. Neither in structure nor in mode of linkage to protein does it resemble hematin. On the assumption that 1 mol. of hemocuprin contains 1 atom of Cu, the electrometric titration curve shows it to be a tetrabasic acid. It dissociates in 2 stages with dissocn. consts. of approx. $4 \times 10^{-7}$ and $8 \times 10^{-10}$, resp. Titration of hemocuprin explains the color changes which occur also with hemocyanin itself. The alk. soln., *i. e.*, the quadrivalent ion of the dissocd. Na salt, is wine red. At $p_H$ 5.5 a development of blue color begins and increases up to $p_H$ 7.4, at which point the 2 weak acid groups have been neutralized, and the color is now pure blue. This represents the acid Na salt, *i. e.*, the bivalent dissocd. ion. Further titration changes the color to green until finally the green undissocd. acid sepd. out. The change of color to green, frequently observed with hemocyanin, has nothing to do with the formation of a hypothetical "methemocyanin", it is a property of the undissocd. substance. Hemocuprin dissolves in concd. $NH_4OH$ with a green color which changes to red when the soln. is dild. It contains no free $NH_3$, but when hydrolyzed by 8 hrs.' boiling with concd. HCl practically all of the N becomes $NH_3$. Similar treatment with concd. NaOH converts only 24% of the N to $NH_3$. This behavior is the reverse of that usually observed with polypeptides. The Cu is evidently not linked to $NH_2$ groups. A. W. Dox

Carbohydrate redorase. Hans v. Euler and Ragnar Nilsson. *Z. physiol. Chem.* 194, 280–8(1931).—The hexosephosphate-dehydrogenase present in the seeds of jute (*Corchorus capsularis*) requires cozymase for its activity. If the cozymase of the seed ext. is removed by dialysis the enzyme action vanishes but can be restored by addn. of cozymase. The instability of enzyme action in the ext. is not due to lability of the enzyme but to destruction of the cozymase. Methylene blue reduction with fresh muscle and muscle ext. is activated by addn. of creatine. Washed muscle and dry prepns., on the other hand, are not activated by creatine. Both types of muscle prepn. are activated by creatinephosphoric acid. It is possible, however, that the activation may be due to a small impurity in the creatine and creatinephosphoric acid prepns. which exert a donor action. A. W. Dox

Use of radium emanation and method of its administration. J. Strasburger. *Klin. Wochschr.* 10, 29–31(1931) H Eagle

Optical specificity of human liver esterase. P Rona, R. Ammon, and H Fischgold *Klin Wochschr* 10, 72(1931), cf *C. A* 25, 976.—The results of Bamann and Laeverenz regarding the effect of strychnine upon the optical selectivity of human liver esterase in the hydrolysis of the racemic Et ester of mandelic acid have been confirmed It has a similar effect upon the splitting of the *dl* methyl ester, facilitating the splitting of the *l*-ester The greater velocity of the *l* hydrolysis is due to the fact that strychnine accelerates the splitting of the formed enzyme-*l*-ester combination by about 50%. H Fagle

The decomposition of the guanine nucleus by the enzymes of rabbit liver. Gerhard Schmidt *Klin Wochschr* 10, 165–7(1931).—A preliminary report. Details of the expts and results will appear in *Z physiol Chem* H. Eagle

Physiological chemistry as an independent profession. D Ackermann. *Klin Wochschr* 10, 175–6(1931) H Eagle

Proteolytic enzymes of human white blood cells and blood serum. H A. Oelkers and H Fischgold *Klin Wochschr* 10, 205–7(1931).—Human white cells obtained by centrifugation from a blood specimen hemolyzed by acetic and tartaric acids contain erepsin, trypsin and cathepsin Blood serum contains only erepsin H Eagle

Biological-chemical methods in the investigation of phylogenetic problems. Robert Jaretzky *Arch Pharm* 269, 50–62(1931).—An address. W. O E.

Studies on pectin. V. The hydrolysis of pectin. Arthur G Norman and John T Martin *Biochem J* 24, 649–60(1930), cf *C A* 25, 1266.—The yields of Ca pectate, furaldehyde and $CO_2$ were estd at intervals in the course of pectin hydrolysis carried out at 100°, with 0.5% and 0.2% alkali The rupture of the pectin ring proceeds more rapidly than the destruction of the furaldehyde-yielding groups A polyuronide deriv of pectin was prepd by alk. hydrolysis of pectin Benjamin Harrow

Quantum problems in radiation biology. R Glocker *Naturwissenschaften* 19, 20(1931).—From the recent results of Wyckoff (*C A*. 24, 5789, 25, 129) on the influence of radiation on *B coli*, conclusions can be drawn on the basis of G's theory as to the effect of electron impulses in a cell The dying of the bacteria follows an exponential curve for waves between 0.5 and 4 A U, the exponent consisting of the radiation dose factor and a probability factor From the latter is derived the "apparent vol" *V* of the cell which is sensitive for radiation W. found that *V* changes with λ; previous work of Lacassagne and Holweck on *B pyocyaneus* with λ = 4–8 A U. (*C A*. 23, 1928) gave a const *V* The mean path of an electron for λ = 0.56–2.3 A U is smaller than its range of action; hence the orbits of electrons originating outside *V* have to be included in the probability calcns In accounting for this effect it is found that the true *V* is const in all cases and that calcd *V* values agree with the results of W In the case of L and H the range of the electrons is far larger than their mean path and therefore does not affect *V* For the calcn the mean path inside the entire cell is to be used, not that inside the sensitive parts only ($^1/_{10}$ to $^1/_{100}$ of the total vol.) Apparently this indicates that several small sensitive spots are distributed all over the cell, a conclusion which is in agreement with the biol conceptions of cells without nuclei The change of *V* with λ and its const value after correction for electron range is a direct proof for the quantum character of the influence of radiation on cells. B J C van der Hoeven

The proteolytic action of papain and cathepsin H A Krebs. *Naturwissenschaften* 19, 133(1931).—Recently Waldschmidt Leitz (*Ibid* 18, 952(1930)) denied an increase in proteolytic activity of papain and cathepsin by removal of heavy metal from their solns and attributed the increase obtained by K (*C A* 24, 3804) to the presence of HCN in the solns. freed from metal In a further study it was found that at *p*H 5 HCN up to concns of 0.2 mole has no effect at all The action of complex forming substances (like HCN) depends on the nature of the metal impurity If the metal is Zn as was proved formerly for this case, HCN has little effect; therefore removal of the metal is far more effective If Au is present as inhibitor, HCN has considerable effect by changing the Au ions into complex ions (cf also Grassmann in "Handbuch d Biochem." of Oppenheimer, p. 184(1930)) B J C van der Hoeven

Specificity of animal proteases. XXII. Mode of action of peptidases. Arnold K Balls and Franz Köhler *Ber* 64B, 294–301(1931), cf *C A* 25, 1542.—In order to det the mechanism of the reaction of aminopolypeptidase (I) of the intestine, the inhibitory effect of various substances on the action of I and of dipeptidase (II) was studied The substances used were benzoylglycine (III), benzoyldiglycine, benzoyltriglycine, bromoisocaproylglycine (IV), bromoisocaproyldiglycine (V), bromo-

isocaproyltriglycine (VI), *p*-nitrobenzoylglycine (VII), aceturic acid (VIII), phthalimide (IX), sarcosine (X), allantoin (XI), creatinine (XII), glycine anhydride (XIII), benzoylglycine with changing concn of substrate, benzoylglycine with changing concn of enzyme, benzoylsarcosine and some amino acids (glycocoll, α-alanine, *l* leucine, *d*-glutaminic acid) From the results obtained certain conclusions may be drawn That the inhibitory action of the NH group depends on its acid character is shown by the fact that III, IV, VII, VIII, IX and X inhibit the action of I; XI, XII and XIII do not That only the peptide linkage adjacent to the acid residue has an inhibitory effect is shown by the fact that equiv quantities of IV, V and VI show the same inhibition of the action Bromoisocaproyltriglycyltyrosine shows an increased inhibitory action, since it has more than one NH group to react with the enzyme The cleavage of natural peptides may perhaps be explained thus—that the COOH activates the NH group for reaction with the enzyme This view is strengthened by the fact that X, which has no free $NH_2$ group but an NH group, inhibits the action of I. Yet for other reasons it seems that the activation of the NH group is caused by the enzyme, *i e*, that the union of the enzyme with the $NH_2$ group of the peptides first renders the NH group capable of functioning as the second point of attachment The results support the theory that the NH group functions as a point of attachment for all peptidases This is the first common principle found for the action of peptidases LOUISE KELLEY

**A new proteolytic action of extracts of intestinal mucous membrane.** ARNOLD K BALLS AND FRANZ KÖHLER *Ber* 64B, 383-7(1931), cf preceding abstract and *C A* 25, 1542.—Although dipeptidase and aminopolypeptidase from intestinal mucous membrane attack the $NH_2$ and NH groups of peptides, glycerol exts of the membrane show a hydrolytic action of peptide-like substances which contain no $NH_2$ or COOH groups, *e g*, chloroacetyl-*o* nitraniline The enzyme action described here belongs to a new type of peptidases which apparently react only with the NH group The enzyme seems either to be present in very small quantities or to lose its activity easily as a result of inhibitory substances, for in the expts the increase in acidity was very slight Expts with chloroacetyl-*p*-nitroaniline and benzoyltriglycine showed the optimum $p_H$ for cleavage to be about 8 LOUISE KELLEY

**The crystallization, denaturation and flocculation of proteins with special reference to albumin and hemoglobin, together with an appendix on the physicochemical behavior of glycine.** W C M LEWIS *Chem Reviews* 8, 81–165(1931).—Certain aspects of the behavior of denaturable proteins in respect to crystn, denaturation and flocculation are reviewed A no of closely related problems are also considered, among them the physicochem behavior of glycine in soln LOUISE KELLEY

**Action of sulfhydryl, iron and cyanide compounds on the oxygen consumption of living cells.** SANFORD M ROSENTHAL *U S Pub Health Repts* 46, 521–39(1931).—Glutathione, either in the oxidized or reduced form, when added to various tissues or to yeast cells, does not accelerate the rate of O consumption Under the conditions of these expts, rat liver, brain, testicle, Jensen sarcoma and chicken erythrocytes are able to keep SH glutathione in the reduced state. The addn of considerable quantities of cysteine and Fe to these tissues does not overcome this property Cysteine is also kept reduced by these tissues, even in the presence of added Fe Rat kidney permits the slow oxidation of glutathione and cysteine Blood serum causes a marked acceleration in the rate of oxidation of glutathione. Hemin, Na Fe tartrate or $FeSO_4$ $(NH_4)_2SO_4$ $6H_2O$ causes no acceleration of the O consumption of rat tissues or yeast cells Methemoglobin, Na Fe tartrate and $FeSO_4$ $(NH_4)_2SO_4$ $6H_2O$ can prevent part of the inhibition of O uptake caused by NaCN. Oxyhemoglobin is less effective, while hemin shows no effect. Neither oxidized nor reduced glutathione influences the inhibition of respiration by cyanide However, a slight antagonism can be demonstrated if S-S glutathione and cyanide are allowed to react for a considerable time before they are added to the tissue. KCN and α amino-β sulfopropionic acid do no inhibit the O consumption of rat testes KCNS causes a slight increase in the rate of O consumption of rat testes. The significance of these results with respect to the mechanism of the action of cyanide upon living cells is discussed J A KENNEDY

**Kinetics of esterase activity in comparison with acid catalysis.** ERNST A SYM. *Biochem Z.* 230, 19–50(1931).—To avoid inactivation of esterase by the substrate and to provide a suitable solvent for the various org. acids, alcs and esters, an acetone medium was found most favorable. In studying the inactivation of the esterase in the presence of 0.2 mol AcOH per l it was found that this becomes less as the mol wt. of the alc. increases (up to butyl alc.) and this is also true for the homologous fatty acids of the aliphatic series The inactivation of the esterase by $H_2O$ in an acetone medium becomes considerable at a concn. of 6–8 mols. per l. Comparative expts.

with esterase and with HCl catalysis at different concns of butyl alc. showed that the reaction velocity const. is subject to large variations. Water activates esterase and inhibits HCl catalysis The esterase activity increases with a rise in the butyric acid concn , very rapidly up to a concn of 0 6 mol per l ; then it remains const or even diminishes The velocity of the esterification reaction of different alcs of the homologous series, with esterase or HCl, or under the influence of heat is practically the same However, the influence of homologous acids on the kinetics of esterification is entirely different for esterase than for the HCl catalysis or for the thermal reaction The hypothesis is developed of the ester formation by a process of contact catalysis
S Morgulis

**Characterization of proteins through the determination of their affinities.** G Ettisch, H Sachsse and W. Beck. *Biochem Z* 230, 68–92(1931) —The affinity of the proteins for Cu is measured by the e m f of the compd , and this is offered as a means of identifying the different proteins The reaction between alk. protein solns and $CuSO_4$ (biuret reaction) has been studied quantitatively, the e. m. f being detd in relation to the protein, Cu, alk. concns and temp in the following chain Cu|protein + NaOH|KCl|$CuSO_4$|Cu The influence of the alkali at the end of 24 hrs.

$CuSO_4$

reaches a definite point which could be detd not only by studying the e m. f but also changes in depolarization, viscosity and light absorption Electrochem differences become apparent especially in high protein concns , when the e. m f with rising NaOH concn is found to increase much more with albumin than with globulin On the contrary, with increasing Cu concn. the e. m f of the albumin diminishes more rapidly than that of the globulin These facts are interpreted as showing that in albumin the Cu binding groups have a greater affinity for the Cu than in globulin, but that their no is smaller in albumin than in globulin Certain theoretical and methodical points are discussed in connection with this study.
S Morgulis

**Depolarization and light absorption of alkaline protein solutions.** G Ettisch, H Sachsse and B Lange *Biochem Z* 230, 93–114(1931) —The depolarization of alk protein solns varies with time and with the alkali concn These alterations are due to the swelling as well as breaking up of the protein particles, which only occur in the presence of sufficiently large alkali concns Globulin is more easily broken up than albumin
S Morgulis

**Viscosity of alkaline protein solutions.** G Ettisch and H. Sachsse *Biochem Z* 230, 115–28(1931) —The flow elasticity of albumin or globulin solns. shows no measurable alteration within a wide reaction range, but there is an indication of a form elasticity as soon as a few cc of $CuSO_4$ soln is added to a highly concd alk. soln of albumin or globulin In fact under some conditions the solns. may become solidified on the addn of the $CuSO_4$. The viscosity increases with increased alkali addn after a certain concn (satn concn ) has been exceeded which causes far reaching alterations in the protein mol The ability to split up is greater in globulin than in albumin, and this is considered to be responsible for the fact that the globulin is more hydrophile
S Morgulis

**The chemical independence of the serum proteins.** G Ettisch and H. Sachsse *Biochem Z* 230, 129–35(1931) —The euglobulin fraction obtained by 1/3 satn with $(NH_4)_2SO_4$ corresponds to the globulin fraction by electrodialysis The paraglobulin obtained by half satn with $(NH_4)_2SO_4$ is an independent chem. substance, which occupies a definite position between the globulin and albumin The transformation of one into another is not very probable
S Morgulis

**Influence of lecithin on the stability of the serum proteins.** István Went and Ferenc Faragó *Biochem Z.* 230, 238–44(1931) —On mixing an aq lecithin emulsion with serum a definite reciprocal relationship is manifested in the alteration in the amts. of euglobulin and pseudoglobulin I on the one hand, and between pseudoglobulin II and albumin, on the other Conclusion Euglobulin is a colloidal complex of pseudoglobulin and lecithin, and the same may also be true for the pseudoglobulin II (pptd by 21 5% $Na_2SO_4$) and albumin Between the 2 main types of serum protein there seem to be less definable dispersoids whose precipitability by neutral salts varies greatly according to the amt of lecithin
S Morgulis

**The specificity of phosphatase.** Kurt P. Jacobsohn and Joao Tapadinhas. *Biochem Z* 230, 304–11(1931) —Mono- and di menthyl phosphate and di menthyl pyrophosphate esters could not be hydrolyzed by phosphatase
S Morgulis

**The destruction of cystine and of cysteine through illumination.** Fritz Lieben and Erich Molnar. *Biochem. Z.* 230, 347–52(1931) —Both cystine and cysteine

undergo decompn under the influence of light from the quartz Hg lamp or diffuse daylight, but this proceeds at a much slower rate than with aromatic amino acids In diffuse daylight the destruction of cystine goes on only in an alk medium, while that of cysteine must be followed in an acid medium since it oxidizes spontaneously in an alk medium Hematoporphyrin must be used as a sensitizer with the cysteine Under the influence of the illumination with the quartz Hg lamp no sensitizer is necessary, but the rate of the reaction without it is markedly slower The products of radiation of cystine when added to tryptophan or to tyrosine diminish their color reactions The reduction of methylene blue in diffuse daylight by cysteine as compared to that in the dark shows that with an increase in the acidity the difference in time required for the fading of the color becomes constantly greater while at the same time the rate of fading sharply decreases. S Morgulis

**Refractometric studies on serum protein. III. The specific refraction for the total protein and for the non-protein substances of horse serum.** D von Deseö *Biochem Z* 230, 373-82(1931), cf *C A* 24, 1874.—The refractive index and sp gr were detd at 17.5°, also the total protein gravimetrically, in 30 horse serums, both normal and immune A study of the data leads to the following formulation The refractive index of the serum, R I − 1.33320 = 0.00209 + 0.00187 × protein content, with an av error of ±0.00002 Or, specific gravity of the serum, S G − 1.0 = 0.00732 + 0.00268 × protein content, with an av error of ±0.00005 The R I and S. G of the non protein materials of the serum are 0.00209 and 0.00268, resp The increase in the specific refraction of serum protein is 0.00187 and that of the specific wt 0.00268 per unit of protein **IV. Increase in the specific refraction of the protein fractions in horse serum.** *Ibid* 383-94.—Three groups of serum proteins were studied from the point of view of their *n*'s The first group was represented by the proteins pptd by satn with a definite amt of $(NH_4)_2SO_4$ and the second by those remaining in soln in the serum The former comprised all the globulins with an av *n* of 0.00195 ± 0.00001 and a corresponding sp gr of 0.00208 ± 0.00005 Corrected on the basis of sp gr data, the *n* should be 0.00187, which is the same as that for the albumin The third group was represented by mixts of both albumins and globulins Here the *n* was 0.00185 ± 0.00002 and the sp gr 0.00272 ± 0.00005 It has been further substantiated that for 1% serum protein the variations in *n* and sp gr are, resp 0.00187 ± 0.00001 and 0.00268 ± 0.00005 S Morgulis

**Hydrotropic solution of calcium, with reference to the solution of calcium in blood serum.** A von Kuthy and H Banga. *Biochem Z* 230, 458-65(1931).—Ca dissolved hydrotropically in a Na salicylate soln. behaves like a serum Ca in that part of it is ionized, is negatively charged and part is in a non-diffusible condition It is therefore suggested that serum Ca is hydrotropically dissolved. S Morgulis

**Comment on the paper of Schreiber and Friedrich: "Demonstration and intensity of mitogenetic radiations."** A. Gurwitsch *Biochem Z.* 230, 505(1931).—Discussing the neg. findings of these authors (*C. A.* 25, 529) G points out that agar yeast cultures do not radiate in the dark but can still be used as detectors S Morgulis

**Investigations on the source of oxidase granules.** Günter Wolbach *Folia Haemat* 43, 121-31(1931).—The subcutaneous injection of horse-radish or beet ext. produces oxidase granulation in white mice. John T. Myers

**The dependence of oxidizing fermentations upon the oxidation reduction potential of the external medium.** S. I. Kuznetzov. *Zentr. Bakt Parasitenk.*, 2 Abt., 83, 37-52(1931). John T. Myers

**The enzymic hydrolysis of gelatin in its relation to the formation of diacipiperazines** (Blanchetière) **10. Neo-, xantho-neobilirubic acid and partial synthesis of mesobilirubin and mesobilirubinogen** (Fischer, Hess) **10.**

Brault, A.: Le glycogène dans le dévelopement des tumeurs, des tissus normaux et des êtres organisés. Paris Masson et Cie. 370 pp. F. 80

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Parsons, Thomas R.: Fundamentals of Bio-chemistry in Relation to Human Physiology. 3rd ed., revised. Cambridge, Eng.: W Heffer & Sons, Ltd 308 pp.

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## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Determination of $p_H$ of [biological] media. M. LEMOIGNE AND R. CHAMINADE *Compt rend soc biol* 102, 922–3(1929).—When the colorimetric method is inapplicable and the electrometric method troublesome, the medium may be brought into electrometric equil with a phosphate mixt. of colorimetrically detd $p_H$ B C A

Detection of necrosis of pancreatic tissue by determination of urinary diastase. J WOHLGEMUTH *Klin Wochschr*, 8, 1253–4(1929).—W.'s method for the detn of urinary diastase in presence of a phosphate mixt of $p_H$ 7.2 is described B C A

Microdetermination of proteins. R WINTERNITZ AND Z. STARY. *Mikrochemie* [N S ], 2, 252–6(1930).—A quantity of the soln contg. not more than 1 5 mg of protein is centrifuged for 15 min with 2 cc. of 20% trichloroacetic acid, the liquid decanted, and the pptd washed with 4% trichloroacetic acid, and heated with a mixt. of $H_2SO_4$ and $H_3PO_4$ to destroy org matter The mixt. is dild to 17 5 cc., 7.5 cc. of Nessler soln is added, and the color developed is compared with a series of standards. B C A

A critique of present methods for the study of gastric acidity. MILTON J. MATZNER AND IRVING GRAY *Arch. Internal Med* 47, 58–63(1931).—The methods of gastric analysis are discussed Histamine should be used as a gastric stimulant if the routine test gives no free HCl A definite alk. tide was found in 50% of the cases showing free HCl after injection of histamine J. B BROWN

The detection and estimation of lactose in urine. C. P. STEWART AND R. M. GRAY. *Edinburgh Med J.* 38, 109–12(1931).—The total sugar (*A*) in the urine is detd by Cole's method and calcd as glucose The total sugar (*B*) in urine hydrolyzed with HCl is calcd in the same way The amt. of glucose (*y*) and the amt of lactose (*x*) can be calcd from the equations $y + x/2 = A, y + x = B$. The method is suitable for the examn. of urine during pregnancy and lactation R B

The technic of tissue culture in hanging drops. ALEXIS CARREL. *Compt rend. soc biol* 102, 742–4(1929).—The $p_H$ of tissue cultures is regulated by flooding a culture chamber with expiratory breaths until an indicator drop (phenol red in a drop of medium) shows that the desired $p_H$ has been reached The chamber is formed by a metal ring, 5 cm in internal diam and 1 cm high; at each end of the ring is a ledge, 0.25 cm deep A mica sheet is affixed to each end by paraffin At one end of the ring there are 2 openings in opposite walls, provision is made for the insertion of a metal cannula, to which rubber tubing may be attached, to flood the chamber with expired air. Four tissue cultures may be observed simultaneously B C. BRUNSTETTER

A diazo method for detecting bilirubin in urine. GEORGE HUNTER. *Can Med Assoc J* 23, 823–4(1930).—The possibilities of detecting bilirubin in icteric urine have been reinvestigated, and a satisfactory qual. test, which might form the basis of a quant method, is as follows To 5 cc. of urine in a 15-cc. centrifuge tube add 2 cc of 10% $BaCl_2$, mix and centrifuge. Pour off the supernatant fluid, wash the ppt with a few cc water, centrifuge again and pour off the liquid. Add 0 5 cc. diazo reagent, stir the ppt with a glass rod, and add 2 cc. of 96% alc., and, as buffer, 0 3 cc. of 6% $Na_2HPO_4$ 12 $H_2O$ If bilirubin is present the same color results as with the diazo reagent and icteric serum If the urine is alk., add AcOH initially till weakly acid If it is highly pigmented, after the Ba ppt. is obtained stir with 2 cc. of 96% alc to which has been added 1 drop of 10% $H_3PO_4$, centrifuge and transfer the supernatant fluid to a second tube along with 4 cc water Add 2 drops 10% $(NH_4)_2SO_4$ and 2 cc $BaCl_2$, repptg the bilirubin, and proceed as above. A. T. CAMERON

The colorimetric determination of nonprotein residual nitrogen in blood. G A. BROSSA *Atti accad sci Torino* (Classe di sci fis , mat , e nat ) 65, 272–4(1930).—Methods of analysis which may be applied readily without very elaborate app or technic are being developed in biochemistry as an aid in diagnosis (*i. e.*, tests for sugar, uric acid, etc.) A method is described for detg *nonprotein N* without the necessity of any distn De albuminize 1.2 cc. of blood serum in 8.8 cc. distd. water by adding 4 cc. of 10% sulfosalicylic acid soln After 30–60 min. filter the soln , and, after adding 1 cc. of $H_2SO_4$ and a crystal of $K_2SO_4$, evap it to dryness Redissolve the residue with water to exactly 12 cc. Use 2 cc. to det the amt. of 30% NaOH necessary to make the soln alk to litmus Then add the calcd amt to the 10 cc. left and add 2 cc. 10% PhOH soln and 0 6 cc. of freshly prepd NaOCl soln. Heat this mixt. as well as a standard soln for comparison in boiling water for 10 min., cool and compare the colors with the help of a colorimeter A W. CONTIERI

The calculation of the color index of blood. FRANZISKA STENGEL. *Wiener*

*klin Wochschr.* 44, 194–7(1931).—An alignment chart shows color index, in terms of *erythrocyte count* and quantity of *hemoglobin*. The latter is detd by the Hellige or the Sahli method. D. B. Dill

Determination of small quantities of zinc in the presence of lead salts. M. W. Stas *Pharm Weekblad* 68, 93–7(1931).—Zn may be detd by pptn with *o*-hydroxyquinoline in solns contg 1% AcOH and 4% NaOAc in the presence of Pb, provided the concn of Pb does not exceed 100 mg per 50 cc. The pptd Zn salt of *o*-hydroxyquinoline is detd volumetrically by bromination with $KBrO_3$ + KBr and titrating the excess Br with $Na_2S_2O_3$ as recommended by Berg (*C. A.* 21, 2630). A. W. Dox

Titrating organic acids in the urine. Wilhelm Wertz. *Klin. Wochschr.* 9, 1632(1930).—Occasionally the tint of the urine precludes or makes difficult the use of tropeolin OO as indicator in the titration of urine org. acids by the Van Slyke-Palmer technic. In such cases H recommends the use of *β*-dinitrophenol. H. Eagle

New reactions of bilirubin in blood serum. Gabriel Monasterio. *Klin. Wochschr* 9, 1772–3(1930).—If one adds 1 drop of $H_2O_2$ and 1 drop of glacial acetic acid to 5–6 drops of serum, a green color develops in the presence of bilirubin, which is intensified by heat. By heating serum with the diazo reagent of van den Bergh, sera which would otherwise give an indirect reaction give a direct reaction. Alc. is a similar "catalyst." H. Eagle

Microestimation of the nitrogenous constituents of urine. Ludwig Pincussen. *Klin Wochschr.* 9, 1966–7(1930).—A reply to the criticism of Jacoby (*C. A.* 24, 5775). Pincussen believes 15 min distn quite adequate. H. Eagle

Estimation of blood volume in congenital heart defect. Karl Hitzenberger and Fritz Tuchfeld. *Klin Wochschr* 9, 2159–60(1930). H. Eagle

Hormonal reaction for pregnancy with the urine of humans and animals. Bernhard Zondek. *Klin Wochschr* 9, 2285–9(1930).—The hypophyseal hormone has been demonstrated in the urine of pregnant women, apes and horses, but could not be found in cows, pigs, elephants or Rodentia. The urine of pregnant mares contains about 10 times as much folliculin per unit vol as that of pregnant women, but, unlike the latter, is in a form not sol. in org. solvents. From such urine it is possible to prep large quantities of cryst. hormone, contg. 8000 units per g. The folliculin content of blood is only $^1/_{100}$ that of the urine. In marked contrast, the blood of pregnant horses contains large quantities of hypophyseal anterior lobe hormone, as shown by the ovarian hyperplasia and the formation of corpora lutea induced by its injection into infantile rats; but the urine contains only minimal quantities. The longer the pregnancy, the less of the hypophyseal hormone circulates in the blood. Z. distinguishes 2 types of the hypophyseal hormone: (1) HVH-A, which causes ripening of follicles, and (2) HVH-B, which causes luteinization. No explanation is offered for the massive excretion of folliculin by the pregnant horse, and the retention of the HVH, particularly HVH-B. It is important to note that in the diagnosis of pregnancy in women, the essential criterion is the presence of HVH-B in the urine, which induces luteinization and the formation of blood spots on the ovary of the test animal; both folliculin and HVH-A may appear in the urine during other conditions, such as at the menopause, in amenorrhea, etc. In the horse, however, the best criterion is the induction of rut in the infantile rat, as shown by the appearance of cells in the vaginal smear. This is a test for the enormous increase in the urine folliculin and is more accurate if the urine to be tested is first acidified, filtered and extd. with ether to remove an uncharacterized inhibiting factor. In 9 virginal mares, this test was uniformly neg.; in 54 pregnant, it was positive in 53; and in 17 mares which had been mounted but had not become pregnant, the test was pos. only once; a total error of only $2^1/_2$%. H. Eagle

A new method for the estimation of glucuronic acid in the urine. Joachim Sauer. *Klin. Wochschr* 9, 2350–1(1930).—The ether ext. of the acidified urine is evapd. to dryness, heated with 12% HCl, and the glucuronic acid estd. by the usual Lefèvre app. The av. daily excretion is 0.22–0.29 g. H. Eagle

A method for the determination of organic iodine (uroselectan) in the urine. K. Hillgruber. *Klin. Wochschr.* 9, 2353–4(1930).—The urine is oxidized with hot $H_2SO_4$ and $H_2O_2$; the I, now free from its org. radical, is then oxidized with Cl water in alk. soln. to $HIO_3$, and this is titrated in acid reaction with KI and $Na_2S_2O_3$. H. Eagle

The peroxidase reaction. XXVIII. An exceedingly sensitive peroxidase reagent for human milk. Tayuru Arakawa. *Tôhoku J. Exptl. Med.* 16, 83–9(1930).—Reagent *A* consists of guaiac resin 0.3–1 g., $As_2O_3$ 0.02 g., glacial AcOH 0.6 g., AcONa 1.30 g. and 99% EtOH to make 100 cc. Reagent *C* consists of pharmacopeial tincture with 0.1% peroxide (cf. *C. A.* 25, 1330) 1, and guaiacol 2 parts, and acetone to make

100 cc. A mixt. of *A* and *C* is used for qual. tests. For quant. tests reagent *B* (benzidine 1 g., AcONa 1.25 g., and 99% alc. to 100 cc.) and reagent *D* (described in part XXX, below) are used. Despite the fact that the qual. test is 64 times as sensitive as those currently used, it fails to react with blood and can, therefore, be used for testing pus, spinal fluid and milk which are contaminated with blood. **XXIX.** Determination of human milk peroxidase. 1. Dilution method. *Ibid* 90–96.—A dil. method in which are used reagents *A* and *C* (part XXVIII, above) is described. **XXX.** Determination of human milk peroxidase. 2. Colorimetric method. *Ibid* 97–106.—The reagents used are (1) reagent *B* (part XXVIII, above), (2) reagent *D* (a 2% soln. of $H_2O_2$ 0.1, and guaiacol 2 parts and 99% EtOH to make 100 cc.), (3) Walpole's acetate mixt. at *p*H 3.6 dild. 1:10 with 0.9% NaCl, (4) $CHCl_3$, (5) 0.1 *M* AcONa in 96% alc., (6) a standard soln. consisting of a $CHCl_3$ ext. of $Cu(OAc)_2$. Equal vols. of (1) and (2) are added to one vol. of milk (whole, or dild. with (3)), and the mixt. is extd. with $CHCl_3$. The ext. is made up to 5 cc. with 96% alc., and compared colorimetrically with the standard. **XXXI.** An approximate estimation of milk peroxidase. *Ibid* 107–11.—To 1 cc. of milk are added 3 cc. of *M* 15 phosphate buffer at *p*H 7.8, 1 cc. of reagent *A* (above) and 1 cc. of reagent *C* (above). In a milk contg. large quantities of peroxidase, a deep-blue color develops immediately. **XXXV.** A rapid micro method for peroxide by the use of milk peroxidase; preservation of milk peroxidase. *Ibid* 202–5.—To 0.5 cc. of reagent *A* are added decreasing quantities of the substance to be tested, and 0.25 cc. of standard peroxidase; the color which develops is compared with that formed by a known peroxide soln. (3% $H_2O_2$ dild. 1:100). Milk peroxidase may be preserved indefinitely by the following technic: 100 cc. of milk is shaken with 10 cc. $CHCl_3$, 10 cc. 95% EtOH and 1 cc. guaiacol, 0.5 cc. glacial AcOH is added and the mixt. filtered 24 hrs. later. The filtrate keeps indefinitely. H. Eagle

Sulfosalicylic acid as protein reagent. Hugo Kühl. *Süddeutsche Apoth.-Ztg* 70, 665–6(1930).—Sulfosalicylic acid is a useful reagent in physiol. chemistry, notably in the detection of albumin in urine. In the present study expts. have been carried out to characterize the various ppts. obtained by treating certain sol. proteins with 1 cc. of the reagent. The protein solns. examd. contained 0.5% albumin. Among the proteins examd. were albumin Merck and Sanguin, natural albumin of duck eggs, meat albumin, plant albumin, gelatin, peptone, keratin, etc. On addn. of the reagent the soln. is heated to boiling, and observations are made on the time required to produce a ppt. (if any), the character of this ppt., being noted. The value of sulfosalicylic acid as a precipitant lies in the fact that the nature of the ppt. often enables one to det. what protein is involved. W. O. E.

Chemical detection of blood according to Segeloff. Paul Schoch. *Pharm. Presse, Wiss.-prakt. Heft* 1930, 166–7.—This test, applicable to the detection of blood in the urine or feces, in conjunction with spectroscopic and microscopic tests, involves the following procedure: While the urine may be tested directly, the feces require a preliminary treatment, as trituration of a 20-g. sample in a mortar with a like amt. of 0.5% AcOH, followed by filtration through a wet (if necessary, double) filter. To 5 cc. 5% pyramidone soln. in abs. EtOH, add 8 drops 3% $H_2O_2$ soln., 8 drops 50% AcOH and 10 drops of the urine or feces filtrate. The presence of the minutest traces of blood in either sample is shown by a violet to light-blue coloration. This test is about 10 times more delicate than that of Almen and about 3 times more sensitive than the Adler test. An improvement on the Segeloff procedure consists in treating 1 cc. of the sample in a test tube with 8 drops AcOH and 8 drops $H_2O_2$, and then, with the tube in an oblique position, adding, drop by drop, the pyramidone reagent. The first 10 or 15 drops mix with the soln. mixt., whereas further addn. of the reagent develops a layer superimposed on the lower, the zone of contact showing a light-blue to amethyst-violet coloration. W. O. Emery

Selective staining of basophilic granules. Eugene Bujard. *Bull. histol. appl.* 7, 264–9; *Stain Tech.* 6, 31(1931).—The technic is described. C. R. Fellers

Histochemical detection of hemoglobin. L. Lison. *Rev. hyg. med. prev.* 52, 894–6; *Compt. rend. soc. biol.* 103, 36–8(1930).—Hemoglobin in blood is transformed to hematin by treatment with the following mixt.: Pb acetate 2–5 g., $CH_2O$ 10 cc. and distd. water 100 g. Peroxidases in the hemoglobin are uninjured by the treatment and give a characteristic benzidine $H_2O_2$ reaction (blue color). The reaction is sp. for hemoglobin. C. R. Fellers

Colorimetric determination of phenols in feces. Deberdt and R. Goutov. *Rev. hyg. med. prev.* 53, 78–80(1931).—Dil. 10 g. of feces to 100 cc. and treat 5 cc. of this soln. with 5 cc. of 10% Na tungstate and 5 cc. of 0.66 *N* soln. of HCl. In a few min. stir the soln. and filter. To 6 cc. of the filtrate, corresponding to 2 cc. of the 1:10 dil.

of feces, add 5 cc of an aq soln. of 2.5% $ZnCl_2$ and 5 cc of 20% $Na_2CO_3$ soln. Agitate the mixt. and filter. Place 8 cc of the clear filtrate in a 30 cc cylinder together with the phenol reagent and make up to 25 cc with distd water. Finally add 5 cc of a 20% soln of $Na_2CO_3$, shake the mixt and set aside for observation at the end of 1 hr. The development of a blue color indicates the presence of phenols. The amt may be estd by colorimetric comparison with a standard made up by adding 0.001 g. of resorcinol per l., and treating 1 cc of this soln by the method just described. This amt of resorcinol gives the same intensity of color as 0.1 g of phenol per l. The method is considerably more accurate than the original Folin and Denis technic. C. R. F.

**New rapid method for tissue diagnosis.** Charles F Geschickter, Edward P Walker, A M Hjort and Carl H Moulton. *Stain Tech* 6, 3-12(1931).—A new staining procedure applicable to both fresh and $CH_2O$-fixed frozen sections is described. A pre staining bath consisting of $KH_2PO_4$ 0.75 g., *N* NaOH 30 cc., distd water 570 cc., glycerol 200 cc and 95% EtOH 200 cc is used to collect the sections as they come from the microtome. The sections are then passed into the following staining soln for 20–30 sec: thionine eosinate 0.75 g., Ba eosinate 0.25 g and azure A 0.25 g dissolved in 100 cc of a mixt of 4 parts of $(CH_2OH)_2$ and 1 part of EtOH 95% plus 0.2% glacial AcOH. The stain is washed off in 2 successive changes of 95% EtOH contg 200 cc of glycerol to each 80 cc of EtOH. The tissue is left in the first bath about 10 sec. and in the second bath 3 sec. Sections are dehydrated by floating for 10–15 sec in a soln of diethylene glycol monobutyl ether and cleared in butyl phthalate by floating in this soln for 20 sec. The section is finally floated on a glass slide, blotted dry with photographic lintless blotting paper and covered with an inverted cover slip upon which 1–2 drops of dammar gum has been placed. C. R. F.

**Dissection, staining and mounting of styles in the study of pollen-tube distribution.** John Buchholz. *Stain Tech* 6, 13-24(1931).—Details of the method are given. C. R. Fellers

**Method of staining pollen tubes within the pistil.** Clyde Chandler. *Stain Tech* 6, 25-6(1931).—A very satisfactory killing soln consists of 6–7 cc of com $CH_2O$ in 70% EtOH. The method of dissection and staining with acetocarmine is outlined. C. R. Fellers

**Lacmoid-Martius—yellow for staining pollen tubes in the style.** B. R. Nebel. *Stain Tech* 6, 27-9(1931).—The staining technic is described. The callose stain permits of interpreting the physiol condition of the tube more readily than a stain of the plasmatic content alone. The method is particularly valuable with fleshy styles such as are found in pomaceous plants, cherries, plums and grapes. C. R. Fellers

**Method for detecting mineral particles in tissues, particularly in lung tissue.** A. Policard. *Bull hist. appl. physiol et path.* 7, 129-31(1930); *Physiol. Abstracts* 15, 203; cf. *C. A.* 24, 3570.—A method is described for detecting such particles in lung tissue, but it is applicable to other investigations. Concd $HClO_4$ is used to dissolve or render transparent the org. particles. The paraffin section is treated with xylene, then alc., and dried; it is covered with a drop of strong $HClO_4$ and heated on a boiling water bath until it becomes transparent; it is immediately cooled and examd. The method is of value in studying the mineral deposits found in the lungs in certain miners' diseases. G. G.

**Ultrafiltration in vivo.** L. Brull. *Compt. rend. soc. biol.* 99, 1605-7(1928); *Physiol. Abstracts* 14, 482.—The principle of the ultrafilter of Giemsa is adapted to an app to receive the blood from the carotid of a dog after the injection of heparin to prevent coagulation. The ultrafiltrate from the plasma is obtained in sufficient quantity to permit physicochem study. G. G.

**Action of ox bile in filtration.** D. Comprerno and A. Dămbovicranu. *Compt rend soc biol.* 103, 182-4(1930); *Physiol. Abstracts* 15, 80.—Ox bile was used to facilitate the passage of substances in emulsion through filters, Chamberland bougies and collodion sacs. Victoria blue and Congo red do not pass in ordinary conditions, but the latter in 1 per 2,000 soln. passes through the bougie to a slight extent. Addn. of bile (1 in 10 to 1 in 100) facilitates the passage of both. *Bacillus pyocyaneus* also passes through the bougie after the use of bile. G. G.

**Colorimetric estimation of phenols in feces.** Mme Tonckiebere-Debergh and R. Goiffon. *Compt rend soc. biol* 103, 485-7(1930); *Physiol. Abstracts* 15, 207.—Errors occur in the filtration of tungsto-molybdic ppts in the method of Folin and Denis. These are obviated in the method employed by the authors for detg. phenols in feces. In this process the tungstic filtrate is treated with $ZnCl_2$ and $Na_2CO_3$. The $ZnCO_3$ retains the S, which is capable of acting on the colorimetric agent, and the resulting color is easily compared with the standard resorcinol color. G. G.

Importance of protein precipitation in amino acid determination in blood. P. M. Re and D Potick *Rev soc argentina biol.* 5, 725–44(1929).—Folin's method gives values below the real ones, and the error increases with the concn. in amino acids The tungstate $H_2SO_4$ mixt used to ppt the proteins diminishes the values obtained up to 50% Trichloroacetic acid gives a much smaller error. Phosphotungstic acid gives intermediate values G G

Methods for the study of the physiology and pharmacology of the artificially perfused mammalian intestine. H F. Roese *Arch. ges. Physiol.* (*Pflügers*) 226, 171–83(1930).—Various methods are described for perfusing mammalian intestine Arthur Grollman

Microchemical examination of very small quantities of skin for phenolic substances. Hans Schmalfuss and Helene Barthmeyer *Mikrochemie* [N S ], 2, 245–52(1930).—*Melanogen* is a provisional name given to any substance which turns an enzyme strip of the flour beetle, *Tenebrio molitor* L., brown, gray or black In studies concerning inheritance and development, it was desirable to test for the distribution of melanogens, *e g*, *o*-dihydroxybenzenes, in organisms, particularly in the colored skins of insects By means of simple methods, most of them already known, it was found possible to do this with very small quantities of material To ext the color, 1–6 × $10^{-4}$ cm of material was pulverized, a suspension made with 0 008–0 25 cc. of water, the suspension was transferred to a small test tube and heated for 2 min in boiling water to destroy injurious enzymes The soln was then filtered and tested with enzyme test strips Tests were also made with $FeCl_3$–$Na_2CO_3$ for dihydroxybenzenes and for phenols by Gibb's reagent and with Millon's reagent. The work is described in detail and will be interesting to those who desire to make similar tests. W. T. H

A modification of MacCallum's hematoxylin method for iron. R. R. Dieterle *Arch Path* 10, 740–1(1930).—In the original method of MacCallum for the staining of unmasked Fe a freshly prepd 0 5% aq soln of hematoxylin was used The modification consists in the addn of 1 cc. neutral $CH_2O$ soln to 100 cc. of the hematoxylin soln. The $CH_2O$ acts as a reducing agent and prevents the natural oxidation of the hematoxylin soln Such a $CH_2O$ hematoxylin soln has been used for 3 months without losing its ability to combine with the I e Harriet F. Holmes

The state of acidity of the stomach contents and its clinical estimation. F. Erben *Wiener Arch inn Med* 20, 353–74(1930), cf *C A.* 24, 3527.—By the use of the phloroglucinol vanillin test of Gunzberg, the free HCl can be detd in the stomach contents This is no test for H ion content as with the same *p*H value, solns of HCl, tartaric acid and citric acid react positively and solns of normal fatty acids and lactic acids negatively The HCl bound to proteins cannot be detd by any direct titration method. Its estn follows the detn of free HCl and of the total HCl after the methods of Sjöqvist or Luttke-Martius By use of these methods it is possible to distinguish in the stomach contents between HCl as the normal acid of the stomach and the accidental acids of the food or pathologic org acids The detn of the actual acidity directly or indirectly (titration of the indicator according to Sahli) is not superfluous or to be ignored but is supplemented As the taste of the acids is not due to the H ion concns alone, but to the equiv concn, the equiv concn must be considered as well as the actual acidity In order that results may be compared in writing on the acidity of the stomach contents the nature of the test meal should be given and the methods used such as total acidity (α naphthaolphthalein) or total acidity (phenolphthalein), free HCl (dimethyl yellow), actual acidity (Sahli) Harriet F. Holmes

A new simple method for preserving microscopical stained films. M van Riemsdyk. *Nederland Tijdschr Hyg., Microbiol en Serol* 5, 119–24(1931).—An aq soln. of transparent gum arabic can be applied with success as a film cover to all microscopical stained smears, perhaps even to histological and anatomical films The gum recommended is the Gee Wee gum Take 1 part of gum and 1 5–2 parts of $H_2O$, make slightly alk. with *N* NaOH to litmus and sterilize. The soln can be kept a long time but the reaction must always be alk The film must be entirely dry J. C. Jurriens

A simplified method for the determination of blood cholesterol. Emily M Day and Adolph Bolliger *Australian J Exptl Biol Med Sci* 7, 41–4(1930).—The method requires less time and app than others and gives a correlation of ±5% with that of Myers and Wardell, with 0 2 to 1 0 cc. of blood Blood or plasma is dried at room temp on two 7 cm. filter papers, folded, placed in 6 in test tube and covered with $CHCl_3$ The tube is then gently boiled for 15 min in a beaker of $CCl_4$ and the $CHCl_3$ decanted and made up to 15 cc. with washings, from which 5 cc. aliquots are taken for analysis as in Myers' method, with 2 cc $Ac_2O$ and 0 1 cc. concd $H_2SO_4$. With 0.2 cc. of blood the drying may be omitted C. G King

Rapid determination of blood serum protein. FERNAND KAYSER *Bull. soc. chim biol* 12, 533-5(1930).—To a mixt. of 25 cc 95% alc and 25 cc. acetone, add slowly with stirring 5 cc blood serum, let stand a few min, filter through a tared filter, wash the flask with 95% alc. and weigh To sep albumin from globulin, stir 10 cc. serum into a soln of 80 g $MgSO_4$ in 65 cc distd water, let stand 1 hr and make up to 125 cc. Filter and to an aliquot of the filtrate add 1 cc formal and 15 drops of 10% AcOH Bring to boiling and filter, washing the ppt with small portions of dil AcOH until free from sulfate Dry and weigh the ppt and report globulin by difference.
C G KING

The determination of lactic acid in blood. J. LOISELEUR AND R. MOREL. *Bull. soc chim biol* 12, 538–40(1930) —The method is based upon the procedures of Sakowsky and Clausen (*C. A.* 16, 2342) To 3 cc fluoride plasma add 21 cc. distd. water and 2 g CaO, let stand a few min, add 6 cc satd $CuSO_4$, let stand 1 hr with occasional shaking, and centrifuge Det lactic acid in the supernatant liquid by the Clausen method Control expts show that lactic acid can be recovered, that glucose does not interfere, and that the results compare closely with Clausen's when applied to different types of blood
C G KING

Utilization of the Soja hispida seed freed from urease in the detection and determination of allantoin. R FOSSE, A BRUNEL, P DE GRAEVE, P E THOMAS AND J SARAZIN *Compt rend.* 191, 1388–90(1930).—Under exptl. conditions the urease of the soy bean was destroyed by heat and also by KCN without affecting the active properties of the allantoinase and urease The urease-free substance was then studied for possible utilization in the detn of allantoin in blood serum and in dog serum. The presence of allantoin in a dilu. of $^1/_{100,000}$ can thus be unmistakably detected
B S LEVINE

The use of uroselectan in urography. R. S E MORRAY *U. S. Vet. Bur. Med Bull.* 7, 111–6(1931).—A brief review of the developments leading to the evolution of Na 5 iodo-2-keto-1-pyridineacetate Indications for its use and methods of administration and 3 case reports are given
B. S. LEVINE

The alkaline decomposition of serine. FLOYD S DAFT AND ROBERT D. COGHILL. *J Biol. Chem.* 90, 341–50(1931) —Serine is decomposed when heated in a strongly alk soln, among the products formed being $NH_3$, glycine, alanine, $(COOH)_2$ and lactic acid. An intermediate decompn. product is pyruvic acid. Serine must be absent from solns in which arginine is being estd. by alk. decompn, but this condition is secured by the pptn. of arginine with phosphotungstic acid The methods commonly employed for the removal of $NH_3$ from protein hydrolyzates do not cause any significant decompn of serine.
A. P. LOTHROP

A reduction in the amount of blood required for the Folin micro method for blood sugar. HAROLD J. JEGHERS AND VICTOR C. MEYERS *J Lab Clin. Med.* 15, 982–4(1930) — A modification is described of the Folin micro method (*C. A.* 22, 2762) for the detn of blood sugar. The quantity of blood required is reduced to 0 025 cc., which may be measured by means of a capillary pipet.
E. R. MAIN

A routine blood chemistry unit. E. G SCHMIDT. *J. Lab. Clin Med* 15, 1013-6 (1930) —A mech unit is described for the routine detn. of blood chemistries in the hospital lab
E. R. MAIN

The preparation of some brominated oils and brominated esters. HELEN L WIKOFF. *J. Lab. Clin. Med.* 16, 36-8(1930) —Methods are described for the prepn of brominated oils and brominated esters suitable for use in röntgenologic work. Sesame oil contg 40% Br appears to be the most suitable of the brominated oils The brominated Me esters of the acids prepd. from cottonseed oil, which contain 42% Br, appear to be the most suitable of the esters. The latter have a low viscosity, are pale amber in color and more limpid than the corresponding oils or Et esters. E R M.

Determination of copper in biologic material. J. M INOUYE AND F. B. FLINN. *J. Lab. Clin. Med.* 16, 49–51(1930) —An electrolytic method is described for the detn of Cu in biologic material.
E. R. MAIN

Simultaneous determination of inorganic phosphate, sugar and lactic acid in blood. SERGIUS MORGULIS AND SHERMAN PINTO *J. Lab. Clin. Med* 16, 60–4(1930).—Procedures are described for the detn. of inorg phosphate, sugar and lactic acid in the trichloroacetic acid filtrate obtained from 3 cc. of blood The inorg. phosphate is detd by the method of Kuttner and Cohen (*C. A* 22, 606); the sugar, by a modification of the Hagedorn-Jensen method and the lactic acid, by the method of Friedemann (*C A.* 23, 3245).
E. R MAIN

Phosphorus metabolism. I. A system of blood phosphorus analysis. GUY E. YOUNGBURG AND MAMIE V. YOUNGBURG. *J. Lab Clin. Med.* 16, 158–66(1930).—

Detailed directions are given for the use of a colorimetric method for the detn. of P, in which the phosphomolybdate formed is reduced with $SnCl_2$. The method is adapted to the detn. of total P, inorg. phosphate P, total acid sol. P and lipide P in whole blood, corpuscles and plasma. E. R. Main

**The determination of nonprotein nitrogen in 0.1 cc. of blood.** Arthur K. Anderson and Stacey F. Howell. *J. Lab. Clin. Med.* 16, 183–6(1930).—A modification is described of the Folin-Wu method for the detn. of nonprotein N which requires but 0.1 cc. of blood. The pptg. agent is a mixt. of $Na_2WO_4$ and $H_2SO_4$. The digestion is carried out in tubes graduated at 5 cc. E. R. Main

**A proposed chemical test for pyrogen in distilled water for intravenous injections.** Edgar B. Carter. *J. Lab. Clin. Med.* 16, 289–90(1930).—One hundred cc. of the distd. water is heated to boiling in a clean pyrex beaker and treated with 10 cc. of 10% $H_2SO_4$ and 0.1 cc. of 0.05 *N* $KMnO_4$. The color of the soln. should not be destroyed by boiling for 10 min. if pyrogens (fever producing org. substances of bacterial origin) are absent. E. R. Main

**Acetone as a yardstick for ketosis.** Arthur T. Brick. *J. Lab. Clin. Med.* 16, 291–3(1930).—A method is described by which the Legal test for acetone may be used as a quant. method for the estn. of acetone in the urine. E. R. Main

**Application of the quinhydrone method for the determination of the *p*H of solid medium.** Wm. Steenken, Jr. *J. Lab. Clin. Med.* 16, 316–7(1930).—The quinhydrone method may be used for the detn. of the *p*H of agar or other solid media. Small portions (5 × 5 mm.) are ground with 0.2 g. of powd. quinhydrone and the *p*H is detd. by use of the Cullen and Bildmann electrode (*C. A.* 19, 3101). E. R. Main

**A simple method of estimating "osmic acid," with some applications to cytological technic.** R. Palmer. *J. Roy. Microscopical Soc.* 50, 221–6(1930).—Analysis of solns. of osmic acid is desirable, as indicative of deterioration and also of the amt. taken up by the tissue under treatment. Qual. tests for $OsO_4$ are available, of which Chugaev's is best. A soln. of $OsO_4$ or a chlorosmate is heated with thiourea in excess, acidified with HCl. A red color is observable in concns. greater than about 1:1,000,000. The reaction is applied to colorimetric estn., by prepg. a series of standards, which are in sealed tubes. 0.2 cc. of 2% $OsO_4$, 32 cc. $H_2O$, 4 cc. of 5% thiourea and 4 cc. of HCl (¼ concn.) give 40 cc. of a soln. contg. 0.01% $OsO_4$, from which other standards may be prepd. by dilution. For estn. of an unknown, 0.05 cc. is measured by a capillary pipet, mixed with 8 cc. $H_2O$, 1 cc. 5% thiourea and 1 cc. of HCl (¼ concn.), heated to boiling and cooled. The reaction is unaffected by $HgCl_2$ but gives a black ppt. if chromate-fixing agents have been used in the tissue. Data are given for the absorption of $OsO_4$ during the impregnation of frog kidney. Solns. of $OsO_4$ keep best in tightly stoppered bottles, so evapn. loss is minimized. C. W. Mason

**Hyrax, a new mounting medium for diatoms.** G. D. Hanna. *J. Roy. Microscopical Soc.* 50, 424–6(1931).—Resinous mixts. of aniline, S and HCHO may be prepd., but these are rather deeply colored and do not harden readily. "Hyrax" is "a derivative of naphthalene" (no formula or recipe given) of pale straw color and resinous character, $n = 1.82$, sol. in benzene or xylene, but not in $H_2O$ or EtOH. It hardens by evapn. of solvent, it may be heated gently and is rendered fluid thereby, without discoloration. Prepd. slides and stained specimens have been permanent for several years, with only slight darkening if exposed to sunlight. Hyrax is very transparent to blue and violet. C. W. Mason

**A method for the histochemical detection of iodine.** U. Hintzelmann. *Z. wiss. Mikroskop.* 46, 486–7(1930).—The tissue is fixed in dil. HCHO and treated with 1% TlOAc. Yellow TlI is formed. Sections are best prepd. by the freezing method, and care should be taken not to dissolve out the TlI by subsequent staining treatments. The yellow color is seen best by reflected light against a dark background. TlOAc is better than Pb salts because no ppt. of chlorides or carbonates interferes, and is much cheaper than Pd salts. C. W. Mason

**The fate of fructose in the animal organism. I. Determination of fructose by the diphenylamine method.** W. W. Oppel. *Biochem. Z.* 229, 85–99(1930).—From a detailed study of the method the following procedure for the detn. of fructose has been worked out. Place a mixt. of 1 cc. of the fructose soln., 0.1 cc. 20% alc. soln. of diphenylamine, and 1 cc. 25% HCl in a test tube for 20 min. in a vigorously boiling water bath. Cool the tube quickly in running water, ext. the color with 2–2.5 cc. isoamyl alc. and after sepn. remove the isoamyl alc. layer and dil. with 30 cc. alc., compare the color with that of a standard fructose soln. treated similarly. Quantities between 0.438 and 0.085 mg. can thus be detd. S. Morgulis

**Determination of the acid elimination in the urine.** Fritz Mainzer and Marga

BRUHN *Biochem. Z.* 229, 216–32(1930).—Urine was collected under paraffin oil and analyzed immediately The $CO_2$ content was detd in the Haldane app after 15 cc urine was equilibrated in a tonometer at 38° with a gas mixt of known $CO_2$ content. The total $CO_2$ was detd. in the Van Slyke app; the H ion concn was detd with the quinone electrode, while the titratable acidity was detd by titrating under oil to $p_H$ 7 45 with phenol red as an indicator Not only the H ion concn but the titratable acidity as well depends upon the $CO_2$ tension of the urine At acid $p_H$ the error in detg the urinary acidity is small, but at $p_H > 8\,0$ it may become 90–100% of the titration With the aid of $CO_2$ tension and total $CO_2$ values satisfactory corrections may be obtained On the other hand, the total acid excretion (acid + $NH_3$ − $HCO_3$) is largely independent of the abs value of the $CO_2$ tension, provided the total $CO_2$ and acid are detd under the same $CO_2$ tension S MORGULIS

**Analytical studies. XII** LUDWIG PINCUSSEN *Biochem Z* 229, 233–7(1930), cf *C A* 24, 4801.—A small extn app is described for extg fat from liquids A method is discussed for detg Br in urine Evap to dryness 5–10 cc. of urine treated with 6–12 drops NaOH, then incinerate in a Ni crucible over an open flame Filter the ash soln into a special distn app, acidify strongly with $H_2SO_4$ and mix with 20 cc. 10% $KHSO_4$ Add a 2% soln $KMnO_4$ drop by drop, from a funnel until a permanent pink color remains and suck cold air through the app for 1.5 hrs, passing it through 2 wash bottles with about 20 cc 2% KI soln At the close of the aeration titrate the KI solns. with 0 01 *N* $Na_2S_2O_3$, 1 cc. of which = 0 799 mg Br. Another method described deals with the microdetn of $NH_3$ and urea by the urease procedure The removal of $NH_3$ by aeration is facilitated by adding NaCl, which diminishes its soly. To 2 cc. urine add 1 5 g NaCl, phenolphthalein and paraffin oil, then 2 cc. 33% $Na_2CO_3$ Distil at 45° for 20 min when theoretical results are obtained In the detn of urea the addn of the NaCl does not have any significance S MORGULIS

**The manometric carbon dioxide determination according to Van Slyke.** FRITZ MAINZER. *Biochem. Z.* 229, 311–4; *Klin Wochschr.* 9, 2401(1930).—A 50-cc. pipet is described so constructed that the gas vol. can be read at 0 5, 2 0, 4 0 and 6 0 cc. in the Van Slyke manometric $CO_2$ app This is very useful in $CO_2$ detns. of urine, which often cannot be made in the ordinary app. calibrated only at 0 5 and 2 0 cc. S. MORGULIS

**Microdetermination of calcium and phosphorus in blood and tissues.** G WIDMARK AND B. VAHLQUIST. *Biochem. Z.* 230, 245–52(1931).—Blood, plasma or tissue fragments contg 0 1–0.2 mg. Ca or 0 05–0.2 mg P are digested with 0 5–0 75 cc $H_2SO_4$ in a small Kjeldahl flask, and when the material is completely charred a few drops of concd $HNO_3$ is added and the heating continued until a clear, colorless soln results. The strongly acid soln. is transferred to a Pt dish, washed with $H_2O$ and the soln evapd. and then ignited to drive off all $H_2SO_4$ The residue is taken up in $H_2O$, transferred to a beaker and warmed on a water bath. One cc. of satd. $(NH_4)_2C_2O_4$ and a drop of methyl red are added, and the reaction is adjusted to $p_H$ 5 with $NH_4OH$ and AcOH. The pptn is allowed to proceed at least 1 hr and the material is filtered through a special porcelain rod with suction. The ppt. is washed twice with $H_2O$ The ppt. is dissolved in 0 5 cc. HCl, heated to 60° and titrated with 0 01 *N* $KMnO_4$ The Ca can be detd. in 2 cc. plasma with an accuracy of 2–3% by this method For the P detn the digested material is diluted with 15 cc. $H_2O$ and boiled for 3 min. To this are added 5 cc. 50% $NH_4NO_3$ and, after renewed boiling, 1 cc. 10% $(NH_4)_2MoO_4$. The mixt is kept for 2 min. at 80°, and the ppt. is allowed to settle out for an hr. It is filtered again by means of the special porcelain rod, and washed 3 times with ice-cold water. An excess of 0 04 *N* NaOH is now added and titrated with 0 04 *N* $H_2SO_4$ against phenolphthalein. S. MORGULIS

**Microchemical demonstration of lead and mercury in the organism.** H BÜLL. *Biochem. Z.* 230, 299–303(1931).—The Pb is detd. as $K_2CuPb(NO_2)_6$ which forms a beautiful cryst. ppt The reaction is sensitive to 0 05 mg Pb and can be carried out even in the presence of Cd or Hg in a concn. 300 times as great as that of the Pb. Blood, urine or feces is charred at a very low temp., and the charred mass is rubbed up with about 4 times its wt. of a mixt of equal parts of $KNaCO_3$ and of $KNO_3$ This is now fused in a porcelain crucible, dissolved in 2 *N* $HNO_3$ and filtered, if necessary. The soln is evapd. and the nitrate is decompd by evapg several times with 2 *N* HCl. Finally, the residue is taken up in 10 cc. 0 1 *N* HCl, warmed to 60° and $H_2S$ is bubbled through it for 30 min. Then following neutralization with 10 cc. 0 1 *N* NaOH the $H_2S$ is passed for 15 min longer. After standing for 24 hrs. the ppt. is filtered off, washed with 1% $NH_4NO_3$ satd with $H_2S$, and dissolved in hot dil. $HNO_3$ After evapn to dryness the residue is taken up in 3 drops of hot 0 1 *N* HCl, transferred to a microscope

slide, evapd over an open flame, and treated with a drop of 2% Cu acetate soln Upon evapn the residue is treated with a drop of a mixt. consisting of equal amts of AcOH, satd $NH_4OAc$ and $H_2O$ to which an equal vol. of satd $KNO_3$ has been added In the presence of Pb small brown or large black crystals appear. Pb is always found in feces where Pb had been ingested, and is never present in the blood unless it has been found in the urine or feces Hg was demonstrated in the vomitus of poisoned persons by first heating this with concd HCl and $KClO_3$ until a yellow color developed, when a 3 mm piece of Cu wire is inserted for 24 hrs The wire is washed, dried and sealed into a capillary tube The Hg is distd off by heating the tube and the droplets of Hg are examd under the microscope For urine, this must first be heated with concd. HCl and $KClO_3$, satd with $H_2S$ and the filtered off ppt. is dissolved in HCl and a crystal of $KClO_3$ This is placed on a microscope slide, carefully evapd and treated with a droplet of a reagent consisting of $Co(OAc)_2$ and satd. $NH_4SCN$. Instead of this a small crystal of a mixt can be added obtained by evapg an aq soln of 2 parts $Co(OAc)_2$ and 5 parts of $NH_4SCN$. Blue crystals of mercuri-cobalti thiocyanate are formed in the presence of Hg S Morgulis

Microdetermination of the reduced and total glutathione in the liver. Joachim Kohnau *Biochem Z.* 230, 353-72(1931) —Weigh quickly on a torsion balance about 0 5 g of fresh liver (or liver kept on ice for not over 1 hr ), cut into several pieces and rub up with a little ignited quartz sand to a fine suspension with 9 cc 10% $CCl_3CO_2H$ After leaving this for 5 min filter the material through a double thickness of Schleicher and Schüll No 595 in a Büchner funnel Rinse the mortar with 4 cc. of the $CCl_3CO_2H$ and pour this also through the filter, repeating the washing once more Pour the fluid into a 100 cc Erlenmeyer flask. To this add 1 cc. 25% KI and 2 cc 0 005 *N* $I_2$ soln and after 2 min titrate with 0 002 *N* $Na_2S_2O_3$, using 2 drops of a 1% starch soln as indicator, make a blank titration, using 10 cc. $CCl_3CO_2H$, the difference multiplied by 0 62 giving the GSH (reduced glulathione) content in mg With this procedure the error is ±4%. S Morgulis

The degree of oxidation within the animal body under the influence of different conditions. Hitoshi Kimura *J. Biochem* (Japan) 12, 351-69(1930) —Muller's method (*C A* 24, 393) for detg the "Vakat $O_2$" has been used with certain modifications This method gives a measure of the amt of $O_2$ needed to oxidize completely the org substances excreted through the urine It consists in oxidizing the urine with $H_2SO_4$ and $KIO_3$ at a high temp and detg in an aliquot the $I_2$ set free with KI. In another aliquot the N is detd by the usual procedure Also a correction for Cl must be made 1 mg Cl is equiv to 1.207 mg $KIO_3$ K. points out that it is necessary first to heat the contents of the flask for 2 hrs at 180°. The use of 0 5 g $KIO_3$ for each 10 cc urine is recommended, but of herbivorous urine only 5 cc is taken Human urine should best be dild 2-3 times with water. Removal of the thyroid gland causes a diminution in the $O_2$ consumption, but the degree of oxidation is not altered Feeding thyroid gland increases the amt of oxidation, while the degree of oxidation is decreased far below normal Adrenalectomy diminishes both the N and the total metabolism, but the degree of oxidation is not materially affected S Morgulis

A new microdetermination of bile acids in the bile. Satosu Nagakawa and Hosaburo Fujikawa *J Biochem* (Japan) 12, 399-410(1930) —When 0 5 cc of an aq soln of bile salts is heated for exactly 2 min in a vigorously boiling water bath with 2 cc concd $H_3PO_4$ and 2 drops of a 0 6% furfural soln in abs alc. a beautiful red color develops suitable for colorimetric study Prep a standard from 2 solns , one of which contains 0 01 g scarlet and 1 g $HgCl_2$ in 100 cc and the other 1 g $K_2Cr_2O_7$ in 100 cc Mix 5 cc of the first and 1 5 cc. of the second soln. and dil. with water to 30 cc ; this results in a soln with a very permanent red color. The color is proportional to the concn of the bile salts within the range of 5-20 mg % This red coloration is probably due to cholic acid, the other bile acids reacting very feebly or not at all Fats, lecithin, cholesterol and alc.-ether exts of the brain give neg results S Morgulis

Methods for the determination of total fixed base, sodium and potassium in urine A Følling *Skand Arch Physiol* 61, 27-31(1931) —For the total base detn. place 2 cc. of urine in a silica dish 7 cm in diam and, after the addn. of 4-5 drops 50% $H_2SO_4$ evap on a water bath and ash at 600°. After cooling, mix this with 1 g of wet stannic acid and 3 cc. 35% $HNO_3$ (make the stannic acid by treating 20 g. Sn shavings with 300 cc 35% $HNO_3$ and washing the residue several times with water by decantation, keep the metastannic acid wet in a glass stoppered jar), stir the mixt. and evap to dryness When cool, treat it with 10 cc of a soln of 2 cc $HNO_3$ in 100 cc. water, to 10 cc of which add 1 cc EtOH just before using Stir the mixt well and filter through ashless paper Evap 5 cc of the filtrate with a drop of 50% $H_2SO_4$ in a Pt dish, heating

cautiously at first, then all over to a bright red heat for about 10 min. Dissolve the ash in 15 cc. neutralized water (add 0.02 *N* NaOH to distd. water until a persistent red color to phenol red results). If not all the $H_2SO_4$ was driven off the color turns yellow and can be brought back to red by the addn. of 0.02 *N* NaOH which is then subtracted from the results. Det. the sulfate by the benzidine micromethod as usual. Det. Na and K separately by removing the Ca and Mg as phosphates through the addn. of $NH_4OH$. To 10 cc. urine add 10 cc. dil. $NH_4OH$ and, after 1 hr., filter the mixt. Evap. 1 cc. of the filtrate in a silica dish to drive off $NH_4OH$, then add 5 drops of 50% $H_2SO_4$ and carry out the detn. as before for the total base. To another 10 cc. filtrate obtained from urine treated with dil. $NH_4OH$ to remove Ca and Mg add 10 cc. 1% $CeCl_3$. Mix well, filter after 15 min. and use a 4 cc. aliquot to det. the total base. Det. the Na alone as the complex uranyl Zn Na acetate salt. To 5 cc. urine add 5 cc. of a $UO_2(OAc)_2$ soln. contg. 27 g. of this salt and 3 cc. glacial AcOH in 1 l. of water. Filter off the phosphates after 15 min. To 2 cc. of the filtrate in an 18 × 150 mm. test tube add 4 cc. of reagent made by dissolving 20 g. $UO_2(OAc)_2$, 40 g. crystd. $ZnSO_4$ and 7 cc. glacial AcOH in 180 cc. water and filtering after 2 days. This soln. should not give a ppt. when mixed with an equal vol. of alc. To the mixt. in the test tube add 6 cc. 96% alc. with const. stirring and, after 20 min., filter through a Jena Gerate glass filter. Wash the tube and the filter 4 times with 3 cc. alc. Now dissolve the ppt. and wash back quantitatively into the test tube with hot water. Transfer to a small Erlenmeyer flask and titrate to a definite red with 0.1 *N* NaOH, using 5 drops 1% phenolphthalein. The cc. 0.1 *N* NaOH/8.77 = 0.1 milli equivs. Na in 1 cc. urine. Det. the K by difference from the K + Na detn. S. Morgulis

**Determination of ammonia in urine by extraction.** Greta Hammarsten. *Skand. Arch. Physiol.* 61, 49–53(1931).—The Widmark rocking extractor is used. The $NH_3$ is liberated from 15–25 cc. urine by 5–10 cc. *N* NaOH and the liberated $NH_3$ is absorbed in a measured amt. of 0.1 *N* $H_2SO_4$. The solns. in the 2 communicating chambers are covered with layers of acid free ether. Half of the $NH_3$ is absorbed in 10 min. so the shaking is carried out for that period of time and the standard acid is titrated with bromocresol purple as indicator. S. Morgulis

**Colorimetric determination of glucuronic acid in urine of man and rabbits.** H. A. Ogata and T. Yamanouchi. *J. Pharm. Soc. Japan* 50, 1059–75(1930). German abstr. 135–8.—The method of detg. glucuronic acid in aq. soln. (cf. C. A. 23, 1718) was applied to the detn. of glucuronic acid in urine of man and rabbits. F. I. N.

**The association of biochemical constituents and of certain cellulosic esters.** Jean Loiseleur and Lion Velluz. *Compt. rend.* 192, 159–61(1931).—A method is described for the prepn. of a clear, solid membrane made from proteins, glucides or lipins. It is accomplished by using a carefully selected ratio of certain solvents. 1 g., in the prepn. of a casein membrane, 0 g. of dry acetate of cellulose is dissolved in a mixt. of 10 parts (17.6 g.) of acetone and 7 parts (33.1 g.) of abs. MeOH, 1 g. casein is dissolved in 9 g. of formic acid. The 2 solns. are mixed with rapid stirring, then poured on a plate till the solvents evap., when a clear membrane is obtained. By this method, membranes may be made from gelatin, casein, glycogen, gums, glycerides and other biochem. constituents. N. M. Naylor

**Biological reactions applied to the medico-legal identification of muscles.** C. Simonin. *Ann. méd. légale criminol. police sci.* 11, 32–7(1931).—Pptg. serums can be used for the identification of fresh muscle only if they possess a very high activity, and only pos. reactions are conclusive. Expts. with 80 guinea pigs are described and showed that: (1) raw muscle behaves in the same way as blood in regard to anaphylactic reactions, (2) on boiling the muscle loses part of its sensitizing properties. A. P.-C.

**The quantitative assay for the testicular hormone by the comb growth reaction.** T. F. Gallagher and Fred C. Koch. *J. Pharmacol.* 40, 327–39(1930).—Individual variations in response of Brown Leghorn capons to the injection of testis hormone were observed; they were not due to variations in age or wt. of the birds or original size of the comb. The best quant. results were obtained by using a min. daily dose required to produce an increase in growth of 3–7 mm. in 5 days. It is suggested that the strength of the hormone prepn. be expressed in bird units; a unit is defined as the amt. of hormone which, when injected in daily doses for 5 days, yields an av. increase of 5 mm. in length and height of the combs in at least 5 birds. C. Rieth.

**The specificity of the phenol reagent for the selective determination of tyrosine in proteins.** Vintila Ciocalteu. *Compt. rend. soc. biol.* 101, 108–9(1929), cf. C. A. 21, 3210.—The John Denis phenol reagent provides a method for the estn. of tryptophan and tyrosine. An objection to this method for tyrosine has been that the reaction is not sp. In approaching this question from the point of view of the speed

of the reaction, C first studied the possible interference of the $HgSO_4$. Conclusions The mercuric tyrosine compd (I) causes the limits of proportionality to vary greatly, and the $HgSO_4$ diminishes the intensity of the reaction. If the solns which contain (I) are boiled for ½ hr with HCl, the proportionality becomes perfect again, but the intensity of the coloration remains feeble. The use of $H_2S$ gives the same excellent results as with tryptophan, but for a complete sepn. of tyrosine the flasks satd. with $H_2S$ should stand stoppered for at least 12 hrs. before filtering; 5 cc. of filtrate is boiled in a 100-cc. graduated flask for 30 min. on the water bath, cooled and treated with the reagent. One mg. tyrosine, without $HgSO_4$, serves as the reference standard. The proportionality is perfect. It is thus possible to det. 0.5–4 mg. tyrosine. J. D. S.

A new clinical method for the estimation of protein in urine. Phyllis M. Tookey Kerridge. *Lancet* 1931, I, 21–2.—The urine is mixed with a C suspension and C and protein are simultaneously pptd. with trichloroacetic acid. The grayness of the ppt. depends on the amt. of protein, when the amt. of C is const. The tone is compared with standards. The error is 0.025–0.05 g. protein N%. F. B. Seibert.

Triketohydrindene hydrate as a reagent for albumin, peptone and amino acids. Herman Gardner. *Lancet* 1930, II, 525–6.—The color reaction with ninhydrin is due to the presence of traces of free $NH_3$ or of $NH_4$ ions and is masked by $NH_4OH$ or alkali in excess, and is, therefore, not a reliable reagent for detecting the products of hydrolysis of protein. Water contg. 0.00865% $NH_4$, or inf. 1 cc. 0.77 mg. $NH_3$ N, gives a blue coloration. F. B. Seibert.

Optimum use of material in biological assays. Warren W. Nicholas. *Bur. Standards J. Research* 6, 77–87(1931).—If a "characteristic curve" (cf. Trevan, *C. A.* 21, 2913) representing the effect of increasing amts. of an agent on an organism is known approx., it may be used to det. the actual points on the curve accurately and efficiently. Such a curve is obtained by plotting the quantity or concn. of an agent, such as x-rays, ultra-violet light, toxins, inorg. drugs, hormones, vitamins, specific sera, etc., against the percentage of cases in which a given effect such as mortality is produced. The practice of using the same no. of animals to det. each point on the curve is inefficient, as the various points are then detd. with different degrees of accuracy. The point which will be detd. with least accuracy is that at which 0.5 the no. of animals show the given effect. To det. all points with the same degree of accuracy it is necessary to use a max. no. of animals for this point, and a decreasing no. for the points departing from this in either direction. A min. no. of animals will be used where all or none produces the given effect. To det. any 1 point independently, an expt. may be conducted with a small group of animals. From the result it is possible to calc. the value for the given point with the aid of an approx. curve, as well as the probable error of this value. The expt. may be repeated until the probable error lies within the desired limits. Cornelia T. Snell.

The study of undetermined carbon and glucidic carbon in normal urines. Paul Fleury and Pierre Ambert. *J. pharm. chim.* [8], 12, 350–64(1930).—The main object was to find a relation between the quantity of glucidic C and undetd. C. Glucidic substances are considered those which not only are pptd. by the Cu Ba reagent (*C. A.* 24, 1625) but also are reducers of Hg salts (F. and Marque, *C. A.* 24, 591, 639). From a sample of urine 3 liquids were prepd. at near 0° for examn.: (1) the urine defecated with Hg salts, (2) the Cu-Ba pptn. filtrate of (1) and (3) the $H_2SO_4$ soln. of the ppt. In each of the 3 liquids were detd. (*a*) total C (Nicloux, *C. A.* 23, 628), (*b*) total N, (*c*) urea, (*d*) Hg reduction, (*e*) Cu reduction (F. and Boutot, *C. A.* 16, 4222) before and after hydrolysis. Conclusions. C and N contained in the defecate were completely recovered in solns. (2) and (3), while Hg reduction showed a loss of 40%, Cu reduction 20.9% before and 25.3% after hydrolysis. Therefore the losses of reducing power must be due not to removal by pptn., but to instability of the reducing substance. As the Cu Ba ppt. carried down only 20% C in the form of truly glucidic C (0.710 g. per l. = 1.78 g. dextrose per l.) while the defecate by Cu reduction after hydrolysis showed only 0.717 g. dextrose, *i. e.*, about half as much, the heretofore undetd. quantity of "nonreducing glucide" must be of about the same order as the reducing quantity. In addnl. expts., starting from the Cu Ba ppts., the liquids showed no appreciable rotatory power. They contained Cu reducing substances, exclusively aldoses (no ketoses), and with $PhNHNH_2$ gave crystals seemingly identical with the glucurosazone of Grimbert and Bernier (*C. A.* 4, 1497); however, they differ greatly in m. p. S. Waldbott.

Determination of biliary salts in bile. I. Gasometric determination in one process. II. Volumetric determination by formol titration. III. Evaluation of biliary sulfur. L. Cuny. *J. pharm. chim.* [8], 12, 485–98(1930); cf. *C. A.* 21, 2914.

3211, 22, 2389 4559—I. To avoid preliminary gasometric detn of N in the free amino acids, urea and $NH_4OH$ present, remove these by $NaBrO$, which liberates their N without affecting the mols of glycine and taurine cholates Defecate the bile with hot 95% alc., treat an aliquot of the filtrate with $NaBrO$, remove excess of this with $H_2O_2$, hydrolyze the bile salts with NaOH, neutralize with $HNO_2$ and det the vol of N as usual in a ureometer by means of $NaNO_2$ and dil $HNO_2$ Calc. the results in terms of g of N per l of bile Make a blank test on the reagents used without bile, deducting any gas vol formed II. Treat the bile as before with 95% alc., NaBrO and NaOH, then eliminate cholalic acid and carbonates by dil HCl, filter neutralize with NaOH (phenolphthalein as indicator), add $BaCl_2$ filter again and acidify slightly Compare a definite aliquot corresponding to 3 cc of bile (in tube *B*) with an equal vol of a blank detn (tube *T*) prepd exactly as *B* except that bile is omitted To both *B* and *T* add 6 drops of phenolphthalein and $Ba(OH)_2$ soln of exactly known strength ($C \times 0.1$ *N*) to pale pink and 10 cc of neutralized $CH_2O$ Now add to *T* 0.5 cc. of $Ba(OH)_2$ soln to bring the soln to dark red, then det in *B* the vol (*n* cc.) of $Ba(OH)_2$ soln necessary to produce the same tint as in *T* The content of N (g per l of bile) is then $N = (n - 0.5) \times C \times 0.0014 \times 1000/3$ III An adaptation of the *benzidine sulfate method* (*C. A.* 21, 2145, 22, 4140) is used After defecation with alc. and evapn., destroy the org matter by treatment with $HNO_3$ and then $H_2O_2$ Hydrolyze the filtered-off benzidine sulfate (obtained by pptn in an acetone medium) with boiling water and while hot titrate the free $H_2SO_4$ with 0.02 *N* NaOH in a bromothymol blue soln as indicator until a permanently *green* tint is formed, to which the indicator soln was previously adjusted Each cc. of 0.02 *N* NaOH indicates 0.00032 g S C prefers the above method I although the capacity of the instrument limits the size of the sample used for analysis Method II requires experience to read the end points, and double filtration is a disadvantage Finally, C. quotes the results of Eisenfarb (*Polskiego Archiwum Medycyny Wewnetrznej* 6, 4(1928)) on comparative detns. of biliary acids in org liquids by colorimetry (Herzfeld and Haemmerli, *C. A.* 19, 2965), fluorescence (Raue, *C. A.* 21, 2710) and gasometry (Chiray and C., *C. A.* 21, 3211)

S WALDBOTT

**Determination of cholesterol in blood.** E. CANALS. *Bull. pharm. Sud-Est; Schweiz. Apoth.-Ztg* 68, 49–50(1930).—The av. normal content of blood serum and plasma in cholesterol is 1.5 g per l The colorimetric method of detn by Grigaut (cf. *C. A.* 4, 2513, 2514, 6, 497, 1447, 8, 147) is only approx accurate. The wt method by Grigaut for total cholesterol, or better still the technic of Windaus for free and combined cholesterol, is recommended Details are given for all methods. S. W.

**Clinical determination of the albumin-globulin ratio in spinal fluid.** WM. G. EXTON AND ANTON R. ROSE *J. Am. Med. Assoc.* 96, 36–7(1931).—For the detn of *total protein* equal vols. (1 cc.) of spinal fluid and Exton's protein reagent are mixed and the resulting turbidity is measured in the scopometer For the detn. of *globulin*, equal vols. (2 cc.) of spinal fluid and a satd soln of $(NH_4)_2SO_4$ are mixed and let stand a few min for the globulin to salt out. The mixt. is filtered and the filtrate passed through the same filter until clear, care being taken to drain the test tube thoroughly. The filtrate is an albumin soln and may be used later if it is desired to ppt. and measure the albumin separately The salted out globulin on the filter paper is placed in a clean test tube, 2 cc. distd $H_2O$ poured on the filter paper to bring the globulin into soln and this is passed thrice through the same filter paper to insure a perfect homogeneous globulin soln After the funnel has been thoroughly drained, 0.2 cc. distd $H_2O$ is added in the tip of the filter cone to wash down the globulin that adheres to the tip of the cone. One cc. $(NH_4)_2SO_4$ soln is added to the globulin soln and mixed The globulin is pptd by adding 2 cc. of a satd aq soln of phenol and mixed by gently inverting the tube once The globulin phenol ppt is allowed to stand at least 15 min and then the turbidity is read in the scopometer sometime between 15 and 30 min after pptn Mg globulin per 100 cc of spinal fluid is obtained by dividing the junior scopometer scale reading by 4 Albumin is detd by subtracting the globulin from the total protein If a sep pptn of albumin is desired, 1 cc. distd $H_2O$ is mixed with 2 cc. of the original $(NH_4)_2SO_4$ filtrate and pptd with phenol as for globulin. The no. of mg. of albumin per 100 cc of spinal fluid is then obtained by dividing the junior scopometer scale reading by 2

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## C—BACTERIOLOGY

CHARLES B MORREY

The effect of iodine on microbes. J JADIN. *Compt rend. soc. biol.* 105, 461-2 (1930) —Suspensions of *E. typhi* (I), *paratyphosus* B (II) and *paratyphosus* C (Hirsfeld's bacillus) (III) were heated on the steam bath at 56° for 30 min. The suspensions were iodized at 50° for 2-3 hrs by adding first several drops of $Na_2CO_3$ soln., then I iodide soln. until free $I_2$ was present. The excess $I_2$ was removed by centrifugation, and the iodized microbes were injected into rabbits to get immune sera. The antigen from the injection of iodized I agglutinated both normal and iodized I (1:4000) but not II or III. Similar specificity was shown by II and III. Iodized microbes, unlike serum proteins, preserve with their antigenic properties all their specificities. B. C. BRUNSTETTER

The action of lipoid solutions upon the growth of acid-fast bacilli. THEOFILIP NYREN. *Beitr. Klin. Tuberk.* 73, 238-50(1929) —Lecithin from 5 different sources (human, cow, pig, plant and egg) was used in disperse soln.; it favored the growth of tubercle bacilli. Cholesterol had no stimulating influence. Human lecithin retarded the growth of saprophytes. There was no inhibition from lecithin upon cold blood tubercle bacilli and saprophytes. A no. of the acid fast bacilli grew upon the lecithin nutrient medium with marked granulations. H. J. CORPER

Biological chemical observations on the tubercle bacillus. V. A. VASSILIOU. *Z. Tuberk.* 54, 219-26(1929) —Tubercle bacilli were extd. with chloroform and a wax-like dark fraction was obtained in addn. to a second fat like fraction. Various substances were tested to det. the soly. of these fats. The chem. investigation revealed that the m. p. could not be detd. because carbonization occurred at 280°. Extn. of the substances with ether revealed an absence of fat and the constituents of fat such as glycerol, elain, steatin, etc., were absent. Conclusion: The so-called fat and waxy substances of the tubercle bacillus are not related to fat or wax. The watery ext. of the chloroform emulsion disclosed an aldopentose, however. H. J. CORPER

The chemistry of disinfection. WILDER D. BANCROFT AND G. HOLMES RICHTER. *J. Phys. Chem.* 35, 511-30(1931) —*Disinfection is explained on the basis of* the colloidal nature of cells. The first stage of decreasing stability of the cell colloid is assocd. with the phenomena of stimulation, the next stage of reversible coagulation inhibits the activity of the organism (antisepsis), and the final stage of irreversible coagulation brings death to the bacteria (disinfection). These colloidal changes of yeast cells and of certain bacteria were observed experimentally with the ultramicroscope. The chem. concept of disinfection is shown to be unsound because of the inapplicability of the mass action law, the lack of stoichiometrical relations and the abnormal temp. coeffs. Conclusion: Disinfection consists first, of an adsorption of the drug and, secondly, of the coagulation of the cell colloids. MALCOLM DOLE

The reaction of purines to protein in microörganisms. ÉMILE F. TERROINE AND I. R. SZUCS. *Ann. physiol. physicochim. biol.* 6, 129-49(1930) —The content of total N cannot be taken as a measure of protein in microörganisms. It is, however, true that a given species of bacterium always contains the same purine/protein N ratio. H. EAGLE

Influence of starvation (complete starvation and nitrogen starvation) on the proportion of proteins and of purines in microörganisms. ÉMILE F. TERROINE AND FR. SZUCS. *Ann. physiol. physicochim. biol.* 6, 157-77(1930) —Either complete or N starvation causes a decrease in the total protein of yeast and of *St. nigra*. Purine and protein N fall concomitantly at first, in later stages, the decrease in protein N is proportionately larger. H. EAGLE

The viability of B. pestis. I. S. TINKER AND G. P. RUDNEW. *Arch. Schiffs- Tropen Hyg.* 34, 554-9(1930) —*B. pestis* is not affected by Hayem's soln. or by Giemsa stain 1:10. It is, however, killed by a modified Turk's soln., or by fixation of the smear with EtOH for 5 min.-2 hrs., followed by Giemsa stain. The reagent used for hemoglobin detn. kills it in 45 min. Dried and stained, the organism remains viable for 2 hrs. H. EAGLE

The vibriocidal powers of the water of certain rivers of India. SARANJAM KHAN. *Indian J. Med. Research* 18, 361-5(1930) —Water of the Ganges and Jumna rivers has vibriocidal properties which are completely destroyed by heating at 55° for ½ hr. H. EAGLE

The bacteriological diagnosis of tuberculosis. J. MOURIZ. *Klin. Wochschr.* 9, 2249-51(1930) —Hohn's method was found to be the best for isolating tubercle bacilli from mixed culture. No more than 4-5% $H_2SO_4$ should be used, a potato-egg medium

was found to be the best A special tube was devised to keep the medium moist
H. EAGLE

**Formation of hydrogen peroxide by lactic acid bacteria.** ALFRED BERTHO AND HANS GLOCK *Naturwissenschaften* 19, 88(1931).—$H_2O_2$ is formed in oxidative metabolism by the facultative, anaerobic, catalase-free lactic acid producers *Bact delbrücki*, *B sugurt* and *B acidophilus* The O consumption was followed in Barcroft manometers with glucose as "donor" HCN, 0.0005 mol., was without influence. The $H_2O_2$ was detected with Ti sulfate and detd as Ce peroxide (Wieland and Rosenfeld, *C. A* 24, 2155) or by direct titration *Generally the theoretical amt from* $2H + O_2 = H_2O_2$ was found Catalase addn reduced the amt. of $H_2O_2$ to half If the $H_2O_2$ was not bound during the reaction, its increasing concn damaged the cells and resulted in decreased total production The conditions were about as follows 3 cc. bacterial suspension of 10 mg dry substance, 3 cc 0.1 *M* glucose, 3 cc. 0.2 *M* borate buffer of $p_H$ between 8 and 9, 1 or 2 cc 0.002 *M* cerous sulfate were added together to give an initial $p_H$ of 8.2 to 8.3 For *Streptococcus casei*, which also respires unhampered by HCN, no $H_2O_2$ formation was found B. J. C. VAN DER HOEVEN

**The use of small additions of acid for increasing the germicidal action of B. C. on bacterial spores** C. S. RAM AYYAR *Agr. J. India* 25, 213–9(1930); cf. *C. A.* 24, 5328.—Spores of refractory bacteria, such as *B. subtilis*, *B. albolactus* and *B. mesentericus*, were practically completely destroyed after 30 min. contact with a soln. contg. 0.2% of B. C. (a special hypochlorite soln. contg. 2% of available Cl) and 0.05% of a N soln. of citric acid With a 0.2% soln. of B. C. alone the spores were not destroyed even after 60 min. contact, although the no. was reduced to a considerable extent K. D. J.

**Remarks on the composition of peanut meal peptone and its use for the culture of pathogenic bacteria.** ALBERT BERTHELOT, G. AMOUREUX AND DENIS PETIT. *Bull. soc. chim. biol.* 12, 1029–30(1930).—Analysis is given of a pepsin (I) and a pancreatic peptone (II), illustrating differences depending upon the method of prepn. I gave good toxin production and II did not, although both gave good growth with *B. tetanus*
C. G. KING

**Physical difference among bacteriophages.** F. M. BURNET *Australian J. Exptl. Biol. Med. Sci.* 7, 27–35(1930).—Bacteriophages from *Salmonella*-dysentery *groups of bacilli fell within 2 groups with regard to the difference in heat stability and* ascension of filter paper C. G. KING

**Balanced salt action as manifested in bacteriophage phenomena.** F. M. BURNET AND MARGOT MCKIE *Australian J. Exptl. Biol. Med. Sci.* 7, 183–98(1930); cf. *C. A.* 24, 5787.—Bacteriophage (I) dild in a soln. of Na, K and $NH_4$ salts were inactivated by heating 1 hr. at 60°, but the presence of Ca, Ba or Sr salts partially or completely prevented *such action* In the absence but not in the presence of bivalent cations or broth, Janus green, toluidine blue and methylene blue inactivated a dil. soln. of I. Different types of I show characteristic individual differences in sensitivity toward inactivating and protecting substances The effects related to the Na-Ca balance are like those of living protoplasmic structure Electrophoretic expts. indicate a decrease in effective size of I in the presence of excess Ca ion C. G. KING

**The electrical behavior of bacteriophages.** F. M. BURNET AND MARGOT MCKIE *Australian J. Exptl. Biol. Med. Sci.* 7, 199–209(1930).—In electrophoretic expts. 20 types (salmonella, dysentery and staphylococcus) of bacteriophage all showed a neg. elec. charge The migration rate and adsorption of proteins (globin and gelatin) varied greatly. In one case cathodic concn. was obtained for a type which acted only on rough strains and was not sensitive to methylene blue, toluidine blue or Janus green
C. G. KING

**Oligodynamic dilutions.** JULIUS MEYER *Chem.-Ztg.* 55, 85–6(1931).—The term "oligodynamic" as used in biology and medicine is a misnomer It was used originally to designate germicidal telekinesis of metals such as Ag or Cu plates placed in aquaria or flower vases At present under this term is included such germicidal action as is manifested by extremely high dilns. of metallic salts, despite the fact that the phenomenon of telekinesis is entirely absent The dilns. with which the biol. and medical investigators are experimenting often are extremely high from the point of view of the analytical and phys. chemist. For example, K. König (cf. *C. A.* 22, 4177) worked with dilns. of $AgNO_3$ and $Pb(NO_3)_2$ varying from $10^{-2}$ to $10^{-20}$. For $Pb(NO_3)_2$ in a $10^{-20}$ dilu. 55,000 l. of the soln. contains 1 mol. of the reagent and for $AgNO_3$ 28,000 l. contains 1 mol. of the reagent. Results obtained from work with such dilns. are scientifically valueless since such dilns. cannot be distinguished from water of the highest purity.
B. S. LEVINE

**Experiments on bacteriophage adsorption by vulnerable bacteria.** CLAUDE P.

Brown and Frank Gemar *U S Vet Bur. Med Bull* 7, 224–0(1930).—The expts. show that it is possible to adsorb bacteriophage obtained from sewage by using a vul nerable organism (*E coli*) against which it is actively lytic. Temp control is necessary in order to bring about the adsorption of bacteriophage when the organism against which it is actively lytic is used for this purpose. A temp as low as 25° still permits lysis while 16° or lower prevents lysis. B S Levine

**Disinfection. II. The manner of death of certain bacteria and yeasts when subjected to mild chemical and physical agents.** Georges Knaysi and Morris Gordon *J Infectious Diseases* 47, 303–17(1930).—The order of death of *E coli* and of *Schizosaccharomyces pombe* when produced either by chem or by phys agencies is detd by the distribution of resistance among the cells. That this distribution is not uniform among a culture of microörganisms is shown by the structure of the death curves. The similarity in results obtained with *E coli* and *S pombe* does not justify the theory advocating a difference in the order of death between small and large cells. **III. The taking up of iodine by yeast cells.** *Ibid* 318–21.—The cells of *Saccharomyces cerevisiae* take up I from its aq solns according to the adsorption isothermal. These results are in agreement with microscopic observations which show that the colloidal structures of the cells and especially the membrane, take up I to a great extent and give up much of it on dilu. When $HgCl_2$ is used instead of I, the adsorbed salt may be pptd as HgS. The membrane, with its high adsorptive power, becomes black, while the rest of the protoplasm becomes gray only after more prolonged standing. This suggests that the mechanism of disinfection is closely related to that of dyeing and tanning. Julian H Lewis

**The use of acid fuchsin in Russell's triple sugar medium.** G D Cummings *J Infectious Diseases* 47, 359–66(1930).—Undecolorized acid fuchsin is recommended for use in the Russell medium because of its chem stability, ease of prepn, ability to give clear-cut reactions and lack of inhibitory effect. The use of undecolorized acid fuchsin would eliminate the variety of methods for the prepn of Andrade indicator now to be found in the literature. Julian H Lewis

**The growth and toxin production of Corynebacterium diphtheriae in synthetic media.** Mary E Maver *J Infectious Diseases* 47, 384–98(1930).—Diphtheria bacilli can be adapted to grow and produce potent toxin in a modified Braun and Hofmeier synthetic medium. The chief modification was of the N-bearing constituents. The cystine content was increased fourfold, asparagine or $NH_4$ succinate replaced the Na aspartate, and glycine was added. It appears that the medium must provide not only nutrients for rapid growth and pellicle formation, but these nutrients should also favor the appearance or maintenance of the toxigenic variants that occur in consequence of a dissociative process. Julian H Lewis

**Hexylresorcinol in experimental tetanus.** George E Coleman *J Infectious Diseases* 47, 410–5(1930).—Hexylresorcinol S T 37, when mixed with tetanus toxin in 16.6% soln is capable of neutralizing 10 and less than 100 minimal lethal doses. It is bactericidal for the vegetating forms of tetanus bacilli within 0.5 hr *in vitro*, but does not kill resistant spores in 12 hrs. When injected into the devitalized or necrosed tissue of guinea pigs infected with tetanus spores, it is without action in modifying the course of the disease. Julian H Lewis

**Decomposition of urea by Proteus.** Alexander A Kay, Wm M Gibbs, Arthur W Walker and Ruth E Jung *J Infectious Diseases* 47, 490–502(1930).—The destruction of urea by *Proteus* in various media was studied. Urea does not meet the N requirement of the organisms and the inference is warranted that the action on urea is only incidental to the metabolism of the bacteria and is not concerned with its vital needs. The enzyme responsible for urea destruction is of endocellular nature since $CHCl_3$-killed, washed and dried organisms are active. Julian H Lewis

**The antagonistic substances formed during bacterial fermentation.** B Klein *Z Immunität* 66, 530–42(1930).—In culture media contg carbohydrates bacteria form antagonistic substances that behave like antibodies in that they produce agglutination and bacteriolysis of whole bacteria and give precipitin and complement fixation reactions with bacterial exts. These reactions are, however, not sp. The agglutination is due to acids formed during fermentation. The antagonistic substances are formed not only in lab media but also in natural and com processes involving fermentation such as the curdling of milk and the manuf of beer, wine and cheese. J. H L

**The antiseptic properties of uroselectan.** Ruggero Ascoli *Minerva med* 1930, II, 415–7.—Uroselectan, the Na salt of 5-iodo-2-keto-1-pyridineacetic acid, in concns of 10–20% retards the growth of *E coli* and *Staphylococcus* in urine. The inhibition is

more marked at a concn of 30%, but even a concn of 40% fails to kill the organisms. The substance, therefore, has bacteriostatic but no antiseptic power P. M.

**Peroxidase in relation to bacterial growth with special reference to the influenza bacillus.** LUCILE R ANDERSON *J Bact* 20, 371–9(1930).—*B influenzae*, hemolytic and non hemolytic, and *B hemoglobinophilus-canis* do not produce peroxidase. *B parainfluenzae* produces it under both aerobic and anaerobic conditions Not one of 13 anaerobes tested produced it according to the benzidine reaction Of 44 aerobes tested all but 4, two of which were streptococci, gave a positive reaction. Banana reacts positively to the benzidine test The "X factor" of Fildes seems to be associated with peroxidase JOHN T MYERS

**Micrococcus niger, a new pigment-forming anaerobic coccus recovered from urine in a case of general arteriosclerosis** IVAN C HALL. *J Bact* 20, 407–15(1930) JOHN T MYERS

***The effect of the oxidation-reduction character of the medium on the growth of an aerobic form of bacteria*** W P ALLYN AND I L BALDWIN *J Bact* 20, 417–40 (1930).—This factor exerts an important influence on the growth and behavior toward atmospheric O of certain aerobic bacteria (*Rhizobium*) In agar shake cultures these organisms establish thin zones of growth, the level of which depends on the oxidation-reduction character of the substrate This also dets in part the ability to initiate growth By reducing with appropriate concns of cystine a medium which is slightly too oxidized for these organisms, it is possible greatly to increase the no of sources which develop into colonies in Petri dish cultures Hence this is important in making plate counts The organisms are able to make slight adjustments if the media are too oxidized The introduction of sand, finely divided filter paper, etc., into a liquid medium which was too oxidized to permit growth overcame the condition, probably because of the trapping of small vols of medium where the organism could make the necessary adjustments, as suggested by a lag period interpreted as time required for this adjustment The bacteriostatic effect of certain oxidizing and reducing substances seems due in part to the poising of the medium at an unfavorable potential Their toxicity depends largely on concn in relation to the oxidation reduction potential of the system Similar concns. were inhibitory under one set of conditions and stimulatory under another J T M

**A marine denitrifying organism.** BLODWEN LLOYD *J Bact.* 21, 89–96(1931).—A denitrifying organism was isolated from sea water off the Scottish coast, and denitrification curves were constructed JOHN T MYERS

**The effect of temperature upon the production of hydrogen sulfide by Salmonella pullorum.** RALPH P TITTSLER *J Bact* 21, 111–8(1931).—An incubation temp of 30° is optimum, and temps above 37° inhibit $H_2S$ formation by *S pullorum* Slight quant differences were noted between aerogenic strains at 30°. The ability to produce $H_2S$ parallels the ability to produce gas from carbohydrates Difco Pb agar is satisfactory for demonstrating $H_2S$ formation JOHN T MYERS

**A modified Loeffler's blood serum medium useful in the routine health department examination for diphtheria and streptococcus infections.** LEON S. MEDALIA, KARL R BAILEY AND CATHERINE ATWOOD *J. Bact* 21, 118–37(1931).—Loeffler's medium is modified by the addn of 4.5% of *N* NaOH, yielding a final $p_H$ of 7.6, bromothymol blue is used as an indicator JOHN T MYERS

**An instance of pigment formation by B. pestis.** A BESSONOVA AND M LOCHOV *Zentr. Bakt. Parasitenk.*, I Abt., 119, 35–8(1930) JOHN T MYERS

**A polysaccharide-building streptococcus.** J OERSKOV. *Zentr Bakt Parasitenk.*, I Abt., 119, 88–93(1930).—A substance analogous to the polysaccharides of the pneumococcus was found. JOHN T MYERS

**Bacteria which destroy blood pigment. (Studies with the help of bacteria which form hydrogen peroxide on heated blood plates.** K. BINGOLD *Zentr. Bakt Parasitenk* I Abt., 119, 97–100(1930).—Pneumococci, *Streptococcus mucosus*, *S viridans* and to a lesser degree *S pyogenes* can split oxyhemoglobin, methemoglobin or hematin to substances of simpler constituents This seems to be due to $H_2O_2$ formation This can occur only in the absence or the presence of minute amts of catalase JOHN T MYERS

**Changes in virulence and hemolytic power produced in hemolytic streptococci by growth in hematin agar.** K BINGOLD AND K BACH *Zentr Bakt. Parasitenk.*, I Abt., 119, 100–3(1930).—Growth in hematin agar decreases virulence and hemolytic power. JOHN T. MYERS

**The pigments of timothy grass bacilli.** ERWIN CHARGAFF. *Zentr. Bakt Parasitenk.*, I Abt., 119, 121–3(1930) JOHN T. MYERS

**The phenomenon of hemolysis through the action of bacteriophage.** ELISABETH BECHTEL. *Zentr. Bakt Parasitenk.*, I Abt., 119, 340–9(1931) JOHN T. MYERS

Cytological observations on the dissociation process in B. pestis. M. Porrovskaya. *Zentr. Bakt Parasitenk*, I Abt., 119, 353-61(1931) —A nucleus of chem. structure analogous to that in higher forms is demonstrable in certain phases of bacterial development. John T. Myers

The disinfecting action of simple organic mercury compounds. Gertrud Meissner. *Zentr Bakt Parasitenk*, I Abt., 119, 375-9(1931) —There are halogen Hg alkyl compds which have a higher killing power for staphylococci and anthrax bacilli than does $HgCl_2$. The growth inhibiting power of Me, Et, Pr, Bu and Am Hg compds is about 25–1000 times higher than that of $HgCl_2$. The action of the higher members of the series is weak or nil. Cl and Br salts are about equal in action, but I salts are weaker. The killing action is also better than that of $HgCl_2$. The hydroxides have a much weaker action than the halogen salts. Anthrax spores were more susceptible than staphylococci. John T. Myers

The influence of alkaloids on the metabolism of Bac. pyocyaneus. T. H. Amako *Zentr. Bakt Parasitenk*, I Abt., 119, 464–72(1931) —Cocaine, nicotine, physostigmine, pilocarpine and strychnine inhibit methylene blue reduction in proportion to their concn. Atropine and morphine inhibit only at moderate concns. (0.1 to 1.0%), not above or below. John T. Myers

The influence of plant growth on the activity of root bacteria. Gertrude Grap *Zentr Bakt Parasitenk*, II Abt., 82, 44–69(1930) —The greatest activity of the N-fixing root bacteria is concurrent with greatest plant growth. $NH_3$ production in soil is also greater during plant activity. John T. Myers

The fermentation of pentoses by certain propionic acid bacteria. Marian Foote, E. B. Fred and W. H. Peterson *Zentr. Bakt. Parasitenk*, II Abt., 82, 379–89(1930) — In common with the majority of organisms, the propionic acid bacteria do not ferment the pentoses as readily as the hexoses. Out of 20 cultures tested, 13 fermented arabinose and only one fermented xylose. The fermentation of pentoses as compared with glucose is marked by a decrease in the percentage of volatile acids and an increase in non-volatile acids. The ratio of propionic acid to acetic acid is decreased. The non-volatile acids consist of lactic and succinic. The latter was identified by its m. p. and the Ba content of its salt. The succinic acid is probably derived from the carbohydrate rather than from the yeast water. John T. Myers

The influence of high dilutions of quinine on the bacterial flora in hay infusion. M. Fehler. *Zentr Bakt Parasitenk*, II Abt., 83, 63–8(1931) —Quinine at a concn. of about $10^{-18}$ *M* favors the growth of *B. proteus*. *Paramecium* is stimulated at a concn. of about $10^{-18}$. John T. Myers

The lactic mannitic fermentation of sucrose. Bolcato Virgilio *L'ind. saccarif. ital.* 22, 427–32(1929) —Partial anaerobiosis is a needed condition for the activity of mannitic enzymes. A smaller amt. of mannitol with aerobic fermentation is compensated for by more lactic and acetic acids. Fermented juices defecated with basic Pb acetate gave, with Bertrand's liquid after 1 day, polarization of 7.60 and 0.528% invert sugar, after 2 days, polarization of 3.70 and 4.000% invert sugar; after 3 days, polarization of 2.20 and 3.040% invert sugar, after 4 days, polarization of 2.70 and 1.630% invert sugar. A variation in the quantity of invert sugar influences the saccharimetric value, rendering it unsuitable for a control of the fermentation process. This is best conducted by considering the principal products lactic acid (45% of the sucrose), AcOH (12–5%), mannitol (30–5%). AcOH is detd. by adding $H_2SO_4$ and distg. in a current of steam, lactic acid is detd. by subtracting AcOH from total acid. For detg. total acid the fermented liquid is neutralized with $CaCO_3$, in 1 cc. of the clear liquid Ca is pptd. with $NH_4$ oxalate and the oxalic acid titrated with 0.1 *N* $KMnO_4$. From this the Ca and lactic acid are detd. Mannitol is best detd. by Gayon and Dubourg's method of crystn. from alc. at 85° and weighing. The estn. is preceded by an alc. fermentation for eliminating the remaining sugars. The yeast has only a slight action on the mannitol. If samples are taken regularly from the beginning of fermentation it is noted that, while the lactic acid is formed continuously with a regular speed, the mannitol is all formed within the first 4–5 days. In the same time nearly all the AcOH is formed. The same juices with the sucrose inverted by warm $H_2SO_4$, filtered and submitted to fermentation, in 2 days show a change in the polarization from neg. to pos., denoting a more rapid consumption of levulose than glucose. The destruction of levulose is very rapid, as is the production of mannitol and AcOH, and continues until all the mannitol is formed. Despite the consumption of glucose (shown by the increase in lactic acid) the pos. polarization continues to rise and reaches its max. with the total disappearance of levulose and arrest in the production of mannitol. After this the pos. polarization is gradually reduced by the transformation of glucose into lactic acid. This is caused by

the high neg value of the sp rotary power of levulose, $[\alpha]_D = -92°$, in comparison with the pos. value of glucose, $[\alpha]_D = +52°,5'$, and the lower fermentation speed of glucose with regard to levulose. R SANSONE

The indole titer of Gersbach. E. L. KRUGERS DAGNEAUX *Chem Weekblad* 28, 66–7(1931).—The fact that the colon bacilli do not give the indole reaction after some time is not a disadvantage as it shows that the pollution occurred long ago and that there is no danger of typhoid contagion E SCHOTTE

The action of alkylresorcinols on phytopathogenic bacteria. C STAPP *Angew Bot* 12, 275–289(1930), *Rev Applied Mycol* 10, 46.—The effect of varying concns of phenylethylresorcinol and of hexylresorcinol on phytopathogenic bacteria depends so greatly on the media in which the bacteria are grown that no conclusion as to the toxic action of these substances on phytopathogenic bacteria within the host can be drawn by their effect on the same organisms on artificial media. Where potato tubers were used as the media for *B phytophthorus* concns of 0.2% of hexylresorcinol and 0.3% of phenylethylresorcinol were necessary to inhibit the growth of the organism, whereas lab tests showed that concns of 0.08% of either killed the bacteria when free of media Seven media and 7 bacteria were studied. ODEN E SHEPPARD

Gas-metal electrode potentials in sterile culture media for bacteria. ELDON M BOYD AND GUILFORD B REED *Can J. Research* 4, 54–68(1931), cf *C A* 23, 3411.—The work of French and Kahlenberg on gas-metal electrode potentials suggested that the potentials obtained at inert metal electrodes immersed in growing cultures of bacteria, and generally regarded as an oxidation-reduction phenomenon, might be of a similar type This was tested by passing air, H, N and $CO_2$ through sterile beef broth and observing the potentials developed at Pt, Au and Hg electrodes It is shown that air causes a rise in potential at all 3 electrodes; $H_2$ causes a marked fall in potential at the Pt and a slight change at the Au and Hg electrodes, N and $CO_2$ cause little or no change in the potential at the 3 electrodes. These changes are in agreement with French and Kahlenberg's results except with the Hg electrode which is shown to react chemically with the broth. J. W. SHIPLEY

The mechanism of bacterial action. J. H. QUASTEL. *Trans Faraday Soc.* 26, 853–64(1930).—A summary of the work on the dehydrogenases of resting bacteria. The theory previously developed (*C A* 22, 249, 4137), of the localization of dehydrogenation reactions on sp. areas of cell surface, is outlined. K. V. THIMANN

Increased bactericidal effect of inorganic compounds in the presence of x-rays (NORRIS) 7. Red colorations on salted hides and a comparison of the growth and survival of halophilic or salt-loving organisms and some ordinary organisms of dirt and putrefaction on media of varying salt concentrations (ROBERTSON) 29. The microbiological aspect of peat formation (THAYSEN) 8.

Handbuch der pathogenen Mikroörganismen. 3rd ed., edited by WILHELM KOLLE, RUDOLF KRAUS AND PAUL UHLENHUTH Band. VII, Tl. 2. Jena G. Fischer Berlin and Vienna. Urban & Schwarzenberg Pp. 753–1752. M. 108. Cf. *C. A.* 25, 983

MACKIE, T. J., AND MCCARTNEY, J. E.: An Introduction to Practical Bacteriology: A Guide to Bacteriological Laboratory Work. 3rd ed., enlarged. New York: Wm. Wood & Co. 421 *pp* $3.50

## D—BOTANY

THOMAS G. PHILLIPS

Phototoxic substance from Hypericum crispum. Z MÉLAS IOANNIDÈS. *Arch. Inst. Pasteur Hellén.* 2, 161–165(1928).—In an attempt to isolate the phototoxic substance from *Hypericum crispum*, 0.16 g of a red, amorphous substance, slightly sol. in water and giving a characteristic spectrum, was obtained from 100 g of the dried plant B. C. A

The phototoxic pigment of Hypericum crispum. ZOÉ MÉLAS IOANNIDÈS. *Compt rend. soc. biol.* 105, 349–51(1930); cf. preceding abstract.—The isolated pigment of *Hypericum crispum* when inoculated into white rats photosensitized the animals in the same way that ingestion of the fresh plant does The pigment was obtained in cryst. form by extg the dried plants with 0.3% $Na_2HPO_4$, and treating the filtrate with AcOEt The 2 phases were sepd by satg. the aq layer with $Na_2CO_3$ The AcOEt soln. of the pigment was purified by washing 3–4 times with satd. $Na_2CO_3$ soln., then with $H_2O$, the filtered soln was concd. by distn. to 60 cc., and treated with 240 cc. of ether. The pigment was extd by shaking with 0.3% $Na_2HPO_4$ The pigment seps. in amorphous

form on acidification with $KH_2PO_4$ soln. Slow acidification, obtained by diffusion without agitation from $KH_2PO_4$ crystals, resulted in 0.05 g. of brick red crystals. These are insol. in $CHCl_3$, $CS_2$ and $C_6H_6$, very slightly sol. in ether, fairly sol. in MeOH, EtOH and AcOEt and extremely sol. in acetone and pyridine. All the solns. are strongly fluorescent, and are bright red in color. The pigment is pptd. in a brick red colloidal form by the addn. of $Na_2CO_3$, or as a grayish green ppt. on the addn. of NaOH. It is also pptd. by dil. acids which seem easily to alter it. The following absorption spectra data were obtained on a soln. of 0.1 g. of pigment in 5000 cc. of alc.: 4 mm. layer, band 1,599-588-586, band 2.553-545, 20 mm. layer, band 1,605-587-575, band 2,558-547-545, band 3.513-548, 10-mm. layer, band 1,612-573-570, band 2.562-530-528, band 3,515-505 (progressive absorption at the extreme violet of the spectrum, 485).

B. C. Brunstetter

**Wood-pentosan. I.** K. Nishida and T. Takagi *Cellulose Ind.* (Tokyo) 6, 170-3(1930), *Abstracts*, 32-3.—Woodmeals from a no. of different coniferous and deciduous trees were extd. with 5% NaOH soln., the ext. was treated with Fehling soln. in order to sep. pentosan as the Cu compd., the latter was decomposed with HCl, and the yield and compn. of the pentosan were detd. The pentosan content (from the Cu compd.) of the deciduous woods examd. is found to be characteristic, while coniferous woods contain much smaller quantities of pentosan. Frequently the wood pentosan was converted into 2 different modifications, deciduous woods contain both the $\alpha$ and $\beta$ varieties, while only the $\alpha$ type is present in coniferous wood. The compn. of the $\beta$ pentosan (% xylan etc.) from the deciduous woods examd. is given; that of the $\alpha$-variety will be given in part II.

B. C. A.

**Micro-incineration of diatoms without carapace.** E. Bachrach and Mme. Pillet *Compt. rend.* 190, 1442-3(1930).—No $SiO_2$ was detected in the hyaline body of the diatom *Navicula* without carapace. The ash contained Ca.

B. C. A.

**Differentiation between good and poor germinative capacity of seeds by chemical means.** H. O. Paech *Diss. Agr.-Chem. Inst. Univ. Breslau* 1929.—The germinative activity of seeds is closely related to their dehydrogenase activity. Of numerous colorimetric methods for the detn. of the latter, the most satisfactory is that using *m*-dinitrobenzene. Comparative tests should be made on the same day with freshly ground material.

B. C. A.

**Action of a sudden withdrawal of nutrient salt solution from corn seedlings.** G. Berthold *Z. Botan.* 23, 94-131(1930).—Corn seedlings, grown for a time in nutrient salt solns., were transferred to distd. water, and progressive anatomical and physiol. changes were observed.

R. C. Burrell

**The nature of chemodinetical stimulation and the differences in swelling produced by *l*-asparagine.** Hans Fitting *Z. Botan.* 23, 328-60(1930).—Plasma streaming in leaf sections was studied and the stimulating effect of dil. solns. of asparagine noted. These dil. asparagine solns. readily become inactivated as the result of bacterial action.

R. C. Burrell

**Chlorophyll changes in barley.** Harald Nilsson *Arkiv Kemi, Mineral. Geol.* 10A, No. 12, 34 pp.(1930).—No essential differences in activity were shown between the normal green chlorophyll in homo- or heterozygotes or the chlorophyll-deficient white homozygotes in barley seeds. The $O_2$ utilization of the intact green embryo and of certain organs as the leaves, roots and endosperm is greater than that of the white parts. No difference between the homo- and heterozygotes could be detd. in this respect. The earlier results which showed no relationship between $O_2$ utilization and catalase activity are confirmed. Higher $O_2$ consumption occurred in all cases with chlorophyll-contg. leaves than with chlorophyll deficient ones. The presence of $KNO_3$ was without effect on the $O_2$ utilization. Only slightly lower ash content was found in the chlorophyll deficient leaves than in the green ones.

H. J. Deuel, Jr.

**Plant proteases. XVI. The activation of animal and plant proteases by glutathione.** W. Grassmann, O. v. Schoenebeck and H. Eibeler *Z. physiol. Chem.* 194, 124-36(1931), cf. *C. A.* 24, 868.—Zoökinase, the natural activator of animal proteases, has recently been shown by Waldschmidt-Leitz (*C. A.* 24, 5316) to be identical with glutathione. A similar identification of the phytokinase of yeast is now reported. The activator of yeast proteinase is rapidly liberated by autolysis in the presence of a cell poison, the greater part passing into soln. during the first hr. The liberation of proteolytic enzyme, on the other hand, is hardly appreciable during the 1st hr. and requires 24 hrs. for completion. The sepn. of enzyme and activator is therefore a comparatively simple matter. The 1st fraction, which has no enzymic activity, contains the glutathione of the yeast and has the property of activating the inactive enzyme to the full activity attainable by treatment with HCN. Boiled yeast ext. shows the

same behavior. Fractionation of the crude activator soln., according to the procedure for purification of glutathione, yields fractions in which the activating capacity and the glutathione content are strictly parallel. The activity of the crude activator soln. is therefore due to its glutathione content. Since cysteine and glutathione must be in their reduced form to activate papain and cathepsin, it would appear that the natural SH system effects an intimate connection between respiration and proteolysis. Hydrolytic processes are commonly assocd. with anaerobic conditions, while synthetic processes are performed by the cell during active respiration. In the functioning cell, which is abundantly supplied with O, the glutathione would be present in its disulfide form, and hence the cathepsin for the most part would be in its inactive form. The cell would thus be protected from autolysis. However, there is reason to believe that the activation phenomena cannot be attributed exclusively to glutathione, since yeast proteinase undergoes self activation under conditions which preclude the intervention of glutathione. A. W. Dox

Plant microchemistry. L. Rosenthaler. *Pharm. Zentralhalle* 72, 81–5(1931).—An address. W. O. E.

**Growth and absorption by oats in relation to varying concentrations of calcium and sodium in the nutrient solution.** C. Philipson. *Svensk Bot. Tid.* 24, 185–202 (1930), *Physiol. Abstracts* 15, 263.—The relation of dry wt. of culture to compn. of the nutrient soln. is shown graphically for 2 periods of growth (*a*) 1–3 weeks, involving 6 harvestings, (*b*) 2 months and for mature plants and seeds. The dry-wt.-time curves for the first 3 weeks follow V. H. Blackman's formula. N content and ash content follow the same course as the dry wt., Ca content increases more rapidly. Changes in Ca utilization are involved in the antagonism between Ca and Na, it is probable that these changes are due partly to alteration in permeability of cell membranes. G. G.

**The proteins and vitamins in the embryo of the soy bean.** Sajiro Ohtomo. *Abstracts from Repts. Central Lab. S. Manchuria Railway Co.* 1929, 15–7.—The embryo constitutes 2.09% of the soy bean. It contains moisture 4.47, crude protein 42.21, protein 35.75, crude fiber 2.06, ash 3.45, crude fat 9.40, non-nitrogenous ext. 37.42 and pentose 5.7%. Of the total N, 78.8% is sol. in $H_2O$, 8.61% in NaCl soln. and 6.22% in NaOH soln.; 78.68% of the N is present as globulin, 6.04% as albumin, 9.12% as proteose and 5.56% as nonprotein. On the basis of dry matter N is distributed as follows: total N 7.08, sol. in 20% HCl 6.00, amide 0.69, humin 0.21, arginine 1.32, histidine 0.23, lysine 0.55, cystine 0.09, amino 4.80%. The embryo is richer in vitamins *A* and *B* than is the endosperm. V. F. Harrington

**Absorption and utilization of potassium by plants.** R. P. Bartholomew and George Janssen. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 212–5 (1930).—The min. amt. of K which it is necessary to maintain in soln. to produce optimum growth varies with different plants. Alfalfa and Hubam clover required a min. K concn. approximating 0.5 p. p. m., cow peas, oats, soy beans and cotton 2.0 p. p. m., and Sudan grass 3.0 p. p. m. In all expts. good growth was made from a concn. of only 0.5 p. p. m. Plants have the ability of absorbing relatively large amts. of K very rapidly, and the amt. absorbed depends upon the amt. in soln. and not upon the needs of the plant, large amts. being taken up when no visible growth is being made. The plant quickly adjusts itself to changes in the concn. of K. Although plants absorb K very rapidly symptoms of K starvation in the later stages of growth are infrequent because the plant is able to transfer the K from the older to the embryonic regions and re-utilize it for growth processes. K. D. Jacob

**Isotopes of potassium: their association with plant life.** J. G. F. Druce. *Chem. News* 142, 33–5(1931); cf. *C. A.* 24, 1885.—Addnl. exptl. work confirms D.'s earlier statement that KCl from the ashes of potato stalks contains more $K^{41}$ than is present in ordinary KCl. In non-living plant tissue there is no accumulation of the higher isotope. Louise Kellby

**Spike disease of Dodonaea viscosa.** B. N. Sastri and N. Narayana. *J. Indian Inst. Sci.* 13A, 147–52(1930); cf. *C. A.* 25, 315.—Diseased tissues of *Dodonaea viscosa*, as compared with healthy tissues, showed a higher nitrate, nitrite, $NH_3$ and amide content, a tendency toward accumulation of sugar and starch, a higher diastatic activity and a deficiency in Ca. *Zyzyphus oenoplia*, which suffers from a similar disease, also shows Ca deficiency. Louise Kellby

**Proteins of Indian foodstuffs. III. Globulins of Bengal gram (Cicer arietinum, Linn.) and horse gram (Dolichos biflorus).** Nuggihalli Narayana. *J. Indian Inst. Sci.* 13A, 153–8(1930); cf. *C. A.* 23, 211.—A knowledge of the compn. of Bengal gram and horse gram is important because of the relation of these pulses to human and animal nutrition, resp. The globulins in these grams were isolated and were found to

contain sufficient quantities of arginine, tyrosine and lysine, but to be deficient in cystine and tryptophan. The arginine content of the Bengal gram was much higher than that usually found in globulins of other Indian pulses. LOUISE KELLEY

Physiological studies on Drosera. II. The effect of quinine and atoxyl on pepsin. KENJO OKAHARA *Science Repts Tôhoku Imp. Univ* [4], 5, 739–55(1930), cf *C. A.* 25, 983.—In the course of studies made by O to det whether *Drosera* enzyme and pepsin are identical, he detd the effect of quinine HCl and atoxyl on pepsin. Digestion expts were carried out at 39°, and the extent of digestion was detd by the nephelometric method, a 40% soln of sulfosalicylic acid was used to cause turbidity. Variations in the method of mixing the solns. and in the concn of the solns of poison used caused the digestion to be accelerated, repressed or unchanged. LOUISE KELLEY

Composition and properties of certain red and yellow plant pigments. LEONORA N. BILGER *Bull Bause Sci Research* 3, 37–46(1931).—The pigment (I) extd from Japan red peppers is shown to differ in chem compn from *lycopin* and the pigment from paprika. Ultimate analyses for I gave C 74.69 and 74.69%, H 9.95 and 10.26%, O (by difference) 15.36 and 15.05%. The crystals were deep red, m. p. 167–9° (when taken immediately after purification), 120–1° (after slight fading) and 50–60° (after complete fading), they were moderately sol. in EtOH and MeOH, sol. in $C_6H_6$ and ether, easily sol. in $CHCl_3$ and $CS_2$, nearly insol. in petroleum ether and insol. in water. They were purified by pptn. from ether by adding petroleum ether and chilling and by recrystn. from $CS_2$. I shows no rotation. The dry crystals of *lycopin*, *carotene* (II), *capsanthin* and I are readily bleached when exposed to air and light. Alc. solns. of I and II may be kept in stoppered glass test tubes (air present) for weeks in daylight at room temp. without noticeable fading and for months in a refrigerator. Alc. and $CHCl_3$ solns. of I and II were exposed in water-cooled quartz tubes to ultra-violet light and in cellophane cover cells to soft x rays with and without air present. In general, alc. and $CHCl_3$ solns. faded much more rapidly than $CS_2$ solns. In the presence of air, alc. and $CHCl_3$ solns. completely lost their colors after 3 hrs.' exposures to ultra-violet light. $CS_2$ solns. required 9 hrs. for complete fading or 26 hrs., when air was excluded. In all cases of exposure to ultra violet light, a very small amt. of a brown resinous material formed on the walls of the tubes. When the filtered solns. were evapd. to small vols. and cooled sparkling colorless crystals sepd. Fading of the pigment was also brought about with soft x rays but in a much shorter time than with ultra-violet light. After irradiation with ultra-violet light neither I nor II showed bands in the visible region; I but not II showed bands in the ultra violet. Twenty five photographs of absorption spectra of these pigments are appended. J. A. KENNEDY

Preliminary study upon the nucleo-cytoplasmic ratio in plant tissues. F. E. HEULIN *Australian J. Exptl. Biol. Med. Sci.* 6, 59–64(1929).—The ratio nucleic acid N/(coagulable protein N + nucleic acid N) found for wheat plants 29, 46 and 57 days old was 0.0341, 0.0124 and 0.0040, resp. C. G. KING

Variability of rice varieties in resistance to toxic action of potassium chlorate and its practical significance. MORIMASA YAMASAKI. *J. Imp. Agr. Expt. Sta.* (Japan) 1, 1–22(1929).—Rice seedlings grown in tubes of $KClO_3$ soln. (0.005–2.0%) were found to vary in susceptibility to toxic action. Upland rice was more resistant than lowland varieties, and among strains of upland rice, a direct correlation between drouth resistance and resistance to toxicity was shown. In all varieties there was a similar relation between length of growing season and resistance. Injury from $KClO_3$ was shown by a dark brown discoloration of the leaf veins. Conditions of growth previous to placing seedlings in $KClO_3$ soln. also affected resistance, those grown under upland conditions and exposed to the sun were less resistant than those previously grown in a watered nursery and shaded. Resistance to toxicity decreased with the age of the seedlings. Differences in resistance to toxicity are attributed to varietal differences in permeability of root cells, not to differences in osmotic pressure of cell sap. K. KITSUTA

Variation and correlation among varieties of wheat and barley in regard to resistance to the toxic action of potassium chlorate. MORIMASA YAMASAKI. *J. Imp. Agr. Expt. Sta.* 2, 139–62(1929).—See *C. A.* 24, 4576. K. KITSUTA

Variations in the unsaponifiable lipides and in the lipide phosphorus of Sterigmatocystis nigra as a function of the mineral composition of the liquid culture medium. CHARLES PONTILLON *Compt. rend.* 191, 1367–9(1930).—The mineral compn. of the nutritive medium has a considerable influence upon the lipide metabolism of *Sterigmatocystis nigra*. B. S. LEVINE

Frangularoside, a new rhamnoside of the freshly dried bark of black alder. M. BRIDEL AND C. CHARAUX *Compt. rend.* 191, 1374–6(1930); cf. *C. A.* 25, 934.—A

method for the prepn and purification of the rhamnoside is given and its properties are described. The use of freshly dried bark is essential. B. S. LEVINE

The distribution of nitrogen in plant extracts that contain a high proportion of nitrate nitrogen. ALBERT C CHIBNALL AND E J. MILLER *J. Biol Chem* 90, 189–96 (1931).—Exts of plant products which contain a high percentage of nitrate N show certain abnormalities in the distribution of N, and it has been necessary to revise the methods employed for the partition of the N into the now commonly accepted groupings Reduction of nitrate was found to occur during HCl hydrolysis (cf Vickery and Pucher, *C A* 25, 1552–3), this reduction was promoted by the presence in the ext. of an easily oxidizable substance which apparently was nitrogenous in character. A particular sample of rye grass (*Lolium perenne*) was found to contain 12 7% of its total N as nitrate N, an amt equal to 4 4% of the dry wt. of the leaf Only the tobacco leaf has previously been shown to contain such a relatively enormous amt of nitrate

A P. LOTHROP

The fermentable principle of the tubers of the asphodel. II. C NEYRON. *Bull sci. pharmacol* 38, 38–51(1931); cf *C A* 25, 1274.—The rhizomes and tubers contain the glucoside *asphodeloholoside* which was obtained as a $Ba(OH)_2$ compd sol in water and pptd. by dil EtOH It is partly decomposed by $CO_2$ The glucoside itself cannot be crystd , it is extremely sol in water and EtOH. The mol wt is about 700, the rotatory value is between —18° and —19° After hydrolysis, the rotation is —67°; the sugars formed are levulose and an aldose, probably glucose. It is easily fermented, especially by *Aspergillus niger*, and only partly by suerase. A. E MEYER

Presence of methyl mercaptan in the leaves of Lasianthus laevigatus Bl., L. lucidus Bl., L. purpureus Bl., L. stercorarius Bl., and L. bracteolatus Miq. D R. KOOLHAAS *Biochem. Z.* 230, 446–50(1931).—A method is discussed for the detn. of MeSH in the steam distillate from leaves. S. MORGULIS

Chemistry of citric acid formation by molds. IV. Transformation of saccharic acid. K. BERNHAUER, H. SIEBENÄUGER AND H. TSCHINKEL. *Biochem. Z.* 230, 466–74(1931); cf. *C. A.* 23, 1151.—Expts with 26 strains of mold fail to give any evidence for the formation of saccharic acid from glucose or gluconic acid, or for the formation of citric acid from saccharic acid or its salts. There is thus no evidence that saccharic acid is an intermediate product in citric acid formation A no of the molds transformed saccharic acid to oxalic acid S. MORGULIS

Characterization of Aspergillus niger strains. III. Further propagation experiments and comparison of different mold strains. K. BERNHAUER, F. DUDA AND H SIEBENÄUGER. *Biochem Z.* 230, 475–83(1931); cf *C. A.* 23, 2741.—The different strains are differentiated by their ability to produce citric acid and to form gluconic acid

S. MORGULIS

Isotopes and living organisms. V. I. VERNADSKII. *Compt. rend.* 192, 131–3 (1931).—The work of Loring and Druce (*C. A.* 24, 1885) indicates that K extd from the potato has an at wt. of 40 4–40 59 and is more radioactive than the lower isotope of K. These results are contested by Lowry (*C. A.* 25, 314) who extd the K of cotton and of wheat and obtained an at. wt. of 39 09–39 31. V. prepd compds of K, Fe, Mg, Zn, Ca, Si and S from living organisms with a view to det. the at. wt of each element. These data would throw some light on the hypothesis that living organisms sep the isotopes of elements This hypothesis is supported by the fact that N, C, H and other elements occur in living organisms in isotopic mixts , and that certain elements (such as Ca, K, Fe and Mg) present in the vital cycle tend to remain there. N. M NAYLOR

The liberation of iodine from the gland cells of Bonnemaisonia asparagoides by the action of ultra-violet light. ROBERT LAMI *Compt. rend.* 191, 863–5(1930).—Irradiation of *Bonnemaisonia asparagoides* with ultra-violet light causes the liberation of $I_2$ It is possible that the algae are killed, and that the liberation of acids from the diffuse vacuoles causes this effect, but it is probable that it is a direct effect of the radiation which ionizes the free $I_2$ present in the gland cells T. H. RIDER

Studies on the nature of rust resistance in wheat. V. Physiology of the host. W. F. HANNA. *Can. J. Research* 4, 134–47(1931).—Detns were made of catalase, diastase and oxidase activity; rate of respiration; and content o fchlorophyll, xanthophyll and carotene in the leaves of 8 wheat varieties With respect to their reactions to stem rust, these wheats vary from almost complete susceptibility in certain varieties to a high degree of resistance in others Catalase activity increased as the plants approached maturity, whereas diastatic activity decreased with increasing age. No significant differences were found in the oxidase activity or respiratory rate of the varieties. Little Club and the varieties of the vulgare group proved to be relatively rich in chlorophyll and the carotenoids It is suggested that photosynthetic processes may

take place more rapidly in the cells of the varieties having a high content of these pigments, and thus furnish conditions suitable for the growth of the rust mycelium
J W Shipley

**The mechanism of growth in the cotton hair.** F. T. Peirce *Trans Faraday Soc* 26, 809–13(1930); cf. *C A*. 23, 5381.—The deposition of sol carbohydrate as cellulose involves linkages in 3 directions, each one corresponding to a stage in the physiology of the plant. The theory of orientation of glucose residues in the cell wall is developed
K V Thimann

**Useful device for evaporating alcohol from plant extracts.** F. E Gardner. *Plant Physiology* 5, 617–9(1930).—The device is attached to a Soxhlet extn battery. It consists of an air pump driven by a $^1/_6$ h.-p. motor and connected to a piece of 0.75-in. iron water pipe 8 ft. long into which are fitted, at the proper intervals, 12 curved pieces of $^3/_{16}$ in. Cu tubing about 7 in. long which lead into the necks of the flasks. The time necessary for the evapn. of 100 cc. 95% alc. is 15–20 min. and for 80% alc. considerably less than 1 hr. A diagram of the app. is given
Walter Thomas

**Some organic acids of wheat plants.** E. K. Nelson and Heinrich Hasselbring. *J. Am. Chem. Soc.* 53, 1040–3(1931).—In an investigation of the org. acids in growing wheat plants the aq. ext. was found to contain (% calcd. on the basis of green plants) malonic, by fractionation of esters, 0.005, aconitic, by $Et_2O$ extn. of acids, 0.040, malic, by fractionation of esters, 0.050, by polarization, 0.064; citric, by fractionation of esters, 0.016, by pentabromoacetone, 0.019, oxalic, trace. The residue after water extn. contained 0.02% oxalic acid (0.11% on dry basis)
C. J. West

**Influence of neutral red on yeast respiration.** Max Geigr Huber *Proc. Acad. Sci. Amsterdam* 33, 1059–68(1930).—Manometric measurements of the $O_2$ consumption at 20° showed that the respiration of bakers' yeast is independent of the $p_H$ between 5 and 8.1. When neutral red is added 1:10,000, respiration in acid medium quickly rises 20–30% and after an hour falls to 80% of the original. In alk. media it falls immediately. The older the cells, the more pronounced are these changes
J. J. Willaman

**Changes occurring in stored alcohol plant extracts.** James E. Webster *Science* 73, 77–8(1931).—Plant samples preserved in 80% EtOH + excess $CaCO_3$ were found to have $p_H$ values of 4.6–6.0 and titers of 3–8. Celery exts. in 80% EtOH for 9 months doubled their $NH_3$ content at $p_H$ 4.2 and quadrupled it at $p_H$ 8+. There was always increase in $NH_3$ in exts. of grapes, celery, lettuce and spinach. W. urges that this method of preservation be studied by other investigations
J. J. Willaman

**Changes in the composition of oranges during ripening.** P. R. v. d. R. Copeman *Trans. Roy. Soc. S. Africa* 19, 107–67(1931).—The growth and compn. of oranges were followed for 104 days, fruits from both unsprayed trees and from those sprayed with Pb arsenate were used. Most of the factors studied fitted rather well this modified form of equation for autocatalytic reactions $\log (x - c)/(a - x) = K(t - t_1)$, where $c$ is the value of the factor at the beginning, $a$ is the final value, $K = k(a - c)$ ($k$ is the velocity constant of the change) and $t_1$ is the time at which $x$ has a value of $a + c/2$. The factors studied were wt. of fruit, skin and pulp, alc. insol. residue, sol. solids, acidity, sucrose, glucose, fructose, ash, N, P, K, Ca, Mg, Fe. The proportion of P, both in the juice and in the ash, decreased during the period of ripening, and storage of P must occur in the early stages of formation of the fruit. The K content of the juice and of the ash increased during ripening and the relatively large proportion of K in the mineral constituents of the juice indicates clearly the importance of this factor in the development of the fruit. The results indicate that the growth of the fruit is dependent upon a continual supply of K. It would appear that K is closely connected with the formation of carbohydrates in the plant, and it is believed that this factor is also assocd. with the transference of the carbohydrates. The K content of the juice of the sprayed oranges is greater than that of the unsprayed oranges, and the proportion of sugar in the total solids was also higher in this case. The Ca and Fe contents of the juice decreased during ripening, while there was no significant rate of change in the content of Mg and no significant increase in N or in ash contents in the juice. Ca appears to resemble P in that it must be stored in the early stages of development of the fruit. P–N ratios in the case of both sprayed and unsprayed oranges are similar and show no significant difference, the mean values being 0.352 and 0.351, resp. The value of the ratio decreased in both series during ripening. On the other hand, the K–N ratio was slightly higher in the case of the sprayed oranges, the mean values for the 2 series being 1.83 and 1.67, resp. The value of this ratio remained more or less const. during ripening. During this period the wt. of the orange increased, and this was accompanied by an increase in the wt. of pulp, in the amt. of sol. solids and sugars in the juice and in the amts. of these constituents per fruit.

At the same time the proportion of cell-wall material in the pulp and of the acid in the juice decreased During the final stages of growth transpiration became dominant, with the result that the fruit lost wt because of loss of water. At the same time there was a corresponding increase in the concn of sol solids in the juice The acidity of the sprayed oranges was less than in the unsprayed oranges, while there was a greater content of cell wall material in the sprayed oranges At the same time there was a slightly higher content of sugars in the juice of the sprayed oranges, and this appears to be due to the fact that the amt. of sucrose was increased The rates of change of the various factors were not affected by the spraying, and it was concluded that the arsenate spray exerts an internal physiol action on the trees, with the result that there is a selective oxidation of the respiratory materials in the fruit As a consequence of this action the acid in the sprayed oranges forms a more important source of respiratory material than the cell wall material The action must be caused by the absorption of arsenical compounds through the leaves of the trees The solution of the problem depends upon the use of sprays other than arsenical A bibliography is included J J Willaman

## E—NUTRITION

PHILIP B HAWK

**Changes in the composition of blood in rabbits fed on raw and cooked soy beans.** Ernest Tso and S M Ling *Proc Soc Expll Biol Med* 28, 219–20(1930) —The feeding of raw or cooked soy beans or a diet of millet and cabbage had no effect on the concns of uric acid, urea N and inorg P in the blood of the rabbit The blood cholesterol value was slightly higher on the soy bean diets Uric acid was detd by the Folin improved method (cf *C A* 24, 2771) Twice the vol of blood filtrate was used and the standard was reduced to 2 cc. C. V Bailey

**Effects of a hyperprotein and hyperpurine diet (pancreas) on the rat.** P Rondoni *Arch ist biochim ital* 2, 243–68(1930) —On a diet of pancreas, either alone or mixed with flour, rats lose wt , especially in the former case, while the kidney wt. increases both absolutely and relatively Other effects of such diet include slight tendency to leucocytosis; diffuse phenomena of swelling in the parenchymal organs; more marked vital colorability with trypan blue; an acidotic condition, increased thermal reactivity compared with that caused by subcutaneous injection of peptone or suspension of uric acid, increased disposition to inflammation B C. A

**Ergosterol and antirachitic vitamin.** M. Comel *Arch ist. biochim ital* 2, 281–306(1930) —When administered in excessive doses, irradiated ergosterol maintains its efficacy as a Ca fixing and antirachitic remedy but gives rise to toxic phenomena The toxicity is displayed mainly by pptn. of lime in the viscera and by a characteristic atrophy of their cellular elements, and is probably due to the ergosterol itself rather than to admixed substances This toxicity throws doubt on the identity of irradiated ergosterol with the lime fixing vitamin, but the irradiated ergosterol may represent the active constituent of the vitamin, the latter being formed by union of the ergosterol with a protective lipin B C. A

**Effect of x-rays on ergosterol.** M. Sumi. *Bull Inst Phys Chem Research* (Tokyo) 8, 640–4(1929) —Vitamin D, formed by irradiation of ergosterol with ultra-violet light, is destroyed by 4 hrs ' exposure to x rays The spectrum of ergosterol and activated ergosterol extends further into the ultra-violet region after irradiation with x rays B C A

**Biological investigations with milk changed by the removal of fats and the addition of carbohydrates.** L. Randoin and R Lecoq *Compt rend soc. biol.* 102, 528–31 (1929); cf *C. A.* 25, 729 —Pigeons were fed daily with a mixt prepd from 8 g of agar agar, 2 g of filter paper and 90 g of dried milk or dried milk from which fats had been removed The animals fed on the fat free diet died in 30–50 days In another series, the diet consisted of 50 g of dried milk (fat free or normal), 40 g of carbohydrate and 10 g of roughage. With the fat free diet, the animals fed with lactose, sucrose, maltose, dextrose and dextrin died in 15–25, 50–70, 70–100 days, 3–4 months and not less than 5 months, resp With the normal milk diet, only the animals fed with lactose died (50–80 days) B. C. A

**Dependence of the sugar curves of the blood on acid and alkaline diets with subcutaneous injection of pilocarpine.** E. T. Minkir-Bogdanova. *Russian J. Physiol* 13, 151–6(1930) —An acid or an alk. diet influences the sugar of the blood but little, the sugar content and its max and min. values being approx. the same in the 2 cases With either diet, subcutaneous injection of pilocarpine produces neither a definite increase nor

a definite lowering of the sugar content of the blood, but the divergences from the mean value are more marked than those of most of the control expts. B C A

Variations of the catalase curve of blood after introduction of pilocarpine on an acid or alkaline diet. S A Povorinskaya. *Russ. J. Physiol.* 13, 183–92(1930).—The curves representing the catalase content of the blood at various times after subcutaneous injection of pilocarpine are of a uniform type for children receiving an alk but not an acidic diet; where a mixed diet is taken, the curves are of a mixed type The catalase-time curves for children on an alk. diet not receiving pilocarpine are not of a uniform type The catalase curves vary irregularly for the same individual according to the day and hour at which the blood is taken No parallelism is found between blood catalase and hemoglobin contents. B C A

Variations in the chloride and water contents of striated muscle, liver and kidney during acute experimental scurvy. Lucie Randoin and André Michaux. *Compt. rend* 192, 108–10(1931), cf *C A* 24, 4535, 25, 1559.—In guinea pigs deprived of the antiscorbutic vitamin the Cl and water contents of the liver and kidney increase only slightly above normal, but the Cl content of the muscle increases considerably. This is not dependent upon the Cl content of the diet, as the same effect was noted in guinea pigs receiving diets contg no NaCl, 0 5% NaCl and 1 5% NaCl Rachel Brown

Observations and measurements on vitamin A. P. Karrer, B. Euler, H von Euler, H Hellström and M Rydbom *Arkiv Kemi, Mineral. Geol.* 10B, No 12 6 pp.—A study is made of the metabolic variations of carotene and its relationship to vitamin A Carotene was found to be concd in the blood plasma or serum Almost none was present in the red blood cells even in those bloods which contained large amts of this pigment In 50 samples of normal human blood sera the av. was 0 8 Lovibond units per 10 cc., although one value was 4 5 units With herbivorous animals, much higher values were obtained With ox serum the content was 17 units and with cow sera taken in Sept the av was 14 Lovibond units (11–16) A seasonal variation occurred in these animals, the highest concns being obtained in the fall after a summer of fresh pasturage while much lower amts were obtained after the usual winter feed While it is admitted that carotene is not the growth-promoting factor identical with vitamin A, it is suggested that this latter factor may be a hydrogenated carotene which has been formed in the liver through the action of carotenase A spectrometric study of these pigments in biostearin and in the distillates of cod liver oil and shark liver oil definitely proves that a growth promoting factor independent from carotene exists A very rapid deterioration of these substances occurs, as indicated by the rapid disappearance of the absorption bands Ether sol substances having a different spectometric picture were obtained from germinating barley and *Fucus vesiculosis* H J D., Jr

The ether-soluble substances of polished rice. Yoshikazu Sahashi *Bull Inst Phys Chem Research* (Tokyo) 9, 882–90 (Abstracts 84–5 (in English) published with *Sci Papers Inst Phys Chem Research* (Tokyo) 14, No 271–3(1930)).—A further substantiation of earlier expts (*C A* 23, 1937; 24, 3264) in which it was demonstrated that polyneuritis in birds is not to be traced to toxic compds in the alc.-sol fraction of polished rice as claimed by Teru Uchi (*C A* 24, 1146) The ether sol portion consists of palmitic, oleic and linoleic acids, phytosterol and other oily nonsaponifiable matter The injection of this ext was not followed by any toxic symptoms in pigeons or in mice, nor was any difference noted in the effect of feeding alc.-extd polished rice or that washed only with water In either case the diet must be supplemented with vitamin B to prevent the onset of polyneuritis H J. Deuel, Jr

The vitamin content of marine plankton. J C. Drummond and E R Gunther. *Nature* 126, 398(1930).—Phytoplankton gave a pos. test for vitamin A in 20 mg doses and the $SbCl_3$ and absorption spectrum tests were likewise pos These were neg for zooplankton The line test for vitamin D was only doubtfully pos with phytoplankton but unmistakably pos with zoöplankton, while the x ray gave neg results with both species H. J. Deuel, Jr

The relation of vitamins to carcinogenesis. Waro Nakahara *Sci Papers Inst Phys Chem Research* (Tokyo) 15, 32–6(1930); *Chem News* 142, 86–7(1931).—In opposition to Fujimaki, Kimura, Wada and Shimada (cf *C A* 21, 1836), N finds no direct relationship between vitamin-A deficiency and cancer in rats Overdosage with vitamin D was likewise ineffective in producing this condition H J. Deuel, Jr

Problems of nomenclature and dosage in experiments with Vigantol M Schmidtmann *Klin Wochschr* 9, 1629–30(1930) H Eagle

The use of an acid diet in the treatment of bronchial asthma. Kurt Teifensee *Klin Wochschr* 9, 1675–8(1930); cf *C A* 24, 2798.—Untreated cases of bronchial asthma show a decreased excretion of acid and $NH_3$ during an attack An acid diet,

with addn of $NH_4Cl$, $NH_4H_2PO_4$ and "Silicalcium," leads to a significant improvement in the asthmatic condition Asthmatics kept in a secluded room show an increased excretion of acid and a decreased no of attacks Definite improvement, however, was obtained only when an acid diet was given Alkalosis is therefore an important symptom in bronchial asthma, the correction of which affects the whole clinical picture H EAGLE

A new principle in the biological demonstration of irradiated ergosterol. JOSEF WARKANY *Klin Wochschr* 9, 2152–3(1930).—Rabbits which usually excrete no phosphate, and are given 30–100 mg of irradiated ergosterol in their food, show large quantities of phosphate in the urine in 48 hrs A normal phosphate excretion can be prevented by daily $CaCO_3$ in the food H EAGLE

The fate of oxidizing enzymes in foods in the human digestive canal. I. BOAS *Klin Wochschr* 9, 2295–6(1930).—Using bananas (which are particularly rich in catalase, oxidase and peroxidase) as a test meal, B finds that all 3 are inactivated if the stomach is acid (to Congo red), but that this inactivation is reversible, the enzymes being reactivated by the neutralization of the mixt Oxidase is the most sensitive to acid As shown by the passage of a duodenal sound, as well as by expts on a dog with fistula of the ileum, the enzymes are reactivated when the food reaches the intestines Normal feces contain no oxidase If pus is present, oxidase may appear, if blood is present, peroxidase may appear Catalase is normally present Normal urine contains no peroxidase or catalase, but they may appear in pathol conditions Oxidase may be present, but it is thermostable and is probably a metallic catalyst. H. EAGLE

The active principle of liver in pernicious anemia. KURT G STERN *Klin. Wochschr* 10, 172–5(1931).—A summary of the recent work. H. EAGLE

The chemical nature of vitamin D. ETSUO TAKAMIYA. *J. Dept Agr. Kyushu Imp. Univ* 3, 1–27(1930).—*A repetition and extension of studies previously reported* (cf *C A*. 24, 3523, 25, 123, 536) New work includes a comparison between the action of $O_3$ and of ultra-violet light upon cholesterol and olive oil with respect to photoactivity, color reactions, and m p of the cholesterol The behavior of the ozonized materials was similar to that of those exposed to ultra-violet light. Ozonized ergosterol was found to be antirachitic when fed to rats made rachitic on McCollum's diet 3143, the potency rising to a max. and then falling off with increasing time of exposure to $O_3$ The relationship of these exptl. results to the chem nature of vitamin D is discussed, and it is tentatively concluded that the antirachitic portion of the ionized ergosterol is ergosterol monoozonide $A_1$, which is possibly identical with vitamin D S B FOSTER

Influence of radium emanation on the transformation of ergosterol to vitamin D. J MAISIN, W. MUND, Y. POURBAIX AND A CASTILLE *Compt rend soc. biol* 103, 534–6(1930), *Physiol Abstracts* 15, 258.—Ergosterol in soln in paraffin irradiated by Ra rays in a closed receptacle undergoes a definite chem. transformation. The product obtained is endowed with antirachitic properties. G G.

Reducing power of tissues in animals with low cystine diet. N. C. LACLAU AND A. D MARENZI *Rev soc argentina biol* 5, 768–73(1929); *Physiol. Abstracts* 15, 233.—*The reducing power is less than in the controls. Differences are greater in liver than in* muscle. There is a certain relation between reducing power and glutathione content of tissues G G

Experimental production of bladder stones. S PERLMANN AND W. WEBER. *Münch med. Wochschr.* 77, 680–1(1930); *Bull. Hyg* 5, 699.—Twenty-three % of the rats fed on a vitamin A-deficient diet had phosphatic stones in the bladder Of 100 rats fed on an unsuitable but not deficient diet, half died in 3 months; of the remaining 50, 7 showed gravel at the end of 80 days The small stones consisted of urates and resembled those of human beings All normally fed rats were free from stones Vitamin-A deficiency is not the only factor, but it is an important one. Europeans have a predominance of urate stones, while oxalate stones predominate among the Japanese. In the case of children, stones are probably due to improper feeding, but in adults anatomical factors, infection and disordered metabolism are the probable causes GEORGE R. GREENBANK

The nutritive value of soy-bean cake and purified soy-bean cake. SAJIRO OHTOMO. *Abstracts from Rept Central Lab. S Manchuria Railway Co* 1929, 10–2.—Feeding and artificial digestion expts show that the alc.-extd cake is less nutritive V. F. H.

The occurrence of vitamins A and B in soy-bean oil and cake. SAJIRO OHTOMO. *Abstracts from Rept Central Lab S Manchuria Railway Co.* 1929, 13–5.—Rat and pigeon feeding expts indicate that soy-bean cake and oil contain some vitamin A This is contrary to McCollum, *et al* (*C. A.* 10, 2902). V. F. HARRINGTON

Studies on experimental rickets. III. The isolation of ergosterol from brewer's

yeast and the activation of ergosterol by ultra-violet light. SEIICHI IZUMI, YOSHINORI YOSHIMARU AND ISAO KONATSUHARA. *Abstract from Rept Central Lab S Manchuria Railway Co* 1929, 18–21.—The ergosterol, m 160–1° and having $[\alpha]_D^{25} = -122°$ in $CHCl_3$, after irradiation cured rickets in doses of 0.001 mg per day. Rays of 311–200 μμ are most effective in imparting antirachitic power. Too long exposure destroys this power. V. F. HARRINGTON

Recent developments in vitamin research. W. D SALMON. *Proc Assoc Southern Agr Workers, 31st Ann Convention*, 288–92(1930).—In general, diets in the South are rather low in vitamins A and C and dangerously low in what for the present may be called the vitamin G fraction, including the pellagra preventive factor. They are also deficient in Ca and in vitamin D. There is little doubt that an abundance of sunlight is the only thing that prevents rickets from being more prevalent in this region. K. D JACOB

Dietary standards for pregnancy. CALLIE COONS. *Proc. Assoc Southern Agr. Workers, 31st Ann Convention*, 293–5(1930).—A study was made of the retention of N, Ca and P by 9 pregnant women at different stages of fetal development. There was a distinct tendency for N retention to increase with an increase in intake and *vice versa*, and N was stored much in excess of the probable fetal demand. Storage of Ca was highest in late pregnancy, as was also the curve of probable fetal demand for Ca. Only 3 of the 9 women were storing as much Ca as the probable fetal demand, and many were storing much less. Assocd. with low Ca retention were instances of maternal tooth destruction and of poor bone formation as shown by x ray examn. of the 8-day old baby. Retention of P was even more const. than intakes, the same woman storing as much in the middle months as in late pregnancy. Also the rate of storage was well above the fetal demand in the middle months. K. D JACOB

Antirachitic activation of ergosterol by soft x-rays. ELIZABETH SHELOW AND JOHN R. LOOFBOUROW. *Bull Basic Sci. Research* 3, 47–64(1931).—Theoretical considerations show that any radiation of shorter wave length than about 3000 or 3100 A. U. should be capable of activating ergosterol. This applies to radiations throughout the x-ray and γ ray regions. The extent of activation should not be appreciable, however, except in portions of the spectrum in which the absorption is of consequence. Calcns show that the greatest x ray absorption of ergosterol lies in the extreme soft x ray region and that appreciable activation should be expected in or near this region. Irradiation expts with soft x rays are described, and absorption spectra and animal expts indicative of the activation of ergosterol by soft x rays are recorded. The effect of x rays on the solvent might be more pronounced than on ergosterol or cholesterol with solvents contg. elements of higher at. wt. than H, C or O, and consideration must be given to the possibility of glass containers giving fluorescent ultra-violet radiations in the presence of x rays. The effect of soft x-rays in activating ergosterol may be a primary or secondary one. The literature is reviewed and photographs and x ray pictures are given. J. A. KENNEDY

Modern problems of nutrition. AUGUSTIN D. MARENZI. *Ann farm bioquim Suplemento* 2, 1–35(1931).—A comprehensive review of the subject along the following lines. I. Complete diets. Factors of importance: equilibria (*a*) caloric, (*b*) N, (*c*) mineral, (*d*) vitamin. II. The importance of the nitrogenous substances. (*a*) protein minimum, (*b*) practical protein minimum, (*c*) high- *vs.* low-protein diets. III. The nutritive value of proteins. Supplemental value. Its relation to the amino acid content. (*a*) Methods for the detn. of nutritive values of a substance, (*b*) the nutritive value of proteins from the viewpoint of maintenance and (*c*) of growth, (*d*) supplemental value of proteins, (*e*) the relation between biol. value of proteins and their chem. constitution. IV. The relation between amino acids and maintenance, and the growth of animals. Methods of study. General results. Conclusions. There is no bibliography. B. S LEVINE

Antioxidants and the autoxidation of fats. H. A. MATTILL. *J. Biol Chem* 90, 141–51(1931).—To secure information on the chem. nature of the antioxygenic substances that are found in natural oils and that prevent autoxidative destruction of fat-sol. vitamins, a series of hydroxy aromatic compds. was tested for their capacity, when used in a quantity of 0.02%, to prolong the thermal oxidation induction period of a standard mixt. of lard and cod liver oil. The antioxygenic capacity of phenols resides in 2 OH groups in the *o*- or *p*-configuration; when these are in the *m*- position the compd. is inactive. The OH groups are ineffective unless attached directly to the ring; fully hydroxylated inositol is ineffective. In the naphthols 1 OH group is sufficient, and, in keeping with its accepted behavior, α-naphthol has the character of an *o*-compd. and is

much more effective, as an antioxidant, than β-naphthol; quinone is effective and β-naphthoquinone is even more so, but the α-form is entirely inactive. A no of sterols of animal origin and sitosterol from wheat, corn and lettuce were all inactive. The existence of pro- and anti-oxygenic substances among the unsaponifiable constituents of natural fats and oils suggests that some of these may be concerned with the physiol. action of the fat-sol vitamins and methods for their segregation from the sterols are under investigation. It is suggested that in the prepn and manipulation of easily autoxidizable substances, the presence of traces of antioxidant will prevent undesirable oxidative changes. A bibliography of 42 references is given A P Lothrop

The effect of nitrous acid upon the components of the vitamin-B complex. H C. Sherman and M L Whitsitt *J Biol Chem* 90, 153–60(1931).—The "protein-free" milk prepn of Osborne and Mendel was used as a suitable material contg both vitamins B ($B_1$) and G ($B_2$) The solns. were treated with $HNO_2$ in 2 ways in one the gas was drawn by aspiration into the vitamin soln and in the other the $HNO_2$ was generated directly in the vitamin soln by adding $NaNO_2$ to it and dropping in an equiv amt. of 1.1 HCl After 14 hrs in each case the dissolved gases were removed under reduced pressure and the liquid was then neutralized with 0.2 *M* NaOH Treatment by the aspiration method had little, if any, influence upon vitamin B but a large diminution of potency occurred when the $HNO_2$ was generated in the soln These results suggest that vitamin B may be a nitrogenous base but of such a structure as to be more resistant to $HNO_2$ than are typical primary amines No destruction of vitamin G was brought about by aspiration of $HNO_2$ through the soln., but partial destruction by the 2nd method was indicated by feeding tests when the data were taken for an 8-week but not for a 4-week exptl period It seems probable from these expts and other unpublished observations that vitamin $G_1$ ($B_1$) is stable toward $HNO_2$ but that there is more or less destruction of one of the newer and not yet clearly defined factors making up the vitamin-G complex and that the reaction involved is likely one of oxidation rather than deaminization. A. P Lothrop

Studies on alimentation and nutrition. IV. Means and measures of food economy. C. Foa. *Arch sci biol* (Italy) 15, 445–94(1930).—This is a review and is part of a series of investigations promoted by the Italian National Research Council The subjects discussed are bread, distribution of food resources between man and domestic animals, utilization of leaves, utilization of waste and residues from slaughter houses, refrigeration and food preservation, utilization of refuse as fertilizer, savings in kitchen and table practice and methods for evaluating the food requirements of man. Peter Masucci

The chemistry of nutrition. Filippo Bottazzi. *Atti III congresso naz. chim. pura applicata* 1930, 51–64.—The latest developments in the biochemistry of carbohydrates, proteins, enzymes and vitamins are reviewed and discussed. The study of metabolism by thermodynamic methods alone is considered insufficient. A detailed knowledge concerning the chemistry of nutritive substances is essential, in addn. to knowing their energy content, before the biol value of the substances can be ascertained Peter Masucci

The phosphate esterification and the phosphatase action in B-avitaminosis. J. Bodnár and Anton Karell. *Biochem Z* 230, 233–7(1931).—The muscles and livers of pigeons suffering from vitamin B deficiency esterify $H_3PO_4$ 77 and 146%, resp., more than the organs from healthy birds. No difference was found between the normal and vitamin B deficient pigeons so far as the phosphatase activity of the muscles and livers is concerned S Morgulis

Intermediate carbohydrate metabolism. VI. Sugar assimilation, phosphorus and water metabolism during prolonged intravenous injections of glucose, fructose and galactose. M. Wierzuchowski, W Pieskow and E. Owsiany. *Biochem. Z.* 230, 146–72(1931); cf. *C. A.* 22, 3232.—The total reduction of deproteinized blood from 3 well nourished dogs, in fasting condition, ranged between 91 and 104 mg. %, of which 54–67 mg % was due to glucose and 34–40 mg % was due to residual reduction. In the continuous intravenous injection of glucose for 3 hrs. at the rate of 2 g per hr. the blood sugar during the first hr. rose on the av of 300 mg % but fell during the next 2 hrs. This diphasic reaction was not observed in the other hexoses. Two hrs. after the injection the blood sugar was lowered below the initial level. During the expt. 10.5% of the injected glucose was eliminated in the urine, the glucosuria curve like the glucemia curve being also diphasic. The rest of the injected sugar was utilized. Two hrs. after the injection there was no more glucosuria. When fructose was injected, the fructose concn. of the blood rose gradually but was on the av. lower than the glucose concn. in parallel expts. However, of the total amt. of injected fructose 10.5% was lost in the

urine, the rest having been assimilated Two hrs after the injection the fructose disappeared from the blood, and only traces were found in the urine. With galactose injections the blood galactose concn increased very rapidly, becoming 800 mg % in the middle of the third hr , and not until 9 hrs after the injection did the galactose disappear from the blood and urine. Only about 30% of the galactose was utilized, the rest being excreted in the urine Under the influence of insulin the diphasic nature of the reaction after the injection of glucose disappeared, since the glucemia in the first hr was much diminished and the assimilation definitely increased The insulin had practically no effect on the fructosemia or on the utilization of fructose, but it did greatly stimulate the rate of removal of galactose from the blood and improved its assimilation to such an extent that only 42% was excreted in the urine. The injection of fructose or galactose of itself does not affect the glucose concn. of the blood, but under the influence of insulin the glucose concn diminishes while the concn of the fructose or galactose actually rises The "residual reduction" remains unchanged when either glucose or fructose was injected In these expts no relation was found between the blood and urine P values With a const. hexose injection the blood became most dild. with galactose and least dild with fructose. The quantity of urine corresponded to the amt. of excreted hexose VII. Lactic acid production under the influence of prolonged intravenous injection of glucose, fructose and galactose. M Wierzuchowski and M Laniewski *Ibid* 173–86 —The lactic acid concn of the blood of fasting dogs varied from 7 to 25 mg %, the hourly excretion in the urine ranging from 1 4 to 5 1 mg In expts with a continuous intravenous injection for 3 hrs at the rate of 2 g per hr. the blood lactic acid curve for each hexose presented rather definite characteristics The lactic acid excretion ran parallel to the changes in the blood concn Most lactic acid was formed from fructose and occasionally from galactose, and least from glucose After glucose injections about 0 1 g lactic acid was excreted, after galactose injections 0 1–0.3 g and after fructose injections 0.3–0 9 g more than before the injections With insulin the lactic acid excretion was increased with all 3 sugars The lactic acid formation is responsible for the acidosis during the sugar injection, the rise in lactic acid concn of the blood being more or less correlated with the increase in concn of the hexose VIII. Respiratory metabolism of intravenously injected glucose, fructose and galactose. M. Wierzuchowski *Ibid* 187–224 —During the expts with continuous intravenous hexose injections the av increase in the nonprotein R. Q was for glucose 0.23 without insulin and 0.26 with insulin, for fructose 0.24 and 0.30, and for galactose 0 13 and 0 18, resp The sp dynamic action of the glucose was 9 7%, of fructose 13.8% and of galactose 17.3% of the caloric content of the assimilated part of the hexose The greatest rise in heat occurred between the second and third hrs and was 51% for glucose, 63% for fructose and 32% for galactose. In the expts with insulin 2 periods were distinguished hyperglucemic, while sugar and insulin were being injected, and hypoglucemic when nothing was being injected In the first period the increase in heat production was for glucose 21%, fructose 38% and galactose 23% greater than in corresponding expts without insulin. The greatest increase in heat was 57% for glucose, 85% for fructose and 32% for galactose. During the hypoglucemic period, 4–5 hrs after the injection, the heat production was increased 36% The largest amt. of sugar which the dogs were able to oxidize was 0 5 g per kg , and of the total assimilated sugar 34% of the glucose, 41% of fructose and 56% of the galactose underwent oxidation. During the hyperglucemic period under the influence of insulin the oxidation was increased 15% for glucose, 24% for fructose and 87% for galactose On the av 36 7% of the cal of the different hexoses was utilized in the sp dynamic increase of heat production, and when 1 mol sugar was oxidized 235 cal were liberated Control expts. in which physiol NaCl soln was injected showed only an insignificant rise in heat production During the 2nd and 3rd hrs of the injection when the transformation of the hexose was at a max the heat production and the increase in R. Q were inversely proportional to the concn. of the injected hexose in the blood. Although a parallelism is not always observed between the blood lactic acid curve and the heat production curve, the extent of lactic acid formation from 1 g of assimilated hexose seems to be correlated with the sp dynamic action and oxidation in that these are greater for the sugar from which the organism produces more lactic acid S M

The iodine content of the bile and thyroid gland in cattle under the influence of the seasonal changes in feeding G Pfeiffer. *Biochem Z* 230, 290–8(1931) — An increase in the av wt of the thyroid glands of cattle of various ages was observed from the winter months to the summer months It has not yet been detd whether there is also a decline in wt from the summer to the winter months The I content rises both with age and with the gland wt. and reaches a max value in cattle 5–6 years old The change from the I-poor winter fodder to the I-rich summer fodder has no

recognizable influence upon the I of the thyroid glands. The bile secretion was found to increase with age. The I excretion in the bile during the summer is 120% higher than in winter, which shows that the I of vegetable matter is well absorbed by the animals. The I content of the feces cannot serve as an accurate guide to a study of I absorption.
S MORGULIS

**Determination of value of vitamin D preparations. II.** MARTIN SCHIEBLICH. *Biochem Z* 230, 312–9(1931), cf *C A* 23, 4971.—In testing the potency of vitamin D prepns. the healing dose does not correspond generally to the preventive dose, the former always being higher and the difference between the 2 being very variable. Detn of the healing dose gave practically the same results either by the line test or by the x-ray examn In such tests there is no evidence that there is any danger of error due to eating of feces, but there is apparently danger from animals licking each other S. M.

**The excretion of creatinic bodies a function of the amount of the endogenous nitrogen discharged.** EMILE F TERROINE, R. BONNET, P. DANMANVILLE AND G MOUROT *Compt rend* 191, 1473–5(1930).—This series of expts was carried out to det whether the behavior of creatinic bodies in metabolism can be attributed to the N of exogenous or of endogenous origin. The diet contained glucides for the energy requirement and was adequate in mineral salts and vitamins but contained no protein Inanition expts were carried out with pigs of 15–20 kg and upon rats, intoxication expts after complete inanition were carried out with pigs for the addn of BzOH and of phlorhizin to the diet, and with rabbits for the addn of $H_3PO_4$ The results of the expts indicate that (1) the excretion of creatinine remains const though that of endogenous N varies greatly; (2) the excretion of creatine follows that of total N; it rises with a rise of excretion of endogenous N as influenced by the diet. The creatinic bodies behave in endogenous N metabolism exactly as in exogenous metabolism N M NAYLOR

**Irradiated helisterol and its antirachitic power.** G. MOURIQUAND AND A. LEULIER. *Presse méd.* 37, 1261–2(1929); *Bull soc. hyg aliment.* 18, 290(1930).—Irradiated purified cholesterol extd from snails was found to possess practically no antirachitic power. On the other hand, cholesterol contg the cholesteric lipoids of snails (helisterol) was found to be exceptionally active, but only after irradiation One to two drops of a 0.1% helisterol soln. was found sufficient to prevent rickets in rats and to facilitate fixation of Ca in the case of an animal fed exclusively on Pappenheimer's diet No. 85
A. PAPINEAU-COUTURE

**Clinical investigations on the antirachitic action of irradiated helisterol.** G MOURIQUAND AND A. LEULIER. *Paris méd* 19, 400(1930); *Bull. soc hyg. aliment.* 18, 294; cf. preceding abstract.—Clinical observations showed that irradiated helisterol has an antirachitic power comparable to that of ergosterol This power reveals itself in the various forms of human rickets, particularly in cases of so-called "florid" rickets and in those in which the decalcification lesions do not extend to the whole diaphysis.
A. PAPINEAU-COUTURE

**Vitamin A in serum and liver.** BETH v. EULER. *Svensk Kem. Tids.* 42, 302–4 (1930)(in German).—There is no vitamin A in the subcutaneous fat of rabbits. There is probably no vitamin A in the serum of rabbits and sheep. The $SbCl_3$ color reaction is indefinite and is probably due to something other than carotene. A. R. ROSE

**The digestion of keratin, especially the horny material of birds feathers, by fowls and mammals.** ERNST MANGOLD AND JOSEF DUDISKI. *Wiss. Arch. Landw., Abt. B., Tierernähr. Tierzucht* 4, 200–21(1930).—The secondary quills of white goose feathers were fed to owls, cats, dogs and rats Examn. of the feces showed some mech disintegration in the case of the cat and owl, but balance expts failed to show digestion in any of the expts Rats on a diet deficient in cystine showed no growth that could be attributed to cystine furnished by the feathers ingested W. GORDON ROSE

**An investigation of the vitamin A content of liver meal.** ANTON SOHNER. *Wiss. Arch Landw., Abt. B, Tierernähr. Tierzucht* 4, 281–96(1930).—The vitamin A potency of liver meal was investigated to det. whether it is a suitable source of vitamin A for milk cows and young animals during the winter months Rats were fed a diet prepd. as directed by v. Euler and v. Euler, *Zur Methodik der Vitaminprüfung* vol. 5, which was deficient only in vitamin A. Liver meal was added to the diet when noticeable loss in wt occurred. Xerophthalmia was cured and normal growth effected by 0.1 g. per day. This was equiv. to 5–10 mg cod-liver oil Since several of the rats lost wt. without showing any indications of xerophthalmia, other criteria, such as loss in wt., are necessary in vitamin A studies W. GORDON ROSE

**The biological values of wheat, barley and rye.** ISTVÁN WEISER AND ARTHUR ZAITSCHEK. *Wiss Arch. Landw., Abt. B, Tierernähr. Tierzucht* 4, 461–6(1930).—Goats were fed diets of hay plus wheat, hay plus barley and hay plus rye, and weighed at

intervals The expt. showed no essential difference in the biol values of the 3 grains. W. GORDON ROSE

Antirachitic vitamin D. Announcement of a standard by the medical research council. ANON *Lancet* 1930, II, 503–4.—A quantity of ergosterol from yeast, purified and dried by methods carefully recorded, was subjected, in an accurately made alc. soln., to irradiation with the rays from a Hg arc, the phys. details of the procedure being measured and recorded with the greatest practicable accuracy. The irradiation products were carefully freed from alc., dissolved in pure, unadulterated olive oil and the vol. was adjusted to a known concn., in terms of ergosterol used. Such solns. retain their activity unchanged for 2 years if maintained at or below 0°. F. B. SEIBERT

Effect of added iron on the hematopoietic properties of dried milk. A. L. BACHARACH *Lancet* 1930, II, 957–8.—The recognized low hematopoietic properties of milk solids can be materially enhanced by drying appropriate quantities of an Fe salt in the milk. F. B. SEIBERT

The toxicity of vitamin D. J. B. DUGUID *Lancet* 1930, II, 983–5, *cf. C. A.* 24, 5058.—The pathol. effects in animals of overdosage of vitamin D are a tendency to increased serum Ca and blood inorg. P; a very greatly increased excretion of Ca and P, especially by way of the kidneys, involving a reduction of Ca and P retention in the body, an accumulation of Ca salts in the tissues and loss in body wt. In estg. the dosage and toxicity a large no. of factors must be taken into account. Standardization is urged. F. B. SEIBERT

The constitution of irradiated ergosterol. A. CASTILLE. *Bull. acad. roy. méd. Belg.* 10, 319–25(1930).—A study of the absorption spectra of aliphatic geometrical isomers shows a remarkable similarity between the *cis*- and *trans*- compds. Since the same similarity is found between the spectra of ergosterol B and isoergosterol B as well as between those of dihydroergosterol A and dihydroisoergosterol A, a simple *cis trans* isomerism due to the mobility of the secondary alc. groups is assumed. Comparison of the absorption spectra of *ergosterol A* (I) and of its irradiation product (*"vitamin D"*) points to the fact that the biol. activation is due to the gradual formation of a geometrical isomer *isoergosterol A* (II) that is identical with the active principle of vitamin D. Prolonged irradiation leads to further rearrangement into another biologically inactive modification, this transformation begins before all of I has been converted into II. G. TOENNIES

The quantitative estimation of the glutathione content in normal and pathological tissues. III. Relationship between the development and the glutathione content in chick embryos. TOKUO KAMIYA *Nagoya J. Med. Sci.* 5, 1–5(1930); cf. *C. A.* 24, 4057.—Expts. made on chick embryos show that the glutathione content increases gradually during the first half of development, reaches a max. in 12–14 days, and then gradually decreases. The liver, brain, heart, muscle and eye contain the largest percentage of the glutathione of the body and are richest in the order named. IV. The glutathione content in various organs of pigeons fed on polished [rice] and subjected to starvation, and also of starved rabbits. *Ibid.* 6–17.—Pigeons fed on polished rice showed a decreased glutathione content in liver, heart and muscle proportional to the no. of days of the expt. The adrenal glands, spleen and blood showed an increase. Starvation produced the same result, but to a greater degree. Symptoms of polyneuritis appeared after 15–18 days in pigeons fed on polished rice and later in those fed on half polished rice. V. Relationship between glutathione content and neurotomy in muscles of pigeons fed on polished and unpolished rice. *Ibid.* 18–23.—Pigeons were subjected to neurotomy of the sciatic nerve of the right leg, the left serving as control. The wt. of the right leg did not increase as rapidly as that of the left and the glutathione content of the muscle subjected to neurotomy showed an increase proportional to the no. of days elapsed since the operation. This was true for pigeons fed on polished rice as well as unpolished rice, but in the control muscles, the glutathione content decreased more rapidly in the former case. A. WIEBEN

Ergosterol and some of its derivatives (DE BOER) 10.

DRUMMOND, J. C., AND HILDITCH, T. P. The Relative Values of Cod Liver Oils from Various Sources. London: H. M. Stationery Office. 135 pp. 1s. Reviewed in *Chemistry & Industry* 50, 160(1931).

## F—PHYSIOLOGY

E. K. MARSHALL, JR.

Excitant substance in the central nervous system. L. HABERLANDT. *Arch. ges. Physiol.* (*Pflügers*) 223, 171–9(1929).—The excitant action of emulsions of the cerebrum

or midbrain when injected into frogs is due to a substance which is sol. in water, but not in alc or $Et_2O$, it is dialyzable, and is decomposed when heated B. C. A

**Existence, origin and significance of the so-called lutein colloid.** A. ALBANESE. *Arch ist biochim ital* 2, 269–80(1930) —Discussion of previous work, together with new exptl results, indicates that the ruby-red test is not sp for the lutein colloidal substances, that the presence of this colloid is not sufficient for the diagnosis of a gravid lutein body, and that the so-called colloid encountered in either the menstrual or gravid lutein body is merely a metamorphic blood deriv., which is accompanied by involutive, atrophic phenomena of the lutein body itself B. C. A

**Amylase content of the milk of various animals.** R. SCHENK. *Arch wiss prakt. Tierheilk* 58, 375–84(1928) —Human milk contains a considerable quantity of amylase, colostrum free milk of the cow, horse, dog, cat and guinea pig contains only traces, while neither milk nor colostrum of the goat contains amylase The markedly higher amylase content of the colostrum of the other animals, falling with the progress of lactation, indicates that the enzyme originates in the colostrum B. C. A.

**Glutathione content of human placenta and denervated gastrocnemius of the toad** J. DI LEO LIRA *Compt rend soc biol* 102, 469–70(1929) —The former contains 0.029–0.038%, the latter 0.014–0.018% (normal), 0.012–0.017% (denervated) of glutathione B. C. A

**Lipogenic and antilipogenic action of hormones as cause of obesity and leanness** A. LUBLIN *Klin. Wochschr.* 8, 2276–8(1929) —Hyperfunction of lipogenic hormones (*e. g.*, insulin) causes obesity and of antilipogenic hormones (*e. g.*, adrenaline, thyroxine, pituitary hormone) causes leanness Intravenous injection of thyroxine (1 mg.) causes a transient rise in blood sugar (*e. g.*, 0.110–0.130 g. per 100 cc.) B. C. A

**Hydremia in alimentary hyperglucemia.** M. N. KALLINIKOVA *Russ. J. Physiol.* 13, 193–7(1930) —Detn. of hemoglobin and water in the blood of children, taken at various times after ingestion of sugar, show that hydremia is not assocd. with hyperglucemia. B. C. A

**Cholesterolemia in alimentary hyperglucemia.** M. N. KALLINIKOVA AND G. D. OBRAZTZOV. *Russ. J. Physiol.* 13, 198–203(1930) —In children alimentary hyperglucemia is assocd. with cholesterolemia, which attains its max. value 15–30 min. after ingestion of sugar. No general parallelism is found between the blood-cholesterol time curves and the dextrose-time curves. B. C. A

**Blood lipase in alimentary hyperglucemia.** E. T. MINKER-BOGDANOVA AND G. D. OBRAZTZOV. *Russ. J. Physiol.* 13, 204–9(1930) —Max. variations of the lipase-time curves of blood following the ingestion by children of large quantities of sugar coincide with the maxima of the dextrose and fat content-time curves The types of lipase-time curves found for different individuals correspond either with the dextrose-time curves or with their mirror images B. C. A.

**Absorption of water, 0.2% hydrochloric acid, gastric juice, ethyl alcohol and various chlorides by the dog's isolated stomach.** R. O. FAITELBERG. *Russ. J. Physiol.* 13, 224–36(1930) —From 22 to 31% of water introduced into the isolated small stomach of the dog is absorbed within 60 min. Addn. of HCl to 0.2% or of NaCl to 0.9% reduces the percentage absorption to about 17%. Natural gastric juice in some cases undergoes resorption, assocd. with diminution in acidity The abs. but not the relative amt. of chlorides resorbed from hypertonic solns. increases with concn. Absorption of alc. from 10 and 20% solns. is complete within 60 min., and amounts to 90% in the case of 40% alc. solns. The velocity of absorption of chlorides and of alc. is greatest during the 30 min. following introduction B. C. A

**The variations of the specific gravity of the plasma and the means available for altering it.** NORMAN S. MOORE AND HAROLD J. STEWART. *J. Clin. Investigation* 9, 423–39(1930), cf. *C. A.* 24, 3828 —For comparable results the same anticoagulant must be used, heparin being employed in these expts. Normal specimens of blood show a remarkable constancy of the sp. gr. of plasma and of plasma proteins, provided the samples are taken at the same time each day In patients suffering from heart disease who were in water balance the max. daily variation in sp. gr. was 0.0004 In 2 normal individuals the variations over a period of 14 months were 0.0015 and 0.0011 Arterial blood showed lower values than venous Intravenous injection of normal saline soln. into dogs lowered the plasma sp. gr. and protein. Administration of 1 l. of water by mouth to human beings had slight effect After hemorrhage a decline in these values was followed by a return to normal after 4 days The injection of gum acacia in glucose soln. slightly increased the sp. gr., but lowered the proteins by dil'n. J. B. BROWN

**Carbon dioxide and oxygen tensions of the mixed venous blood of man at rest.** DICKINSON W. RICHARDS, JR., AND MARJORIE L. STRAUSS *J. Clin. Investigation* 9,

475–532(1930) —Certain aspects of the process of equilibration of lung gases with incoming venous blood are discussed Equil can be regularly established for $CO_2$ with certain high O mixts and for both $CO_2$ and O with certain low O mixts. J B B

Studies on the Arneth count. XVII. The effect of alterations of the serum-calcium level on the count. David R. Clemenko. *Quart J. Exptl Physiol* 20, 369–77(1930), cf *C A*. 24, 5351.—Irradiated milk taken by humans, colloidal Ca orally administered to rabbits, and physiol saline soln intravenously injected into rabbits produced no change in the Arneth count or the serum Ca level Colloidal Ca injected intramuscularly into rabbits and $CaCl_2$ intravenously raised the serum Ca level and produced a regenerative deflection of the count. Intravenous injections of hypotonic solns produced no effect on the serum Ca level but caused a regenerative deflection of the count Rachel Brown

The reformation of muscle glycogen destroyed by work. G Debois. *Compt rend soc biol* 103, 546–8(1930) —Contraction of the paw muscles of cats (anesthetized or decerebrated) was effected by elec stimulation of the sciatic nerves The integrity of the vagi nerves is essential for the reformation of muscle glycogen after work; the left vagus alone is sufficient. The glycogen lost after section of the cervical medulla, vagotomy or pancreatectomy is fully restored by the injection of 30 units of insulin B C. Brunstetter

The effect of the injection of synthetic thyroxine on the carbon and nitrogen in urine Georges Fontès and Lucien Thivolle *Compt rend. soc. biol* 105, 558–9(1930) —Two adult male dogs of the same wt and age were kept on a const diet throughout the expt.: after a month, the vol of the urine, as well as its C and N contents, was recorded daily for 3 weeks (I), the same detns were made over a period of 2 weeks in which 1 mg of thyroxine was injected daily (II), over a period of 2 weeks in which 2 mg of thyroxine was injected daily (III) and lastly, over a period of 2 weeks in which no injections were made (IV). Variations of wt. over each period were recorded. The av amts of C and N per day in g were I, 3 60, 5 04, II, 4 12, 5 66, III, 4 15, 5 72, and IV, 3 62, 4 90 The C/N ratios for the 4 periods were 0 71, 0 72, 0 71 and 0 73 The vol of urine was not altered by thyroxine treatment The av wt changes were I, +150; II, −450, III, −400, and IV, +250 B C Brunstetter

The effect of thyroidectomy with and without injections of thyroxine on the carbon and nitrogen in urine. Georges Fontès and Lucien Thivolle. *Compt rend. soc. biol* 105, 559–61(1930), cf preceding abstr —The same diet and technic were used in this expt. A 15-kg dog was used. The data obtained support the conclusion that thyroidectomy alters the C/N ratio of the urine, but that injections of thyroxine do not The thyroid gland exerts functions other than the elaboration of thyroxine B. C. Brunstetter

The effect of delivery on the protein equilibrium of the serum. Ch Achard, M. Barièty and A Codounis *Compt rend. soc biol* 103, 1064–6(1930) —The total protein, the albumin and the globulin of the sera of 9 women at the time of delivery and 10 days after delivery were detd The total protein and albumin are slightly less than normal and can be accounted for by the hydremia of pregnancy In 6 of the cases, the total protein was decreased 10 days after delivery, in 5 cases the albumin was decreased, while in 5 cases the globulin was increased. B C. Brunstetter

The organic bases and amino acids in normal human urine. Sakisaburo Wada *Acta. Schol Med Univ Imp Kioto* 13, 187–99(1930) —From 300 l of normal human urine, the following compds were isolated leucine, alanine, *l*-proline, *d,l* proline, isoleucine, valine, phenylalanine, aspartic acid (?), glutamic acid, hippuric acid, creatine, creatinine, histidine, methylguanidine, betaine (?), choline, methyl pyridylammonium hydroxide, lysine, xanthine, *l*-methylxanthine (?), adenine, hypoxanthine, heteroxanthine and *p*-xanthine H. J Deuel, Jr

Cortin, the vital hormone of the adrenal cortex. Frank A Hartman. *Endocrinology* 14, 229–32(1930) —The injection of cortin (an ext. prepd from the adrenal cortex) not only prevented the development of the usual symptoms following double adrenalectomy but allowed the animals (cats) to survive indefinitely (170 days in the longest expt ) as well as to increase in wt Its potency was also demonstrated in bringing about the recovery of 2 animals in acute adrenal insufficiency. The blood urea is lowered from the high level occurring in adrenal deficiency. A relationship was shown to exist between the rate of growth of adrenalectomized rats and cortin injection H J Deuel, Jr

The effects of growth-promoting and gonad-stimulating principles of the anterior lobe of the pituitary on basal gaseous metabolism in the rat. Milton O. Lee and Jules Gagnon *Endocrinology* 14, 233–42(1930) —The subcutaneous administration

of the gonad-stimulating principle of the anterior lobe of the pituitary daily for periods of 8 to 24 days caused no significant change in the basal metabolism in rats. Identical results were obtained on exts of the fresh gland and on that isolated from the urine of pregnant women On the other hand, the intraperitoneal injection of these prepns was effective in reducing the metabolic rate of 10 of the 18 animals used after several daily injections The lowered metabolism continued 6 to 14 days after the treatment had stopped H J Deuel, Jr.

The metabolism of the isolated frog heart. A. J Clark, C. P Stewart and R Gaddie *Proc Roy Soc Edinburgh* 50, 297–303(1930) —Expts were made on isolated frog heart perfused with Ringer's soln either with or without glucose. Even in the presence of serum, glucose and insulin the carbohydrate metabolism represents only a fraction of the total metabolism The protein catabolism can account for somewhat over 50% of the total O consumption There is no evidence that this organ uses fat as detd by the amt present The heart does not synthesize glycogen from protein It is possible that an unknown factor essential for carbohydrate metabolism is absent in these artificial expts although the ease with which the heart utilizes non carbohydrates sources of energy suggests that the metabolism of this foodstuff is not a primary process which produces muscle contraction These results are at variance with those obtained earlier on dog heart H J Deuel, Jr

Physiological chemistry of the blood in the tropics. W Borchardt *Arch Schiffs-Tropen-Hyg* 34, 608–12(1930) H Eagle

The iodine content of the normal thyroid of albino rats G Sankaran *Indian J. Med Research* 18, 563–70(1930) —Thyroids average an I content of 0 018%, independent of sex and age Thyroid weight is proportional to body weight H. E.

The significance of the parathyroid hormone for the regulation of the calcium economy. Christian Bomskov. *Klin. Wochschr.* 9, 2065–6(1930) —A preliminary report. H Eagle

The water-binding relationships of child blood plasma. J. Jochims *Klin Wochschr.* 9, 2115(1930) —Viscosity is a reliable index of the water-binding power of the plasma colloids. In child plasma it varies between 0 095 and 0 108 During hydremia in the child there is a parallel fall in plasma viscosity and protein the sp viscosity remains const, indicating that the excess water in the plasma is free and not bound by plasma colloids H Eagle

Choline and choline esters in the blood. H. Bohn. *Klin Wochschr.* 9, 2147–8 (1930).—A protein-free ext. of human blood contg. choline, when injected into rabbits or cats, causes a very pronounced fall in blood pressure. Choline esters are known to be many thousand times as active in this respect as choline, and B suggests that the choline in the blood (1 5–2 mg %) is, in part at least, in the form of an ester with, *e. g.*, AcOH. In essential hypertension there is a low blood choline H. Eagle

Glucolysis and increase in acidity in tissue cultures, and analogous phenomena in the organism. A. A Krontovskii and M. A. Magath. *Klin. Wochschr.* 9, 2165–8 (1930).—The oxidation of glucose to lactic acid is the most important source of energy in tissue cultures. This type of metabolism may be characteristic of active regenerative processes even in the organism The $CO_2$ formed results both from respiration and from the action of the lactic acid upon the $NaHCO_3$ of the medium. Changes in tissue cultures are analogous to changes observed in ischemia, inflammation, wound healing, regeneration, etc. H. Eagle

Milk secretion and menformone. S. E. de Jongh and Ernst Laqueur. *Klin Wochschr.* 9, 2344–6(1930) —The administration of menformone to male guinea pigs causes lactation. It is interesting to note that large quantities, 50 units twice daily for 4 weeks, cause a preliminary mammary hypertrophy; if this dose is then suddenly decreased, lactation begins within 2–3 days and continues for as long as 40 days if constantly decreasing quantities of menformone are injected The authors point out the complete analogy to conditions in the pregnant woman H. Eagle

The protein content of the urine of patients with normal kidney function. Bruno Minz. *Klin Wochschr.* 9, 2352–3(1930) —Using sulfosalicylic acid as a pptg. agent and solns. of casein as a nephelometric standard, M. finds that the urine of normal subjects invariably contains some protein, ranging from 0.14 to as high as 13 mg % The Esbach method can detect only 25 mg. %. H. Eagle

The theory of diuresis (urine excretion) Hellmut Marx. *Klin Wochschr.* 9, 2384–8(1930).—The blood of a fasting dog contains a substance which inhibits the diuresis caused by water. The significance of this finding is discussed, particularly in the light of the fact that a pituitary ext. has a qualitatively similar effect H Eagle

Substances in human urine and diagnoses of pregnancy. M. Aron and M. Klein

*Compt rend soc biol* 103, 702–4(1930); *Physiol. Abstracts* 15, 218–9.—The action of human urine on the thyroid glands of guinea pigs and rabbits demonstrates that the substance in the urine producing this effect is the hypophyseal hormone. This sp. reaction is obtained with all urines, whether from men or women, but the urine of pregnancy only can affect the genital organs. This latter effect is due, not to the hypophyseal, but to a placental substance. G. G.

**Pulmonary chemical sensibility studied by means of the isolated head.** A. Pi. Süsser and J. Puche. *Compt rend soc biol* 103, 735–6(1930); *Physiol. Abstracts* 15, 220. G. G.

**Secretion of cerebrospinal fluid.** T. Falkiewicz. *Compt rend soc. biol* 103, 821–3(1930); *Physiol. Abstracts* 15, 253.—The secretion of the cerebrospinal fluid is stimulated by hypophyseal ext., pilocarpine and atropine; it is not increased by adrenaline, thyroxine, caffeine, $AmNO_3$, theobromine, salicylate of Na, Br, I, luminal and hypertonic or hypotonic solns. of NaCl. The hypophysis is the biol. regulator of this secretion. The neg. results are opposed to the theory of transudation and confirm that of sp. secretion. G. G.

**The storage of iodine in living tissues.** W. Weber. *Schweiz. med. Wochschr.* 15, 237–9(1930). *Bull. Hyg.* 5, 912.—The thyroid is known to store appreciable amts. of I, other glands such as the ovary and suprarenal store the element but in considerably smaller quantities. W. fed rabbits KI and injected solns. of the salt in the blood to det. whether the I content of the tissues was raised. Tissues such as the liver, heart, lungs and spleen were so low in I that the amt. might be attributed to exptl. error. The value for the kidneys was higher, but this might be attributed to the urine on the tubules. The urine contained considerable amts. of I. After 24 hrs. 50–60% of the I consumed had been excreted. George R. Greenbank.

**The content of glutathione of the blood in high altitudes and on exposure to natural Alpine sun.** J. von Deschwander. *Strahlentherapie* 39, 278–82(1931).—D. found that the glutathione content of the blood and that of the red blood cells are considerably increased at altitudes of 1300–500 m. above sea level. After one hour's irradiation with natural Alpine sun, the glutathione content of the blood and the quotient glutathione erythrocytes decrease. This means that the glutathione content of the red blood cells decreases. Conclusion: The sp. respiration function of the blood and that of the red blood cells are increased at these altitudes, while by irradiation with natural Alpine sun this function is decreased. Frederick R. Greenbaum.

**The minute volume and gaseous metabolism of the artificially perfused mammalian intestine.** H. F. Roese. *Arch. ges. Physiol.* (*Pflügers*) 226, 181–9(1930).—The $O_2$ consumption of denervated mammalian intestine is 4.5 cc. per kg. per min., but varies considerably with time. The R. Q. is greater than unity. Arthur Grollman.

**Ammonia formation and sugar utilization in artificially perfused mammalian intestines.** H. F. Roese. *Arch. ges. Physiol.* (*Pflügers*) 226, 190–7(1930).—Intestines perfused by a Starling heart-lung prepn. form appreciable quantities of $NH_3$, presumably as a result of bacterial decompn. Glycocoll is resorbed by the intestine but is deaminized neither by the intestinal wall nor by the lung of the heart lung prepn. Urea, although retained by the intestinal wall, is not converted to $NH_3$. The sugar utilization of the intestine is 1.75–1.94 g. per kg. per hr., only 20% of which is oxidized. Arthur Grollman.

**Effect of sleep, abstention from sleep, and physical work on the blood chemistry.** M. Hochrein, J. Michelsen and H. Becker. *Arch. ges. Physiol.* (*Pflügers*) 226, 244–54(1930).—Abstention from sleep for a night resulted in an increase in the NaCl, total base, total $CO_2$ and $PO_4^{---}$ of the blood. Physical exercise produced greater changes in the blood chemistry of subjects deprived of sleep, during the preceding night, than in normal rested subjects. Arthur Grollman.

**The temperature coefficient of oxygen utilization by surviving organs.** E. Schmutzler. *Arch. ges. Physiol.* (*Pflügers*) 226, 291–304(1930).—The $O_2$ consumption of isolated perfused limbs of the dog remained const. for 3–4 hrs. Cooling and subsequent rewarming did not affect this $O_2$ consumption. The temp. coeff. for the $O_2$ consumption was const. and equal to 3% of the value at 35°, for each degree change in temp. A similar linear relationship also occurred in goose blood over the temp. range of 17–39°, the coeff. being 4% of the value at 35°. Arthur Grollman.

**The effect of reduced air pressure on animals. III. The effect of varying degrees of reduced air pressure.** W. Linzel and T. Radeff. *Arch. ges. Physiol.* (*Pflügers*) 226, 307–18(1930). cf. *C. A.* 24, 4544.—White rats were kept for 3 weeks under reduced air pressures of varying degrees. The blood corpuscles increased at air tensions corresponding to 2000 and 4000 m. altitude, but little at higher altitudes. The total hemo-

globin and blood vols. increased in inverse proportion to the air pressure The heart wts did not increase except at pressures corresponding to altitudes of 6000 meters or more ARTHUR GROLLMAN

A chemical investigation in Victoria (Australia) of the blood of cattle and sheep. JOAN H NORRIS *Australian J Exptl Biol Med Sci* 7, 3–4(1930), cf *C A* 24, 5809 — The mean values found for inorg P (mg /100 cc ), total P and Fe, resp , were 4 44, 10 13 and 60 54 for 26 steers, and 6 63, 12 59 and 57 92 for 22 cows C G KING

A chemical study of the liver during inanition. L VAUDIN, M JAVILLIER, H ALLAIRE AND MAD SCHIRMER *Bull soc chim biol* 12, 894–902(1930) —A dog receiving water only until its weight had dropped from 7 to 5 1 kg showed the following % loss (dry wt ) in liver constituents compared to a control kept on a normal diet glycogen and glucose 74 8, ash 33 7, insol ash 48 1, ether ext 31 8, cholesterol 24 4, unsaponifiable matter 10 5, glycerides 45 7, lecithin P 25 1, nucleoprotein P 16 5, N 18 3, total loss in dry wt 27 2% C G KING

The pituitary posterior hormone in fat metabolism. W RAAB *Endocrinology* 14, 385–8(1930) —Pituitrin promotes the absorption and destruction of circulating fat by the liver through a nervous pathway starting in the tuber cinereum and running through the cervical spinal cord and the abdominal splanchic to the liver Any disturbance of the pituitary mesencephalic system leads to obesity Arterio-venous fat detns suggest that pituitrin does not affect the fat deposit directly There seems to be a relation between the pituitrin nervous mechanism and chem heat regulation MARY E LEAR

Crystalline cholesterol in the post-retinal fluid. ALBERTO J SCHIVO AND LUIS N PIZZORNO *Ann farm bioquim* 1, 160–6(1930) B S LEVINE

Protein sugar in the blood plasma of the horse. H BIERRY *Compt rend* 192, 240–1(1931), cf *C A* 25, 1270 —The protein sugar content of the blood plasma varies with the species and within the species with the individual Furthermore, it is possible to provoke in the same individual important variations in the protein sugar content through the injection of adrenaline and insulin In the blood plasma of the horse glucidic complexes combined with protein (protein sugar) constitute about $^2/_3$ of the total sugar. The latter oscillates around 2 g per l of plasma Marked individual variations occur. B S LEVINE

Combining the values of optic density and viscosity of a suspension for the determination of the number and volume of the dispersed elements. G ACHARD *Compt rend* 192, 242–4(1931) —A made a study of the relation between viscosity and no of red blood cells on the one hand, and optic d and no of red blood cells on the other. An attempt was made by combining the viscosity and optic d value to derive an empirical formula which would make possible the detn of the vol and the no of the dispersed elements. B. S LEVINE

A metabolic study of desiccated suprarenal medication in man. R G. HOSKINS AND F. H. SLEEPER. *Endocrinology* 14, 109–11(1930) —Before the medication was begun records were made of a series of clinical lab. detns The suprarenal substance was administered by mouth in dosages varying from 18 to 90 gr daily for 54 to 108 days. The results are recorded in a table From the viewpoint of lab findings they are neg Likewise no significant mental changes are observable The general deviations observed were such as are usual in any medically selected group B S LEVINE

Purification of the male hormone by high-vacuum distillation. E DINGEMANSE, J. FREUD, S KOBER, E. LAQUEUR AND A P W MÜNCH *Proc Acad Sci Amsterdam* 33, 1206–9(1930) —The method of fractionation is described and a schematic outline of the fractions obtained is presented It is concluded that the male hormone can be brought to a high degree of purity through high-vacuum distn At 90° with pressure of 0 001 mm the hormone is found in the distillate, and at 80° in the residue. Fractional distn offers the possibility for the sepn of the male from the female hormone Also in *Naturwissenschaften* 19, 166(1931) B S. LEVINE

The quantitative knowledge of cerebral lipoids. (A dissertation ) ERICK BACKLIN. *Upsala Läkareforenings Förhandl , N F.* 35, 105–83(1930) —The object was to det. the changes occurring in the cerebral lipoids in the psychoses The chemistry of the lipoids of the brain and methods for the quant. study of cerebral lipoids are reviewed. A new method is described which requires only 30–50 mg of the brain substance for the detn of (*a*) cholesterol, (*b*) the fraction contg unsatd. phosphatides in greater part, (*c*) the satd phosphatides and (*d* and *e*) cerebrosides with satd and unsatd fatty acid radicals. Results obtained by this method indicated that it is reliable. The water content of the brain substance was detd In the autolysis taking place in the cerebral

hpoids during the first 24 hrs. postmortem, demonstrable changes actually occur
B. S. LEVINE

Effect of composition of air on the growth and mortality of the chick embryo. A. L. ROMANOFF *J. Morphol Physiol* 50, 517(1930); cf *C. A.* 24, 4087.—Studies were made upon fertilized hen eggs. Continuous exposure to 0.4% of $CO_2$ in the air stimulated growth during the first part of the embryonic period. A high $CO_2$ and a diminished $O_2$ content decreased the size and increased the mortality of the embryos. Temporary exposures to high $CO_2$ concn. of 24- or 48-hr. periods decreased the size of the embryos with no apparent injuries.
C. M. McCAY

The phosphorus partition in normal whole blood. BURNHAM S. WALKER AND MILDRED E. HUNTSINGER. *J. Lab. Clin. Med.* 16, 247–52(1930).—The total P content of normal whole blood is 39.2 mg. per 100 cc. The inorg. phosphate P appears to be 9.7% of the total P, the acid-sol. P 68.1%, the acid sol. org. P (ester P) 58.3% and the lipin or lecithin P 36.0%. The P detns. were made by the method of Fiske and Subbarow (*C. A.* 20, 1092).
E. R. MAIN

The effect of splenectomy on changes in the blood at high altitudes. ANTONIO CHIATELLINO AND STEFANO GOLDBERGER. *Arch. sci. biol.* (Italy) 15, 407–32(1930).—The studies were made on 3 normal and 3 splenectomized dogs which had been kept on Colle d'Olen for 6 weeks. The percentage increase in red blood corpuscles for the normals was 5.0, 8.9 and 0.6, for the splenectomized animals 50.0, 22.3 and 33.3. The percentage increase in hemoglobin was, resp., 14.3, 19.5, 11.8 and 31.8, 58.0, 11.7. There was also an increase in leucocytes which appeared rather late, but there was no marked difference between the 2 groups. Blood smears from the splenectomized animals showed numerous Jolly bodies and a few normoblasts; the controls also presented a similar picture but with much less frequency. The resistance of the corpuscles was greater in the splenectomized than in the normal animals. On returning to lower altitudes, there was a marked diminution of all values which approached the initial values, the resistance of the corpuscles, however, remained higher than the initial value.
PETER MASUCCI

Gaseous exchange of the testicle. A. CHIATELLINO. *Arch. sci. biol.* (Italy) 15, 433–44(1930).—The respiratory exchange of the testicles of normal decerebrated, narcotized and curarized dogs was detd. In the first 2 groups, the blood flow in the organ was noticeably less than in the curarized group. In those narcotized the R. Q. was on an av. 45.7 cc. per min. per 100 g. of organ. The $O_2$ consumption was on an av. 3.47 cc. per 100 g. of organ, the $CO_2$ production was on an av. 3.00 cc. per min. per 100 g. of organ. The respiratory exchange in the left and right organs of the same animal corresponded perfectly. There were marked differences, however, between individual animals, in general with an increase in blood flow, there was a decrease in the respiratory exchange.
PETER MASUCCI

Variations in the nonprotein nitrogen of the blood during fatigue. UGO ROSSELLI AND S. CHIABRERA. *Minerva med.* 1930, I, 65–70.—The purpose of this investigation was to det. the relation between muscular fatigue, hyperthermy and protein metabolism. From the results obtained on 6 subjects, the conclusion is drawn that the increase in nonprotein N of the blood which accompanies muscular fatigue (running) is independent of the energy spent and of the hyperthermy from fatigue. The increase in the nonprotein N is attributed to a change in equil. between the tissues and blood plasma.
PETER MASUCCI

Choline and adrenals. GAETANO VERLE AND TEODORO COMBES. *Arch. fisiol.* 28, 25–32(1930).—Injections of adrenaline cause the passage of choline from the adrenals into the circulation. The supradiaphragmatic section of the vagus has no influence on the choline content of the adrenals.
A. E. MEYER

Experimental determination of sex and the sterility by hormone action. B. PANIZZA. *Arch. fisiol.* 28, 51–68(1930).—See *C. A.* 25, 329.
A. E. MEYER

The metabolism of alcohol by man at high altitudes. A. BORNSTEIN AND A. LOEWY. *Biochem. Z.* 230, 51–67(1931).—The alc. content of the blood rises more rapidly and to a higher level at high altitudes than in the plains, but after the max. concn. has been reached the loss of the alc. from the blood proceeds at the same rate at high or low altitudes. The min. vol. as well as the frequency of the respiration is little affected under both conditions. The R. Q. was found to be regularly lower in the mountains than in the plains, and after the consumption of alc. it fell much more so that in the mountains the R. Q. often became that of pure alc. oxidation. Under neither condition did alc. exert any sp. dynamic action, except when sugar was given together with the alc.
S. MORGULIS

Phosphoration, lactic acid formation and phosphatase activity in muscle pulp and

in muscle powder. J. Bodnár and Béla Tankó *Biochem. Z.* 230, 228–32(1931).—The lactic acid formation of muscle pulp decreases during preservation in direct ratio to its loss of ability to esterify $H_3PO_4$. The $H_3PO_4$-esterifying substance is completely retained in the powder prepd. from muscle pulp with alc. ether, or with acetone ether. The inability of the muscle powder to form lactic acid is attributed to the diminished content of phosphatase, since the loss of phosphatase activity is parallel to the diminution in lactic acid formation S. Morgulis

Fate of fructose in the animal organisms. II. Do the digestive juices cause a change of fructose to glucose? W. W. Oppel. *Biochem Z* 230, 269–84(1931); cf *C A.* 25, 1858.—When a fructose soln is preserved under toluene in a thermostat with a mixt of digestive juices (gastric, pancreatic and intestinal) at different $p_H$ values there is no formation of aldoses even after 20 hrs Shorter preservation of similar mixts, but without toluene likewise fails to bring about any transformation of fructose to an aldose, although the intestinal sucrase causes considerable hydrolysis of sucrose in the same period of time S. Morgulis

Studies on blood glucolysis. II. The pyrophosphate fraction and glucolysis. H K. Barrenscheen and Béla Vásárhelyi. *Biochem Z* 230, 330–46(1931), cf. *C. A* 25, 1544.—The pyrophosphate content of different bloods shows considerable variation, increasing in the following order horse<cow<dog<rabbit<guinea pig<man<pig. In man the pyrophosphate fraction constitutes relatively the highest portion of the acid-sol org P. Except for the blood of the pig, with its very large pyrophosphate content but no glucolytic power, the glucolytic ability of the various bloods seems to be correlated with their pyrophosphate content. During glucolysis there is an increase in the pyrophosphate which is entirely accounted for by the decrease in inorg. P, but when the glucolysis is accelerated by the addn of $SO_4$ ions the pyrophosphate diminishes instead. Neither the feeding of large amts of glucose nor the preliminary injection of insulin has any effect upon the pyrophosphate fraction of the blood P. The pyrophosphate is present only in the erythrocytes, apparently in some org. combination because it cannot be easily isolated. The blood and cells contain a pyrophosphatase which sets free P from pyrophosphate, the enzyme being inhibited in its action by F S Morgulis

The solubility, dissociation and tension of carbon dioxide in urine. Fritz Mainzer and Marga Bruhn. *Biochem Z* 230, 395–410(1931).—Detns made on 20 urines gave the following results the soly. $\alpha_{(CO_2\ 38°)} = 0.441 - 0.514$; $p_{KI} = 5.81 - 6.30$; and $P_{(CO_2,\ 38°)} = 13.3 - 24.24$ mg. Hg From this it seems that the $CO_2$ tension of the urine could not have the physiol significance as representing the tension in the tissues. S Morgulis

The cholesterols in structural combinations in protoplasm. V. Studies on adrenals from cattle. G. Pfeiffer *Biochem. Z.* 230, 438–45(1931); cf. *C. A.* 24, 4826.—A special procedure is described for the hydrolysis of the adrenals with 2% NaOH. In 100 g of fresh substance was found 0.2753 g. total cholesterol, of which 56.6% were cholesterol and oxycholesterol (the latter alone representing 17.5%) and 43.2% cholesterol esters. Cholesteryl palmitate was 2.3% and the oleate 9.1%; oxycholesteryl oleate was 31.9%. The high cholesterol content of the adrenals is thought to be due to the destruction of erythrocytes for the building up of the adrenal hormon. The endogenous synthesis of cholesterol in the adrenals is considered as improbable. S. Morgulis

The significance of the conjugated bile acids in fat resorption. IV. F. Verzar and A. von Kuthy. *Biochem. Z.* 230, 451–7(1931); cf. *C. A.* 23, 4957.—The objection to the hypothesis that fat is absorbed in the intestinal tract as the water-sol. combination of fatty acids with bile acids could be based upon the fact that there is never enough bile acid present to convert all fatty acids into a diffusible state. Expts. made on isolated and washed out segment of intestines of living animals show that a given amt. of bile acid promotes the absorption of much more fatty acid than could be made diffusible in tests *in vitro*. It is therefore assumed that the bile acids become adsorbed on the epithelial cells of the mucous membrane where the fatty acids become converted into diffusible forms This is corroborated by the finding that even hrs. after the administration of bile acids these can be demonstrated in the mucous membrane though not in the lumen of the intestine The adsorbed bile acid-fatty acid combination is presumed to undergo hydrolysis, the bile acids being then ready to take up more fatty acids S. Morgulis

The role of the pyloric sphincter in the control of gastric acidity. Robert Elmen and A. P. Rowlette. *Arch. Surg* 22, 426–37(1931). John T. Myers

The zinc content of the liver of the rat in relation to growth. Gabriel Bertrand

AND MME Y BRANDT BEAUZEMONT *Compt rend* 191, 1410–1(1930); cf. *C. A.* 24, 5358.—With the same methods of technic and analysis as previously described, expts were made to det the Zn content of the livers of rats at various stages of growth at birth at 15 days (near weaning), at 30 days and at 7 months It was shown that the quantity of Zn per 100 g of liver decreased with age, there being about 3½ times more of metal at the time of birth than in the adult rat Because of this storage of Zn at birth, it seems that the role of Zn in nutrition is more important in the adult than in the new born N M NAYLOR

The mucin of the articular fluids CH ACHARD AND M. PIETTRE. *Compt rend* 191, 1412–4(1930).—In the expts described, synovial mucin is purified by repeated pptns from a water soln with acetone It is first obtained as a thick, viscous mass but with further purification, as a dry powder Synovial mucin averages 0.7% S, while the mean content of S in blood serum averages 1.4% The sp viscosity of synovial mucin is 5.389, that of blood serum is 1.090 The synovial mucin described compares favorably with true mucin (1) by its soly in excess HCl and its slight soly. in excess AcOH and (2) by the fact that its content of sulfur is similar to that obtained for saliva mucus (Hammarsten) and for tendon mucus (Loebisch) N. M NAYLOR

Threshold relationships of testis hormone indicators in mammals. the rat unit. CARL R MOORE AND T F GALLAGHER *J Pharmacol* 40, 341–49(1930); cf *C A* 24, 3547.—The order of sensitivity in the rate of testis hormone indicators was (1) spermatozoön motility test, (2) prostate cytology test; (3) seminal vesicle, Cowper's gland and vas deferens tests, (4) elec. ejaculation test The rat unit is defined as the minimal daily amt required to maintain 50% of castrated animals in a normal condition, the indices being a normal prostate gland and seminal vesicle One rat unit is approx equal to 6 bird units C. RIEGEL

The chemistry of muscular contraction. OTTO MEYERHOF *Lancet* 1930, II, 1415–22.—The hydrolysis of creatinephosphonic acid in muscle is of the utmost importance in muscle contraction The lactic acid-forming system is analyzed and a "hexokinase" discussed Similarities between the glucolytic function of muscle and the fermentative function of yeast are pointed out The importance of phosphonic esters pyrophosphate and adenylic acid in muscle or enzyme exts is stressed All vertebrates are found to contain creatinephosphonic acid in their striated muscles, and all classes of invertebrates utilize argininephosphonic acid F B SEIBERT

The regulation of oxygen consumption in animals with variable alveolar gaseous tension. H J JORDAN *Arch néerland physiol* 15, 198–212(1930).—Diving birds amphibia, molluscs and insects are considered The O content of the lungs may vary more than 10% with only a slight difference in consumption B A SOLLE

Iron in normal and pathological tissues and its biological significance. I. Iron content of the organs of various classes of animals KENTUI KOJIMA *Nagoya J Med Sci* 5, 34–48(1930).—In mammals and fishes, the Fe content of the spleen is always greater than that of the liver, but in birds, reptiles and amphibians the opposite is true On the other hand, the glutathione content is greater in the liver of mammals and fishes than in the spleen and vice versa for birds reptiles and amphibians. The amt of both Fe and glutathione in the lungs of birds is relatively higher than in the other organs II Relationship of the iron content of the organs and the growth of animals. *Ibid* 49–61 The fluctuations in the Fe content of growing honeybees and silk worms parallel the cytochrome content, gradually becoming greater during the larva stage, decreasing during the pupa stage and increasing again in the imago stage The amt of Fe in growing chick embryos reaches its max somewhat later than the glutathione and cytochrome content The Fe content per g dry substance in the organs of normal chickens was found to be liver 0.1806 heart 0.1317, leg muscle 0.0879, brain 0.1444, kidney 0.4920, lung 0.0525 and blood 0.1468 mg Egg yolk contained 0.0314 mg Fe/g dry substance, but no Fe was found in egg white The water content of the organs of chick embryos decreased with growth III Effect of the time of year upon the iron content of animals that hibernate [toad] (Bufo vulgaris japonicus) *Ibid* 62–70.—In general, the Fe content of the various organs of the toad is greatest in winter and least during the spawning time The glycogen content parallels that of Fe, but the glutathione content is just the reverse The liver always contains more than twice as much Fe as the spleen A WIEBEN

The carbon dioxide content of the blood in the new born. HOWARD F. KANE AND JOSEPH KREISELMAN *Am J Obstet & Gynec* 20, 826–7(1930).—A study of 47 specimens indicates that the $CO_2$ of the blood in the new born is consistently high and increases with the degree of asphyxia R. C WILLSON

Alkali reserve in blood during gestation S PASCALI *Clinica Ostetrica* 32, 537–55

(1930); *J Am Med Assoc* 96, 76.—From studies of 45 cases in various months of gestation, it is concluded that in the first 3 months of pregnancy the alkali reserve is lowered, but not markedly. The normal limits of alkali reserve are maintained between the fourth and eighth months. In the ninth month the reserve is about normal but tends to fall in the beginning of labor. R. C. WILLSON

**Cholesterol and bilirubin contents of blood of mother and child.** H. HINGLAIS AND J. GOVAERTS. *Gynéc et Obstét* 22, 137(1930). *J Am Med Assoc* 95, 1870.—Hypercholesterolemia in the mother is frequent at term but it is by no means observed constantly. The cholesterol content of infants at birth is distinctly low. During the first few days after birth the blood cholesterol of the infant increases markedly. No relation was found to exist between the excess blood bilirubin at birth and the low cholesterol value. Bilirubinemia decreased in the first few days after birth. R. C. WILLSON

**Organic and inorganic phosphorus content of blood in children.** P. FEDOROV. *Vrachebnoe Delo* 13, 505–10(1930). *J Am Med Assoc* 95, 1789.—The results given are from examns. of 1000 samples of blood from 254 healthy children aged from 7 to 15 yrs. The av. inorg. P in blood of boys and girls was about the same, 3.97 mg. per 100 cc. Org. P was 6.02 mg. per 100 cc. No seasonal changes in org. P were observed. R. C. W.

**Oxygen and carbon dioxide inhalations and their effect on circulation.** C. KROETZ. *Z. Kreislaufforsch* 22, 641(1930). *J Am Med Assoc* 96, 80.—In man O inhalations do not increase the catabolic processes in the organism, there is, however, a high elimination of N. The latter reaches, or nearly so, the increase in the amt. of O intake. In healthy subjects the arterial blood O remains unchanged but the amt. of O in venous blood is usually greatly increased. There is a definite increase in the min. vol. of the circulation. O inhalations in cardiacs produce an increase in the O tension of the tissue, a normalization of the O content of the arterial blood and an elevation of the low min. vol. and beat vol. in decompensation. $CO_2$ inhalations increase the O content of the arterial blood and increase the venous reflux and with it the min. vol. and the beat vol. R. C. WILLSON

## G—PATHOLOGY

H. GIDEON WELLS

**Anaphylaxis with water-soluble specific substance from yeast-like fungi.** T. J. KUROTCHKIN AND C. E. LIM. *Proc Soc Exptl Biol. Med* 28, 223–5(1930).—The sensitizing power of the mycelial growth is distinctly higher than that of the budding cell growth of the same fungus. *Monilia pinoyi* had a higher sensitizing capacity than *M. psilosis*, culturally, the former fungus differed from the latter in that its growth was accompanied by a rapid and rich formation of the mycelium. The guinea pig was used. C. V. BAILEY

**Zinc and cancer.** A. ZLATAROFF. *Bull soc chim biol* 12, 41(1930).—It is suggested that accumulation of Zn is one defense of the organism against the abnormal metabolism of the cancer cell, the Zn tending to inhibit the enhanced activity of proteolytic enzymes and catalase, to stimulate the decreased activity of peroxidase and to oppose the increased colloidal activity of the cancer cell, thus tending to reëstablish normal cellular respiration. B. C. A.

**Use of precipitated diphtheria toxin in the preparation of anti-diphtheria serum.** P. SÉDALLIAN AND MME. CLAVEL. *Compt rend* 190, 1525–6(1930).—The ppt. obtained when diphtheria toxin is adjusted to $p_H$ 4.7 (cf. *Compt rend soc biol* 97, 1543–5(1927), *C. A.* 22, 810, 23, 3509) is dissolved in a neutral peptone broth (Martin), and then injected (in increasing amts. during 3 months) into horses. The serum obtained is of the same value (as an antigen) as that resulting from injection of the original toxin. B. C. A.

**Potassium content of pleural discharges.** DIMITRESCU-MANTE. *Compt. rend. soc. biol* 102, 971–2(1929).—Av. values are 25–35 mg. per 100 cc. B. C. A.

**Effect of various salts on the stability of diphtheria toxin.** S. SCHMIDT. *Compt. rend. soc. biol* 103, 95–8, 98–100, 104–6(1930), cf. *C. A.* 24, 5855. B. C. A.

**Role of the electrolyte in the diphtheria toxin-antitoxin reaction. Coagulation of the purified toxin in presence of various salts.** S. SCHMIDT. *Compt. rend. soc. biol* 103, 101–3, 106–8(1930); cf. *C. A.* 24, 5855. B. C. A.

**The influence of different salts on the stability of toxin and antitoxin.** S. SCHMIDT. *Z. Immunitäts* 66, 506–18(1930), cf. preceding abstract.—Diphtheria antitoxin is much more stable to the destructive action of salts than is toxin. The flocculating function of both substances is less stable than the antigenic or antitoxic properties.

Salts of acids which have strong oxidizing or reducing actions quickly destroy toxin and antitoxin. This is also true for salts of certain aromatic acids, as salicylic and cinnamic acids JULIAN H. LEWIS

Occurrence of xanthine calculi in New Zealand sheep. T. H EASTERFIELD AND J A BRUCE *New Zealand J. Sci Tech* 11, 357-61(1930).—Calculi found in the kidneys of certain sheep consist of xanthine. The probable cause is a deficiency of minerals in the pasturage B C. A.

Hypochromic anemia with achlorhydria. THEODORE R. WAUGH *Arch Internal Med* 47, 71-81(1931).—Mostly clinical. J. B BROWN

The cholesterol partition of the blood plasma in parenchymatous diseases of the liver. EMANUEL Z. LIPSTEIN *Arch. Internal Med.* 47, 82-93(1931).—The cholesterol ester values of the blood plasma in acute parenchymatous damage of the liver are diminished or reduced to zero in proportion to the severity of the disease process. The cholesterol partition is normal in atrophic cirrhosis J B BROWN

Chemistry and metabolism in experimental yellow fever in Macacus rhesus monkeys. III. Blood sugar and liver glycogen. A. MAURICE WAKEMAN AND CLARE A MORRELL. *Arch Internal Med* 47, 104-15(1931); cf. *C. A.* 24, 5835.—Monkeys with yellow fever showed hypoglucemia 24 hrs before death. Hypoglucemic convulsions during fasting could not be produced even with blood sugar as low as 45 mg % In yellow fever, monkeys with hypoglucemia showed low liver glycogen. Adrenaline produced no hyperglucemic symptoms. J B BROWN

The potassium content of the hearts of persons dying from edematous and nonedematous conditions. L. C. SCOTT. *Arch Internal Med* 47, 116-21(1931).—There is no appreciable av difference in the content of water, Na and K in the hearts of edematous and nonedematous persons There is considerable individual variation. The Na content may be greater or less than K. J B BROWN

The blood lipoids in nephrosis and chronic nephritis with edema. L. LICHTENSTEIN AND EMANUEL Z. EPSTEIN *Arch Internal Med* 47, 122-7(1931).—Increased cholesterol, both total and ester, and phosphatides were found in the blood plasma of patients with various nephroses The lipoidemia was accompanied usually by diminution of serum proteins, especially albumin Similar results were obtained on 7 cases of chronic glomerulonephritis J B BROWN

Terminal hypoglucemia. E G SCHMIDT AND T. NELSON CAREY. *Arch Internal Med* 47, 128-34(1931).—Detn of blood sugar in 33 nondiabetic patients dying in the hospital showed low terminal blood sugars (28-75 mg %) in 36% of the cases. Urea usually rose just prior to death J B BROWN

The optical activity of cerebrospinal fluid in suppurative meningitis, and its lactic acid, sugar and chloride content. SYDNEY L. WRIGHT, JR., ELIZABETH F. HERR AND JOHN R PAUL. *J Clin Investigation* 9, 443-61(1930).—The lactic acid concn in the cerebrospinal fluid in suppurative meningitis is decidedly abnormal and usually related to the severity of the clinical symptoms. The ultrafiltrate of this fluid is usually *l*-rotatory The lactic acid may be present as *l* rotatory *d* lactates. The ratio of concn of $Cl^-$ in the blood and spinal fluid is not altered The sugar and lactic acid ratios are greatly altered, there being less sugar and more lactic acid. An extended bibliography is given J B. BROWN

The proportion of certain important inorganic constituents in the dying heart muscle. L C. SCOTT *J Clin Investigation* 9, 463-74(1930).—As a result of a large series of analyses of heart muscle from persons dying from a variety of diseases, there does not seem to be any relation between the water content, the content of ash, Ca, Mg, K and Na and disease With the exception of Mg, the inorg constituents are quite variable Hearts from individuals dying from arteriosclerotic changes do not show high Ca content. A reversed ratio of K to Na may indicate an affected cardiac contractility. J. B BROWN

The humoral origin of the paresis consecutive to the destruction of the suprarenals. J E ABELOUS AND H LASSALLE *Compt. rend. soc. biol* 103, 475-7(1930).—The injection of blood from a frog paralyzed as a result of destruction of its suprarenals into a frog whose suprarenals have been extirpated results in paralysis and death, if injection is made into a normal frog, the same disturbances result after a very short delay They are, however, transient, the poisons being gradually destroyed or neutralized by adrenaline The considerable increase of muscular chronaxy in relation to that of the nerve implies a curarizing action of the poisons which accumulate in the organism when its suprarenal function is suppressed B C. BRUNSTETTER

The protein equilibrium of blood serum in cerebral tumors. CH. ACHARD, M BARIÉTY AND A CODOUNIS. *Compt rend soc biol.* 105, 346-7(1930).—A study of

10 cases of cerebral tumor showed that the protein equilibria of the blood sera were practically undisturbed The range of values for total protein was 76 30–89 74 g. per 1000, for albumin, 39 10–58 84 and for globulin, 25 36–41 07 g. per 1000 The albumin–globulin ratio ranged from 0 95 to 2 12 B C BRUNSTETTER

**Oxalaturia and increased oxalic acid secretion in urine in tuberculosis.** JOSEF A LANGER AND TH LITTIG *Beitr klin Tuberk* 72, 492–6(1929) —Among 150 tuberculous individuals examd there were 29 2% with a pos oxalaturia, 48 2% with variable findings and 22 6% persistently neg Of the latter there were about 61 7% with severe processes Among children and youths under 16 years oxalate crystals were found less frequently No effect of a febrile reaction was noted and a diet rich in oxalic acid was without effect. H J CORPER

**Experimental studies on artificial immunization against tuberculosis. Hemolysin tests.** P KALLOS AND E BAJZA. *Beitr klin Tuberk* 73, 323–4(1930) —In earlier expts on artificial tuberculosis immunization in which tuberculous tissues were placed subcutaneously in sacs impervious to bacteria (*Beitr klin Tuberk* 71, 604(1929)) it was recommended that this method be used for immunizing purposes In order to det whether these sacs are suitable for the production of antibodies, sheep erythrocytes were placed in the sacs subcutaneously in rabbits and it was shown that the serum of these animals after a short time contained a fair titer of hemolysins H J. C

**Bilirubin determination in the blood serum in chronic pulmonary tuberculosis.** F WARNECKE *Z Tuberk* 54, 321–7(1929) —As the result of an examn. of 134 patients with severe bilateral pulmonary tuberculosis there was found a diminution of bilirubin in the blood serum 0 002 mg as compared to normal 0 005 mg Toxic destruction of the liver parenchyma, of the reticulo-endothelium, insufficient supply of hemoglobin or O unsatn of hemoglobin are looked upon as possible causes The detns were made by means of direct and indirect diazo reactions and with the Autenreith colorimeter. H. J CORPER

**Blood sedimentation and white blood picture in the prognosis of pulmonary tuberculosis.** HERMAN VOS *Z Tuberk* 55, 431–7(1930) —Study of the blood picture and sedimentation revealed a disagreement between the 2 in 22% of 309 cases examd In the cases where disagreement occurred the majority showed a parallelism of the clinical course and the leucocyte formula while the smaller proportion revealed an agreement of the sedimentation rate and the clinical course. Conclusion: The hemogram more rapidly reacts to the immuno-biologic condition of the body than the sedimentation rate H. J. CORPER

**Studies on the tuberculin reaction.** G PLATONOV AND S SHAVROVA *Beitr klin Tuberk* 73, 435–41(1930) —In elaboration of observations made by others that certain substances possess the property of inhibiting or neutralizing the local tuberculin reaction, the authors used solns of Na morrhuate and Na gynocardate, as well as solns of Ca and Mn salts After the amt. of tuberculin producing a reaction in the patient had been detd these various reagents were added in different concns Na morrhuate and Na gynocardate caused a definite diminution in the reaction while $MnCl_2$ increased it and $CaCl_2$ gave indefinite results It is believed that the action of Na morrhuate and Na gynocardate is to be explained on the basis of the antitryptic properties of the unsatd. lipoids, while with $CaCl_2$ the possibility of the action through the nervous system cannot be excluded On the basis of a parallelism between the local and general sensitiveness, it is reasoned that these expts may point to a way of desensitizing lung tissue for therapeutic purposes J H CORPER

**Further observations on the serum calcium and plasma cholesterol in health and disease and on the blood chemistry in osteomalacia.** T. A HUGHES, D. L SHRIVASTAVA, P. N SAHAI AND K S MALIK. *Indian J. Med Research* 18, 517–26(1930) —The serum Ca of residents in the Punjab is higher than that of normal inhabitants of temperate climates The oral administration of vitamin D (Vigantol or Radiostol) or vitamin A (Radiostoleum) caused a rise of serum Ca in 4 cases of osteomalacia, but indefinite changes in serum P or plasma cholesterol H EAGLE

**Chemical composition of urinary calculi in rats.** S RANGANATHAN *Indian J Med Research* 18, 599–613(1930) —The compn. of the urinary calculi of albino rats varies with the diet. Ca rich stones develop on a Ca rich diet, they contain it as $CaCO_3$, $Ca(OH)_2$ or both, are poor in P and N and contain no uric acid $CaCO_3$ stones contain little $H_2O$, $Ca(OH)_2$ stones may contain as high as 49% $H_2O$ $MgNH_4PO_4$ stones develop on diets contg no added lime. H. EAGLE

**Chemical composition of the "nucleus" of urinary calculi.** S RANGANATHAN *Indian J. Med Research* 18, 613–7(1930).—The nuclei of vesical calculi are not homo-

geneous They contain uric acid, urates and only traces of phosphates, their compns usually, but not necessarily, parallel the compn of the surrounding stone H E

**Renal diabetes and ketonuria** Wilhelm Berg *Klin Wochschr* 9, 1621-3 (1930) —A description is given of an unusual case of renal diabetes, with development of ketonuria during pneumonia H Lagle

**Functional disturbances of the kidneys in diabetic coma.** A Wi Elmer and M Schiffs *Klin Wochschr* 9, 1631(1931) —Contrary to the conclusions of Gott schalk and Muller, ketonemia and acidosis may play a very significant part in causing kidney insufficiency in diabetic coma Ketonuria, decreased alkali reserve and ketonemia do not necessarily run parallel A very severe ketonemia (> 300 mg %) is quite compatible with negligible ketonuria and a plasma $CO_2$ of 40% H Eagle

**Calcium gout and calcinosis universalis** Hermann Steinitz *Klin Wochschr* 9, 1632-4(1930) H Eagle

**The metabolism of progressive muscular dystrophy.** Gertrud Mosberg *Klin Wochschr* 9, 2051 2(1930) —In 3 cases of infantile muscular atrophy which presented no clinical signs of endocrine disturbances there was (1) an increase in blood Ca, cholesterol and lactic acid, (2) abnormal blood glucose and NaCl curves following their ingestion and (3) a normal insulin curve H Eagle

**Alimentary lipemia.** A Hirsch *Klin Wochschr.* 9, 2062-4(1930) —Alimentary lipemia is not observed in cases of portal obstruction (atrophic cirrhosis, ascites) or in disturbances of fat absorption of the most diverse kind (fever, cachexia, bile duct obstruction) Alimentary lipemia is therefore not a functional test of a cirrhotic liver, but of enteral fat resorption Its absence is, however, one of the regular and early symptoms of atrophic cirrhosis H Eagle

**Specific skin reactions in patients with gonorrhea by means of specific protein-free substances derived from gonococci** Wolfgang Casper *Klin Wochschr* 9, 2154-8(1930) —A protein free, type specific deriv of Type I gonococcus, carbohydrate in nature, gave specific skin reactions in gonorrheic subjects, apparently allergic in nature Type II derivs gave no reaction with these patients, conversely, the Type I substance gave no reaction in a patient who was sensitive to Type II. H Eagle

**Uremia in scarlatinal nephritis** A Altmann *Klin Wochschr.* 9, 2252-4 (1930) —The usual premonitory signs may be completely absent in cases of uremia following scarlatinal nephritis The non protein N may be normal, blood pressure may not be high and there may be no oliguria, hematuria or albuminuria A suggests the possibility that the convulsive uremia of scarlatinal nephritis may differ in essential respects from the quiet uremia of chronic nephritis H Eagle

**Hyperinsulinismus with a hypoglucemic symptom complex** F. Krause *Klin Wochschr* 9, 2346-9(1930) H Eagle

**Nephrosis and glucosuria.** H Strauss *Klin Wochschr.* 9, 2388-9(1930) — Previous communications have shown that there is a low threshold value for blood sugar in nephrosis following the peroral intake of glucose. The results of Fell, which indicate an abnormally high kidney threshold, were obtained by the intravenous injection of glucose H Eagle

**Percutaneous immunization with the Löwenstein diphtheria protective salve** Heinrich Baar and Hans Benedict *Wochschr* 9, 2395-6(1930) —Eighty % of 106 children became Schick neg following percutaneous immunization Inducing an erythema by means of a mustard plaster previous to the application of the toxoid salve increases the absorption H Eagle

**Experimental basis for the serological demonstration of a specific cancer antigen.** H Lehmann Facius *Klin Wochschr* 9, 2430-3(1930) —A lipoid which reacts specifically with a rabbit anti carcinoma serum can be obtained in the acetone insol., petr ether-sol fraction of the original carcinoma tissue This fraction does not react with Wassermann pos sera and does not react with a group specific antiserum H Eagle

**Humoral changes in a case of trypanosomiasis (a contribution to the question of auto-antibodies)** Odön Fischer *Klin Wochschr* 9, 2436-8(1930) —The serum of a patient with trypanosomiasis contained agglutinins at 0° for human blood cells of all groups including his own cells, and complement fixing antibodies against an alc ext of human red cells F interprets these as antibodies to the hosts' own red cells, due to changes induced by the infection H Eagle

**Observations on the sugar metabolism in a case of spontaneous levulosuria.** P A Heeres and Herman Vos. *Klin Wochschr* 9, 2440-1(1930) H Eagle

**Influence of the benzene nucleus on the specificity of azoproteins.** M. Adant *Compt rend soc biol* 103, 539-40(1930), *Physiol Abstracts* 15, 260 —In the azoproteins

obtained by coupling diazotized aniline with serum protein, the protein fragment has lost its specificity An active precipitin corresponding to the serum employed in production is quite free from activity toward the azoprotein Replacement of the aniline mol by a benzidine or naphthylamine mol causes no modification of the specificity of the antibody G G

Antigenic properties of gelatin. R. BRUYNOGHE AND P. VASSILIADIS *Compt rend soc biol* 103, 543–4(1930), *Physiol Abstracts* 15, 260—Gelatin and gelatin aniline were injected into animals with the view of ascertaining whether they caused the production of deviating substances Neither serum gave the slightest trace of deviation of alexin on gelatin coupled with aniline, but both fixed the alexin on gelatin by itself The inactivity of the gelatin aniline serum toward the antigen cannot be attributed to a want of sensitizing substances, it is rather due to the nature of the antigen G G

Antigenic properties of collagen and their modification under the influence of radium emanation. J LOISELEUR AND ACH URBAIN *Compt rend soc biol* 103, 776–8(1930), *Physiol Abstracts* 15, 258–9—The flocculation of collagen under the action of Ra is preceded by diminution of viscosity and lowering of the antigenic properties G G

Experimental production of chicken sarcoma with arsenic trioxide. N C. LACLAU AND C PILLADO MATHEU *Rev soc argentina biol* 5, 744–67(1929), *Physiol Abstracts* 15, 262—Carrel's results could not be repeated Injections of $As_2O_3$ and embryonic pulp did not produce sarcoma. Cholesterol injections did not modify these results. No results were obtained by modifying the time of contact of arsenic and embryonic pulp, varying the $p_H$ and adding $ZnSO_4$ or ext. of rat sarcoma Substitution of embryonic by spleen pulp also gave neg results. Granuloma were produced by injecting clay. Subsequent injections of arsenic did not produce cancer G. G.

Factors affecting the deposition of dental calculus. GEOFFREY H SMITH. *Australian J. Exptl Biol Med Sci* 7, 45–77(1930)—Loss of $CO_2$, changes in $p_H$ value and phosphate content of the saliva are not important factors in the deposition of dental calculi. A salivary phosphatase from desquamated epithelial cells which forms inorg. phosphate from org esters is the chief factor The optimum $p_H$ of the enzyme is 5 5. C. G. KING

Rapid precipitation tests for syphilis and blood transfusion. B S LEVINE *Am. J. Syphilis* 15, 81–9(1931)—Antigen pptn. is merely the first step of the complement-fixation procedure made visible The recent pptn. procedures used in the lab diagnosis of syphilis are relatively not greater as improvements over the early pptn procedures than the cold incubation complement fixation procedures (Kolmer and similar tests) are over the early Wassermann tests The improved pptn. procedures are not intrinsically specific for syphilis They are empirical tests exactly as are the improved complement fixation tests None of the antigen pptn procedures is any more sensitive in reaction at any stage of the syphilitic disease than are the properly standardized cold incubation complement-fixation procedures Antigen pptn procedures, similar to those of complement fixation, yield pos reactions, mostly of the weaker intensity, with serum of individuals affected with certain chronic low grade conditions other than syphilis Antigen pptn tests for syphilis have their zones of nonreactivity similar to the complement-fixation procedures The colloidal conditions prevailing in some sera at times may favor complement fixation and not antigen pptn. and *vice versa* The serum conditions which lead to nonreaction either with the pptn or complement-fixation procedures or both are intermittent in the majority of instances The proper precautions to be taken in testing blood sera before deciding upon their suitability for transfusion are given B S. LEVINE

Electrodialysis of antitoxin serums. FERNANDO MODERN *Rev inst bacteriol* 5, 695–702(1930)—An exptl. review and also original study in the electrodialysis of serum antitoxin with a view to its possible application on a large scale to the concn of immune serums B S. LEVINE

Purification of antidiphtheric serum by thermal coagulation in the presence of salts. RAÚL WERNICKE AND FERNANDO MODERN *Rev inst bacteriol* 5, 713–7 (1930)—Heating antidiphtheric serum for 10 min. at 70° in the presence of salts destroys its antitoxic properties Such destruction increases with the duration of the heating and with the salt concn. The liquid fraction of the serum thus obtained generally is poorer in total protein in comparison with the proteins carrying the antitoxin than is the original serum. Therefore the ratio antitoxin units·1 g protein is between 2 and 3 times as great in this liquid fraction as in the original serum, but it never exceeds 3 times its value. The yield in the antitoxin varies and generally reaches

60%, though it may be as high as 92–95%. More of the antitoxin is recovered in the presence of $(NH_4)_2SO_4$ and $Na_2SO_4$ than in the presence of NaCl. B. S. LEVINE

A contribution to the study of the precipitation of diphtheria toxin-antitoxin. FERNANDO MODERN AND RAÚL WERNICKE. *Rev inst bacteriol.* 5, 705–12(T. A.) (1930).—Pptd toxin antitoxin requires a min. reaction of $p_H = 3.6$ to dissolve completely in acid medium the pptd. T. A. liberates the antitoxin, the optimum reaction being $p_H = 3.2$ to 3.6. Temp. has an influence upon this reaction, the optimum being at 10–15°. The antitoxin unit content increases in the course of time from the instant the pptd. T. A. has gone into soln. The yield in the antitoxin units recovered from the T. A. in acid soln. increases with the dilu. B. S. LEVINE

Plurality of the antigen contained in B. anthracis. A. SORDELLI AND V. DEULOFEU. *Rev. inst. bacteriol.* 5, 778–85(1930).—With the aid of water or physiol. salt soln., preferably warm, it is possible to ext. from *B. anthracis*, cultivated on serum agar, a complex possessing complement fixing properties in the presence of that fraction of anticarbuncle serum which is sol. in $H_2O$ and $CO_2$. In this ext. there is also a substance (hydrocarbon) which possesses the properties of a precipitinogenic antigen. Both substances are relatively thermostable in neutral and alk. reaction. The complement fixing complex is destroyed by heat in acid medium. Both complexes are pptd. by alc. and acetone. The precipitinogenic substance is not thereby altered with regard to its antigenic properties, whereas the complement fixing fraction completely loses its antigenic properties. B. S. LEVINE

Studies in allergy. I. The specific activity of pollen oil. EDGAR L. MILFORD. *J. Allergy* 1, 331–3(1930).—Oil ext. from dry ragweed pollen with the usual fat solvents produced skin reactions in only ⅔ of the patients who reacted to aq. exts. of the pollen. Passively sensitized areas of the skin of normal people reacted to the aq. exts. when these sites had been exhausted by the oil ext. JULIAN H. LEWIS

Allergy considered as a special type of alkalosis. HARRY BECKMAN. *J. Allergy* 1, 496–500(1930).—Because clinical conditions assocd. with acidosis either relieve or prevent allergy B. believes that a "potential alkalosis" is an important causative factor in allergy. He emphasizes the use of nitrohydrochloric acid in the treatment of hay fever. JULIAN H. LEWIS

Studies on pollen and pollen extracts. IV. The allergically active constituent in pollen oil. MARJORIE B. MOORE, HOBART W. CROMWELL AND EDMOND E. MOORE. *J. Allergy* 2, 6–10(1931).—The non-dialyzable $H_2O$-free EtOH-sol. fractions of pollens have a skin reacting activity. From the results of local passive sensitization and desensitization tests it is believed that the active constituent in pollen oil is identical with one or more of the antigens extd. by aq. solvents. Chem. tests of the active non-dialyzable constituent of pollen oil indicates that it may be glucosidic in nature. JULIAN H. LEWIS

Further studies on the precipitation test for syphilis. EMIL WEISS. *J. Infectious Diseases* 47, 355–8(1930).—The comparative study of Kahn's antigens with regard to the temp., time and ratio of tissue to solvent employed in their prepn. led to the prepn. of an improved antigen. Dry beef heart is extd. with EtOH in the ratio of 1:3 for 40 min. in the icebox. The ext. is discarded and the tissue dried. To the dried tissue 95% alc. is added in the ratio of 1:5. The alc. extn. is carried out at 37° for 3 days. This ext. is then filtered and left overnight at room temp. The ext. is refiltered and 0.6% cholesterol is added. This antigen is simpler to prep., has a wider sp. zone and does not require addnl. sensitizing or correcting. JULIAN H. LEWIS

Serologic studies on the proteins found in casein. D. C. CARPENTER AND G. J. HUCKER. *J. Infectious Diseases* 47, 435–42(1930).—By extn. with acid 70% alc. and by fractionation with K oxalate 3 proteins having mol. wts., resp., of 98,000, 188,000 and 375,000 were sepd. from crude casein. These proteins were clearly distinguishable from one another by serologic reactions. It was also found that the alc.-sol. protein of Osborne and Wakeman is not the same as the acid alc.-sol. protein having a mol. wt. of 375,000. JULIAN H. LEWIS

Precipitation with cerebrospinal fluids. A. M. MALLOY, R. L. KAHN AND LUCY WESTALL. *J. Infectious Diseases* 48, 203–11(1931).—As is true with the Kahn reaction, the colloidal Au and mastic reactions depend on the globulin fraction of the spinal fluid, the albumin fraction giving neg. results. The globulin fraction gives results somewhat more sensitive than the unfractionated fluid, undoubtedly because of the removal of the protective action of the albumin. After a Kahn test has been performed with a soln. of globulin obtained from the spinal fluid and after removal of the ppt. by centrifugation, the supernatant soln. continues to give colloidal Au and mastic reactions, indicating that the pptn. substances in the globulin soln. (or the

conditions of this soln ) responsible for the Kahn reaction are not the same as those responsible for the colloidal Au and mastic reactions Heating the globulin fraction at 56° up to 2 hrs. exerts little effect on the 3 reactions When heating is prolonged to 24 hrs., there is a tendency toward *reduction in sensitivity, especially in that of the* Kahn reaction Heating the globulin exerts comparatively little reduction in the sensitiveness of the colloidal Au and mastic reactions and considerable reduction in that of the Kahn reaction After heating at 70° for 30 min , there is reduction in the sensitiveness of the 1st 2 reactions and marked reduction in that of the Kahn reaction. These heating expts also indicate that the conditions governing the Kahn reaction are not identical with those governing the colloidal Au and mastic reactions J H L

Detoxifying and disinfecting properties of sodium salicylate. Its action on diphtheria and tetanus toxins and on streptococcal "toxic" filtrates. Konrad Birkhaug *J Infectious Diseases* 48, 212–25(1931) —*A satd soln of Na salicylate has the power of* neutralizing diphtheria and tetanus toxins *in vitro* without destroying their antitoxinogenic capacity Neutralization proceeds in direct proportion to the concn. of Na salicylate, the duration of contact and the degree of temp Simultaneous injection of pure toxin and the required amt. of Na salicylate that produces a neutral mixt. *in vitro* fails to avert death from diphtherial toxemia, although the period of survival is slightly prolonged No neutralizing effect is exercised by the satd soln. of Na salicylate on the toxic filtrates of hemolytic or nonhemolytic streptococci, a feature that seps. these "toxins" from the true bacterial exotoxins of *C diphtheriae* and *Cl tetani* The bactericidal action of Na salicylate on commonly encountered pathogenic microorganisms is about $^1/_{10}$ that of phenol The precise mode of action of Na salicylate *in vitro* remains obscure Its dual capacity to exercise antitoxic and antiseptic action *in vitro* suggests the hypothetic possibility that its therapeutic success in certain infectious diseases is effected by weakening the pathogenic microörganisms and their capacity to secrete the deleterious exotoxins Julian H. Lewis

Titration of the antigenic properties of diphtheria toxin in vitro. E Hoen and L Tschertkow *Z. Immunitäts* 66, 389–93(1930) —Flocculation tests are not adapted to the titration of antitoxin binding values of diphtheria toxin and its derivs but the ring pptn test gives const and accurate results Julian H Lewis

The action of phenol-alcohol on serological reactions. G Sollazzo. *Z Immunitäts* 66, 424–42(1930) —Phenol and alc added to lipoid antigens (sp lipoids, Wassermann and Forssman antigens) make them more reactive in immune reactions Phenol alone is more active than alc., but a mixt. of the 2 is most active. J H L

The identity of heterogenetic antigens. K A Friede and L A Schwarzmann *Z. Immunitäts* 66, 454–64(1930) —Although 9 different heterogenetic antigens have been described the authors believe they are all the same antigen Proof of this opinion is given in adsorption expts Julian H Lewis

The presence of Forssman heterogenetic antigen in the blood corpuscles of the guinea pig. G Sollazzo *Z. Immunitäts* 66, 465–84(1930) —Heterogenetic anti serum and antiserum obtained by immunizing with sheep blood react specifically with alc. exts of guinea pig red blood cells The hemolytic amboceptor for guinea pig red cells in these sera is difficult to activate with guinea pig serum but can be activated readily with rabbit serum Guinea pig red cells adsorb antibodies from heterogenetic antisera slowly Repeated exposures of red cells to the antiserum must be used These expts prove that guinea red cells contain Forssman antigen. Julian H Lewis

The antagonistic influence of glucose in anaphylactic shock. K M Dvolaitzska-Barisheva and M S Goldberg *Z Immunitäts* 66, 485–90(1930) —By perfusion expts it is found that *glucose in 5% concn. has the property of inhibiting the sp. action of antigen on the vessels of a sensitized* guinea pig *This action of glucose is ascribed* to the fact that glucose has the ability to prevent the change in the grade of dispersity of the colloids in muscle cells that result from the combination of antigen with antibody within the territory of the cell Julian H Lewis

The occurrence of the Thomsen antigen in human organs. M N. Sinyushina *Z. Immunitäts* 66, 491–5(1930).—The receptor which is developed by human erythrocytes exposed to the growth product of certain bacteria and which makes them agglutinable by all sp agglutinating sera is not developed under the same conditions by cells of human organs Julian H. Lewis

The appearance of organ specific brain substances in ontogenesis. E Witebsky and G Sollazo. *Z Immunitäts* 67, 1–8(1930) —The brains of guinea pig embryos 4–6 cm. in length and of human fetuses of the 3rd to 4th months react with sp anti brain sera. In earlier stages the brains do not react The sp antigen of embryonal brains is heat stable and alc sol. which indicates it is lipoidal in nature. J. H. L.

**Potassium and calcium in anaphylaxis** M A Kuschnarjew *Z. Immunitäts* 67, 9–14(1930) —After anaphylactic shock there is a marked increase in the K and a decrease in the Ca contents of guinea pig serum Anaphylactic shock is inhibited in sensitized guinea pigs if $CaCl_2$ is injected along with the antigen Guinea pigs injected with isogenous or autogenous serum mixed with KCl or KI show symptoms of anaphylactic shock Anaphylactic shock is undoubtedly concerned with disturbances of the Ca K equil in the vegetative nervous system Julian H. Lewis

**The alkalosis of vomiting and the acidosis of advanced renal disease** T. G H Drake, P Marsh and J L Gamble *Am J Diseases Children* 40, 705–17(1930) —The chloride ions lost by vomiting can be restored by the intravenous administration of physiol NaCl soln and the increased concn of bicarbonate ion thus reduced to the normal value The intravenous administration of 10% dextrose soln aids in restoring the renal function impaired by the progressive dehydration brought on by vomiting The lowered concn of bicarbonate ion assocd with nephritis can be corrected by the intravenous injection of $NaHCO_3$ unless the impairment of renal control has already become too far advanced Charts are included which give the quant ionic compn of the plasma in the types of acidosis and alkalosis discussed and which illustrate quantitatively the changes in compn produced by the injection of $H_2O$ and other substances E. R. Main

**Cerebrospinal fluid of premature infants. Results of a series of spinal punctures in one hundred and seventy cases, with special reference to the origin of physiologic xanthochromia of the new-born infant.** Jerome Glaser. *Am. J. Diseases Children* 40, 741–52(1930) —Lumbar puncture during acute meningeal congestion usually yields cerebrospinal fluids which are definitely hazy but which do not contain a sufficiently large no of erythrocytes to show a pink coloration. The yellow spinal fluids give a pos van den Bergh reaction in 55% of the fluids examd A pos benzidine test on the supernatant fluid obtained by centrifugation of bloody fluids always indicates meningeal hemorrhage, but a neg test does not rule out hemorrhage The icterus index of both the blood serum and the spinal fluid is highest during the 2nd and 3rd weeks of life E R. Main

**Bile-salt hemolysis in new-born infants and its inhibition by the blood serum.** Heyworth N Sanford, Marian M Crane and Eleanor I Leslie *Am J. Diseases Children* 40, 1039–44(1930) —The erythrocytes of normal, new born infants are more resistant to hemolysis by bile salts than those of adults and the serum gives greater protection against hemolysis There appears to be no variation from the normal in idiopathic icterus, pathologic jaundice due to congenital syphilis or in hemorrhagic disease of the new born E R. Main

**Pentosuria in children, with laboratory data on four cases.** Alfred E Fischer and Miriam Reiner. *Am J Diseases Children* 40, 1193–1207(1930) —Pentosuria in children is not assocd with an increased amt. of nonfermentable reducing substances in the blood or with changes in tolerance for glucose The blood pentose curve of pentosuric children following the ingestion of xylose is similar to that of normal children A small quantity of the ingested pentose may be accounted for in the urine and feces The fate of the remainder is undetd The excretion of ingested pentose is slightly greater and more prolonged than that characteristic of normal children. Pentosuria appears to be the result of a metabolic defect and not of an increased permeability of the kidney for pentoses E R. Main

**The gastric and duodenal contents of normal infants and children. The duodenal enzyme activity and the gastric and duodenal reactions [hydrogenation]** Theodore G Klumpp and A Victor Neale *Am J Diseases Children* 40, 1215–29(1930) —The $p_H$ of the gastric contents of children under 2 yrs. is approx 4 1 and decreases to 2 8 in children of 9–12 yrs The presence of true achlorhydria appears to be uncertain unless the histamine test is employed, since many of the infants and children show no free HCl during fasting and a smaller no show none after a test meal of cream The $p_H$ of the duodenal contents during fasting tends to remain at 7 0 and is decreased to approx 5 0 after the test meal The amylolytic enzyme activity of the duodenal contents during the 1st yr of life is very low and then increases abruptly, exceeding the av values for adults The lipolytic activity is consistently low throughout infancy and childhood The proteolytic activity is high The gastric acidity and the activity of the lipolytic and amylolytic enzymes are slightly increased after the ingestion of the test meal of cream. E R Main

**Inorganic blood chemistry in the osteochondritides.** Joseph Buchman and Isaac F Gittleman *Am J Diseases Children* 40, 1250–6(1930) —The Ca, Na, K,

Mg and inorg P contents of the blood serum in osteochondritides are within the normal limits Rickets does not appear to be a causative factor E R MAIN

Creatinuria in tuberculosis. I. Creatinuria in tuberculous men. JAMES T. THOMPSON *J Lab Clin Med* 16, 5–11(1930) —Creatinuria often appears to be assocd. with pulmonary tuberculosis E R MAIN

Phosphorus metabolism. II The distribution of phosphorus in normal and cancer bloods. GUY E YOUNGBURG AND MAMIE V YOUNGBURG *J Lab Clin Med.* 16, 253–9(1930), cf *C A* 25, 1857 —The blood in cancer appears to vary from normal blood in the following respects The ester P content of the corpuscles is increased 20 5%, the lipide P is increased 17 2% and the inorg phosphate P is decreased 15 6% It is not yet detd whether the changes are characteristic of cancer only. E. R MAIN

The leucocytic reaction to injections of a nonspecific protein. REUBEN L LARSEN AND A A JANSON *J Lab Clin Med* 16, 362–9(1931) —The leucocyte content of the blood appears to be progressively increased in normal individuals following 6 injections of a non sp protein prepn (Proteolac) A slight, temporary increase may follow one injection The increases are not accompanied by local reactions, rise in temp. or chills The size of the dose may not be a determinative factor E R. MAIN

A microscopic slide precipitation test for syphilis with spinal fluid. B S KLINE AND C R REIN *J Lab Clin Med* 16, 398–404(1931) —A microscopic slide pptn test is described in which spinal fluid is used directly with an antigen consisting of a cholesterolized alc. ext. of beef muscle The test is somewhat more sensitive than the blood Wassermann test with the same antigen Only fluids which reduce Benedict's soln may be used E R MAIN

The glucosuria of hyperthyroidism and its clinical significance. I. M RABINOWITCH. *Ann Internal Med* 4, 881–96(1931) JOHN T MYERS

Extra-insular (central) glucosuria with hyperglucemia following epidemic encephalitis. I. W HELD, A ALLEN GOLDBLOOM AND JULIUS CHASNOFF *Ann. Internal Med* 4, 897–908(1931) JOHN T MYERS

The behavior of some biochemical components of the blood and the spinal fluid in eclamptic uremia. L CANNAVO *Biochim terap sper* 17, 478–85(1930) —Observations of 2 cases of eclampsia are reported The NaCl in the blood is normal; it is increased in the spinal fluid The hyperglucemia observed is supposed to be connected with the muscular convulsions A E MEYER

Studies on experimental protein hemotoxic anemias. AAGE NYFELDT. *Folia Hematol* 42, 129–59(1930) JOHN T. MYERS

Acidosis and hyperthyroidism; variations of the alkali reserve in the red corpuscles. ENRIQUE CANTILO *Presse méd* 38, 722–3(1930) —Thyroid hyperfunction causes a decrease of the alkali reserve in the red corpuscles to the limit of 50% In hypothyroidism no change was observed The increased metabolism in the former case causes an over production of acids A E MEYER

Cataract and calcium metabolism. R RIVOIRE *Presse méd* 38, 723–7(1930).— The coincidence of cataract and diseases caused by Ca deficiency is emphasized. A E MEYER

Protein and protein quotient in the serum of tuberculous patients. ANDRÉ DUFOURT, ROBERT AND MOREAU *Presse med* 38, 843–5(1930) —For the investigation of the proteins in serum, proceed as follows Sep serum from the clotted blood and dil with 9 parts $H_2O$ contg a trace of AcOH Within 24 hrs, the nucleoproteins are pptd Filter and add to 20 cc of the filtrate 5 g NaCl, boil, add 6 to 8 drops of $Cl_3CCO_2H$ (20%), cool and centrifugalize Wash the ppt. several times with $H_2O$, at last with EtOH, collect on a filter, dry at 100° to 105° and weigh as total proteins. Neutralize 40 cc of the dil serum and ppt. the globulins with $MgSO_4$ Fill up to a vol. with a concd soln of $MgSO_4$, filter and use a quantity of the filtrate corresponding to 3 cc. of serum. Ppt by heat and proceed as previously This gives the serines, the globulines are calcd by difference. The quotient serin % globulin % is 1 6 to 2 0 in normal persons. A high quotient gives a favorable prognosis in tuberculosis, a low one is unfavorable But other factors have to be considered also to obtain a judgment of value A E MEYER

The different forms of flocculation of colloids. AUGUSTE LUMIÈRE *Presse méd* 38, 873–5(1930), cf *C. A* 24, 5570 —The general characteristics of colloids are described Disease is considered as a disturbance of the colloidal system. A E. MEYER

Psychosis and blood lipoids. Quantitative variations of total cholesterol and total fatty acids in the blood. I. Manic-depressive psychosis. SVEN STENBERG *Acta*

*med scand* 71, 558–97(1929); cf *C. A.* 24, 651 —For normal men and women the total cholesterol and total fatty acids were 0.1444 and 0.1524%, and 0.2466 and 0.3050%, resp. Both in the manic and melancholic phases of the manic-depressive psychosis there are notable changes in total cholesterol and total fatty acid of the blood, the values falling back to normal after recovery. S. Morgulis

The brown pigment of hemochromatosis. Martin Jacoby *Biochem. Z.* 230, 225–7(1931).—The liver obtained at autopsy of a case of hemochromatosis was finely cut to ext. the pigment. This was insol. in alc., ether, $(CH_3)_2CO$ or $CHCl_3$. Glacial acetic acid became strongly colored and the soln. was difficult to filter, but if the mixt. was boiled a colorless filtrate was obtained. Neither did the pigment pass into benzene, phenol, toluene or $CCl_4$. The pigment is very sol. in 0.85% NaCl. If the liver pulp previously treated with NaCl soln. is extd. with $H_2O$, it is possible to ppt. a brown substance by complete satn. with $(NH_4)_2SO_4$. This was washed with satd. $(NH_4)_2SO_4$, suspended in $H_2O$ and dialyzed until the Nessler reaction became neg. The substance is then dissolved by the addn. of NaCl and on filtration a clear brown soln. is obtained. Of the 691 mg. dry residue in 100 cc. soln. 154 mg. was ash; 9.1 mg. N and 66 mg. Fe. The relation between N and Fe is thus 4:1. S. Morgulis

Urinary creatinine as a test of renal efficiency. A. Muir Crawford *Lancet* 1930, II, 1177–79.—In a great variety of cases of nephritis, which are tested and described, the creatinine excretion for a 24 hr. period was detd. and would seem to be a reliable prognostic guide. F. B. Seibert

Nature of the chill-producing principle in antipneumococcus serum. Albert B. Sabin and G. B. Wallace *J. Exptl. Med.* 53, 339–62(1931).—The chill principle appears to be formed only in blood which has been allowed to stand. The expts. reported do not show that the reaction is dependent on formed elements, fibrinogen or lipoids. Anticoagulants, filtration, dialysis and moderate heating are without effect in removing the principle from the soln. contg. it. By changes in the NaCl and H ion concn. in antibody solns. an acid globulin and an alk. globulin fraction may be obtained. The acid globulin fraction, whether or not phospholipin is present, contains the greater part of the chill principle and a small part of the antibody substance, the alk. globulin fraction contains the greater part of the antibody substance and a smaller part of the chill principle. The acid globulin fraction is not itself the chill principle but serves as a carrier of this, probably through an adsorptive process. C. J. West

Immunization with mixtures of poliomyelitis virus and aluminum hydroxide. C. P. Rhoads *J. Exptl. Med.* 53, 399–404(1931).—See *C. A.* 25, 738. C. J. W.

Iron and copper in various tissues in acute myeloid leucemia. Kenzui Kojima and Shinzo Kosaka. *Nagoya J. Med. Sci.* 5, 71–4(1930).—K. and K. tabulate results obtained in analyzing liver, spleen, heart muscle, kidney, cerebrum and blood in myeloid leucemia. The spleen was richest in Fe and the cortex of the kidney and brain contained more Fe than the marrow. However, the liver was richest in Cu and the cerebrum cortex contained nearly 3 times as much Cu as the marrow. A. W.

Normal urine sugar in cystoscopic examinations. Russell Richardson *Am. J. Med. Sci.* 180, 171–7(1930).—Normal urine sugars in specimens obtained by ureteral catheterization usually show approx. equal amts. of sugar from the 2 kidneys in the absence of any disease which damages kidney efficiency. The sugar from a badly damaged kidney is very much decreased as compared with that from a normal kidney. R. C. Willson

The hydrogen-ion concentration of the blood in eclampsia. H. J. Stander and N. J. Eastman *Am. J. Obstet. & Gynec.* 20, 822–5(1930); cf. *C. A.* 24, 884.—Immediately following an eclamptic convulsion the blood $p_H$ usually increases, often to a true acidosis. R. C. Willson

Studies in epilepsy. XI. The calcium content of the blood and of the spinal fluid. Wm. G. Lennox and Margaret B. Allen *Arch. Neurol. Psychiatry* 24, 1199–1205 (1930); cf. *C. A.* 24, 5372.—Detns. were made in 77 epileptics. Av. concns. and av. spinal fluid serum ratios were within normal limits, although there was an abnormally wide distribution of values, with a tendency toward low spinal fluid measurements. In 1/3 of the patients the ratio of spinal fluid to serum Ca was less than 45%. R. C. Willson

Acetone bodies in normal pregnancy and in the toxemias of pregnancy. H. J. Stander and J. F. Cadden *Bull. Johns Hopkins Hosp.* 47, 382–90(1930).—The total acetone bodies (free acetone, acetoacetic acid and $\beta$ hydroxybutyric acid) in the blood of normal nonpregnant women varied between 11 and 18 mg. acetone per l. blood after correction for lactic acid, the av. being 15.8 mg. In normal pregnant women

corrected acetone bodies varied between 11 and 24 mg., with an av. of 16 6 mg. Corrected values in pregnancy with nephritis were 8 0 to 48 8 mg., and in eclampsia they averaged 50 2 mg R. C. WILLSON

Alkalinity of the blood in eczema. B S. DIKKENIN AND N N. YASNITSKY. *Kasansky Meditsinsky Jurnal* 26, 703-8(1930); *J Am Med Assoc* 95, 1546.—Urine *p*H was normal but that of the blood was found to be from 0 1 to 0 5 above the av. R C WILLSON

Acid-base equilibrium in diseases of the heart and kidneys. I M LIPETS AND M. M. PISMAREV. *Kazansky Meditsinsky Jurnal* 26, 778-86(1930), *J Am. Med Assoc* 95, 1629.—A decrease in the alkali reserve and a parallel decrease in the alveolar $CO_2$ were observed during the decompensation period in both heart and kidney diseases, usually more pronounced in the latter and in proportion to the severity of the condition The Cl content of the urine remained unchanged The blood urea was increased in almost all patients with kidney diseases, but in only a few patients with cardiac complaints R C WILLSON

Peculiarities of glucemic reaction in early infancy. V L STYRIKOVICH *Okhrany Materinstva i Detstva* 1, 28-42(1929), *J Am Med Assoc* 95, 1789(1930).—S studied the various phases of the glucemic reaction and recognized the following main types and subtypes, according to the curves they give (1) with a single rise, encountered in only 37% of cases, (*a*) to a considerable height with a more or less rapid descent to normal, (*b*) to a moderate height, remaining there for a time (1 hr or longer), with sometimes a wave-like fluctuation, and thereupon dropping—in some cases with a tardy hypoglucemia, (*c*) to a modest height with subsequent drop to a lower level on an empty stomach; (2) with 2 rises (*a*) with the second rise lower than the first, and the second wave of smaller vol than the first, (*b*) with the second rise attaining or surpassing the level of the first, and the second wave equal to or exceeding the first, (*c*) with the second rise rapid, returning to normal after a short time; (3) with 3 rises—a rare form R C. WILLSON

Absorption of calcium and phosphorus in experimental rickets. F PEOLA AND G GUASSARDO *Riv. clin pediatrica* 28, 583(1930), *J. Am Med Assoc.* 95, 1541.—Normally the absorption of Ca is from 50 to 60% of the amt. taken in and that of P from 70 to 80% In exptl. rickets that of Ca remains normal while that of P falls to 60% This decrease appears later in the disease, however. R. C. WILLSON

Benzene derivatives of intestinal putrefaction in the etiology of cancer. E. GRANDJEAN. *Schweiz med Wochschr* 60, 823-8(1930), *J. Am Med Assoc.* 95, 1540.—Benzene derivs of intestinal putrefaction resulting from diets rich in animal proteins exert a continuous growth stimulation on the healthy cells, and gradually the constantly irritated tissues develop into malignant tumors. Benzene derivs are also formed wherever in suppurative processes disintegration of protein by anaerobic bacteria takes place, as in the lungs, female genitalia, abscesses of the teeth and ulcers The theory that benzene derivs are significant in the etiology of cancer is supported by the fact that occupational cancers are most frequent in workers who come into contact with benzene and coal-tar products R. C. WILLSON

Cardiac insufficiency; chemical changes in the blood. E BECHER *Z Kreislaufforsch* 22, 638-40(1930); *J. Am Med. Assoc.* 96, 80.—The amino-N content of the blood in cardiac insufficiency is almost constant and varies only slightly from the normal Occasionally the creatinine content is increased. The blood serum does not contain an increased amt. of urochrome or urochromogen. The uric acid, urea and residual N are frequently increased but not so much as in renal insufficiency There is no increase in the aromatic substances Phenol, cresol and its derivs. and indican are not increased R. C. WILLSON

## H—PHARMACOLOGY

A. N. RICHARDS

Effect of some imidazoles on gastric secretion. J. P. BURGERS AND A. C. IVY. *Proc Soc. Exptl Biol. Med.* 28, 115-6(1930).—Imidazole, imidazolepropionic acid, imidazolealdehyde, 1-imidazolelactic acid and imidazoleacrylic acid in doses of 1 mg to 5 mg have no effect on gastric secretion or on blood pressure in the dog. C. V. BAILEY

Effect of calcium chloride injections on blood sugar of normal and jaundiced dogs. ALLAN G REWBRIDGE AND EDMUND ANDREWS. *Proc. Soc. Exptl. Biol. Med.* 28, 126-7(1930).—The intravenous injection of a 10% soln of $CaCl_2$ caused a rise in blood sugar nearly as marked as that following the injection of sugar itself and tended to last

longer Sugar and Ca seem to have a reciprocal influence on each other and one cannot say which is of greater importance in the control of blood coagulability. C. V B

Rate of urinary arsenic excretion after giving acetarsone ("stovarsol") and "carbarsone" by mouth. MEI-YU CHEN, H H ANDERSON AND C. D LEAKE *Proc Soc Expll Biol Med* 28, 145-8(1930).—Acetarsone (3 acetylamino-4 hydroxyphenylarsonic acid) and carbarsone (4-carbaminophenylarsonic acid) are slowly excreted in the urine after oral administration. A normal man give 0.5 g. of acetarsone excreted 20% of the ingested As in 72 hrs., given a similar dose of carbarsone he excreted 8% in 52 hrs. Another subject excreted 7% of the As in 24 hrs. following 0.5 g. of acetarsone and 13% in 42 hrs. following the ingestion of 0.5 g. of carbarsone. C. V B

The pharmacology of inflammation. I. Technic. LOUIS HIRSCHHORN AND M. G. MULINOS. *Proc Soc Expll Biol Med* 28, 168-70(1930).—One drop of a 15% soln. of essential oil of mustard in mineral oil, instilled into the conjunctival sac of the rabbit, induces blepharospasm for 1 hr., lacrimation for 0.25 hr., immediate injection of the conjunctival blood vessels lasting for 48 hrs., pin point miosis which passes off in 1 hr. and edema which is max. in 0.5 hr. Complete recovery usually occurs in 7-14 days. The method lends itself to studies of the inhibitory and curative effects of drugs on inflammatory processes. C. V. BAILEY

Further investigations concerning the stimulating effect of anterior pituitary gland preparations on the thyroid gland. LEO LOEB, R. B. BASSETT AND HILDA FRIEDMAN *Proc Soc Expll Biol Med* 28, 209-13(1930).—Guinea pigs were injected daily with 1 cc. of an acid ext. of anterior pituitary gland for 5 consecutive days. On the 6th day the thyroid gland was markedly hypertrophied, the cells were mitotic and the colloid had largely disappeared. Retrogression progressed regularly and the gland had a normal appearance at the end of 31 days. The administration of thyroid substance diminished but did not prevent this hypertrophy. The injection of anterior pituitary ext. is more potent in producing hypertrophy of the thyroid gland than is the removal of a great part of the gland or the administration of stimulating doses of KI. C. V BAILEY

Comparison of physiological action of aspidospermine and quebrachine. RAYMOND-HAMET *Compt rend* 191, 157-9(1930).—The hydrochlorides of these alkaloids isolated from the bark of *Aspidosperma quebracho blanco*, contrary to reported expts. act differently on the sympathetic or vagus nervous systems. B. C. A.

Secretion of dextrose under the influence of phosphates and sulfates. J. VAN DE VELDE *Compt rend soc biol* 102, 596-9(1929).—Injection of a soln. of $NaH_2PO_4$ into a dog after injection of dextrose accelerates the secretion of sugar in the urine, the blood corpuscles giving up more sugar than the plasma. $Na_2HPO_4$ has practically no effect on the *p*H of the blood, but, as in the former case, the sugar is quickly secreted. $Na_3PO_4$ produces such rapid secretion that the sugar content of the corpuscles falls temporarily below the normal. $Na_2SO_4$ causes marked alky. but leaves the secretion of sugar practically unchanged. B. C. A.

Sugar metabolism and water regulation. II. Treatment of cardiac diabetes with insulin and dextrose. H TATERKA *Klin Wochschr.* 8, 1763-4(1929), cf. *C. A.* 24, 4808.—The action of injected insulin is retarded but more marked; dextrose causes a less rapid and less marked rise in blood sugar. Non-cardiac diabetics with insulin edema behave similarly. B. C. A.

Action of substances of the pilocarpine group (pilocarpine, arecoline, physostigmine) on the gas content of the blood. A. M. PREOBRAZHENSKII *Russian J. Physiol* 13, 19-32(1930).—Expts. on dogs show that all substances of the pilocarpine group diminish greatly the O content of venous blood and leave unchanged or increase slightly that of arterial blood; decrease of the latter is, however, caused by large doses of physostigmine. If the decrease of the amt. of O in venous, with normal content in arterial blood is the result of increased O absorption by the tissues, and diminution of the O content of arterial blood the result of insufficient arterialization of the blood in the lungs, the increased consumption of O must be a characteristic common to all substances of the group. The arterialization of the blood in the lungs thus compensates for the O consumed, except that, in most of the cases in which physostigmine and all in which toxic doses of the other substances were administered, the O content of the arterial blood falls. B. C. A.

The comparative changes in gastric acidity and urinary reaction after the injection of histamine. MILTON J. MATZNER AND IRVING GRAY. *Arch. Internal Med* 47, 202-5(1931).—In tests combining gastric analysis with histamine as a stimulant and estn. of urinary acidity, not over 50% of the cases showing gastric free HCl gave a definite alk. tide. The use of histamine is discouraged. J. B. BROWN

**Liver extract, liver ash and iron in the treatment of anemia.** CHESTER S KEEFER, K. K. HUANG AND C S YANG. *J. Clin Investigation* 9, 533–54(1930), cf *C A.* 24, 3038.—With liver ext increased hemoglobin regeneration was shown in the nutritional anemia of childhood and in the anemias of dysentery, hookworm and pregnancy In some cases the effect of the ext. was increased by Fe Liver ash, equiv to 300 g of liver per day, was of little effect Fe in the form of $FeCO_3$ was quite effective, usually in proportion to the size of the dose. Often the effect of Fe was greater than that of liver ext or ash J B BROWN

**Cardiac antagonism of pilocarpine and tropine.** RAYMOND-HAMET *Compt. rend* 192, 111–3(1931).—Ordinarily the injection of tropine in a dog subjected to the action of a large dose of pilocarpine suppresses the cardiac inhibition Since the same phenomenon is observed if sparteine replaces the tropine, it is not due to the atropine action of tropine. RACHEL BROWN

**Influence of hydrogen-ion concentration on the fixation, by adsorption, of cocaine hydrochloride on the nerve fibers.** JEAN RÉGNIER AND GUILLAUME VALETTE. *Compt rend* 192, 114–6(1931), cf *C A* 25, 143.—The adsorption of cocaine-HCl on animal charcoal increases from $p_H$ 3 to $p_H$ 7 5 by 1 5 times, the increase being very marked above $p_H$ 6 With nerve fibers the increase from $p_H$ 3 to $p_H$ 7 6 is 5 times Therefore an alk. medium favors the fixation of the anesthetic on the nerve itself R B

**Regulation of respiration.** NATHAN B EDDY *Quart J Expil Physiol.* 20, 313–31(1930), cf. *C A* 23, 4251.—*The effect upon salivary secretion of the intravenous administration of $NaHCO_3$, NaOH, NaCl and $Na_2SO_4$.* In the dog, salivary secretion elicited by continuous administration of pilocarpine is decreased by intravenous injection of $NaHCO_3$, $Na_2CO_3$ or NaOH The effect produced by $NaHCO_3$ is proportional to the size of the dose, whether in isotonic or hypertonic soln NaOH has a greater action than $Na_2CO_3$ $NaHCO_3$ prevents almost completely the augmenting effect upon salivary secretion of a 10 min. period of rebreathing These alk agents also increase submaxillary blood vol. flow Their effect may be due to changes in acid-base equil in which the H-ion concn of the interior of the cell may be a major factor In isotonic soln NaCl or $Na_2SO_4$ increases submaxillary secretion and blood-vol flow In hypertonic soln they decrease the former but increase more markedly the latter The effect of these salts seems to be due to the increase in blood-vol flow and to the withdrawal of water from the tissues. *The effect upon salivary secretion of the intravenous administration of lactic acid, sodium lactate and HCl.* The secretion of the submaxillary gland is increased by the intravenous administration of lactic acid and HCl The increase due to HCl is frequently followed by a decrease below normal The effect of HCl is the same whether the sympathetic supply to the gland is intact or not Lactic acid and HCl increase the submaxillary blood-vol. flow. The increase in secretion produced by lactic acid is greater if the vago-sympathetic has been cut. Na lactate decreases salivary secretion if the vago-sympathetic is intact, but increases it if the nerve is cut. It increases submaxillary blood vol flow The lactate ion appears to be inhibitory to the central and augmentory to the peripheral mechanism of secretion Changes in the acid-base equil of the tissues and blood are an important factor in the effect of lactic acid, HCl and Na lactate upon secretion Coincident changes in blood-vol flow probably affect the results, and some additional effect of the lactate ions, such as their use as food material supplying energy for secretion, may be involved *Effect upon salivary secretion of the intravenous administration of $NH_4Cl$ and $(NH_4)_2CO_3$.* The administration of $NH_4Cl$ and $(NH_4)_2CO_3$ produces an initial increase and subsequent decrease in the rate of salivary secretion and in the submaxillary blood vol. flow One cc. per kg of *M*/6 $NH_4Cl$ or $(NH_4)_2CO_3$ produces transient fall in blood pressure and brief increase in pulmonary ventilation Five cc. per kg of $(NH_4)_2CO_3$ lowers the blood pressure and depresses pulmonary ventilation. The effects of $NH_4Cl$ and $(NH_4)_2CO_3$ on the salivary secretion are probably due to changes in the acid-base equil. and to changes in blood-vol flow. RACHEL BROWN

**The therapy and the prevention of carbon disulfide poisoning.** G B AUDO-GIANOTTI *Industria chimica* 5, 1375–80(1930).—A summary of the symptoms, therapy and prevention of industrial poisoning by $CS_2$ A W. CONTIERI

**Experimental studies in the neutralizing action of sodium thiosulfate in atoxyl intoxication.** N. KURODA. *Acta dermat* 13, 289–99 See *C. A.* 24, 1431. E. J. C.

**Sensitization of the skin of guinea pigs to phenylhydrazine.** W. JADASSOHN. *Klin. Wochschr.* 9, 551(1930). E. J. C.

**The effect of insulin upon the rate of dialysis of diabetic blood sugar.** ISREAL S KLEINER, HAROLD BIRNKRANT AND THEODORE ROTHMAN. *Endocrinology* 14, 226–8 (1930).—The addn of dry potent insulin to hirudinized blood of a diabetic dog did not

alter the rate of dialysis of sugar from it. This indicates that the pancreatic hormone does not exert its effect by producing a more readily diffusible form of glucose.
H J Deuel, Jr.

Antagonism between sulfur and adrenaline. Domenico Campanacci *Wiener klin. Wochschr.* 44, 79–81(1931).—The antagonistic effect on blood pressure is produced when 30 mg. of colloidal S and 1 mg. of adrenaline are injected. D B. Dill

Assimilation of intravenously injected heroses; phosphorus and water metabolism. E. Owsiany and M Wierzuchowski *Compt. rend. soc. biol.* 103, 415–8(1930), *Physiol Abstracts* 15, 240–1.—The sugar assimilated is estd. as the difference between the amt. injected and the amt. eliminated by the kidney Of 4 dogs, 2 assimilated glucose best and 2 fructose, 90% of the total in each case. Insulin causes an insignificant increase in glucose assimilation and has no effect on that of fructose. The amt. of inorg. P in blood and urine is lowered during the active assimilation period. The curve of P reduction is not affected by the rate of assimilation. The P curve is raised again after cessation of injection, and the rise is not prevented by insulin. G G

Liver and muscle glycogen and blood sugar in starved and phlorhizinized dogs. F. Rathery, R Kourilsky and Mlle. Y. Laurent *Compt rend soc biol.* 103, 472–4(1930), *Physiol. Abstracts* 15, 240.—Starvation alone, even when prolonged, causes only a slight diminution of hepatic and muscular glycogen. Injection of phlorhizin after a period of starvation causes a diminution of hepatic and muscular glycogen. In spite of the almost complete absence of hepatic and muscular glycogen the glucemic level may remain normal, although accompanied by a marked glucosuria. The glycogen of the liver or muscles does not seem to be essential for the maintenance of this normal level. G G

Influence of insulin on early variations of hepatic and muscular glycogen in the normal and phlorhizinized dog. F Rathery, R. Kourilsky and Mlle. S. Gibert *Compt. rend soc. biol* 103, 474–5(1930), *Physiol. Abstracts* 15, 240.—Phlorhizin in the fasting dog causes marked diminution of hepatic and muscular glycogen. Injection of insulin now causes rapid restoration of the glycogen of the liver, while that of muscle is still further diminished. The loss of hepatic glycogen is great, and not proportional to the muscular loss. G G

Chemical modifications of blood after injection of ionium nitrate. Y Pourbaix. *Compt. rend soc. biol* 103, 536–8(1930), *Physiol Abstracts* 15, 257.—Ionium injected in small doses, which are well tolerated over long periods, causes a disturbance of glucose and cholesterol metabolism manifested by instability of these substances in the blood. Later anemia sets in and is accompanied by a considerable diminution of plasma globulin and an increase of the albumin/globulin quotient. G G.

Action of choline and its derivatives on respiration. M Villaret *Compt. rend. soc. biol* 103, 675–7(1930), *Physiol. Abstracts* 15, 226.—Choline, acetylcholine and formylcholine, which have similar cardiovascular actions, also produce the same effect on the respiratory rhythm. Bromocholine causes more sustained apnea than the others, because it persists longer in the circulation. The effect is due to the choline group. G G.

Choline apnea and artificial respiration. M Villaret *Compt rend. soc. biol.* 103, 677–9(1930), *Physiol Abstracts* 15, 226.—Choline and its derivs. cause apnea in large doses, polypnea in small doses. The effect is independent of vagus influence. The duration of the apnea is proportional to the dose. Artificial respiration saves the lives of animals treated by otherwise fatal doses. It must be continued much longer with bromocholine than with other derivs. The fatal action of the poisons is effected, not directly on the heart, but on the respiratory center. G G

Adrenaline, atropine and lobeline in choline apnea. M Villaret. *Compt. rend. soc. biol.* 103, 771–2(1930), *Physiol. Abstracts* 15, 226–7.—When apnea is set up by the action of choline, it is not modified by doses of adrenaline, atropine or lobeline, which are capable of counteracting the cardiac influence of choline and its derivs. G G.

Derivatives of choline mechanism of polypnea caused by intravenous injection of choline and its derivatives. M Villaret *Compt rend. soc. biol* 103, 772–3 (1930), *Physiol Abstracts* 15, 227.—The polypnea elicited by the injection of choline and its derivs. into the circulation is enhanced by a discharge of adrenaline. The results correspond with the observation that in reflux or central polypnea injection of adrenaline causes, not apnea, but hyperpolypnea. G G

Fatty bodies in cells of the liver, lung, kidney, suprarenal and testicle in the normal dog and in the dog poisoned by tolylenediamine. J Slotwinski *Compt rend soc. biol.* 103, 811–5(1930), *Physiol. Abstracts* 15, 244.—In the normal dog there is a

subpleural chain of cellular elements contg large amts. of cholesterol esters This reserve seems to be of great importance in defence against intoxication Intoxication with tolylenediamine leads to infiltration of the liver cells with fat. After poisoning, the *disappearance of the subpleural cells and the diminution of fatty bodies in the* suprarenal cortex and in the interstitial cells of the testis indicate a defensive process and a neutralization of the toxic substances G G.

Histochemical and biological studies of electric ionotherapy. F Raszeja. *Compt rend soc biol* 103, 799–803(1930), *Physiol Abstracts* 15, 213–4 —Normally in the skin of the rabbit Ca is distributed in the subcutaneous tissue and K in the epidermis. When $CaCl_2$ is ionized on a pad with the passage of an elec current through it to the skin, the K is pushed into the deeper regions and the Ca ions occupy the surface Rabbits treated in this way are much less susceptible than controls to the decalcifying effects of Ca free diet The cond of the serum is markedly increased after introduction of Li in the above manner, and this when the urine becomes free from Li. The elimination of this element lasts longer than is revealed by the urine G G

The role of the reticulo-endothelial system in the metabolism of fat in the normal dog and in the dog poisoned by tolylenediamine. J. Slotwinski *Compt rend soc biol* 103, 816–8(1930), *Physiol Abstracts* 15, 244 —The reticulo-endothelial system in the tonsils, liver and bone marrow plays a most important part in the metabolism of fat. It is still more important in pathol conditions like tolylenediamine intoxication. The fatty inclusions in the cells of the system are formed of lipoids and cholesterol esters The elements contg these particles in the tonsil are situated deeply in the lymphatic nodules. They are rare under the epithelium G G

Pathology of aniline poisoning. G Aiello. *Med. Travail* 1, 294–6(1930) — *Bull Hyg* 5, 929 —A describes the symptoms of acute and chronic poisoning by aniline dyes Venesection and inhalation of ammonia relieved these symptoms. In most cases of dye poisoning the dye can be detected in the urine, particularly if aniline blue or black is the cause. George R. Greenbank

Injury to the digestive tract by copying pencils. I. Ilkoff. *Deut. med. Wochschr* 56, 1132–3(1930), *Bull. Hyg* 5, 929 —The injury is due to tissue necrosis by gradual soln. of the aniline violet. In a test case a man ate meat contg a 3-cm piece of the pencil, ulcers formed in the pylorus. Food contg. crushed pieces of the pencil was given to dogs All the dogs showed gastric or duodenal inflammation and ulcers formed in a few days. This is due to the fact that the aniline deriv. has an alk. reaction which dissolves the albumin and thus causes destructive penetration whereas acid dyes cause coagulation and hinder penetration. George R. Greenbank

Insulin and glycogen. I. Study in the normal dog. F. Rathery and R. Kourilsky. *Ann physiol. physiochim. biol* 6, 32–72(1930).—In the dog the hepatic vein contains the most glucose, the portal vein least and peripheral vessels have intermediate quantities Following the administration of insulin, the relative order does not change, but the difference between the hepatic and peripheral veins increases. The liver therefore continues to discharge glucose into the circulation; nor can one postulate an increased avidity of the tissues for glucose, as the difference between the arterial and venous blood sugar does not increase. Immediately following the injection of insulin, the blood sugar shows a transitory increase, particularly in the hepatic vein, the liver glycogen decreases, while the muscle glycogen is not appreciably changed Conclusions are given in the following paper II. Study in the dog following pancreatectomy, starvation or phlorhizin. General conclusions concerning the role of glycogen. *Ibid* 73–128 —Following pancreatectomy, all the sugar values rise, but their order changes The sugar of the hepatic vein falls below that of the peripheral veins, however, it remains higher than the portal blood sugar. Liver glycogen falls precipitously, while the muscle glycogen is only slightly affected Qualitatively, the effects of insulin are exactly the same as in the normal animal, except for the fact that it induces an increase in liver glycogen. Moreover, insulin has the same effect upon starved dogs as upon normal dogs Phlorhizin administered to fasting dogs causes an almost complete disappearance of liver glycogen, but the blood sugar remains normal Conclusion Liver glycogen plays no role in the maintenance of blood sugar; there is some intermediate product of metabolism in the liver Insulin does not mobilize glycogen or activate the muscle metabolism of sugar. The effect of insulin upon glycogen, whether hepatic or muscular, is of only secondary importance in insulin hypoglucemia Glycogen is not indispensable either for the proper functioning of the liver and muscles or for sugar metabolism. H. Eagle

Behavior of soaps in the animal organism. Irvine H. Page and E. V. Allen *Arch Exptl Path Pharmakol* 152, 1–27(1930).—Most soaps, particularly those of

hydroxy and unsatd acids, are highly toxic. Injected intraperitoneally into rats and mice, they cause marked histological changes, chiefly perivascular infiltration and focal degeneration in the liver and proliferative changes and adhesions in the peritoneal cavity The total fat content of the liver decreases, but the I no increases. On intra venous injection of soap, the blood pressure falls and respiration increases Diethanol amine ricinoleate increases the permeability of the blood spinal fluid barrier for circulating dyes H EAGLE

The action of a sympathomimetic alkaloid in Sida cordifolia (Brela). R. N CHOPRA AND PREMANKUR DE *Indian J. Med. Research* 18, 467-75(1930).—The active principle of *Sida cordifolia* (Brela) is a sympathomimetic alkaloid resembling ephedrine in its pharmacol properties. H EAGLE

The conditions of "basic narcosis" in combined narcosis experiments. L. LENDLE *Klin. Wochschr* 9, 1609–15(1930) H EAGLE

Secondary ultra-violet radiation and its biological effect. MONA SPIEGEL-ADOLF *Klin. Wochschr* 9, 1615–8(1930).—Only a small portion of the radiation-energy emitted by Ra or x rays is absorbed by proteins in soln., while ultra-violet light is comparatively much better utilized The fluorescent light emitted by salt crystals following exposure to radium or x rays is much more effective in causing the coagulation of protein, the hemolysis of red cells and the death of paramecia than the original radiation energy used to induce this fluorescence. H EAGLE

The effect of thyroxine. O EICHLER AND R. SANDERS. *Klin. Wochschr.* 9, 1618(1930).—The intravenous injection of thyroxine (1.8 mg per kg.) into rabbits causes a signif cant increase of the blood lactic acid and $O_2$ consumption. H E

The antagonism between adrenaline and insulin. Experiments in adrenalectomized dogs. R. CARIO *Klin. Wochschr* 9, 1623-4(1930).—The injection of coned. glucose solns into the pancreatico-duodenal artery of dogs does not cause an elevation of blood sugar even after the adrenals have been removed Injected into any other artery, it causes a transient hyperglucemia. This is further evidence that the blood sugar as such is an adequate hormone for the regulation of insulin secretion Adrenaline and insulin may be antagonists in the regulation of blood sugar H EAGLE

Animal and clinical studies on the question of synthalin-B HERBERT HIRSCH KAUFMANN *Klin. Wochschr* 9, 1631–2(1930) H. EAGLE

Oral desensitization of dermatoses due to alimentary idiosyncrasies by the use of species-specific peptones. ERICH URBACH. *Klin. Wochschr* 9, 2046–9(1930) H. EAGLE

The opposing effects of liver and spleen. A contribution to the spleen treatment of erythremia. F. HÖGLER. *Klin. Wochschr.* 9, 2052–8(1930).—Ra irradiation of the long bones has a beneficial effect in erythremia, in which it is often followed by an excretion of aldehyde in the urine, but no beneficial effect could be discerned upon pernicious anemia In 2 cases of erythremia a striking improvement in the blood picture was effected by the daily ingestion of large quantities of spleen over a period of months. In one case of pernicious anemia, splenectomy followed by liver therapy caused a typical erythremia, which was controlled by the subsequent administration of spleen. The liver and spleen therefore have antagonistic effects upon the erythrocytes H EAGLE

The separation of mixtures of dyes by normal and poisoned kidneys. RUDOLF HÖBER. *Klin. Wochschr* 9, 2065(1930), cf. *C. A.* 24, 4543.—Most dyes are excreted slowly through the glomeruli (*e. g.*, cyanol) but some, like phenol red, are rapidly excreted by the tubules in a coned. form. If a mixt. is injected into frogs or rabbits, the tubular dye predominates at first, after it has been almost completely excreted, the urine contains only the glomerular dye. If the tubules are injured, as by uranium nitrate, the quick tubular excretion of a coned. dye is not observed, and one obtains only the glomerular excretion of the two in approx. the same concn This fact suggests a method for testing tubular function in man. H EAGLE

A highly active liver extract which can be injected. M. GANSSLEN. *Klin. Wochschr* 9 2099–103(1930).—Excellent results were obtained in the treatment of pernicious anemia by the intragluteal injection of protein free liver ext. Improvement is usually obtained in 6–8 weeks H. EAGLE

Clinical observations on the treatment of anemias with stomach preparations. FERDINAND BERTRAM *Klin. Wochschr* 9, 2103–6(1930).—Using the proprietary prepn. Stomopson, B found improvement in 10 of 11 cases of Biermer's (pernicious) anemia. In the unsuccessful case liver therapy was effective H. EAGLE

Experimental studies on the effect of the inspiration of small quantities of benzine and benzene upon the respiratory organs and the entire body. M. SCHMIDTMANN.

*Klin Wochschr* 9, 2106–8(1930).—The inhalation by rabbits, guinea pigs, mice a rats, of small quantities of benzine or benzene-gasoline vapor over long periods of ti eventually causes emphysema, chronic bronchitis, and atalectatic pneumonia . initial leucocytosis is followed in the later stages by a marked leucopenia, and a in both the red cell count and hemoglobin In the spleen, an initial myeloid infiltrat of the pulp is followed by a gradual decrease in cells, pronounced phagocytosis of cells, and, in some cases, hyalinization These results are exactly the same as the ac changes induced by the subcutaneous injection of benzine, differing only in the lo time required for their evolution (months) Heart and liver both show focal necr in the center of small areas of infiltration The cumulative toxic effect of these repea small inhalations are highly significant in the light of the continuous exposure of urban population to the exhaust of automobile engines H Eagle

The effect of beef adrenal extract upon the uterus. Erich Engelhart. *Kl Wochschr* 9, 2114–5(1930).—The subcutaneous injection of beef adrenal ext. i virginal female rabbits causes proliferative changes in both the mucosa and musculatu H Eagle

The decrease of oxidation processes during ether anesthesia. H Fuss and Derra. *Klin Wochschr.* 9, 2115–6(1930).—In dogs ether drop anesthesia cause definite arterial $O_2$-unsatn., which is less pronounced with ether air anesthesia, and observed if an ether-$O_2$ mixt is used The increase in blood lactic acid during anesthe bears some relation to the degree of arterial $O_2$-unsatn and is possibly due to an hibition of resynthesis H Eagle

Copper treatment of anemia in nurslings. E Schiff, H Eliasberg and Joffe *Klin Wochschr* 9, 2144–5(1930).—The authors believe that the daily ministration of 20 drops of 1% $CuSO_4$ $5H_2O$ is of benefit in anemia H. Eagle

The treatment of pernicious anemia with preparations of gastric mucosa. Henning and G Stieger *Klin Wochschr* 9, 2145–7(1930).—A dried prepn of mucosa was found to be highly effective Acid alc exts were not effective Both antrum and fundus contain the active principle, which is not pepsin. H Eagle

A case of hydrazoic acid poisoning. Zd Köcher *Klin Wochschr* 9, 216( (1930). H Eagle

The effect of intracutaneous injection upon the basal metabolism. Wilfri Lowenstein *Klin Wochschr* 9, 2255–6(1930).—The intracutaneous injection solns. of protein, or even $H_2O$, causes a marked fall in the basal metabolic rate, amount to as much as 50%, and beginning within 10–15 min L suggests that it is due eit to a reflex in the vegetative nervous system, or to the release of histamine from c at the site of injection H Eagle

The significance of ammonium chloride medication in the treatment of diure Paul Saxl and Otto Erlsbacher. *Klin Wochschr* 9, 2302–3(1930).—NH causes a lowered alkali reserve and decreased circulatory blood vol., while Salyr causes an increased blood vol. Despite their antagonistic action upon the vol of cir lating blood, a combination therapy with these 2 drugs causes a much more rapid moval of transudates due to cardiac failure, hepatic cirrhosis, nephritis, etc., and e of exudates, as in articular arthritis. H. Eagle

The dependence of gas exchange and the action of iodine upon the hydrogen-concentration. L Wislicki *Klin Wochschr* 9, 2354–5(1930).—Increased [$NaHC$ or decreased $CO_2$ tension causes an increased $O_2$ consumption by rat muscle *in vi* and an increased respiratory quotient An acid reaction has the opposite effect. N in small concn., neutralizes either change, in higher concn., it causes an increa formation of lactic acid without any further effect upon $O_2$ consumption. It is int esting to note that it has no constant effect at serum reaction ($p_H$ 7.46). Thyrox has no effect, probably due to its insolubility at this H-ion concn H Eagle

Excretion and storage of neodorm. Anneliese Rothman *Klin. Wochs* 9, 2398–9(1930).—Weeks after the ingestion of neodorm (bromoisopropylbutyram $Br_2$ can be demonstrated in the tissues, the brain in particular, in a water sol. fo The $Br_2$ is gradually excreted, chiefly in the urine and bile. H. Eagle

Pharmacological study of the effect of caffeine-adenine mixtures. David Macht and Hermann Schroeder *Klin Wochschr* 9, 2429–30(1930) H Eagle

Treatment of insulin lipodystrophy. Reinhold Boller. *Klin Wochschr* 2433–5(1930).—The addn. of cocaine or novocaine in insulin has a preventive therapeutic effect in diabetics who tend to develop lipodystrophy as a complicat of the insulin treatment. H. Eagle

The effect of digitalis upon the final wave of the electrocardiogram. Er Blumenfeldt and Spencer G. Strauss. *Klin. Wochschr.* 9, 2439(1930).—

reversal of the T-wave in the electrocardiogram is only an exceptional occurrence in patients receiving digitalis and cannot be taken as a criterion of digitalis effect. H Eagle

The effect of vasopressin and oxytocin upon the blood sugar in human beings. A. Wl. Elmer and M. Schiffa. *Klin. Wochschr.* 9, 2439–40(1930).—Vasopressin, injected subcutaneously, usually causes an elevation in blood sugar. The effect of pituitrin is much less frequent and less marked. Oxytocin is ineffective. H Eagle

Local anesthetics. Derivatives of amino alcohols having the function of primary alcohols. E. Fourneau, G Benoit and Roger Fiemenich. *Bull. soc. chim.* 47, 838–85(1930).—The prepn. and properties of a series of di primary glycols are described, also the aldehydes from which they are derived, several of which are new. Similar tables are given of a series of acetobromohydrins, and a series of amino alcs. with their benzoyl derivs. Some of these derivs. which formed colorless crystals of definite m. p. were tested as local anesthetics. They are very sol. in $H_2O$ and alc., sol. in acetone, insol. in $Et_2O$ and taste bitter. They have a strong anesthetic reaction which takes effect slowly. Ann Nicholson Hird

Carbon monoxide poisoning and a new treatment by irradiation. F. Koca. *Farmaceutisk Tidskr. Lekirske Lasty* 9, 16–33(1929).—Ultra-violet light causes dissocn. of CO hemoglobin *in vitro* and *in vivo*. Animals and humans poisoned with CO showed marked improvement when irradiated with ultra-violet light at a distance of 60 cm. for 40 min. William J Hess

Influence of arsenicals and crystalline glutathione on the oxygen consumption of tissues. Carl Voegtlin, Sanford M. Rosenthal and J. M. Johnson. *U. S. Pub. Health Repts.* 46, 339–54(1931).—The addn. of cryst. SH-glutathione to kidney, liver, testis, the Jensen rat sarcoma, and baker's yeast does not increase the rate of $O_2$ consumption beyond the extra amt. of $O_2$ required to oxidize the S of the added glutathione. Oxidized glutathione has no accelerating influence on the $O_2$ consumption of kidney and testis. Arsenious oxides ($R.AsO$) in relatively low concn. cause a pronounced reduction in the rate of $O_2$ consumption. The pentavalent arsenicals ($R.AsO_3H_2$), including tryparsamide, in the same concn. are devoid of any influence on the $O_2$ consumption. Of the arsenobenzene derivs. ($R.As=As.R$) salfarsphenamine is ineffective, whereas neoarsphenamine due to its rapid oxidation reduces the $O_2$ consumption, but less markedly than arsenoxide. These results are in harmony with observations concerning the pharmacol. and chemotherapeutic properties of these compds. which distinguish the 3 groups, $R.AsO$, $R.AsO_3H_2$ and $R.As=As.R$. SH-glutathione when added to tissues in the ratio of 10 moles to 1 mole of arsenoxide prevents the reduction in $O_2$ consumption caused by arsenoxide alone. S-S-glutathione is ineffective, showing that the action of SH glutathione is due to its SH group. $FeSO_4(NH_4)_2SO_4.6H_2O$ is ineffective in overcoming the reduction in $O_2$ consumption produced by arsenoxide. These observations add further evidence in favor of the theory that the pharmacol. action of these arsenicals is essentially due to a chem. reaction with SH glutathione and possibly other SH compds. of protoplasm. From the physiol. viewpoint the results appear to indicate that glutathione in some as yet unexplained manner is concerned in the $O_2$ consumption of tissues *in vitro*. J. A. Kennedy

Observations on the venom of a large Australian snake, Pseudechis australis. C. H. Kellaway and Donald F. Thomson. *Australian J. Expl. Biol. Med. Sci.* 7, 134–50(1930); cf. *C. A.* 24, 650.—Weekly "milkings" through rubber yielded 0.1 to 0.31 g. dry venom. It exerted a marked effect upon heart muscle, blood pressure and respiration, and is strongly hemolytic and anticoagulant. The lethal dose for lab. animals varied from 0.6 to 5 mg. per kg. C. G. King

The action on mammalian circulation of the skin secretion of Hyla aurea. Wm. A. Osborne. *Australian J. Expl. Biol. Med. Sci.* 7, 226–8(1930).—The secretion exerts an effect like that of digitalis on the heart and like that of ephedrine on the arterioles. C. G. King

Standardization of the trypanocidal activity of some aryl derivatives of arsenic acid. L. Launoy and (Miss) Engler. *Bull. soc. chim. biol.* 12, 886–93(1930).—A new standard index is proposed, based upon "trivalent curative dose" (I) and "tolerance dose" (II), in which I is the av. quantity required to destroy a virulent blood stream infection of *Tr. brucei*, *Tr. evansi* and *Tr. equiperdum* in mice (held 30 days) and II is the intravenous dose tolerated by 50 to 60% of the animals. Rabbits may also be used. The index so obtained for atoxyl is taken as one and other compds. are given proportionate values, tryparsamide = 2.03 and Fourneau 270 = 5.95. C. G. King

Iodine reaction in exophthalmic goiter. Willard O. Thompson and Phebe K. Thompson. *Endocrinology* 14, 393–9(1930); cf. *C. A.* 24, 3559.—In Boston the small-

est quantity of I that produces any reduction in basal metabolism in exophthalmic goiter is greater than 0.75 mg in 1/3 of the cases. The min. amt. to produce max. reduction is 6 mg. Between these limits, the relation between the percentage approach of the basal metabolism toward the normal level and the size of the dose is roughly linear. The effective dose has not been detd. in Chicago but 6 mg. causes a marked reduction in basal metabolism. MARY E. LEAR

The role of iodine in the treatment of exophthalmic goiter. M. L. GREENSTEIN. *U. S. Vet. Bur. Med. Bull.* 7, 167–9(1931).—G. describes the beneficial effects of Lugol's soln. in a specific case. B. S. LEVINE

Experimental rabies in white mice and attempted chemotherapy. A. HOYT AND C. W. JUNGEBLUT. *J. Infectious Diseases* 47, 418–24(1930).—Prophylactic administration of various drugs (particularly arsenicals and quinine derivs.) failed to protect white mice infected intracerebrally by single or multiple minimal lethal doses. The period of incubation of the disease consistently showed a very slight prolongation following injection of Ag arsphenamine. JULIAN H. LEWIS

The effect of barium sulfate upon the incidence of human intestinal protozoa. JUSTIN ANDREWS AND MOSES PAULSON. *J. Lab. Clin. Med.* 16, 39–42(1930).—The no. of intestinal protozoa per unit vol. of stool appears to be greatly reduced following the ingestion of $BaSO_4$. The intestinal amebas are affected more noticeably than the flagellates. The effect is transitory and is not prolonged by extension of the period of administration of $BaSO_4$. E. R. MAIN

Pharmacology of brominated oils. CLAYTON S. SMITH AND HELEN L. WIKOFF. *J. Lab. Clin. Med.* 16, 43–6(1930).—The brominated esters of cottonseed oil appear to be well adapted for use in the röntgenologic demonstration of lesions. They are eliminated from the site of injection in rabbits within a week and produce no deleterious effects in repeated doses. E. R. MAIN

Antimony in medicine. C. N. MYERS AND BINFORD THROVE. *J. Lab. Clin. Med.* 16, 239–46(1930).—A compd. (M 303) is described which contains both Sb and As in the tervalent condition. It appears to be a valuable therapeutic agent in syphilis, leprosy and diseases in which protozoal organisms are involved. An historical discussion of the use of Sb in medicine is included. E. R. MAIN

The elimination of water and sodium chloride through the kidneys after intravenous injection of isotonic sodium chloride solution. IGNAZIO SIMONE. *Biochim. terap. sper.* 17, 469–77(1930).—A soln. of 0.974% NaCl was slowly injected into rabbits. In proportion to the vol. injected a higher percentage of Cl and $H_2O$ is eliminated, the ratio of $H_2O$:Cl is always the same. A. E. MEYER

A new digitalis, "Digitalis lanata" Ehrh. EM. PERROT, P. BOURCET AND RAYMOND-HAMET. *Bull. sci. pharmacol.* 38, 7–16(1931).—The plant, whose botanical description is given, contains a cryst. glucoside, dilanin, of digitalis action, but of higher potency than the cryst. digitalin of *Digitalis purpurea*. The toxicity is the same in oral administration as in intravenous injection. In contrast to *D. purpurea*, the *D. lanata* keeps up an almost const. pharmacol. activity when cultivated. The drug is not only more uniform, but also of higher content of the glucoside. A. E. MEYER

Quinidine in paroxysmal tachycardia. C. BONORINO UDAONDO. *Semana méd.* (Buenos Aires) 1930, II, 1402–7.—Quinidine sulfate (0.5 g.) dissolved in physiol. saline was given intravenously. Two cases were successfully treated. A. E. MEYER

Sinusitis treatment with lipiodol. RICARDO BRACHT. *Semana méd.* (Buenos Aires) 1931, I, 102–4.—Iodized oil, lipiodol, was injected into the sinus cavity for radiography. It is an excellent remedy. A. E. MEYER

Local inflammations treated with concentrated solution of magnesium sulfate. S. JOUAN. *Semana méd.* (Buenos Aires) 1931, I, 259–62.—A satd. soln. of $MgSO_4$ was applied in a permanent bandage on the inflamed area. Forty cases were successfully treated. A. E. MEYER

Influence of insulin on the glycogen content of the perfused rabbit liver. NIELS A. NIELSEN. *Biochem. Z.* 230, 259–68(1931).—On perfusing the rabbit liver with defibrinated blood without insulin there is a gradual decrease in the sugar content of the blood and a corresponding increase in the liver glycogen. The deposition of the glycogen in the liver is not uniform. Addn. of 1/3 to 20 units of insulin to the blood causes a rise in the blood-sugar concn. and a loss of glycogen in the liver. No effect was observed with amts. smaller than 1/3 insulin units. S. MORGULIS

Influence of fermentation poisons upon experimental tumors. L. L. KARCZAG. *Biochem. Z.* 230, 411–9(1931).—Enzyme and protoplasm poisons have been differentiated upon the basis of their effect in inhibiting the fermentation of (1) both yeast and zymin (protoplasm and enzyme poison), (2) zymin alone (enzyme poison), or (3)

yeast alone (protoplasm poison) By this method it was possible to discover substances which injured the glucolytic enzyme without producing any poisoning effect upon the protoplasm The N of the biologically active mol plays a paramount role, especially the $NO_2$ and the CN groups, and not in the nucleus but in the side chains of the compd By the same method substances were discovered which are protoplasmic poisons. It was then attempted to select substances such as isoquinoline red, Magdal red ethyl red, Martius yellow, Mikado yellow, bromothymol blue, propionaldehyde, cyanohydrin, nitrobenzaldehyde, *o*-nitrobenzonitrile, which because of their relative nontoxicity could be employed in animal expts to treat tumors No consistent results were obtained, although with isoquinoline red, Magdal red and ethyl red a definite influence was noted II. L Karczag and C Sellei *Ibid* 420–34.—Ethyl red, chrysoidine, Magdal red, isoquinoline red and Martius yellow, which are inhibitors of the yeast fermentation process, were found to exert an inhibiting action on the glucolysis of tumor cells which diminishes in the order given above These substances also cause a diminution of the respiration in the same order so that Martius yellow either had no influence upon the respiration of the tumor cells or actually stimulated it. These enzyme poisons act upon several enzymes so that both the fermentation and the respiration enzyme are simultaneously inhibited, and in this respect they differ from the KCN which injures the respiratory enzyme much more than the glucolytic enzyme Furthermore, whereas the action of KCN on glucolysis is reversible, the effect of the above substances is irreversible *In vitro* the effect of these enzyme poisons can be superimposed upon the action of KCN, but when used subcutaneously in animals the KCN effect predominates. The substances which were found to be toxic for the fermentative activity of both tumor and yeast cells were also toxic for the fermentation by *B coli* It is usually easier to influence glucolysis than respiration, and it is therefore concluded that the therapeutic efforts, so far as the metabolism of the tumor is concerned, must be directed toward the respiratory function It is suggested that results could only be expected by definitely and permanently inhibiting their respiration while leaving the glucolytic ability unchanged or slightly lowered III. L. Karczag *Ibid* 435–8.—The sugar content of Ringer soln mixed with sarcoma powder increases. Fermentation of the glucose proceeds slowly and continuously in such a mixt., though the controls *show no fermentation in the same time* Conclusion Rous sarcoma can ferment glucose with liberation of gas and this process can be studied also *in vitro*.
S Morgulis

**The action of certain autonomic drugs upon the pigmentary responses of Fundulus.** Dietrich C Smith *J Expll Zoöl* 58, 423–53(1931).—Certain sympathetic and parasympathetic stimulants (cocaine, ergot, pilocarpine, physostigmine, atropine) were injected into the body cavity of the fish, *Fundulus heteroclitus*, and the effects upon the dermal melanophores were studied Cocaine in sublethal doses produces a contraction, in lethal doses an expansion of the melanophores Ergot produces a stellate condition of the melanophores which then respond to temp changes like denervated melanophores Pilocarpine and physostigmine retard the normal responses of the melanophores High concns produce permanent expansion Atropine produces a stellate condition but unlike pilocarpine the melanophores still respond to background shade Lethal doses produce complete expansion but the melanophores respond to temp changes like innervated melanophores In appropriate dosage atropine antagonizes the action of pilocarpine but *not of cocaine* The melanophores of fishes possess a double rather than a single innervation C. H Richardson

**Adsorption and narcotic action.** H H. King, J Lowe Hall, A C. Andrews and H L Cole *J Pharmacol* 40, 275–89(1930).—The authors detd the free surface tensions of drugs in aq solns, the interfacial tensions of aq solns against pure liquid paraffin and against a liquid paraffin soln of lecithin, and calcd the adsorption at various concns. The drugs used were trional, butyl chloral hydrate, sulfonal, bromal hydrate, triacetin, diacetin, chloral hydrate, Et carbamate, monoacetin, Me carbamate, Et Me carbamate A comparison of the compds. in homologous series showed that the free surface tension and the adsorption in each series decreased as the liminal values (as detd by Meyer) increased The calcd adsorption values increased as the liminal values decreased in the series with pure paraffin For the paraffin-lecithin series the results were not so regular C. Riegel

**Chloroform content in various tissues during anesthesia and its relationship to the theories of narcosis.** James L. McCollum *J Pharmacol* 40, 305–25(1930).—Dogs were anesthetized with $CHCl_3$ and the blood and tissues analyzed for $CHCl_3$ content. The corpuscles contained more $CHCl_3$ than the plasma and more than their lipoid content would indicate The $CHCl_3$ content of the brain and tissues increased grad-

ually, but at the point of highest concn (for the brain) there was less $CHCl_3$ than the lipoid content would indicate was possible C RIEGEL

**Number of open glomeruli in acute mercuric chloride nephrosis.** ROBERT A. MOORE AND LOUIS M HELLMAN *J Exptl Med* 53, 303-6(1931) —Acute Hg nephrosis in the rabbit is not assocd with a decrease of glomerular circulation C J W.

**Effects of the intravenous injection of colloidal silver upon the hematopoietic system in dogs.** SAMUEL S SHOUSE AND GEORGE M WHIPPLE *J Exptl Med* 53, 413-20 (1931) —Colloidal Ag has no sp action on the bone marrow in dogs but is a systemic poison which may cause anorexia, weakness, loss of wt , anemia and death Hemolysis can be demonstrated after large doses of colloidal Ag and the anemia presumably is due in part at least to a destruction of red blood cells in the peripheral circulation. The colloidal Ag, injected intravenously, is deposited as granules almost exclusively in the cells of the reticul-endothelial system after the manner of particulate substances Repeated injections of non-lethal amts of this substance are invariably followed by hyperplasia of the bone marrow Large single doses cause rapid death in 12 hrs or less, characterized by pulmonary edema and congestion C J WEST

**Aplasia of marrow and fatal intoxication in dogs produced by Röntgen radiation of all bones.** SAMUEL S SHOUSE, STAFFORD L WARREN AND GEORGE H WHIPPLE. *J Exptl Med* 53, 421-35(1931) C J. WEST

**The combined effects of colloidal silver and highly filtered Röntgen radiation upon the hematopoietic system in dogs.** SAMUEL S SHOUSE AND STAFFORD L. WARREN. *J. Exptl Med* 53, 437-45(1931) —The individual destructive effects of colloidal Ag and heavily filtered radiation are still evident when the 2 are used together; the combined effects are cumulative in that small doses are more destructive than when either is used alone The leucocytosis resulting from the injection of the colloidal Ag affords no protection against the terminal leucopenia following the radiation C J W

**The effect of amyl nitrite on the size of the heart and the width of the aortic shadow as determined röntgenologically.** WM A BRAMS AND HERMAN A STRAUSS *Am. J. Med. Sci* 180, 618-20(1930) —Six normal and 15 arteriosclerotic persons were studied röntgenologically before and after administration of $AmNO_2$ The transverse diam. of the heart shadow was reduced in 18 of the subjects, the presence or absence of arteriosclerosis seemed to play a minor role in these changes The width of the aortic shadow was increased in 13 of the 21 patients after $AmNO_2$ administration. This result was independent of the condition of the peripheral vessels or the degree of blood pressure R C WILLSON

**The action of thymophysin on the human pregnant uterus in situ.** M. PIERCE RUCKER. *Am J Obstet & Gynec* 20, 791-7(1930) —After an intramuscular injection of 0 5 cc of thymophysin in a case at term there was apparently no change in the type of uterine contractions or in the tone of the uterus A dose of 1 cc. in a case in the fifth month of pregnancy showed an increased frequency, a decreased force of contractions and an increase in the tone of the uterus between contractions The same dose produced similar but more marked changes in cases at term R. C WILLSON

**A study of the effect of acriflavine given intravenously on experimental uterine infection in the dog.** JOSEPH L MEYERS *Am J Obstet & Gynec* 20, 760-74(1930) — An appropriate dose of acriflavine given intravenously has a definite beneficial effect on the course of the experimentally infected uterus of the dog The earlier the dye is injected the greater is the effect. In some instances sterile cultures of the inoculated or infected uterine horn are obtained after acriflavine therapy R C WILSON

**Cerebral blood flow. I. The effect of intravenous administration of hypertonic and hypotonic solutions on the volume flow of blood through the brain.** COBB PILCHER. *Arch Neurol & Psychiatry* 24, 899-906(1930) —The O content of arterial blood and blood from the occipitovertebral sinuses in the dog was studied before and after the intravenous injection of 50% dextrose or 30% NaCl and of distd water. The O content varied immediately after the injections but became stable within 30 min. and remained so for several hrs The O content from the occipitovertebral sinus was invariably diminished markedly after the injection of both hypotonic and hypertonic solns. The arterio-venous difference (utilization of O) increased after injection of both types of solns **II. The effect of intravenous injection of hypertonic and hypotonic solutions on the cardiac output and blood pressure.** *Ibid* 907-12 —The cardiac output was usually diminished after injection of both types of solns. The O consumption and O utilization were usually increased by both types The mean blood pressure varied during the injection but thereafter was increased slightly in all expts. R C. WILLSON

**The effect of potassium iodide on the pulse rates of normal individuals.** DONALD

McEachern *Bull Johns Hopkins Hosp* 47, 299–303(1930).—In the absence of thyroid disease or other interfering circumstances, KI produced significant increases in pulse rate in 12 subjects while 5 showed a slight decrease. The changes came on gradually about the third to seventh day and reached the max at about the tenth day. Normal rate was restored within a week or so after the drug was discontinued.
R. C. Willson

The effect of the ingestion of potassium iodide on the electrocardiogram of normal individuals. Donald McEachern and B. M Baker. *Bull Johns Hopkins Hosp* 47, 304–7(1930).—KI in therapeutic doses has no significant effect. R. C. Willson

The effect of lead on the isolated uterus. M. D Devlet Kildeeva and B A Rajkhstein. *Kazansky Medizinsky Jurnal* 26, 690–4(1930). *J. Am. Med. Assoc* 95, 1545.—After a graphic record had been made of the normal muscular contractions of a part of the uterine cornu in cats placed in Ringer's or Locke's soln. kept at 39° with a const. stream of O flowing through the soln., Pb acetate was added gradually to the soln. The uterine contractions changed with the concn. of the Pb acetate. When this reached 1:200 the uterus reacted by a complete tetanus and the muscular contractions could not be made to reappear even after all traces of the Pb acetate had been washed out. The introduction of Pb acetate into the blood stream of cats also produced a hypertonic condition of the uterus. R. C. Willson

Antagonism between adrenaline and ergotamine, and the respiratory quotient. R. Capo *Riforma Medica* 46, 1347–53(1930). *J Am Med Assoc* 95, 1703.—Ergotamine does not modify the greater consumption of O induced by adrenaline but when administered during fasting it causes a notable lowering of the elimination of $CO_2$ and a reduction of the R.Q. Adrenaline causes a mobilization of hepatic glycogen and thus increases almost constantly the elimination of $CO_2$ and rises the R. Q. Ergotamine inhibits the hyperglucemia that is induced by adrenaline without modifying the increased intra-org. combustion caused by the latter. R. C. Willson

Iodoxybenzoate as a test reagent for free phenolic hydroxyl groups in organic compounds (Leake) 7. Trypsin preparations suitable for the prevention of adhesions (Walton) 17. Derivatives of anesthesin (Coviglio) 10.

Anschütz, W., Specht, K. and Thiemann, Fr.: Die Avertinnarkose in der Chirurgie. *Berlin J Springer* 200 pp. *Reviewed in J. Am Med Assoc.* 96, 715(1931).

## I—ZOÖLOGY

E. A. Gortner

Amylase in the extracts of the salivary glands of the silk-worm larva (Bombyx). S Matsumura. *Bull Sericulture and Silk Ind* (Japan) 2, 4–5(1930).—Aq. glycerol exts. of the salivary glands of the silkworm hydrolyze sol. starch to dextrin and sugar and glycogen to dextrose with optimum activity at $p_H$ 6.6–7.1. In the absence of NaCl the enzyme is almost inactive. Exts. made from European varieties of silkworm are less active than similar prepns. from the Chinese and Japanese varieties.
B. C. A.

Cardiac hormone in the tortoise. A. de Carvalho. *Compt. rend. soc. biol.* 102, 535–37(1929).—Elec. irritation, and the action of pilocarpine, atropine, ephedrine and ergotamine on the heart of a tortoise failed to detect a cardiac hormone. B. C. A.

Action of hypophyseal extract on egg production of batrachians. R. Kehl. *Compt. rend. soc. biol.* 103, 744–5(1930); *Physiol. Abstracts* 15, 248.—The alk. aq. ext. of the anterior lobe of the hypophysis of mammals, when injected into *Discoglossus*, rapidly elicits the free laying of eggs in the females captured in Dec. and Jan. Controls which are kept in the same conditions of fasting, etc., do not lay their eggs. G. G.

Cause of ammoniacal odor of flesh of the shark. O Martin. *Z. Fleisch Milch-Hyg.* 40, 48–9(1929).—The $NH_3$ arises from urea (up to 2.5% of the flesh), the origin of which is not pathol., it serves to maintain the internal osmotic pressure against that of the water. B. C. A.

Amino acids of tissues. IV. The diamino acid content of muscle tissue of different classes of animals. John L. Rosedale and Joseph P. Morris. *Biochem J* 24, 1294–6(1930). cf. *C. A.* 24, 164.—An increase in the amt. of histidine N and a decrease in lysine N are found in the lower organisms (tissue of crocodile, cockroach, mosquito larvae, oysters and sponge). V. Monoamino acids of the horse mackerel (Caranx rottleri). *Ibid* 24, 1297–1300.—The monoamino acids are extd. with BuOH. Better results are obtained by first removing some of the amino acids from soln.
Benjamin Harrow

The hydrolytic products of the protein from the egg capsule of the gastropod, Hemifusus tuba Gmel. Jun-Ichiro Sagara. *J. Biochem* (Japan) 12, 473–4(1930).—The protein of the egg capsule of *Hemifusus* seems to belong to the albumoids, being in some respects similar to keratin and in other respects to elastin. It contains no glycine, tyrosine or histidine, but much leucine and glutamic acid, these 2 amino acids making up 30% of the protein S. Morgulis

A qualitative analysis of the digestive secretions of the larva of the Japanese beetle (Popillia japonica Newm) Millard C. Swingle. *J Econ. Entom* 23, 956–8 (1930).—A qual chem examn of the digestive secretions of this larva showed the presence of ions of Al, $Fe^{++}$, Ca, Mg, K, Na, $NH_4$, $CO_3$, Cl, $NO_3$ and $PO_4$. C. H R.

Investigations on the rapid coloration of the cilia of ciliates. Hélène Anselmier. *Pharm Acta Helv* 5, 33–41, 64–71, 88–94(1930).—Detailed directions are given for the differential staining of the cilia of ciliates, thus making it possible rapidly to diagnose ciliates in mixed cultures of infusoria. Photomicrographs of certain protozoa of various origins, and a bibliography of 10 references accompany this highly specialized study S Waldbott

## 12—FOODS

F. C. Blanck and H. A. Lepper

Amendment of July 8, 1930, to the Federal food and drugs act and requirements thereunder. Anon Food and Drug Administration, U. S. Dept. Agr., *Service and Regulatory Announcements* F D No 4(1931).—The forms of statements required on *canned foods* of substandard quality and substandard fill, together with standards for fill of container of all canned foods and of quality and condition for *peas, peaches* and *pears*, are given H A. Lepper

Color and flavoring problems in the food industries. T. H Fairbrother *Food Manuf.* 6, 72–5(1931) E. H

Possibility of use in foods of coloring materials made in Italy. C. Manuelli and R. Maggiora. *Atti III congresso naz. chim. pura applicata* 1930, 627–35.—The characteristics of coloring materials allowable in foods are reviewed E. M Symmes

Reaction between metal receptacles and foodstuffs. I. Relation of metals to fluids (drinks): corrosion. B. Bleyer and J. Schwaibold *Biochem. Z.* 230, 136–45 (1931).—The corrosion of various metals (Al, Zn, Fe, Ni, Sn, Pb, Cu, Ag, brass) by water, tea and coffee has been studied and the extensive findings are recorded in tables and curves. S. Morgulis

Determining the swelling rate in canned foods. W. S. Sturges, E. T. Drake and L. B. Parsons. *Food Ind.* 3, 105(1931).—A quant. method for the measurement of swelling rate of Sn cans is given. The principle of the method consists in weighing the can under $H_2O$ and also in air $S = 100\ W'/V$, where $W'$ is the decrement in wt. in $H_2O$, $V$ = wt. in air − wt. in $H_2O$, and $S$ is the % swell C. R. Fellers

The $p_H$ values of New Zealand wheats and flours. J. K. Dixon. *New Zealand J. Sci. Tech.* 12, 146–53(1930).—The $p_H$ and buffer-effect values of ground whole-wheat flour prepd. in the lab. and com. flour were detd. Exts. prepd. by the Kent-Jones method were used in a quinhydrone cell coupled with a calomel half-cell. One hr. was required to get a correct reading The Pt electrodes poisoned readily. The results showed that the quality of a com. flour as detd by the baking test cannot be predicted from the $p_H$ or buffer-effect value of its wheat or flour prepd in the lab. The $p_H$ and buffer-effect values of flours are governed by the treatment each wheat receives at the mill and bear no relation to the values found for samples prepd in the lab., although the lab. values may be of some assistance to the miller in choosing the method of treatment to be adopted for each lot of wheat. L. E. Gilson

Utilization of the soy bean. IV. Electrolytic oxidation of the hydrolyzate of proteins. I. Yoshitaro Takayama. *J. Soc. Chem. Ind., Japan* 34, Suppl. binding, 31–2(1931); cf. *C. A.* 24, 2810.—Crude soy-bean protein was hydrolyzed with $H_2SO_4$. The hydrolyzate was filtered from humin and electrolyzed with a peroxidized Pb anode and a Pb cathode in an undivided cell (anodic c. d 2 amp./sq. dm.), the soln. was then steam-distd The distillate was neutralized with NaOH and redistd. The volatile acids remaining as Na salts were 9.6% of the crude protein. A mixt. of free acids was obtained from the salts by addn of phosphoric acid and fractionated at 95–195°, sepg formic and isovaleric acids and AcOH, with small quantities of propionic and butyric acids. The residual soln. of the steam distn. was distd. over CaO under reduced pressure into HCl. The volatile base obtained was pure $NH_4Cl$. The relation between $NH_3N$

produced and elec quantity consumed was detd In the same way, formic and isovaleric acids and AcOH were obtained from gluten hydrolyzate E M. Symmes

"Vaingan" rice cultivation in south Konkan. R M Hegdekatti *Poona Agr Coll Mag* 22, 146–59(1930) —The term "vaingan" is given to rice grown by means of lift irrigation during the hot summer weather As compared with rainy season rice, "vaingan" rice kernels and bran are richer in albuminoids and digestible carbohydrates and poorer in woody fiber and ash, particularly siliceous ash "Vaingan" rice straw contains more digestible carbohydrates and albuminoids than rice straw from a rainy season K D Jacob

The determination of starch in cereal products. C. W. Herd and D. W. Kent-Jones *J Soc Chem Ind* 50, 15–22T(1931) —Methods for detg starch are broadly classified as (I) hydrolytic methods, (*a*) acid hydrolysis, (*b*) enzymic hydrolysis; and (II) non hydrolytic methods The "by-difference" method and the method of direct washing out from dough are in the latter category. Some of these methods are discussed in detail and the relative results obtained by the application of them to different mill stocks are considered. These stocks included (1) corn starches, (2) corn flours and mill stocks, (3) wheat offals, and (4) whole wheats Conclusions By "starch" different observers mean different things. The modified Rask method is suggested as of the greatest utility, while hydrolytic methods are open to grave suspicion. The modified method is: Place 1 g of material and 1 g acid washed sand in a centrifuge tube, mix and cover with washed $Et_2O$, stir, centrifuge and pour off the liquid Make 2 addnl. washings and to the residue add 25 cc. of water and 0.25 cc. *N* NaOH, mix and after 15 min add 5 cc. pure MeOH and mix again. Mix in 5 cc. dil MeOH (2 l water), centrifuge this mixt. and remove the alc layer Wash the residue twice with 10 cc. of dil MeOH and finally thrice with water Stir the residual mass into a thick paste with a few cc of water, add a total of 20 cc of water to transfer to a 100-cc. flask, add 20 cc. concd. HCl and make up the vol to 100 cc. with Rask's acid. Filter the contents of the flask by suction through a Gooch crucible contg asbestos and a layer of acid-washed sand into a small dry suction flask Transfer 50 cc. to a 200-cc beaker contg 110–5 cc. 96% alc., and immediately after pipet drainage, stir the resulting mixt 1 min or until the ppt becomes flocculent. When it has settled, transfer the contents of the beaker to a centrifuge tube, centrifuge 10 min and remove the supernatant liquid Wash the residue with 70% (by vol ) alc. and twice with 96% alc Wash the ppt. with $Et_2O$, dry the crucible at 40° for 10–15 min. and then at 130° to const wt W. H. Boynton

The determination of starch in flour by diastase-acid hydrolysis. B G Hartmann and F Hillig *J Assoc Official Agr Chem* 14, 112–6(1931) —A detailed description is given of a modification of the technic of the official A O A C. method for the detn of starch by diastase acid hydrolysis. The time required for starch conversion by diastase is reduced from 2 hrs. to 20 min by introducing a preliminary pepsin digestion (cf *C A* 21, 287), but the total working time required for the peptic-diastatic digestion is about 3 hrs The peptic digestion increases the starch yield appreciably, this is shown to be due to the fact that the starch is rendered more accessible to diastatic hydrolysis and not to any reduction by the pepsin or the products of its action In the pepsin digestion an acidity adjustment corresponding to 5 cc. *N* HCl per 100 cc of substrate is made, after the digestion the acidity is carefully neutralized, the mixt is slightly acidified with HCl, and finally treated with $CaCO_3$ to assure a practically neutral condition for the diastatic inversion The official method was also modified in regard to the removal from the flour of the sugars and free fat; the procedure proposed, though time-consuming, is easy to carry out and gives satisfactory results with ordinary care, even in the hands of analysts inexperienced with it. A Papineau-Couture

Starch explosion hazards reduced by safety measures. D J Price and H R. Brown *Food Ind.* 3, 106–7(1931) —Explosions of dry starch are relatively frequent and are usually caused by sparks from machines, motors, etc., or by static electricity A serious explosion at Decatur, Ill is described Safety measures are outlined C. R. Fellers

Estimation of the age of flour. W. Hartmann *Z. Untersuch Lebensm* 59, 364–79(1930) —Samples of flour and bread (33 3 g ) were extd for 6 hrs with boiling petr ether or $CHCl_3$, and the *n* at 40° and the acid value of the ext detd Flours recently mill ground had acid values of 54 to 76 and 46 to 64 when contg 60% of rye and wheat flour, resp , while the corresponding figures for flours of the same compn , ground in the lab and left for 24 hrs., were 44 and 39 Bleached flours were not included. Extns , after various intervals, showed that the acid value increases with time of storage, rapidly at first, to about 240 after 15 months Gluten N, lecithin phosphate contents and

*n* decrease on storage at a rapid rate, particularly in the initial stages. The acid value and *n* of the unground grain, however, showed little alteration on storage Reductions in *n* were observed for bread baked from rye and wheat flours, while the acid value was increased in the latter case only The lecithin phosphate fell from 0 to 1 3 mg per 100 g of flour in both cases The bacterial contents were also detd on samples 5 to 15 months old; in the presence of growths of *Oidia*, small quantities of an unsaponifiable wax-like substance were obtained In view of statements that flour is no longer suitable for baking purposes after 6 months' storage, it is suggested that the max permissible acid values in such cases should normally be 120 to 150 for 60% rye flours, and 90 to 100 for 60% wheat flours C R Fellers

Direct determination of available carbon dioxide in baking powder. Mayne R. Coe *J Assoc Official Agr Chem.* 14, 99–101(1931).—In the gasometric method adopted by the A O A C for the detn of $CO_2$, 2 detns must be carried out to obtain available $CO_2$, which is the difference between the total and residual $CO_2$ The following new method is proposed, the same app is used and only 1 detn is required Run 25 cc. of 5% $(NH_4)_2SO_4$ soln into the 250-cc. decompn flask contg 1 7 g of baking powder, heat at boiling temp till all gas is evolved, cool to room temp; when equil is established (generally in about 15 min) read the amt of available $CO_2$ on the graduated tube and make the necessary temp and pressure corrections. Total $CO_2$ also can be detd in a few min with the same sample, without detaching the flask from the app, as follows Fill the buret contg a few cc of $(NH_4)_2SO_4$ with $H_2SO_4$ (1 + 5), run 25 cc into the flask, heat almost to boiling, let cool as before, take the reading, subtract a no corresponding to the no of cc. of acid used from the no of cc. found, and correct for temp and pressure $(NH_4)_2SO_4$ is used as reagent because (1) a satisfactory evolution of $CO_2$ is obtained from all varieties of baking powder; (2) it acts as a protein coagulant for powders contg egg albumin, thus serving as a foam destroyer, (3) if distd water is used with phosphate powders and those contg egg albumin, low results are obtained, but with 5% $(NH_4)_2SO_4$ soln the same results are obtained as with the gasometric method, (4) if the total $CO_2$ value is desired the acid reagent may be used to evolve the residual $CO_2$ remaining in an $(NH_4)_2SO_4$ soln. The technic of the method is described in detail. It gives results checking with those of the gasometric method as closely as would duplicates by the latter method. A Papineau-Couture

The function of emulsions of oil and water in breadmaking, with special reference to gluten formation and modification. J. C. Van Dyk. *J. Soc. Chem Ind* 49, 421–2T (1930).—Glutens obtained from doughs which had been made up with emulsions are softer and more elastic. When the gluten is dried in a hot air oven at 105°, the color of the baked gluten is superior to that obtained by drying off the glutens from a dough of flour and tap water. It is very difficult to wash out doughs made from flour and emulsions, and in order to prevent dispersion the starch must be filtered through fine muslin. Emulsions of oil and water increase the amt of gluten in the flour to a very small extent. This contradicts Bennion (*C. A* 21, 613) There seems to be no definite relation between the fact that emulsions of oil and water keep bread moist for a long period, and the increase of gluten As the washing free from starch is very difficult, it seems that the increase of gluten reported by B was caused by some const. error connected with the washing out of the gluten Albert L Henne

Phosphatide content of different breads. B Rewald. *Z Untersuch. Lebensm* 60, 315–8(1930).—The phosphatide contents were detd by R.'s method (*C. A.* 23, 3940), the sample being extd in succession with a large excess of acetone and a mixt. of $C_6H_6$ and EtOH The exts were evapd separately, the residues extd with dry $Et_2O$, and the P was detd in each case in the residue after evapn. of the $Et_2O$ The sum of these 2 figures was taken as the total phosphatide content, the following percentage of the dry samples being found Rye bread crumb or crust 0 174, crumb and crust of white bread 0.287, crumb and crust of pumpernickel 0 073, black bread crumb 0 183 and crust 0 194, graham bread crumb 0 267 and crust 0 302 The respective P contents of the residues after extn were 0 20, 0 24, 0 32, 0 34, 0 35, 0 30 and 0.29%. With the exception of pumpernickel, the different breads examd. contained approx. the same amts of phosphatide. Similarly, the P contents of the residues were approx equal in all cases. Temp is without influence on the phosphatide content because both crust and crumb had the same amts Yeast fermentation was also without effect on the phosphatide of bread C. R Fellers

The extinction coefficient of milk. A Schneck and H. Mengebier. *Milchwirtschaft. Forsch.* 11, 1–29(1930).—The light transmission is proportional to concn. under strictly controlled conditions The Lambert-Beersche rule may be employed. The fat phase has little effect In dilns of 1–100 the results satisfy the Lambert-Beersche rule Many

samples tested show the extinction to be depressed 4% by skimming Milks from different cows have different extinction coeffs It is shown that the extinction coeff *due to fat varies with the av. size of the fat particle.* GEORGE R. GREENBANK

The residual nitrogen of cow milk. F. KIEFERLE AND J. GLOETZL. *Milchwirtschaft Forsch.* 11, 62–117(1930) —The authors consider the residual N of milks as analogous to that of blood and urine They ppt. the coagulable protein by heat and 10% AcOH. The N remaining in the filtrate is called total residual N The total residual N *for an individual milk is 84 8 mg* % per 100 cc when the total N is 531 7 mg % for herd milk it is 66 3 mg % for a total N of 533 1 mg % If the hexone bases are removed by Na tungstate and trichloroacetic acid the residual N for an individual milk is 28 4 mg. % The values for the total residual N in mg % of the constituents for individual and herd milk are, resp., albumoses 30 7, 27.2, peptone 24 2, 18 7, amino acids 3 9, 4 6, $NH_3$ 1 3, 1.1; urea 13 4, 10 1; creatinine 2 3, 1 7; creatine 3 1, 2 2, uric acid 2 1, 1 5 The total residual N increase in pasteurization is 10 4% and in boiling 18 6% GEORGE R. GREENBANK

Proteolysis of milk. II HARTWICK. *Milchwirtschaft Forsch* 9, 339–54(1930) — The detn of caseolytic organisms in milk is described; the detn of $NH_3$ by distn in a vacuum and the detection of peptone are also of value Tryptophan was not detected The catalase value is not always parallel with the no of proteolytes B. C. A

Has "chromiform," the new milk preservative, proven its value? FONZES DIACON *Ann. falsif* 24, 22–5(1931); cf. *C. A.* 23, 913 —The previous investigation established the value of "chromiform" when added to fresh milk Evidence is now presented showing that, when added to milk several hrs old, "chromiform" is a much better preservative than either $K_2Cr_2O_7$ or $(CH_2O)_3$ alone A. PAPINEAU COUTURE

Influence of formaldehyde on the precipitation of milk protein material. MARCEL MASCRÉ AND EMILE BOUCHARA. *Bull soc chim biol* 12, 994–1000(1930); cf *C A* 24, 5052 —Addn of up to 20% formol to milk caused more AcOH to be required for pptn of casein, but less N was left in soln after pptn was complete, and there was less re-soln upon adding an excess of acid A similar effect was exerted upon the pptn of total milk proteins by $CCl_3COOH$ C. G. KING

Souring of milk. I. W. GRIMMER AND W. PAAPE II. W. GRIMMER AND C ARLART *Milchwirtschaft Forsch* 9, 88–99, 100–20(1929); cf *C. A.* 23, 3990, 24, 3025 —Rennin coagulum and the residue of milk on porous plates differ in that the N, Ca and P contents of the latter are the smaller Possibly in coagulation by rennin dissolved Ca and P are co-pptd., or combination of $Ca_3(PO_4)_2$ with caseinogen or casein occurs With progressive souring the Ca content of the coagulum diminishes fairly regularly If $\sqrt{kS}$ is the H ion concn of lactic acid of acidity $x$, $c$ is a factor and $y$ is the H ion concn of the milk, $y = cx^{-1}\sqrt{kS}$. The value of $c$ was 3 03–5 42 (av 4.3) $\times 10^{-4}$. B. C. A

The foaming problem. W. MOHR AND C. BROCKMAN *Milchwirtschaft Forsch* 11, 48–61(1930) —Milk with the greatest surface tension and viscosity produces the most stable foam The foaming properties are greatly changed by the addn. of Na citrate The solidity and stability of the foam are greatly diminished by the salt There is a relation between the foaming and the surface viscosity. The tendency to foam depends on the ability to form a surface. Solidification of the wall gives a measure of the surface viscosity but not of the stability. It requires an optimum surface viscosity for a stable foam With increasing fat foam formation and stability decrease Foam formation *is greater when the fat is liquid than when solid Homogenization of* skim milk reduces foaming, with whole milk it is increased The influence of temp varies with different milks The optimum is from 30° to 60°. Repeated foaming does not decrease the capacity. Churning reduces the capacity of the skim milk. G R G

Detection of heated milk K. EDLR AND H PFEIFFER *Z Untersuch Lebensm* 60, 311–4(1930) —Of the several variations of the *benzidine test for* the detection of heated milk, the following method gave the most satisfactory results shake 5 cc of milk with 0 5 cc. of a 4% soln of benzidine in 96% EtOH, add 1 drop of a 1% soln of $H_2O_2$ after 1 min, and shake the mixt again Raw milk gives a stable blue-green color, milk heated for 30 min at 63° gives a transient blue-green color, while strongly heated milk is colorless After 1 min add 10 cc of a satd soln of $MgSO_4$ and shake the mixt raw milk becomes gray green gradually turning to blue green in about 10 min; heated milk is gray green and gradually becomes grayish blue After 10 min more dark blue curds sep from the slightly heated milk, while in the strongly heated milk the curds are white If $MgSO_4$ is replaced by $Na_2SO_4$, the respective colors are chocolate

to violet-brown and green-brown Heated milk having an abnormally high leucocyte content or lactic acid acidity, or milk heated for a short time below 63°, tends to give the color reactions of raw milks, and it is desirable before making the test to add 0 25 *N* KOH soln to reduce the acidity to 0 06% lactic acid These exceptions are due to the peroxidase assocd with the proteins or leucocytes of the milk, which normally passes into soln when the milk is heated and hence loses its activity, but may be activated by lactic acid and inactivated by the addn of AmOH In doubtful cases a mixt of 10 cc. of milk, 10 cc of a satd soln of $MgSO_4$ and 1 cc of a 20% soln of AcOH is shaken and centrifuged for 6 min at 120 r. p m Slightly heated milk gives a clear serum, raw milk a definitely opalescent serum, and mixed milk contg 20% or more of raw milk, a faint turbidity C R. Fellers

Pseudomonas as a cause of bitter milk. R. W Newman Calif Dept. Agr., *Monthly Bull* 19, 640(1930) C R. Fellers

Anaerobic spore test as an index of contamination in milk. M H Knutsen and E C. Holst. Penn Agr Expt Sta., *43rd Ann Rept of the Director in Bull* 258, 29(1930) —The addn of reduced Fe increased the efficiency of the test, but even this improved technic failed to show any decided degree of accuracy in differentiating milks as to the amt of manurial contamination One of the principal reasons the test is invalid is because anaerobic spores germinate after varying periods of time depending upon the temp of incubation and other factors. C R. Fellers

The physicochemical constitution of spray-dried milk powder. L H Lampitt and J. H. Bushill. *J. Soc Chem Ind* 50, 45–54T(1931) —It is shown that the figures obtained for fat content (Soxhlet) are not comparable to the "free" fat as detd. by the standard method as described The normal moisture content of com milk powders has no effect on the amt of "free" fat The "free" fat content of 8 com spray-process powders is given, showing that the percentage calcd on the total fat may vary between 3.33 and 14.22, for roller process powder it is between 91 6 and 95 8 Increasing the surface of the particles of spray-process powder by grinding 3 hrs increases the "free" fat up to 83% of the total, but in the roller process powder practically all of it is free. The differences in the systems of drying which may influence the constitution of the particles are pointed out. Attempts to simulate the Soxhlet mechanism by a repetition series of standing extns. has thrown some light on the differences observed It is shown that when milk powder absorbs moisture certain well defined changes take place and that a first "clammy" stage is succeeded by the development of a dry, hard and powdery texture This change is accompanied by a freeing of the fat. It is proved that there is a definite range of moisture content at which the fat is freed; this is called the "critical moisture content" by the authors. Microscopical examn proves this change to be accompanied by the crystn of the lactose, and this crystn. is also produced by treatment with 96% alc. Spray process lactose is amorphous but crystallizes under the effect of exposure to moist air or to treatment by 96% alc Time is a factor in the freeing action of absorbed moisture; powder freshly made reacts more slowly than an older one. The fat-freeing action of moisture is irreversible The crit moisture range is independent of the fat content and proportional to the amt. of solids not fat in the powder. It is not possible to put forward a definite theory concerning the structure of the milk-powder particle. The lactose in its amorphous state has an important effect on the availability of the fat to solvents, and any means so far tested by which the lactose is caused to crystallize results in the freeing of the fat J C. Jurrjens

Butter-fat test in condensed and evaporated milk. W. D. Swope, C. D Dahle and F. J Doan. Penn Agr Expt. Sta., *43rd Ann Rept of the Director in Bull* 258, 26(1930) —The method for sweetened condensed milk is that previously given (*C A* 24, 4869). In testing evapd milk, excellent results were obtained by using 3 cc. of $NH_4OH$, 4 cc. of BuOH and 17.5 cc. of 1.1 $H_2SO_4$, added to 9 g of evapd milk The fat column was measured, as for condensed milk, from the bottom of the lower to the bottom of the upper meniscus This method also yields accurate results when used on *ice cream* and ice cream mixes. C. R. Fellers

Sterilization of glass-lined tanks. F. M. Scales and Harriet E. Russell *Food Ind* 3, 120–1(1931) —Results indicate that glass-lined tanks which have been properly cleaned and rinsed and then sprayed with a Cl soln contg 225–250 p p m of available Cl in an alk. NaOCl soln will be sterile or nearly so 30 min after being sprayed. Bacterial cultures obtained from non-sterile milk bottles were used in carrying on the expts. C. R. Fellers

Advances in processing aid domestic casein. F. L. Chappell. *Food Ind.* 3, 102–4 (1931) —Approx 60,000,000 lb of casein, 80% of which is consumed by the paper

trades, is annually consumed in the U S A casein low in both ash and acidity is required A continuous process of manuf. from skim milk is described Briefly, the casein is pptd by HCl, the concn being approx 0.5%, at a temp. of 43°. The curd is broken up, washed, pressed and dried to 10–15% moisture content within a very few min. The quality of the domestic product is constantly being improved C. R. Fellers

Bacterial flora of some ice cream ingredients. R. W. Newman and A. E. Reynolds Calif Dept Agr., *Monthly Bull* 19, 677–83(1930).—Data are given for frozen egg yolks, fresh eggs, powd eggs, powd skim milk, gelatin, sugar, powd. cocoa, cold pack (frozen) strawberries and ice cream colors. C. R. Fellers

Gelatin percentage can be reduced. E. O. Anderson, T. A. Lyons and R. L. Pierce *Ice Cream Trade J.* 26, No. 11, 81–3(1930).—Ice cream of good body was secured with the grade of gelatin used when the percentage of gelatin was about 0.10% and the homogenizing pressure was 3000 lb Apparently satisfactory ice cream contg no gelatin was also obtained when the homogenizing pressure was 3500 and 4000 lb. By taking advantage of these data com ice cream is now being prepd in which the gelatin has been reduced to 0.10%. A. H. Johnson

Gelatin will not be replaced. B. E. Horrall. *Ice Cream Trade J.* 26, No. 11, 80–1(1930).—Expts were conducted in which it was attempted to replace gelatin in the ice cream mix by using high homogenization pressures The results indicated that the lots with higher gelatin contents and lower homogenizing pressures were not so coarse or icy as lots with lower gelatin contents and higher homogenizing pressures. The smoothness in texture of the ice cream increased with the quantity of gelatin used Water showed a tendency to drain out of mixes contg the smaller quantities of gelatin The lower the gelatin content of the mix the shorter was the time required to reach the desired overrun In general, the work indicated that high homogenizing pressure would not entirely replace gelatin A. H. Johnson

Consistency of Swedish butter. E. Haglund, G. Wode and T. Olsson *Kgl. Landtbruks-Akad Handl Tid* 69, 1147–72(1930).—The consistency of Swedish butter at different times of the year and from various districts, and factors causing these differences, were detd. The no. of samples was 413 Butter hardness was detd by the Perkins method (*C. A.* 8, 1313) at 15°, av. of 6 impressions, expressed as the wt. in g. which the falling body must have for the rod to displace 1 cc. of butter The I value of the butter was detd also Butter hardness varies considerably with the time of year, and that from different districts at the same time of year is different. These variations are caused by variations in I value of the fat and hence are due to feeding Hardness decreases as I value increases Fat with a given I value can give butter with varying degrees of hardness Churning tests showed that permanent variations in butter hardness can be produced by manuf. methods Long cooling of cream before churning increases butter hardness, as does long cooling of butter granules before working Differences in degrees of butter hardness caused by methods of prepn. are as great as variations in hardness of collected samples of identical I value E. M. Symmes

A new relation for the determination of vegetable oils in butter. Oscar de Souza Vieira *Rev. brasil. chim.* 2, 237–46(1930).—Taking into consideration the increasing use of babassú oil and other palmaceous oils in the adulteration of butter and paying particular attention to the relative meanings of the various indexes, S. V. studies the methods actually used for the discovery of such fraudulent mixts. Bromometry is not yet suited to the study of small quantities of vegetable oils A valuable relation results from the great differences between the consts. of the insol. fatty acids (Polenske) and butyric and caproic acids (xylene) in various kinds of vegetable oils, principally palmaceous oils Thus the relation (Polenske/xylene) × 100 is found to be 10 for the various kinds of butters and possibly 1529 for babassú oil. John M. Ladino

Effect of method of preparation on the calcium content and consistency of cheese Gunnar Wode *Kgl. Landtbruks-Akad. Handl. Tid.* 69, 1032–43, *Medd. Centralanstalt försöksväsendet jordbruks., Mejeriforsök* No. 40, 14 pp. (1930).—There is a close relation between Ca content and body of cheese, the higher the Ca content the weaker the body, and vice versa During cheese making the vat whey dissolves Ca from the curd. A loss of Ca is caused also by the whey removed during the pressing The quantity of Ca dissolved from the curd by the vat whey increases, parallel to the acidity of the milk before setting If the vat whey is sepd. quickly from the curd it dissolves less Ca The quantity of Ca dissolved from cheese by press whey increases with increasing vol. and acidity of press whey. The total Ca dissolved by vat whey is considerably greater than that dissolved by the press whey E. M. Symmes

Bleaching, muddy discoloration and black-spot development in colored cheese.

G F V Morgan *New Zealand J Agr* 42, 35–6(1931), cf *C A* 25, 748.—Bleaching of annatto-colored cheese was traced to the reducing action of certain organisms, including *B subtilis* and *B fluorescens liquefaciens*, on the dye in the absence of an adequate supply of atm O. Upon longer keeping the bleached areas acquired a muddy discoloration. Black discoloration was traced to the action of bacteria in reducing Pb salts present in the annatto coloring material. K D Jacob

Physicochemical investigations of vegetable juice. E. Canals, J Canaye and I Cabanes *Bull soc chim biol* 12, 1022–4(1930).—P, Ca, Mg, Na and K were detd in the expressed juice and in the dialyzate from turnips, carrots, radishes, spinach, asparagus, peas, beets and 6 fruits. Practically all of the Na and K and over 90% of the P and Mg were removed by dialysis. Of the Ca 30–94% (av. 70) was removed. C G King

Maraschino cherries, their preparation and manufacture. E H Wiegand and D E Bullis *Glass Packer* 4, 125–7, 134(1931), cf *C A* 24, 439.—For bleaching the raw unstemmed cherries (white sweet varieties) a soln. of 1.5% of $SO_2$ and 1.5% soln. of $Ca(OH)_2$ is used. The process is usually carried out in bbls. Excessive lime causes spoilage to occur from gas forming and liquefying bacteria. Daily agitation of the bbls. is necessary to prevent the lime from settling out. The cherries keep practically indefinitely in this soln. The cherries are leached in cold water for about 20 hrs. to remove $SO_2$ and lime, stemmed and pitted, and finally dyed with erythrosin or mixts. of erythrosin and Ponceau in a slightly alk. soln. $NaHCO_3$ added at the rate of 7 oz. per bbl. is used to give proper reaction for dyeing. About 1 oz. of erythrosin *per 100 lb. of liquid is used. The dye is set by acidifying with citric acid added at the* rate of 1 lb. per 100 lb. of liquid. The cherries are now ready for the candying process, which consists of the gradual building up of a sirup concn. of 50–65% of sucrose. Oil of bitter almonds or BzH is universally used for flavoring purposes. Sterilization of the bottled product is carried out at a temp. of 180° for 25–30 min. C R Fellers

Determination of formic acid in fruit juices. A Hanak and K. Kürschner. *Z. Untersuch. Lebensm.* 60, 278–90(1930), cf. *C A* 24, 4098.—Steam-distil with 0.3 g. of tartaric acid for 45 min. 10 cc. of the juice or 10 g. of the fruit sirup dild. to 20 cc.; the increase in the vol. in the distn. flask should not exceed 20 cc. Avoid overheating by the use of an asbestos shield and collect 400 cc. of distillate in just enough distd. water to cover the end of the adapter. Dil. the distillate to 500 cc., titrate 200 cc. of it and calc. the total free volatile acids. To 100 or 200 cc. of the distillate, according to the amt. of $HCO_2H$ present, add the calcd. amt. of 0.5 *N* NaOH soln. required to neutralize the acidity, followed by 0.5–1.0 cc. in excess. Warm the mixt. for 10 min. to saponify any formic esters and then evap. with 0.2 g. of $Na_2CO_3$, without boiling, until 30 cc. remains. Add sufficient 0.2 *N* $KMnO_4$ (usually 3–5 cc.) so that an excess of 1–1.5 cc. is present. Oxidation is complete after 45–60 min., then add 1 cc. of 10% $ZnSO_4$ soln. to flocculate any suspended matter, and dil. the soln. to 50 cc. and filter. Det. the excess of $KMnO_4$ colorimetrically by matching the color of 25 cc. of filtrate against that of a 0.2 *N* soln. of $KMnO_4$ in a colorimeter. The colorimetric method is sensitive to 0.1 cc. (equiv. to =2.76 mg. of $HCO_2H$). The method gave accurate results on a variety of fruit juices. C R Fellers

The manufacture of lime juice and its economic value. V H Kulkarni *Poona Agr. Coll. Mag.* 22, 88–92(1930).—The manuf. and preservation of lime juice in India are described. The yield of clear juice is about 40% of the wt. of the fruit. West Indian bottled lime juice contains about 5.6% citric acid while the av. Kagdi lime juice contains approx. 7.5%. K D Jacob

New method of enzymic clarification of unfermented apple juice. Zoltan I. Kertesz. *N. Y. State Agr. Expt., Bull.* 589, 3–10(1930).—A very active pectin-decompg. enzyme obtained from *Penicillium glaucum* is proposed as an agent for assisting in the clarification of apple cider. The enzyme can be prepd. from the mold in either solid or liquid form. The method of extn. is not given. Starches or proteins are not attacked by the enzyme prepn. in concns. of 0.5% acting at 55° for 10 hrs. The insol. matter which is formed by the decompn. of the pectin and is largely responsible for the cloudiness in cider is readily removed by filtration or centrifugation. The clear filtrate may be bottled and pasteurized for 20 min. at 76° without showing any change in flavor. In 1 test about 30% of the pectin was removed from cider by enzyme clarification. The method may have com. applications. C. R. Fellers

Removal of spray residues from apples; a wax-solvent method. J. R. Neller. *Ind. Eng. Chem.* 23, 323–5(1931).—Winesap apples were dipped in various solvents to remove the exuded wax and the oil that had been added in the spray mixts. MeOH proved to be a desirable solvent and enabled the HCl wash effectively to remove arseni-

cal spray residues that could not be removed with HCl alone even when heated. The storage quality of the fruit was not impaired. Practical considerations of the method are discussed J. R. Neller

Composition of tomatoes and tomato products and the determination of water in these products. A. Leonhard. *Z. Untersuch. Lebensm.* 60, 185–95(1930).—The compn. of 34 samples of German and Italian tomato products is tabulated. After comparing the various methods of detg. dry solids in tomato products, L. prefers to det. the water directly by distn. with xylene. Place 5–10 g. of the well mixed sample in an Al boat and dist. with 150 cc. of xylene in a 300-cc. Erlenmeyer flask on a sand bath. A delivery tube 350 mm. long, bent at an angle of 45°, leads into a vertical 150-cc. graduated receiver completely immersed in running water and closed except for a glass tube drawn out at 1 end to 2 mm. in diam. and inserted through a rubber stopper. The bottom of the receiver contains 1 cc. of 1:1 KOH soln., and 150 cc. should distil over in about 20 min. Remove any condensate from the delivery tube by application of a small flame, shake the contents of the receiver gently and read the vol. of the sepd. aq. layer after 2 hrs., deducting the 1 cc. of alkali originally present. Volatile oils are retained in the xylene. The results for dry matter were compared with those obtained by calcn. from the sp. gr. of the filtered aq. ext. In general, the dry solids obtained by the direct distn. method were 0.0–4.7% less than by the sp. gr. method, *i. e.*, the moisture results were probably a little high, especially for samples of the more liquid products. C. R. Fellers

Converting wastes into profits. A study of what can be done with tomato pomace. Earl D. Stewart. *Food Ind.* 3, 112–4(1931).—Tomato seeds contain approx. 18–20% of high-quality edible oil resembling cottonseed oil, solidifying pt. —9°. It contains about 45% olein and 34.2% linolein. Tomato pomace may be readily dried in a rotary air drier. The yield is 15 lb. per ton of tomatoes. The compn. is crude protein 21.0, crude fat 18.0, fiber 27.3, N free ext. 21.9 and moisture 5.0%. The product is ground in a hammer mill. Although the taste is bitter, the product is suitable for *cattle feed*. Other products are considered briefly. C. R. Fellers

Insect control in dried fruits. H. M. Reed. *Food Ind.* 3, 117–9(1931).—The use of cold storage, vacuum fumigation with $CS_2$ and $CO_2$, HCN, ethylene oxide and ethylene oxide-$CCl_4$ mixts. are advocated for preventing or destroying insect infestation in various dried fruits under varying conditions. C. R. Fellers

Some properties of honey colloids and the removal of colloids from honey with bentonite. R. E. Lothrop and H. S. Paine. *Ind. Eng. Chem.* 23, 328–32(1931).—Honey samples contain 0.1–1% colloids, which exert a considerable influence on the properties of the honey. The particles have an isoelec. point at *p*H 4.3, at which max. flocculation by diatomaceous earth and min. cataphoresis occur. Addn. of bentonite flocculates the colloids completely. K. V. Thimann

Some organic acids in honey. E. K. Nelson and H. H. Mottern. *Ind. Eng. Chem.* 23, 335–6(1931).—The non volatile acids were detd. by Hartmann and Hillig's method (*C. A.* 24, 2208), the pptn. with $Pb(OAc)_2$ being checked with known mixts. of malic and citric acids in the presence of sucrose. Succinic acid is present in the more acid specimens. Volatile acids, mostly HOAc and $HCO_2H$, range from 0.01 to 0.05%, malic and citric up to 0.05 and 0.008%, resp. K. V. Thimann

Ultra-violet absorption of honeys. J. Stitz and J. Kocheis. *Z. Untersuch. Lebensm.* 60, 420–5(1930).—The Bunsen Roscoe absorption extinction coeff. $\epsilon$ is given in terms of the intensities of incident light $I_0$ and transmitted light $I$, the concn. $c$, and the thickness of the layer of soln. examd. $x$ by $(1/cx)\log(I_0/I)$. By means of the Judd Lewis sector photometer and Hilger quartz spectrograph $\epsilon$ was detd. for wave lengths $\lambda$ of 5500 to 2350 A. U. from the measured values of $\log(I_0/I)$ with a relative error of ± 2.2%. A layer 1–4 cm. thick was used, the source of illumination being a W–Fe arc with electrodes 3 mm. apart in front of a 0.02 mm. slit. Absorption curves in which $\epsilon$ is plotted as ordinate against $\lambda$, are shown for 6 varieties of genuine honey, a characteristic curve always being obtained with a sharp max. at 2700 A. U. corresponding with $\epsilon$ = 0.13 to 0.145 for a 1-cm. layer of a 4.5–6.5% soln. Glucose, fructose and sucrose give higher absorption maxima than water but all are relatively low. For com. sucrose, $\epsilon$ is slightly higher than in the pure product. Dextrin has a very high absorption at 2700–800 A. U. Addn. to honey of 22% of sucrose lowered $\epsilon$ by 0.8. The total absorption of honey cannot be detd. from the individual absorptions of its sugar constituents alone, since the nature and concn. of the ash, coloring matter and proteins exert a considerable influence. C. R. Fellers

Mushrooms should be packed in glass. C. G. Hicks. *Glass Container* 10, No. 1 8–9, 22(1930).—Darkening or oxidation of canned mushrooms is due solely to the

presence of O and not to the action of light. A weak citric acid brine is used in the prepn. to prevent darkening during the heat treatment, which varies from 30 to 45 min. at 240° F. C. R. FELLERS

Stem marrow kale fodder, its cultivation and yield. H. EDIN AND G. SUNDELIN *Kgl Landtbruks-Akad Handl. Tid* 69, 972–1013(1930) —Stem marrow kale has been used widely recently, but data on feed value, cultivation and yield are scarce and inadequate The dry substance of fresh stem marrow kale is 11.5–15%. Leaves contain twice as much protein as the stalk, and considerable fat. The org substance was crude protein 16 4, fat 3 1, fiber 18 5, N-free ext. 62 0 and true protein 10 9%. The org. substance was about 86% of the dry substance Digestibility coeffs of late harvested kale were crude protein 75, fat 66, fiber 48, N-free ext. 88, carbohydrates 81, org matter 78 and true protein 67 Fresh stem marrow kale contains about 95 feed units per 100 kg. of org matter, 7.5 kg of digestible protein, and 68 starch equivs, whereas dried kale has 66 feed units. The numerical value is 87–91 for fresh kale and 76 for dried kale. For cattle feeding, grinding or cutting is unnecessary, but the milk may have the taste of kale Sheep eat stem marrow kale, but coarse stalks must be crushed. Pigs eat leaves without grinding, then eat stalks later. For 50 kg body wt., 5 kg of kale per day may be fed pigs, but this fodder is not a fattener. Poultry will eat cut kale, as a supplementary, rich vitamin food. Detailed instructions for cultivation of stem marrow kale are given. E. M. SYMMES

The camelthorn (Acacia giraffae, Burch). J. S. HENKEL. *Rhodesia Agr. J.* 28, 71–3(1931) —The pods of camelthorn are eagerly eaten by elephants, giraffes and other wild animals in Africa. Their compn. is. $H_2O$ 9 4, acid-sol ash 3.3, ether ext. 1 6, fiber 31 0, crude protein 11 4, CaO 0 9, $P_2O_5$ 0.24 and $K_2O$ 1.3% A. L. MEHRING

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Experiments in spray residue removal (STREETER, *et al.*) 15. A study of arsenical residue on apples in Pennsylvania (HODGKISS, *et al*) 15. Importance of microbiology [in study of milk and its products] (CAZI) 15. Life and work [on ice cream] of the late Professor A. C. Baer (BECKER) 2. Proteins of Indian foodstuffs (NARAYANA) 11D. Influence of neutral red on respiration [of bakers' yeast] (GEIGER-HUBER) 11D. Rust resistance in wheat (HANNA) 11D. The antagonistic substances formed during bacterial fermentation (KLEIN) 11C. Apparatus for pasteurizing milk or other liquids by "holding process" (U S. pat. 1,792,328) 1. Vacuum tank and heated tube system for condensing milk or other liquid products (Brit. pat. 335,964) 1. Continuous process for sterilizing milk or other liquids under pressure (Brit. pat. 337,027) 1.

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OLIVAN, NICASIO: Industrias de la leche. Barcelona. Cervantes. 204 pp.

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Preserving food. FRITZ WALTER RAUTH and WILHELM SCHEFFER. Fr. 694,527, April 25, 1930. Packing materials for food are coated with a mixt. of glycerol, a colloid such as agar-agar and water.

Preserving foods. ERICH FREUND Fr. 695,096, May 5, 1930. Foods are preserved by heating them in a soln. of agents, such as salts of open-chain hydroxy acids, which facilitate the swelling of the dried products. Examples are given of the use of Na lactate and gluconate

Conserving foodstuffs. RICHARD WILLSTÄTTER. Ger. 513, 656, Jan. 22, 1929. Animal and vegetable foodstuff is conserved by addn. of not less than 0 004% vol of HCN in closed vessels Thus, meat is kept fresh for 6 weeks at 20° with 120 to 300 mg HCN to 5 kg of meat in a 100 l. vessel

Vitamin food. LAURENT M. RAYBAUD Fr. 694,443, July 24, 1929 The vitamins in germinated seeds, whole or ground, are preserved by a coating of sugar chocolate, etc.

Hydrolyzed protein products CHARLES N FREY (to Standard Brands, Inc.) Can 308,910, Feb 24, 1931 Hydrolyzed protein substances high in assimilable N are made by hydrolyzing a protein-contg substance with $H_2SO_4$, neutralizing a portion of the $H_2SO_4$ with CaO, sepg the ppt and neutralizing a further portion of the acid with aq $NH_3$

Flour. METALLGES A.-G Fr 694,666, April 29, 1930 Flour for cooking purposes is improved by adding to the flour or to the cereal before grinding, perphosphates up to 2.5% or more of the wt of the flour, so that besides O for the bleaching, there remains in the phosphate an amt of O sufficient to have a raising action on the flour during baking

Dough-bleaching agents comprising bean flour, etc. D VERON Brit. 335,943, July 3, 1929 A dough bleaching agent is prepd by treating fresh untreated legumes contg carotin removing enzymes with a green malt infusion, drying the treated material at a low temp and grinding $NH_4$ or Ca phosphates (3%) may be added to the infusion before use or similar mineral salts may be added to the bean flour in larger proportion, to form a composite yeast food and bread improver. Cf *C. A.* 24, 1676

Bread. OTTO GRAUL Ger 516,268, July 27, 1928 In the manuf. of bread of relatively low carbohydrate content by baking a mixt of rye bran or groats with fresh wheat gluten, sterilized white of egg is added to the leaven

Yeast product. CHARLES N FREY, ELMER B BROWN and COLGATE CRAIG (to Standard Brands, Inc.) Can 308,908 Feb 24, 1931 A food product is prepd by heating a mixt. of 4 lbs of yeast, 35 cc. of HCl (d 1.19), 10 cc of lactic acid (85%) and 2.5 cc of phosphoric acid (85%), hydrolyzing the mass, sepg the residue and evapg the ext., neutralizing the excess of acid and admixing flavoring ingredients prior to the completion of the evapn

Yeast product. CHARLES N FREY, ELMER B BROWN and COLGATE CRAIG (to Standard Brands, Inc.) Can 308,909, Feb 24, 1931. A food product is prepd by heating a mixt of 4 lbs of yeast, 35 cc of HCl (d 1.19) and 23 cc of lactic acid (85%), hydrolyzing the mass, sepg the residue and evapg the ext., the excess of the acids being neutralized prior to the completion of the evapn

Yeast product. CHARLES N FREY, ELMER B BROWN and COLGATE CRAIG (to Standard Brands, Inc.) Can 308,911, Feb 24, 1931 A food product is prepd. by hydrolyzing 4 lbs of compressed yeast with 40 cc of HCl (d 1.19) and 10 cc. of $H_3PO_4$ (85%) in an autoclave at 15–20 lb pressure for 3 hrs The ext is sepd and the residue evapd to a pasty consistency of d 1.4 The acidity may be neutralized with soda, a favorable final reaction is approx neutrality to litmus

Baking powder. WILLIAM E STOKES and REGINALD A WRIGHT (to Royal Baking Powder Co.) Can 308,902, Feb 24, 1931 A baking powder comprises $NaHCO_3$ 300, $Ca(H_2PO_4)_2$ 33, Na H pyrophosphate 405 and starch 262 parts

Testing milk. N GERBER'S CO., G M B H Ger 516,423, April 15, 1928. To det whether udder disease is affecting the compn of the milk, samples from each of the four quarters of the udder are treated with an indicator, preferably bromothymol blue, and then compared one with another

Ozonized acetone. CHEM FAB VON HEYDEN A.-G (Georg Schroeter, inventor) Ger 495,021, Nov 18, 1927 A product contg active O is prepd by treating acetone with ozonized O or ozonized air until an acid reaction has developed The product is useful as a *reagent for distinguishing boiled from unboiled milk*, since a drop of the product added to milk that has been treated with ext of guaiacum wood or resin gives a blue color with raw milk but no color with boiled milk

Apparatus for pasteurizing milk in bulk. CHARLES E NORTH (to Creamery Package Mfg Co.) U S 1,791,511, Feb 10 Structural features

Emulsifying apparatus suitable for use with milk and butter. L. S RICHARDS, E M RICHARDS and CREMAC MARKETING CO., LTD Brit. 335,949, April 4, 1929 Mech. features

Apparatus and system of operation for continuous freezing of food materials such as ice cream. CLARENCE W VOGT (to Vogt Instant Freezers, Inc.) U. S 1,791,772–3–4, Feb 10 Mech. features

Butter and margarine. UNILEVER N V. Fr 694,770, April 30, 1930 Butter and margarine of good keeping qualities are made by bringing the H-ion concn. of the aq constituent to above 5

Margarine. J. D RIEDEL-E DE HAËN A. G Ger 516,119, July 28, 1926 The incorporation of lecithin and other phosphatides into margarine is effected by dissolving

the phosphatides in oxidized or polymerized oils, and incorporating the soln with the margarine Thus, lecithin 1 part and an oxidized unsatd oil 4 parts may be dissolved in ether, the soln evapd and the product incorporated into margarine

**Cheese.** Swift & Co Ger 513,666, Jan 6, 1925 Emulsified cheese is produced by treating the pulverized cheese with an emulsifying agent, sterilizing and finally emulsifying without heating

**Conserving meat, etc.** Otto Sindl Ger 513,716, Oct 27, 1927 The meat, etc, is treated with the condensed products passing over from a wood distn at about 400°, the tar oil, MeOH and acid having been removed

**Cake, pastry, etc.** Pomosin Werke G m b H Ger 516,363, Nov 2, 1929. The deterioration of cake, pastry etc, into a dry and stale condition is retarded by thoroughly incorporating pectin into the cake, etc, mixt Examples are given

**Jams, marmalade, etc.** A W Beach Brit 336,321, July 22, 1929 In making jams, marmalade, conserves, confectionery, etc, the sugar is added in the form of an aq soln (preferably contg 40% or more sugar) obtained by lixiviation or diffusion treatment of the sugar beet, followed by concn and purification and decolorization

**Tea extracts, etc.** O Stronach and P A Wickmann Brit 335,901, July 1, 1929 Tea leaves are treated with an org solvent (such as petroleum ether, pentane, $CHCl_3$ or ether), the solvent is removed to leave a dark green paste, and from the latter the chlorophyll, fat and wax like components are removed by treatment first with 70–80% alc. and then with a solvent such as petroleum ether, and a tea aroma residue is obtained by distg off the last mentioned solvent A fat, oil or wax may also be used as a solvent by allowing the tea leaves to stand with it for a sufficiently long time The tea paste may be dild with sugar to deposit the tea aroma on the latter, and caffeine and tannic acid exts may be added, prepd from tea leaves remaining in the extn app Tablets may be prepd from the product and it may be mixed with candy, chewing gum, milk or other edible substances

**Apparatus for drying tea.** J. A Main. Brit 336,619, June 14, 1929 Structural features.

**Alimentary salt.** P Wood Brit. 336,279, Feb 18, 1929 Solns. contg Mg salts are added to solid NaCl to give proportions similar to those of salts from sea water and the wet mixt is dehydrated as described in Brit 319,203 (*C A* 24, 2513) Org Mg salts may be used and some of the Mg may be in the form of insol salts or finely divided or colloidal material

**Food for animals.** R A Legendre Brit 336 014, Nov 3, 1928. Preservation of feeds such as straw, bran or oats mixed with molasses is facilitated by adjusting the *p*H of the contained moisture to a value between 6 and 11 by the addn of various substances effective for this purpose

**Preserving green fodder.** Gustav Fingerling Ger 513,557, Nov 20, 1925 Green fodder is treated with a Cl evolving electrolyte, *e g*, NaCl soln and subjected to electrolysis The cathode is surrounded by a diaphragm App is described

## 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**European laboratories for the testing of materials** Franklin L. Everett. *Mech Eng.* 53, 201–4(1931) E. H

**Drying the output of the chemical plant.** Ralph Becker *Chem. Met. Eng* 38, 94–6(1931) —A survey of commercial drying equipment and applications.
L. W. T. Cummings

**The heating and drying of granular materials by convection.** W. Gilbert. *Engineer* 150, 500–2, 530–2, 574–5, 617–9, 640–2(1930) —A study of the rate of heat transfer from hot gases to granular lumps of *coal, cement, clay*, etc., under varying conditions of lump size, gas velocity and gas temp Graphs and formulas are given from which the rate of drying over a wide range of conditions can be calcd D. B. Dill

**The economy of hot-air drying with regard to the highest permissible temperature of the product to be dried.** Ödön Vajda *Chem Fabrik* 1930, 25–7; cf *C. A* 24, 3006 —The results of calcns of the heat consumption and power requirements for air circulation in parallel and counter current driers and the lowering of the vapor pressure of hygroscopic materials as a function of the water content are shown on 4 charts
J H. Moore

Hydrogen in modern industry. RENE DUBRISAY. *Science ind* 1929, 323–4. E J. C.

Dust and air filtration. R. C. ROWE *Can Mining J.* 52, 192–6(1931) —The *advisability of filtering air for various machines* is emphasized Types of dusts and advantages gained by filtration are pointed out. The amount of filter surface is important. W. H BOYNTON

The theory of rectification in packed columns. E. KIRSCHBAUM. *Chem. Fabrik* 1931, 38–40, 51–3, 63–5, cf *C. A.* 24, 4194 —A math method is developed for calcg the height and diam of packed towers, which takes into account the phys properties *of the mixt and quantities rectified It has the advantages that in most cases the results* may be obtained graphically, and a chart shows curves for detg the height of intermittent and continuous towers. J. H. MOORE

Moisture in technical gases. II. Application of moisture calculations. FRIEDRICH LÜTH *Arch Eisenhüttenw* 4, 185–92(1930); cf. *C. A.* 24, 2814 —After a discussion of the practical application of moisture calcns., various methods for measuring the moisture content of gases are described, among them the wet and dry bulb method, the pressure temp method, direct weight method and Haar hygrometer H. STOERTZ

Chemical warfare. MICHELE GIUA. *Rivista chim sci. ind.* 1, 170–8, 193–201, 240–51, 266–72, 289–306, 321–60(1930) —Chem and phys. properties, toxicity, uses and manuf of poison gases used in the World War are described E M. SYMMES

Apparatus for defense against toxic gases. R. MARCILLE. *Compt rend.* 192, 382–4(1931) —The principle of the app is as follows respiration takes place in a closed bell, the expired air is passed into a soda soln which absorbs the $CO_2$, the diminished vol of air being supplemented by pure O from a small tank of compressed gas Such an app weighing 10 kg maintains comfortable respiration for one person for 2 to 3 hrs. The app is inexpensive and light in wt. and may also be made of sufficient size to protect several people at the same time. ALBERT L. RAWLINS

Chemical reactions in the oxygen isolation mask. ALBERT HLOCH *Z ges Schiess u Sprengstoffw* 25, 379–81, 422–5(1930) —A discussion of the chem reactions involved and the chem problems to be solved in the design of a practical isolation-type gas mask As fillers the alkali superoxides do not furnish sufficient O, and hence a small auxiliary O container is necessary Other principal objections to this type of filler are (1) the high temp of the air entering the lungs and (2) the high breathing resistance of the canister The alkali superoxides discussed are $Na_2O_4$, $K_2O_4$ and a mixt of the two, or $KNaO_4$ A newer type of filler contains alkali chlorates (cf *C. A* 24, 5086) The reaction which furnishes O is started by a type of ignition which results in an initial burst of O which then continues at a rate sufficient for the needs of respiration This filler is free from the objections cited against the alkali superoxide fillers A. L KIBLER

Burning accident from sodium chlorate. J. W. DREW *New Zealand J. Agr* 42, 55(1931) —Clothing worn during spraying with $NaClO_3$ for weed eradication should be washed free of all traces of the salt before being exposed to an open fire In one case, failure to observe this precaution resulted in severe burns on the lower limbs. K D JACOB

*Insulation for high temperatures.* E. F. ZEINER. *Power* 73, 104–6(1931) —Thermal conductivities of furnace-insulating materials and of insulating cements are compared D B DILL

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The thermal properties of ammoniates and analogous compounds and their use in absorption refrigerating machines (PLANK, VAHL) 2. Heat transfer in liquid $NH_3$ (HIRSCH) 2 *Determination of the local strength of fabrics, felts, paper, etc.* (SCHIEBERT) 1. Solid $CO_2$ from Mexico (MARTIN) 18. Porous material for heat insulation, etc. (Brit. pat. 336 318) 18.

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Gran enciclopedia de química industrial. Química de Muspratt. Suplemento II. Barcelona: Francisco Seix. 332 pp. Ptas. 21.60, bound, Ptas. 30.50. Cf. *C. A.* 24, 2514.

KIEFER, PAUL J., AND STUART, MILTON C.: Principles of Engineering Thermodynamics. New York: John Wiley & Sons. 545 pp. $4.50. Reviewed in *Mech. Eng.* 53, 243(1931).

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Separation of gas mixtures. GES. FÜR LINDE'S EISMASCHINEN A.-G. ABT. GASVERFLÜSSIGUNG. Ger. 513,683, Apr. 20, 1929. Addn. to 490,878 (*C. A.* 24, 2214). Gas mixts., such as air, are resolved into components by liquefaction and fractional evapn. in an app. such as described in 490,878, but in which the heat-exchangers and storers are modified. Cf. *C. A.* 24, 5117.

Gas reactions or purifications. COMPAGNIE INTERNATIONALE POUR LE FABRICATION DES ESSENCES ET PETROLES. Fr. 694,097, Aug. 2, 1929. In treating gases or vapors with catalytic or purifying agents a cylindrical or annular chamber closed at both ends is used, in which the catalyst or purifying agent is placed between 2 perforated partitions which allow a free space at each end for the gas. Perforated tubes for the admission of a reactivating agent and perforated tubes for the exit of the gases formed during the reactivation run through the mass parallel to the axis of the chamber.

Separation of dust from gases. WOODALL-DUCKHAM (1920), LTD., and A. M. DUCKHAM. Brit. 336,201, June 6, 1929. Sepn. of suspended matter from a gas, such as that resulting from the passage of air through a bed of coal and shale for stratification and removal of impurities, is facilitated by adding a gas or vapor such as steam or a liquid spray and so altering the relative ds. of the gas and dust and in some cases causing cohesion of the dust by wetting. Various details of procedure and control of the treatment are described, including an automatic control for the admission of the steam or other treating agent.

Separating fatty or waxy substances from solutions. DEUTSCHE GASOLIN A.-G. (Johann K. Pfaff, Kurt Böttger and Adolf Sieweke, inventors). Ger. 516,401, May 17, 1927. See Fr. 677,385 (*C. A.* 24, 3110).

Emulsions. DEUTSCHE HYDRIERWERKE A.-G. Ger. 513,813, Jan. 17, 1929. Addn. to 512,979 (*C. A.* 25, 1303). In emulsifying substances insol. or only slightly sol. in water, the emulsifying agent of 512,979 is replaced by the reaction products of the esters of monobasic org. acids and alcs. of high mol. wt., with polybasic org. acids. Thus, oleyl alc. is esterified with AcOH in the presence of $H_3BO_3$ and the product treated with adipic acid. The product is used to emulsify peanut oil or other neutral oils in the presence of a small quantity of NaOH. Another example is given.

Moistening pulverulent materials. OTTOKAR URBASCH. Austrian 120,160, June 15, 1930. A uniform and still pulverulent product is obtained by treating the materials with the vapor or spray of the moistening liquid in a rotary drum having loosed or fixed subdividing means. The treatment of stone dust, foundry sand, flue dust, fine ores and cement is referred to.

Separating lump materials according to their behavior toward rays of short wave length, including Röntgen, cathode or ultra-violet rays. FRIED. KRUPP GRUSONWERK A.-G. Ger. 516,130, July 27, 1927.

Sterilizing closed vessels. ARTHUR VONDRAN. Ger. 513,632, Mar. 27, 1928. A reversible air or gas current moistens and carries around the disinfecting agent.

Canister construction for breathing apparatus. R. H. DAVIS. Brit. 336,674, July 19, 1929.

Use of sodium peroxide and similar compounds in cartridges of respiration apparatus. DEUTSCHE GASGLÜHLICHT-AUER GES. and HANSEATISCHE APPARATEBAU GES. VORM. L. VON BREMEN & CO. Brit. 337,170, Nov. 7, 1928. In app. of this character, of closed circuit type, evolution of O is effected at the commencement of breathing by the introduction into the app. of a gaseous acid such as $CO_2$ or HCl (which may be generated from an effervescent powder or supplied in suitable flasks). Various details of app. are described.

Refrigerating agents. K. BERGL. Brit. 336,557, June 11, 1929. In a refrigerat-

ing system employing in open circuit an aq. $NH_3$ soln., the $NH_3$ vapors are absorbed on exhaustion in a liquid such as $H_2SO_4$, which converts them into a non-volatile form. Various details of app. and operation are described.

Absorbent for use with ammonia in refrigerating apparatus. HARRY P. SMITH (to Frigidaire Corp.) U. S. 1,791,515, Feb. 10. A mixt. of $SrCl_2$ and $LiNO_3$ is used as an $NH_3$ absorbent.

Insulators. I. G. FARBENIND. A.-G. Fr. 694,151, April 18, 1930. Elec. conducting wires are insulated by filaments obtained by the hardening of polymerization, condensation or transformation products of butadiene hydrocarbons no longer elastic or extensible.

Insulators. I. G. FARBENIND. A.-G. Fr. 694,425, April 25, 1930. The condensation products obtained from ethers or thioethers of dicarboxylic acids and polyhydric alcs. described in Fr. 655,565 (*C. A.* 24, 6041) are used as insulators in elec. machines and app.

Insulating material. GUSTAV OTTER. Fr. 694,644, April 28, 1930. A sound and shock insulating material is composed of a vulcanized oil mixed with MgO, cement, etc.

Heat-insulating material. I. G. FARBENIND. A.-G. Brit. 306,163, March 11, 1929. See Fr. 691,958 (*C. A.* 25, 1304).

Waterproofing materials and manufacture of electrical insulation. R. C. NEVILLE. Brit. 306,731, Aug. 29, 1929. Articles such as those of asbestos, asbestos cement, clay or the like are impregnated with coal tar, tar oil, pitch or similar material, dried and immersed in a soln. of $CH_2O$ and phenol, and finally heated to 230° for 3–12 hrs. Various details and modifications of procedure are described.

Heat- and sound-insulation. M. CASAS. Brit. 306,440, Oct. 24, 1928. The residue of the combustion of rice chaff is used (suitably in the proportion of 50% or more) with other materials such as asbestos, "silicate wool" and a small proportion of binding substances such as starch or fused silicates, or with clay and granulated cork, etc. Cf. *C. A.* 24, 5057.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Potable and industrial water 1924–1929. Advances, processes, literature. H. BACH. *Chem.-Ztg.* 55, No. 17, *Fortschrittber.* No. 1, 1–29(1931). E. H.

Water supply conditions at Sweetwater, Texas. H. N. ROBERTS. *Proc. 12th Texas Water Works Short School* 27–30; *U. S. Pub. Health Eng. Abstracts* 11, W, 15(Jan. 31, 1931).—The new Bitter Creek supply of 2½ million gals. per day plus a ground supply of 2 million gals. furnishes water of good quality for 11,000 people. Rapid filtration is used. C. P. FELLERS

Water works of the City of Mexico. EDUARDO MELLIZA, ANTONIO CONTRERAS AND ALFONSO V. ACOSTA. *Southwest Water Works J.* June, 1930, 11–7; *U. S. Pub. Health Eng. Abstracts* 11, W, 7(Jan. 24, 1931).—The source of the water is at Xochimilco Springs, about 20 miles south of the city. Because of previous occasional contamination, a dosage of 0.1 p. p. m. of Cl is now added. The present supply is to be enlarged to a capacity of 100 million gals. per day. C. P. FELLERS

Development of ground water supplies. R. O. JOSLYN. *5th Ann. Rept. Missouri Water and Sewerage Conf.*, 64–71; *U. S. Pub. Health Abstracts* 11, W, 15(Jan. 31, 1931).—Of 200 water supplies in Missouri, 65% use ground water as a source. Drilled wells are more economical and less likely to become contaminated than dug wells. Complete sealing out of water from contaminated or otherwise unfavorable strata is essential. C. P. FELLERS

Analyses of the water and deposits from the springs of the "baths of Basra" (district of Tarnava-Mica). J. DIENES. *Bul. soc. stunte Cluj* 5, 239–42(1930).—Analytical data are given. J. H. REEDY

The nitrogenous compounds in sea water—methods for their study. J. GRAU. *Pes. and oceanog. Madrid* [2], 25, No. 10, 2/3–19(1929).—Attention is called to the wide variety of types of nitrogenous compds. present in sea water. A review is given of the existing methods which might be applied to the study of the following classes of N compds.: free N, $NH_3$, nitrites, nitrates, albumens, total N and org. N compds. other than those mentioned. No exptl. data are given and no new methods are suggested. JOHN B. ESTRUCH

The Hardy-Ibbs water-purification plant at Königsberg. G. SAUTTER AND R.

Duisburg. *Gas u Wasserfach* 74, 73–6, 101–4, 128–32(1931).—A new water purification system was constructed at the Hardershof waterworks of Königsberg in 1929 and 1930, and details of the system and its operation are given, with numerous illustrations. The yellow raw water is softened with lime water and clarified and decolorized by adding 50–60 mg. alum per l., followed by rapid filtration through a quartz sand filter after a settling period. The older slow sand filtration plant is still in use. Daily detns. of color, hardness, free $CO_2$, *p*H and permanganate requirement are made before, during and after treatment. Bacterial tests also are made. A clear and almost colorless water is obtained from the badly colored ground water. R. W. Ryan

**An interesting water-purification change.** Otto Ruehl and Albert Wicklein *Chem. Ind.* 17, 207–8(1930).—A summary of changes made in a soda-lime water-softening system and the results obtained are given, including costs. M. C. Rogers

**Sterilization of water by metals.** P. Dienert and F. Kirkiland. *Compt. rend.* 192, 185–7(1931); cf. *Compt. rend.* 136, 707(1903); Lakhovsky, 188, 1009(1929).—Previous work has shown the efficiency of Ag, Zn and Mg in destroying the microorganisms in water. The expts. here reported show that water is freed from *B. coli*, pathogenic organisms, and liquefying bacteria by passing it over a prepn. called silver sand or by agitating it with the silver sand. The organisms disappear more rapidly from water at 37° than at a lower temp. The presence of NaCl in the water retards the process of bacterial destruction. It is shown that water thus treated contains less than 0.003 mg. of Ag per l. N. M. Naylor

**Experience with the lime-baryta process.** A. Thiesing. *Die Wärme* 53, 943–9(1930).—The results of a no. of investigations on water purification installations are presented. The effect of the addn. of lime and baryta, and the limit of softening are detd. Allen S. Smith

**Boiler-water conditioning. A Pittsburgh development.** J. N. Wells and H. A. Jackson. *Proc. Eng. Soc. West Penn.* 46, 427–42(1930); cf. *C. A.* 21, 3107.—Success in boiler operation at high pressures depends upon the timely and correct analysis of the constantly changing boiler $H_2O$. Fundamental requirements of boiler $H_2O$ conditioning establishes that a sufficient amt. of dissolved material (carbonate or phosphate) must be maintained to give chem. equilibria, all org. or saponifiable material must be eliminated and a min. concn. of solids in feed $H_2O$ be maintained. Numerous specific examples, from the Pittsburgh area, of such conditioning are cited. Howard S. Jenkins

**Determining the quality of boiler-feed water by the electrical method.** Yu. M. Kostrikin. *Izvestiya Teploteknik. Inst. (Trans. Thermo Tech. Inst., Russia)* 1930, No. 2, 27–32.—The performance of the Leeds Northrup instrument of Philadelphia is described. A. A. Bortnitsky

**Purification of sea water for boilers.** I. Shik and G. Torosyan. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No. 10, 101–8.—Prevention of $CaSO_4$ formation is of primary importance. Ninety-five % of the Ca is ppted. by treating 100 cc. of water with 0.317 g. $Na_2CO_3$. Fair results are obtained even with 0.075% $Na_2CO_3$. V. Kalichevsky

**The study of the fouling of steam turbine paddles.** Jules Renouard. *Chaleur et Ind.* 11, 175–80(1930).—Two 4500-kw. turbines running on steam at 14–15 kg. at 320° suddenly gave trouble after some years of satisfactory performance, by blade fouling in 2 weeks so that the rotor was quite out of balance. Two analyses of the deposits are given, the major constituents being $CO_2$, CaO, $Fe_2O_3$ and $SiO_2$. It was concluded that the trouble was due to the boiler feed waters. Finally this was held at 40–45° of alky., *i. e.*, about 2 g. per l. Some discussion is given as to how the deposits arose and also a description of the kind of corrosion seen in the steel tubes of water reheaters. S. L. B. Kilkerton

**Practical operation of sewage works.** C. B. Kreuter, *et al.* *Civil Eng.* 1, 91–4(1930).—This is a committee report and subsequent discussion before the Sanitary Eng. Div., Amer. Soc. Civil Eng. The report is a general review of sewage-plant operation and outlines principles for proper procedure. The detailed tests for control purpose are given together with suggestions as to the reporting of cost data, etc. The discussion, showing wide variance in personal opinion, was based upon the value of the various detns. and their relationship to the problems in question. Howard S. Jenkins

**The simple facts about sewage treatment.** Geo. G. Nasmith. *Can. Pub. Health J.* 22, 70–6(1931).—A discussion of sewage treatment, with particular reference to the North Toronto activated-sludge plant, which treats a normal dry weather flow of about 4 million gallons per day from a residential district of 50,000 people. The plant consists of a storm water tank, bar screens, primary settling tanks, aeration tanks in which rising air bubbles give the sewage a spiral motion, final settling tanks, sludge-digestion

tanks and glass covered drying beds The effluent is non putrescible and contains 15-20 p p m suspended matter, its quality being better than that of the Don River, into which it flows The primary and activated sludges are continuously digested together, the 30,000 cu ft. of gas collected being employed for heating the incoming sludge and for lab purposes Digestion is complete in a month The digested sludge contains 50% org matter and approx 3% $N_2$ and is odorless R E Thompson

Sewage-reclamation plant for Los Angeles. R F. Goudey. *West Construction News* 5, 519 23(1930). *U S Pub Health Eng Abstracts* 11, S, 10(Jan 17, 1931)—In order to study sewage reclamation, the City of Los Angeles placed in operation in May, 1930, an exptl sewage plant of 200,000 gal -per day capacity. The problems to be studied are outlined C. R Fellers

Modified form of Imhoff tank used in four Oklahoma towns. Frank B King. *Eng News Record* 106, 112(1931)—General practice of allowing 15-20% of top area for gas vents is probably satisfactory where there is daily supervision or mech means is employed to break up the scum, but experience has indicated that a greater area must be allowed for gas vents in installations where little attention is paid to operation. In modified type of tank employed in 4 towns in Oklahoma, 60% of the top is left for scum accumulation, the sludge bed being placed nearby to allow the scum to be thrown from the tank with a fork when excessive amts interfere with escape of the gas. R E T.

Thermophilic digestion of sewage solids. IV. Fresh solids and activated sludge. Willem Rudolfs and H Hefuktjekian *Ind Eng Chem* 23, 67-0(1931), cf *C A* 25, 157—Digestion of lab samples of daily additions of fresh and activated sewage solids was accomplished at 50° in the short period of 2 1 days, seeding materials produced under similar thermophilic conditions having been used These expts. indicate that a daily charge of 50% volatile matter as fresh sludge can be assimilated The sludge so obtained had all of the characteristics of well-digested material Additional work is to be conducted on a semi plant scale Edward S Hopkins

Dewatering sewage sludge on glass-covered sand beds. G C Houser *Munic Sanit* 2, 69-70(1931)—Glass-covered beds afford means of at least partially controlling odors from drying sludge. By protecting the sludge from rain the area can be reduced as much as 50%. G L Kelso

Separate sludge-digestion plant at Toledo mechanically operated throughout Harvey P Jones *Eng News-Record* 106, 389-02(1931)—A description is given of what is stated to be the world's largest mechanically operated sep sludge-digestion plant, now under construction at Toledo, Ohio Treatment will include prechlorination coarse screening, grit removal, sedimentation, sep sludge digestion and sludge drying Mech equipment will provide for automatic cleaning of coarse screens, continuous cleaning of grit chambers, continuous sludge removal from sedimentation tanks, skimming of scum and oil from the latter, and agitation of sludge during digestion. The plant, which is the final step in a 14 year program for cleaning up the Maumee River, is designed to serve the 1950 population of 600,000, contributing a mean daily flow of 80 million gallons Prechlorination will be employed to eliminate odors and reduce the bacterial load the chlorination plant being designed for an ultimate capacity of 18 000 lb of $Cl_2$ per day, equiv to a dosage of 15 p p m based on the max dry weather flow of 140 million gallons per day anticipated in 1950 The screenings will be destroyed at the municipal incineration plant. Digestion tank capacity equiv to 2 23 cu ft. per capita will be provided, including 6 months' sludge storage during the winter The gas formed will be collected in domes and utilized for maintaining the optimum digestion temp Provision is also being made for maintaining the $p_H$ value of the sludge at the optimum for digestion The drying beds will be glass-covered, the space provided being equiv to 0 25 sq ft per capita. The dried sludge will be used for reclaiming low lying ground The cost of the plant was estd at $1,971,000 and the actual bids were approx 5% lower R. F Thompson

The influence of chlorine on an activated-sludge process. H D Bell. *The Surveyor* 79, 217-8(1931) cf *C A* 24, 1450—Since bleaching powder is cheaper than liquid Cl for small plants, it was used to reduce the load on the bio-aeration unit. Twenty % increase in plant capacity resulted from chlorination. The final effluent showed an av of 2 0 p p m of nitrate N, thus showing that putrefaction was decreased by Cl treatment. A L. Elder

Filtering materials for trickling filters. Wm E Stanley. *Civil Eng* 1, 113-6 (1930); cf *C A* 25, 368—A general review of the materials used in sewage filter beds Edward S Hopkins

Selecting the materials to prevent clogging. Frank W. Jones. *Civil Eng* 1, 118-20(1930)—The size and durability of filter-bed material must be such as to insure

an abundant air supply through the entire mass Surface growths seal the beds, diminish the air supply and cause "ponding." This is also caused by application of improperly treated sewage Disintegration of the beds may cause clogging in the depths, decreasing the voids. This may also be caused by the rough surfaces of the aggregates retaining the solids Uniform particles of clean material should be used, regardless of size They must be as durable as possible to retard disintegration by weathering EDWARD S. HOPKINS

**Operating filters to remove organic growths.** CHAS. C. HOMMON *Civil Eng* 1, 116-8(1930) —Study of about 60 sewage trickling-filter beds in this country shows that while reasonably clean filters are obtained naturally it is doubtful if the process is satisfactory The uncertain natural removal of clogged material by sloughing, entirely beyond the control of plant operators, is a disquieting feature of plant control. Control of sloughing and killing of surface algae was accomplished by drying the beds for 24 hrs every 7 days This eliminated "ponding" and cleaned the top 12 in of material of adhering particles by action of the sewage flow when re-admitted to them The results of this practice in the Canton, O., plant were in accordance with expectation and prevented the more or less periodic 'ponding' of the beds EDWARD S HOPKINS

**Experiments on the destruction of the filter fly (Psychoda).** W. D SCOULLER AND H H GOLDTHORPE *The Surveyor* 79, 219-20(1931) —Expts. were made on 2 filters with creosote oil emulsion and *o*-dichlorobenzene Expts in l. cylinders showed that vapors from *o*-dichlorobenzene killed the flies in 10 min. Treatment on filters at the rate of 1 gallon per day per 437 sq yds. of filter surface inhibited breeding of *Psychoda* after 10 days' treatment and gave immunity for a month It was twice as effective as the creosote emulsion in paraffin oil One gallon of creosote emulsion per day was needed per 220 sq yds. of filter surface Flies gradually returned when the treatment was stopped A. L. ELDER

**Notes on the determination of biochemical oxygen demand.** W D HATFIELD AND K MORKERT. *Sewage Works J.* 2, 521-8(1930) —The dilu method was found to be accurate to 5% if the bottles were carefully cleaned with cleaning soln., rinsed and dried, and if the org matter in the dilu water was well stabilized and the water itself not toxic to the normal bacterial flora. Distd. water for dilu gave low results, 500 p. p. m., bicarbonate water higher results, and natural well water still higher results. Adoption is recommended of a standard dilu water contg Ca, Mg, Na, $HCO_3$, $SO_4$ and Cl ions Data are given which show that rubber stoppers have an O demand and should never be substituted for glass stoppers in the incubation bottles. W. D. HATFIELD

**Effect of sunlight and green organisms on reaeration of streams.** WILLEM RUDOLFS AND H. HEUKELEKIAN *Ind Eng Chem* 23, 75-8(1931), cf *C. A.* 23, 4760 —This lab. study is based upon the dissolved O, biochem O demand and *B. coli* tests of samples collected from the Delaware River for 24 hr. periods. Results, presented in chart form, indicate that the dissolved O increased rapidly during the forenoon, reaching a max. between noon and 4 P. M. During the night a decrease was noted until the lowest point was reached at 3 A. M., with a subsequent increase again after daylight. This occurred in spite of temp decrease during the night hrs. Many expts. confirm the belief that this O is given off by blue green algae growths in vigorous activity. These data have important bearing on stream-pollution surveys, particularly in summer seasons and discredits afternoon sampling if these specimens of algae are present. EDWARD S. HOPKINS

**Technic of stream-pollution investigations.** P. W. MOHLMAN, T. L. HERRICK AND H. GLADYS SWOPE. *Ind Eng Chem* 23, 209-13(1931) —Special considerations are to be noted in the sampling of a polluted river. A carefully chosen sampling program is to be followed and the most representative points in the stream used for the testing stations. Bottom samples should be carefully collected to assure the elimination of sludge deposits. Composite samples are a necessity for correct data. Interesting diagrams locating proper sampling stations are given EDWARD S. HOPKINS

**Experimental studies of natural purification in polluted waters. IV. Influence of the plankton in the biochemical oxidation of organic matter.** C. T. BUTTERFIELD, W. C. PURDY AND E. J. THERIAULT. *U. S. Pub Health Repts* 46, 393-420(1931); cf *C. A.* 24, 2220 —A dil dextrose-peptone soln (I), which could be readily and accurately reproduced, was used in a series of expts. designed to show the functions of the bacteria and the plankton and the probable interrelationships of the 2 groups of organisms in the biochem. oxidation process. The results obtained in these expts. indicated that: (1) Dil I preserved free from biol activity did not absorb any dissolved O under the conditions of these tests. (2) When inoculated with bacteria in pure culture, dil. I favored their growth, and they increased rapidly in no., reaching a limiting population by the second day of incubation This limiting no was maintained for long periods of

time (3) While bacteria were actively multiplying, O was depleted at a rapid rate After the limiting no. had been reached, thus depletion of dissolved O practically ceased, although the living bacterial population remained high (4) The results observed with mixed cultures of bacteria, free from plankton, were the same as with pure cultures, except that the extent of oxidation was somewhat greater (5) The protozoon *Colpidium* grew well in the presence of bacteria in dil I but was not able to grow in it in the absence of bacteria When the concn of food in the medium was increased 100-1000 fold *Colpidium* grew well in the absence of bacteria The conclusion was reached that in the dil medium the bacteria act as "collectors" or "concentrators" of the *Colpidium* food (6) *Colpidium* growing in pure culture used up the O The amt. of O used, however, was comparatively small (7) When bacteria and plankton were grown together in dil I, the results obtained during the first 2 days of incubation were approx the same as when bacteria only were present. After the first 2 days, however, the bacterial nos were not maintained but were reduced rapidly, the reduction being accompanied by a plankton increase Moreover, the oxidation process did not cease but continued as in natural polluted waters (8) In general the extent of oxidation observed in dil I varied directly with the complexity of the biol factors present—that is, the greater the variety of organisms acting in the medium, the more extensive the O depletion observed. Based on the results obtained the theory is advanced that the chief function of certain plankton in the biochem oxidation process is to keep the bacterial population reduced below the satn point and thus to provide conditions suitable for continuous bacterial multiplication this in turn resulting in more complete oxidation Support is given to this theory by the results obtained in expts. in which the limiting nos. of bacteria were reduced by phys and chem means Such reductions in bacterial nos. were invariably followed by renewed bacterial multiplication and oxidation J A Kennedy

Some inter-relationships of plankton and bacteria in natural purification of polluted water C T Butterfield and W C. Purdy *Ind Eng Chem* 23, 213-8 (1931), cf *C A* 22, 2223.—Normal polluted $H_2O$ contains many bacteria and plankton, if these are removed or killed oxidation ceases Studies with *B aerogenes* and bacteria free *Colpidium* in pure culture were undertaken to show the relationship between them Active multiplication of bacteria caused rapid adsorption of O by the $H_2O$ until a limiting concn was reached Use of the pure plankton culture gave moderate O depletion, admixt. of the cultures gave rapid O adsorption during periods of bacterial multiplication and also after the limiting value of *Colpidium* had been reached This indicates that the function of plankton in polluted streams is to maintain the bacterial population below their limiting value and to provide suitable conditions for their multiplication, thereby giving more complete oxidation Edward S. Hopkins

A routine method for direct determination of B. coli in large quantities of water on a solid medium. I Dienert and P Etrillard *Ann services Tech hyg Ville de Paris* 1930.—In France the common test for *B coli* is by the use of 0.1% phenol broth. The medium described is a type of eosin methylene blue agar. It contains 1000 ml. distd water 10 g peptone (Difco), 2 g dipotassium phosphate, 10 g lactose, 15 g agar The reaction is adjusted to $p_H$ 7.5 When ready to use the following is added to 25 ml of the agar eosin yellow 2% 0.5 ml., methylene blue 0.5%, 0.5 ml., phenol 5% 0.25 ml Highly contaminated waters are plated directly in small quantities. In waters less densely polluted the bacteria must be concd *B coli* colonies are round, and 3-4 mm in diam By transmitted light the center of the colony is a dark violet blue this color covering at least ¾ of their area The periphery is bright gray blue, sometimes metallic in appearance By reflected light the center of the colony appears slightly elevated The colonies beneath the surface are in the form of small, dark blue lentils *B aerogenes* colonies are 4-6 mm in diam with deep-brown centers when viewed by transmitted light By reflected light they do not show the metallic sheen In case of doubt colonies are picked and inoculated to peptone broth G L Kelso

Epidemic of intestinal disorders in Charleston, W. Va., occurring simultaneously with unprecedented water-supply conditions. E S Tisdale *Am J Pub Health* 21, 198-200(1931).—Throughout the entire drought period of 4 mos (Aug to Dec., 1930), in which acute and offensive taste and odor conditions existed in the water supply and a high pollution continued as a result of pollution of the Elk River by water from the Kanawha River the filtration plant operation was above reproach, and daily independent bacteriol tests by 3 different water testing labs. showed that the U. S Treasury Standards had been met. The illness caused by these unprecedented circumstances is described J A Kennedy

Water-borne typhoid fever still a menace. Abel Wolman and Arthur E Gorman *Am J Pub Health* 21, 115-29(1931).—W and G give a detailed analysis of water-

borne outbreaks of typhoid fever and *dysentery* covering the decade 1920–1929 for both the United States (47 states) and Canada (9 provinces). These outbreaks are classified as to population groups affected, as to points of pollution in waterworks system, as to causes and as to relative magnitude. Data are given concerning the largest outbreaks. The 5 cities in the U. S. with repeat outbreaks from the same cause and the 4 cities with repeat outbreaks from a different cause are further considered in tabular form.

J. A. KENNEDY

Use of chloramine in treatment of pool water. J. F. T. BERLINER. *Beach and Pool Mag.* 5, 9–10(1931).—Chloramine, unlike chlorine, is not destroyed by org. matter or actinic rays, nor removed by aeration. Less chlorine is required, a reduction as high as 80% being accomplished. Complaints of tastes, odor, and irritating effects, as well as algae and slime growths are reduced. The ammonia is added before the chlorine. Before applying the *o*-tolidine test, nitrites, if present, must be destroyed by oxidation with $H_2O_2$.

G. L. KELSO

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Chloramine, its preparation, properties and use. HIRSCHKIND. 6. Importance of microbiology [in study of sewage and water]. CARR. 15. Apparatus for drying sludge for fertilizer. (U. S. pat. 1,792,084.) 1. Recovering fibers from the waste waters of the paper, cellulose, etc., industries. Austrian pat. 120,610. 23. Apparatus for eliminating CO from motor vehicle exhaust gases. U. S. pat. 1,791,912. 1. Purifying light oils recovered from coal gas, etc. [with production of solutions for softening water]. (Brit. pat. 336,636.) 22.

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Regenerating zeolites used in water softening. WALTER H. GREEN (to Permutit Co.). U. S. 1,792,220, Feb. 10. A moving stream of the zeolite is first subjected to the action of a relatively weak regenerating soln. and then to the action of a stronger regenerating soln. App. is described.

Tubular heat-exchange apparatus suitable for heating boiler feed water, etc. FOSTER WHEELER CORP. Brit. 336,800, Jan. 23, 1930. Structural features.

Dechlorinating water. JOSEF MUCHKA. Austrian 120,119, June 15, 1930. In removing excess of Cl from chlorinated water by passing the water through active C or the like, the dechlorinating mass is kept sterile by continuously exposing a fresh surface to the chlorinated water. Suitably, the water is supplied through an injector to the top of a container for the active C, and the water supply pipe is connected to the bottom of the container in such a way that C is sucked up by the injector and carried by the water to the top of the C mass.

Rotary sewage distributor. E. HARTLEY. Brit. 336,384, Sept. 23, 1929. Structural features.

Purifying waste waters from gas manufacture. HEINRICH BRUNS. Ger. 516,527, July 25, 1929. Addn. to 504,337 (*C. A.* 24, 5404). The washing oils required for the method of Ger. 504,337 are used in a cycle and are dephenolized, *e. g.*, by washing with NaOH soln., immediately before or after treating the waters therewith.

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## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

The formation of a board of specialists to study the interesting scientific problems of agriculture in the hot countries and the organization of scientific service for the Colonies. AUG. CHEVALIER. *Bull. agr. Congo Belge* 21, 335–73(1930).—The formation of a board to study the agricultural and forestry possibilities of the hot countries and to furnish scientific information is discussed. A no. of the important problems facing such a comm. are given.

J. R. ADAMS

Importance of microbiology as a subject of study and research in agricultural colleges. A. K. B. CARR. *Penna. Agr. Coll. Mag.* 22, 172–9(1930).—The importance of microbiology in the study of *soils, manure, sewage, water* and, particularly, *milk and its products* is discussed.

K. D. JACOB

A few impressions of agricultural chemistry in foreign countries. C. A. BROWNE. *J. Assoc. Official Agr. Chem.* 14, 101–12(1931).—An address dealing briefly with modern trends in European countries, as observed in the course of 16 months' sojourn in various European countries.

A. PAPINEAU-COUTURE

The restoration of the fertility of tropical soils. ALBERT BRUNO. *Bull. agr. Congo Belge* 21, 574–80(1930).—A no. of the plantations in the French colonies have

lost much of their fertility because of lack of fertilization Conclusions are drawn from work carried out in other countries as to the proper fertilizer for the various tropical crops on these plantations J. R. Adams

Titanium in some New Zealand soils and pastures. H O. Askew. *New Zealand J Sci Tech* 12, 173–9(1930) —Soils of various types from different regions were examd. The Ti content varied from 0.25 to 1 5%, calcd as Ti, but in a large proportion of the samples it fell between 0 3 and 0 7% "Bush sick" soils, both of granitic and volcanic origin, were low in Ti. Heavy loam and clay were highest. The variation in Ti content of the pasture grasses and clovers is considerable From 1 to 8 5 mg $TiO_2$ per 100 g dry matter was found. This amt. is believed to be too small to affect detrimentally the assimilation of phosphates in the animal body by pptn. of an insol phosphate. There appears to be a correlation between the Fe and Ti contents of the pasture vegetation, both tend to increase at the same time. No correlation exists between Ti and Mn. L E Gilson

Chemical composition of the soils of McHenry County. T. H. Hopper and H. L. Walster. N Dak. Agr Expt Sta., *Bull* 240, 3–46(1930) —The soils are carefully classified as to type, depth and chem. compn The following composite % compn. of surface soils is representative N 0 247, P 0 060, K 1.35, Ca 1 66, Mg 0 55, S 0 91, Si 35 22, org C 2 72, carbonate C 0 24. With the exception of the gravelly and sandy soils, sufficient Ca, S, N, P and K were present for normal crop needs C. R. F

Chemical analyses of Congo soils. F. Claus. *Bull. agr Congo Belge* 21, 560–1 (1930) —A short note is given on the history of the analyses of Congo soils with the titles of a few of the publications on this subject. J. R. Adams

Chemical analyses of Congo soils at the Zambi Laboratory. G Batz. *Bull agr Congo Belge* 21, 562–6(1931) —Both the mech. and chem analyses of 30 representative soil samples of the colonies are tabulated. The soils of the central basin are very mediocre in nutritive values while in the rest of the colony these values are variable and depend on the origin of the soils. J R. Adams

Response of Illinois soils to systems of soil treatment. F. C. Bauer. Ill. Agr Expt. Sta., *Bull* 362, 437–514(1930) —This bulletin brings together in summarized form, certain results obtained from 28 exptl fields that are located on representative types of Ill soils and have been under investigation for 15-26 years The immature, dark soils of Ill. are much more productive than the mature lighter soils Farm manure with or without lime was an effective fertilizer on all soil types. The proper use of lime is fundamental to the management of most Ill. farm lands, and nearly always gives very profitable returns In general, soils deficient in available P respond generously to applications of superphosphate or very finely ground raw rock phosphate. Little difference was found as to the effectiveness of these 2 carriers of P. The light-colored soils and the less-productive dark-colored soils respond strikingly to applications of K. C. R. Fellers

Microbiological studies of some typical Iowa soil profiles. P E Brown and T. H Benton Iowa Agr Expt. Sta., *Research Bull*, No 132, 363–420(1930) —The nos of bacteria, actinomycetes and molds in various horizons of typical profiles of some Iowa soils were detd during 2 seasons, and the results are compared with careful descriptions of the soil profiles by horizons C. R. Fellers

Studies in soil colloids. I. Base exchange and soil acidity. Amar N Puri *Mem Dept Agr India, Chem Ser* 11, 1-38(1930), cf *C A.* 25, 159 —The exptl. evidence obtained in this investigation lends support to the view that soil acidity is due to insol. colloidal acids or "acidoids," which are assocd. with surface active H ions and characteristic reactions A no of reactions characteristic of sol. acids were studied in fully unsatd. soils obtained by exhaustive treatment with 0 05 *N* HCl. The results showed that acidoids, though insol., give reactions similar to those of sol acids, the reactions taking place, however, in 3 distinct stages in which 1, 2 or 3 equivs of H can take part. The exptl. facts can be best interpreted by supposing that the acidoid in a fully unsatd. soil is a tribasic acid Results of liming expts. showed that toxicity of acid soils is confined to the primary H ion of the acidoid. II. Factors influencing the dispersion of soil colloids in water *Ibid* 39–51 —Dispersion coeff (D C) is defined as the % of the total clay (0 002 mm) that can pass into suspension by "auto-subdivision" on being left in contact with water for 24 hrs Expts with air-dried clayic acid (obtained by prolonged treatment of clay with 0 05 *N* HCl) and metallic clayates (obtained by exhaustive treatment of clay with neutral salts) showed that Na clayates go almost completely into suspension after air-drying by simply keeping them in contact with water, while K, Ca and Ba clayates have a D C. of approx. 10 or less The D. C. for clayic acid and Al clayate is very low Na and Li clayates contain the largest pro-

portion of particles that show no sign of settling to a depth below 5 cm after 10 days If a soil suspension at max dispersion is converted, however, into any clayate (with the possible exception of the clayates of Al and Fe) the dispersion remains at its max., provided the soil is not allowed to become dry. Alkali soils rich in exchangeable Na show a high D C. and a very low rate of percolation. Successive treatments of alkali soils with gypsum increase the permeability and lowers the D C. Highly acid soils give a very low D C. and a very high rate of percolation. Irrigated soils give a comparatively higher D C. than unirrigated ones III. Flocculation of soil colloids. *Ibid* 101–18.—Almost equiv quantities of Ca, Ba and Sr hydroxides are required to flocculate a soil The higher the valency of the exchangeable ion, the smaller the ionization and stability of the suspension and consequently the smaller the flocculation value (F V) for a given electrolyte NaCl is an efficient flocculating agent when the exchangeable ions are principally Fe and Al, but is quite inefficient in the case of soils contg principally exchangeable Na In general, Na ions are the weakest flocculating agents, and they show a great difference between F V for partial and complete flocculation Where the amt of exchangeable Na is large, it is not possible to locate accurately the latter value because the whole mass gelatinizes. Flocculation values for Al ions are not greatly different from those for Ca and Ba ions. This is probably due to the formation of Na aluminates at higher $p_H$ values which behave like other Na salts as regards their flocculating power, or it may be due to pptn. of a part of the Al as $Al(OH)_3$ Mg ions are less powerful flocculating agents than Ba and Ca ions. The concn. of gypsum needed for flocculating a deflocculated soil contg only bivalent exchangeable ions is 1 574 mg of Ca per 100 cc This shows that lime cannot function as a permanent cure for the deflocculated condition of a soil because the lime must be converted eventually into $CaCO_3$, a satd soln of which contains only 0 72 mg of Ca per 100 cc. IV. Methods of estimating soil colloids. *Ibid* 119–31.—Methods of detg soil colloids are briefly reviewed Heat of wetting, dye adsorption and $NH_3$ absorption methods are affected by the nature of the exchangeable base in the soil and are not reliable measures of the colloid content. Mech. analysis and water-absorption methods seem to be the most accurate It is suggested that the hygroscopicity of a soil should be measured by bringing it into equil with an atm of 70% humidity, and soil in equil with an atm of 10% humidity should be considered as dry basis for referring to hygroscopic moisture In order to define completely the colloidal behavior of a soil it is necessary to know its clay content, hygroscopicity and base-exchange capacity. V. Methods of determining saturation capacity and degree of saturation of soils. *Ibid* 133–41.—The following method is proposed for detg the state of satn of soils with respect to bases: To 10 g of the soil add 100 cc of water and shake for 2 hrs. with 2 g of $CaSO_4$. Next add 100 cc. of 0.2 *N* $Ba(OH)_2$ and shake at intervals for 6 hrs. during 2 days. After addn of 10 drops of phenolphthalein soln the color of the supernatant liquid is discharged with 0 1 *N* $H_2SO_4$ and the acid is then added gradually with vigorous shaking after each addn The titration is complete when the supernatant liquid remains absolutely colorless for 2 hrs The titration is completed in 2 to 3 days. The total $Ba(OH)_2$ minus the total acid gives the amt of base retained by the soil and is equal to $T - S$, where $T$ is the amt. of base the soil is capable of binding and $S$ is the amt. of absorptively bound base originally present in the soil. $T$ is detd by washing another 10 g of soil with 0 05 *N* HCl till all the replaceable bases are removed, as detd by the absence of Ca ions in the filtrate, followed by washing with water till the free acid is removed The soil is then transferred to a bottle and titrated with $H_2SO_4$ after addn of an excess of $Ba(OH)_2$ exactly as described above. The method is simple and rapid, inasmuch as detns. can be made on 20 soils at one time.

K. D. Jacob

The adsorption of the anions of acid dyes by soil colloids. J. G. Smith and P. L. Gile *J. Agr. Research* 41, 401–13(1930).—Several soils contg colloids with widely different silica sesquioxide ratios were shaken with either $H_2O$ or weakly acid solns. of the acid dyes, Na carminate, orange II and ponceau with negligible adsorption of the anions. The soils removed large quantities of ponceau from a 0 05 *N* acid soln but this is evidently a pptn of the dye J. R. Adams

A simplified method of determining "sticky point" of soils. Amar Nath Puri *Agr. J. India* 25, 206–9(1930).—The method of Keen and Coutts (*C. A* 23, 5261) for detg the "sticky point" of soils is simplified as follows: 50 g of air-dry soil is spread on a stout glass plate and water is added gradually from a buret. After each small addn of water the soil is well mixed and worked into a paste, first with an Fe spatula and then with the hand, exactly as in the standard method The sticky point generally can be located within 2–3 drops of water, corresponding to about 0 4 to 0 6% moisture content. The amt. of water in cc. multiplied by 2 gives the sticky point On 48 samples of soil

from different parts of India, the results obtained by the simplified method were almost identical with those obtained by the method of Keen and Coutts if allowance was made for the air-dry moisture content in very hygroscopic soils K. D JACOB

Soil humus. S OSUGI AND Y. SANO. *J. Sci Soil and Manure; Proc. Intern Soc Soil Sci* 5, 112-3(1930).—Soil humus was fractionated by Waksman's method. The sol portion is too small to be significant. The C, N and ash contents of the $\alpha$ and $\beta$ fractions were examd No particular relationships between the $\alpha$ fractions of rich humus soils or the $\beta$ fractions in mineral soils were observed. Schollenberger's chromic acid method for detg humus (*C A* 22, 291) is satisfactory if samples of suitable size are used e g, 0 01 g sample of soil with 30% humus, 0 02 g with 15 20% and 0 1 g with 5% B C. A.

Potassium thiocyanate method for determining soil acidity. Y. KAMOSITA *J Imp Agr Expt Sta, Tokyo, Proc Intern Soc. Soil Sci* 5, 103-4(1930).—The color intensity in the Comber test for soil acidity was standardized by titrating the ale ext. with KOH soln Values so obtained for a no of soils were compared with $p_H$ values exchange acidity and exchangeable base content Soils exhibiting exchange acidity have $p_H < 5.5$ Soils with $p_H < 6.88$ give, with Comber's test, red colorations which increase in intensity with increasing exchange acidity. In soils showing exchange acidity the proportions of exchangeable Ca and Mg are smaller than those of Fe and Al. The reverse is the case where no exchange acidity exists It is suggested that the red coloration in Comber's test is due to the exchange of ferric ions for K ions in the thio cyanate and that exchange acidity is partly the result of the presence of exchangeable Fe B C. A

The effect of lime on the texture of soils. WALTER REIMER. *Wiss Arch Landw, Abt A, Pflanze* 4, 251-70(1930).—The heat of wetting of loam, clay or humus soils remains unchanged by addn of CaO or $CaCO_3$ These substances increase the bacterial decompn of org matter in the soil, thereby changing the texture. This effect is negligible, however, for the quantities of CaO or $CaCO_3$ used in practice W. G R

Lime additions to friable clay. W BRENNER. *Bull Agrogeol Inst Finland* No 29, 13 pp (1929), *Proc Internat Soc Soil Sci* 5, 129-30(1930).—Addn. to soil of lime in quantities predetd from titration curves to produce $p_H$ changes up to 5 6 effected the calcd changes To bring about $p_H$ 6 in the field, 1 6 times the quantity of lime calcd from lab tests was required It was impossible in the field to bring the $p_H$ value to 7 0 The most heavily limed areas of this soil rapidly developed further acidity B C. A

The effect of plowing under cane trash upon the available nitrogen of the soil. WM L OWEN AND W P DENSON *Zentr Bakt Parasitenk*, 2 Abt, 82, 174-99(1930).—The addn of fresh cane trash to soils contg nitrates causes a very rapid transformation of the N into org forms This depressing effect on soil nitrates decreases at a fairly const. rate when the crop residue is in contact with the soil, and under ordinary conditions it has perhaps lost most of its pernicious effects at the time the fertilizer is applied to cane fields The addn of fresh trash retards appreciably the rate of growth of corn plants but when it has been partially buried for several months, it increases the initial rate of growth and the yield The addn of cane trash to soil increases its water holding capacity and retards drying Cane trash in soil causes appreciable gains in total N, indicating stimulation of the N fixing bacteria by the products arising from decompn of the org matter Field tests over a period of several years show no decrease in crop yields, indicating that the practice is consistent with conserving available N in the soil Whether the continued practice of incorporating such large quantities of org matter with a C N ration of approx 1 40 would tend so to increase the accumulation of the more resistant constituent, lignin, as to affect unfavorably the compn and productiveness of a soil needs further study JOHN T. MYERS

Cellulose-decomposing soil-fungus of an unusual character. H L. JENSEN *Proc Linnean Soc, N S Wales* 55, 699-707(1930).—A fungus, probably belonging to the genus *Botryosporium*, was isolated from an English field soil with addn of manure This organism proved very sensitive to acid reaction, $p_H$ 4 5 being very near the limit of acidity at which growth could be induced, a good growth would only take place at $p_H$ values above 6 0, and an optimum zone seemed to stretch from $p_H$ 6 6 to $p_H$ 7 4 and possibly higher In neutral or alk soln the fungus exerted a very strong cellulose-decompg activity, in unbuffered physiologically acid soln it exerted almost no activity Its sensitiveness to acidity is greater than that of any fungus hitherto studied ALICE W. TYPPERSON

Agreement between the Azotobacter and seedling plant methods (for determining the phosphoric acid requirements of soils). H NIKLAS, H POSCHENRIEDER AND F

CZIBULKA *Das Superphosphat* 6, 111–5(1930). cf *C. A.* 24, 5410.—In 2000 comparative expts. with the *Azotobacter* and the Neubauer seedling plant methods for detg the available $P_2O_5$ content of soils, the agreement between the 2 methods was very good, good and poor in 74.7, 14.1 and 11.2% of the trials, resp. K. D JACOB

The evaluation of the results of soil analyses, with respect to the need of phosphate fertilization. ANTONÍN NĚMEC. *Wiss. Arch. Landw., Abt. A, Pflanze* 4, 228–46 (1930). cf *C. A.* 24, 5017.—Addn. of superphosphate to soils contg. but little phosphate sol. in 1% citric acid soln. failed to increase the yield of sugar beets in some cases, whereas other cases were observed where increased yields were obtained from soils rich in phosphate sol. in 1% citric acid soln., when similarly fertilized. This anamolous behavior was found to be due to the Fe content of the soil. Soils contg. more than 45–50 mg. sol. Fe per 100 g. soil failed to show increased yields when fertilized with superphosphate, regardless of the phosphate content of the soil. Other expts. showed that the same effect is observed if the $SiO_2$ content of the soil is greater than 12 mg. per kg. soil. Similar results were found for several grains and vegetables. W. G. R.

Determination of easily soluble phosphoric acid and potash in soils by extraction with water and with carbonic acid-bicarbonate solutions. B. DIRKS AND F. SCHEFFER. *Das Superphosphat* 6, 75–80(1930). cf *C. A.* 25, 1019.—It is proposed to det. easily sol. $P_2O_5$ and $K_2O$ in acid soils by extn. with distd. water, and in neutral and alk. soils by extn. with a $H_2CO_3$ soln. of $Ca(HCO_3)_2$. Thirty g. of the soil is shaken with 75 cc. of water, or the soil is mixed with 1 g. of $CaCO_3$ and shaken with 75 cc. of soln. contg. $CO_2$ equiv. to 80 cc. of 0.1 *N* NaOH per 100 cc., for 1 hr. continuously in a 100-cc. flask. $P_2O_5$ in the filtrate is detd. by the Mo blue method, and $K_2O$ is detd. by the cobaltinitrite method. The method gives results which usually parallel those obtained by the Neubauer seedling method, although the actual numerical values obtained by the 2 methods may be quite different. Results obtained with the method on soils receiving the same fertilizer treatment over a period of years are tabulated, and the use or non use of $P_2O_5$ and $K_2O$ fertilizers is definitely indicated by the data. K. D JACOB

Increased root-solubility of potash contained in the soil as a result of phosphoric acid fertilization. C. DREYSPRING AND F. HEINRICH *Superphosphate* 4, 1–10, 46–59 (1931).—As a result of expts. with the Neubauer method for root-sol. $K_2O$ and $P_2O_5$ on 85 soils of different types and origin, it was found that the root-soly. of the soil $K_2O$ was increased 1 to 14 mg. per 100 g. of oven-dry soil by the addn. of $P_2O_5$ fertilizers. Readily sol. phosphates were more effective in increasing the root soly. of soil $K_2O$ than were the less sol. phosphates. Superphosphate caused an av. increase of 8.8 mg. of root-sol. $K_2O$ and basic slag an av. of 4.2 mg. per 100 g. of oven-dry soil. The percentage increase in the assimilation of $K_2O$, caused by either of the 2 phosphates, systematically diminished as the root sol. $K_2O$ content of the soil increased. The abs. assimilation by the plants, on the other hand, became slightly higher. The increase in the assimilation of $K_2O$ was also dependent on the root-sol. $P_2O_5$ contained in the soil, the abs. figures became slightly, and the percentage figures considerably, smaller with increasing $P_2O_5$ content of the soil. D. and H. consider that the potash-activating power of superphosphate is due principally to its content of free $H_3PO_4$ and $CaH_4(PO_4)_2$. The Ca sulfate in superphosphate may also have some effect. K. D JACOB

History of the ammonium citrate method for determining insoluble phosphoric acid. W. CATESBY JONES. *Am. Fertilizer* 73, No. 11, 36, 38, 60(1930).—A review.
W. H. Ross

The fertility of the fundamental soil zones of the Union and their fertilizer requirements. A. N. LEBEDYANTZEV *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 351–63 (1930).—The soils were analyzed chemically for the properties which indicate to some degree the fertility of the soil, such as exchange capacity, exchange acidity, hydrolytic acidity, hygroscopic moisture, N, P, K and org. matter. The results are presented graphically and in tabular form on the podsols, gray forest soils, degraded chernozem, deep chernozem, ordinary chernozem, southern chernozem, chestnut and gray arid soils. The control pots of the vegetation expts., conducted by the Mitscherlich method, show that the natural fertility of the soil zones follows from a low point in the podsol zone to the highest point on the deep and ordinary chernozem and to a lower point on the southern chernozems and chestnut soils and still lower on the gray soils. The yields follow the properties of soil fertility enumerated above, which in themselves increase and decrease in the order of the soil zones as enumerated. The field expts., as well as some of the vegetation expts., indicate that all zones show deficiencies decreasing in the order N, P, K. The podsols have the least K. They also respond most effectively to fertilizers in general. The same is true for desert soils when water is supplied. Next in order of effective response are the northern chernozems. The lowest response is obtained on the

southern portion of the chernozem zone Some specific crops require specific fertilizers irrespective of the soil zones J S JOFFE

Survey of the fertilizer industry. P. E HOWARD. U. S. Dept. of Agr., *Circ* 129, 1 22(1931) —A statistical review of the world consumption of N, $P_2O_5$ and $K_2O$, the world production of inorg N compds, basic slag, superphosphate and other fertilizer materials the quantity and value of fertilizer imports and exports for the U S.; and the U S supply of N, $P_2O_5$ and $K_2O$ W H Ross

Fertilizer trials at Rothamsted. Rothamsted Expt. Sta., *Rept.* 1929, 125 pp— Efficiency of phosphate fertilizers on grass land is in the order superphosphate > high-soly basic slag > low soly basic slag > mineral phosphate The high-soly. fertilizers increased the proportion of phosphate in the herbage Superphosphate increased the potato crop provided no N was given, but decreased it in the presence of N and potash In cooking tests the color of potatoes which had received potash fertilizers was superior In this respect the chloride gave best results, followed, in order, by the sulfate and potash fertilizer salts In flavor only the best of the potatoes fertilized with potash equaled that of the unfertilized, all others were inferior Complete fertilizers gave best results with sugar beet, and these were still further improved by dressings of salt. With barley, $H_2CN_2$ and $NH_4Cl$ again gave as good results as $(NH_4)_2SO_4$, though still inferior to $NaNO_3$ Potash reduced the attack of *Fusarium culmorum* In pot culture chlorides delayed the ripening of barley straw and gave a lower dry-wt yield than sulfates The highest-quality barley was obtained with $NH_4Cl$ and urea No harm resulted from sowing up to 2 cwt of $H_2CN_2$ per acre with the seed, but 4 cwt. per acre was distinctly injurious B C A

Nitrogen fertilizers. BRUNO WARSER *Metallbörse* 20, 1853(1930), cf. *C. A.* 25, 1617 —A review of various pyrolytic and acid processes for making mixed fertilizers from phosphate rock and K Al silicates, from phosphate rock, $HNO_3$ and $NH_3$, and from KCl $H_3PO_4$ and $NH_3$ S L MADORSKY

Results of experiments with nitrogen fertilizers on cotton. V. N. MANDRUGIN *Udobreni i Urozhai (Fertilizers and Crops)* 2, 363-9(1930) —The addn of nitrogenous fertilizers from various sources at the time of planting shows that the best results during the year of application were from $(NH_4)_2SO_4$ followed by $KNO_3$, $CaCN_2$, $NH_4NO_3$ and $CO(NH_2)_2$. The best after-effects were shown by $NH_4NO_3$, followed by $(NH_4)_2SO_4$, $KNO_3$, $CO(NH_2)_2$ and $CaCN_2$. The highest total increase in yield for the 2 years came from $(NH_4)_2SO_4$ followed by $NH_4NO_3$, $KNO_3$, $CaCN_2$ and $CO(NH_2)_2$. When the same fertilizers were added during the process of boll formation the $CaCN_2$ was the most effective during the first and second years In general, the increase in yield was higher when the fertilizers were added later in the process of growth. This is in accordance with the results of physiol expts which show that cotton takes up more N in the later stages of growth than during the early part. J S JOFFE

Nitrate fertilization and nitrogen fixation by the legumes. ERWIN WEBER. *Zentr Bakt Parasitenk.*, 2 Abt., 82, 353-79(1930) —Nitrate fertilization decreases N fixation JOHN T. MYERS

Potash fertilizers at the "Belle Etoile" distillery. DUBOSC. *Bull agr. Congo Belge* 21, 581-3(1930) —The addn of a large quantity of $K_2O$ causes a richer and purer juice in the sugar cane and favors the maturity of the cane This in turn favors a greater production of rum to the acre of cane J R A

Tests with phosphate fertilizers. G TOMMASI AND S DOJMI. *Atti III congresso naz chim pura applicata* 1930, 661-3 —In some cases the use of finely ground mineral phosphate is advantageous, but much less effective than sol phosphate fertilizers. E M. SYMMES

The use and action of phosphates on chernozem. M. A. EGOROV. *Pochtovedenie* (Russian) 23, No 3-4, 5-28(1928), cf *C A.* 24, 2534 —In an attempt to establish the conditions for the reversion of phosphates in chernozem soils, E conducted a series of expts assuming beforehand that the Ca humates in the soil undergo double decompn. with sol phosphates By using the mono-, di- or tri-Na phosphate on soils the corresponding Ca phosphates ought to be obtained Ten g of soil was mixed with 50 cc. of 0.25 *N* solns of various phosphates, shaken for 3 min and filtered. With $KH_2PO_4$ the ext. was almost colorless with $NaH_2PO_4$ the ext. was light yellowish brown, with $(NH_4)_2HPO_4$, $K_2HPO_4$ and $Na_2HPO_4$ it was the same, with $K_3PO_4$ it was dark brown with $Na_3PO_4$ it was intense dark brown Thus the color depends on the nature of the cation (Na being more active) and the anion ($H_2PO_4^-$ and $HPO_4^{--}$ giving a slight coloring and $PO_4^{---}$ producing an intense coloration) The intensity of the color increased with the increase in concn and an increase in the time of shaking The humus substances can be released by washing with a salt soln and then with water Exts

obtained by the use of $NaH_2PO_4$, $Na_2HPO_4$ or $KH_2PO_4$ together with $CaCO_3$ are darker than those obtained with the phosphate alone $CaCO_3$ alone when mixed with soil and water gives no humus in the ext Five-g samples of soil were treated with 25 cc. 1.0 *N* $NaH_2PO_4$, $KH_2PO_4$ and $Na_2HPO_4$, shaken for 3 min, placed in collodion bags and dialyzed After a few days a brownish liquid began to rise from the surface of the settled soil in the bag with the $NaH_2PO_4$ and diffuse through the supernatant liquid. It finally turned the entire bag into a dark-colored mass, some org matter started to go through the dialyzer This action was slower with the $Na_2HPO_4$ With the $KH_2PO_4$ the liquid after 3 months was just a weak brownish yellow The behavior of the $NaH_2PO_4$ and $Na_2HPO_4$ is explained on the basis of formation of the more sol $Ca(H_2PO_4)_2$ and the less sol $CaHPO_4$ Addns of $FeSO_4$ or $FeCl_3$ to exts of $Na_2HPO_4$ had no effect on the mobility of the humus Addns of $FeCO_3$ gave the same results as addns of $CaCO_3$ The reactions in all cases resolve themselves into the formation either of a sol or an in sol phosphate By successive extns with $Na_3PO_4$ and decanting it was found possible to obtain in soln most of the org fraction of the absorbing complex, about $^1/_3$ to $^1/_2$ of the total org matter is contained in this fraction J S Joffe

**Fertilizing action of bone meal.** E Truninger and F Keller *Landw Jahrb Schweiz* 43, 931–45(1929).—Bone meal, with preference for the defatted, is recommended to give good results when used on acid soil One application of raw bone meal gave 0.33 the increase of superphosphate, on doubling the application the increase was 0.50 There is a relationship between the particle size and the activity N from bone meal is estd to be 50% as valuable as nitrate N George R Greenbank

**Ammonia liquor as a fertilizer.** Brischas *Gas u Wasserfach* 74, 13–6, *Gas Journal* 193, 324(1931).—Pot tests carried out at the Mitscherlich Expt. Sta at Marienburg on the effect of $NH_3$ liquor on oats and mustard plants in light, medium and heavy soils indicate that good results may be obtained on the better or heavier soils Phosphate and potash were added in each case In spite of the alk nature of the $NH_3$ better results were obtained when phosphate was added as Thomas meal instead of superphosphate This was first noted at a period about half way in the growth of the plants and became more noticeable as the expt progressed Poor results were obtained on a pure sand soil, even though potash and phosphate were added R W. Ryan

**Composition of lime for fertilizer.** Yoshizo Hayashi *J Imp Agr Expt Sta.* 1, 57–72(1929).—The CaO content of 43 representative liming materials in Japan varied from 55.94 to 95.92%, av 71.82% The finer the particles of lime, the lower was the CaO content K Kitsuta

**Production of citric-soluble fertilizers by the decomposition of phosphorite with silica at high temperatures.** Jaak Kuusk. *Acta Commentationes Univ Tartuensis* (Dorpatensis) AXX, 1, 1–79(1930)(in German).—A study was made of the optimum conditions for the formation of citric sol phosphate (sol in 2% citric acid soln) by heating natural phosphates with $SiO_2$ With Esthonian phosphorite and Florida phosphate, both of which have the fluorapatite structure, active decompn began at about 1370° and, in general, the percentage of citric sol $P_2O_5$ increased with further increase in temp With finely ground phosphate, passing a sieve having 5000 meshes/sq cm, the amt of citric sol $P_2O_5$ formed depended upon the quantity of $SiO_2$ used, up to about 42% of the wt of the furnace charge, and better decompn was obtained with finely ground $SiO_2$, passing a sieve having 5000 meshes/sq cm, than with the same wt of coarse $SiO_2$ Approx 90 to 98% of the total $P_2O_5$ was converted into the citric sol form when mixts contg 30 to 40% $SiO_2$ were heated rapidly in an internally fired gas furnace to 1380° and then heated to 1440–1460° at the rate of 2°/min Lower results were obtained when the mixts were heated in an elec furnace under the same conditions Phosphates contg excessive amts of lime were successfully decompd by proportionately increasing the amt of $SiO_2$ in the charge The presence of more than about 10% of $Fe_2O_3$ and $Al_2O_3$ depressed the citric soly of the $P_2O_5$ K thinks that the citric sol $P_2O_5$ is present as a *silicophosphate*, $3Ca_3(PO_4)_2 \cdot CaSiO_3$, which results from the replacement by $SiO_2$ of the F in the fluorapatite compd, the F being volatilized as $SiF_4$ With phosphates of the carbonato-apatite type decompn began at about 1100°, and above this temp. the percentage conversion in a given time increased rapidly.
K D. Jacob

**Industrial value of marine flora.** Victor de Buen *Rev ing ind* 1, No 6, 5–12, No 8, 12–6(1930).—A brief review is given of methods of prepn of fertilizers, I, algmic acid, cellulose, food products and other org prepns from various marine algae and phanerogams L E Gilson

**Field results indicate value of ammoniated superphosphate for cotton.** Anon *Phosphorus Digest*, Feb, 1931, 2–6.—Complete mixts prepd from KCl and highly

ammoniated superphosphate plus $(NH_4)_2SO_4$ (when additional N was required) were compared with mixts. of similar analysis prepd from KCl, ordinary superphosphate and $(NH_4)_2SO_4$ as fertilizers for cotton in field tests carried out in S C, Ga and Ala. In 17 tests the ammoniated superphosphate mixts gave an av. yield of seed cotton 6.4% greater than that obtained with the ordinary superphosphate mixts. The av yield of cotton obtained at the first picking was also higher from the plots fertilized with the ammoniated superphosphate mixts. The ammoniated superphosphate used in these expts was prepd by treating ordinary superphosphate with approx. 6% of anhyd $NH_3$.
K. D Jacob

Effect of fertilizers on the phosphorus content of plants. J H. Mitchell. *Phosphorus Digest* March, 1931, 6–7.—Expts. by the S. C. Expt Sta over a no of years showed that application of complete fertilizers contg 10–12% $P_2O_5$ gave av. increases of 27, 42 and 47% in the $P_2O_5$ content of oats, soy beans and grass hay, resp.
K D Jacob

The present and the improved methods of making farmyard manure in Kanara. R M Hegdekatti. *Poona Agr Coll Mag.* 21, 222–40(1930).—Large quantities of farmyard manure are prepd in India by the fermentation in pits of org materials in the presence of approx 30% by wt of cattle dung and urine. The principal org materials used are the green and dry leaves and young shoots of forest plants. The leaves of a no of varieties of plants used for this purpose contain approx 1.10 to 2.10% N and 0.5 to 20% tannin as well as astringent resins and volatile oils which act as deterrents to injurious insects in the soil. Fermentation of the material in the pits is hastened by keeping it moist and turning it occasionally. Fermentation is also hastened by the addn of 0.1% N in the form of $(NH_4)_2SO_4$ and 5% of lime or lime alone. A better grade of manure is produced in covered pits than in uncovered pits. In 7 expts the loss of org matter during fermentation ranged from 29.5 to 64%. Analyses of various org materials and of manures prepd from them are tabulated.
K D Jacob

Barnyard manure nitrification in cultivated fields. Chr Barthel and N Bengtsson. *Agl Landtbruks Akad Handl Tid* 69, 1014–31(1930).—Expts with pure bacterial, yeast and mold substance and different amino acids, show that N which is included as a constituent in the cell substance of different microörganisms, and which forms the main portion of the org N in barnyard manure, is nitrified readily in the soil when it is present in the form of pure prepns. However, org N in barnyard manure does not mineralize in tilled soil until a very long time has elapsed, and has no fertilizing effect during the first months or years after introduction. Either the microbial cells in the manure are protected from decompn by colloidal substances in which they are imbedded or the decompn depends upon the C–N ratio (cf Jensen, *C A* 23, 5263). Data are insufficient to decide upon either theory.
E M Symmes

The conservation of ammonia in fertilizing with liquid manure. S Tovborg-Jensen. *Wiss Arch Landw*, Abt A *Pflanze* 3, 161–80(1930).—The rate of escape of $NH_3$ from solns of $(NH_4)_2SO_4$ plus NaOH and $NH_4HCO_3$ was detd by drawing air through the solns maintained at const temp. Lab expts were conducted on the rate of escape of $NH_3$ from liquid manure spread on various soils. The effect of added salts was detd by adding $CaCl_2$, $KNO_3$, gypsum and superphosphates to the liquid manure, and detg the $NH_3$ lost when the solns were allowed to dry on filter papers. The lab expts show that the liquid manure is best spread on the soil when it is porous in cool weather and that addn. of the salts mentioned prevents 90% of the loss of $N_2$ ordinarily suffered. Field expts. were also conducted by fertilizing with (1) liquid manure, (2) $KNO_3$, $CaCl_2$ and superphosphate dissolved in liquid manure and (3) liquid manure and each of these salts added separately; the best results were obtained by dissolving the salts in the manure. The following *rapid volumetric method for the detn of $NH_3$* is described. The liquid manure is added to an alk. NaOBr soln and the $N_2$ evolved is collected and measured in a gas buret. 100% of the $N_2$ in $NH_3$ is obtained by this method, but only 95% of the $N_2$ is liberated from urea.
W Gordon Rose

The use of preservatives to prevent loss of nitrogen from cow excreta during the day of collection. Rowland B French. *J Agr Research* 41, 503–6(1930).—Thorough mixing of the feces and urine greatly increases the speed of the action by which N is lost. When unmixed this loss is from 1 to 2.6% of the total N in 18 hrs at 70° F and when these excreta are thoroughly mixed it varies from 6 to 30%. $CuSO_4$, $ZnSO_4$ and formaldehyde in small concns gave complete protection against loss of N when added to homogeneous mixts of feces and urine but the $CuSO_4$ was very ineffective with unmixed excreta. At higher concns boric acid, $FeSO_4$, phenol, salicylic acid and toluene also showed some preservative action.
J R. Adams

The chemical composition of grass from plots fertilized and grazed intensively in

1929. J G Archibald *J Agr Research* 41, 491–501(1930).—The dry matter of the grass from the fertilized plots was higher in N, ether ext., Ca and P, and lower in crude fiber than the dry matter of the grass from the unfertilized plot. Acre production of all constituents detd., crude fiber excepted, was markedly higher on the fertilized than on the check plots. The seasonal variations in the compn. of the grass confirm the conclusions of a previous paper (cf. *C A* 23, 4008). The amt. of rainfall is one of the most important factors which influence the chem. compn. of the grass. J. R. Adams

Club-root in cruciferous crops. J G Gibbs. *New Zealand J Agr* 42, 1–17 (1931).—Fertilization of cruciferous plants with basic slag and $K_2SO_4$ seemed to reduce the intensity of club-root infection. Satisfactory control of the disease was obtained by applying burnt lime at the rate of 2 to 3 tons per acre about 3 months before sowing the crop. K. D Jacob

Calcium relationships of forage crops. L. I. Pugsley and R. R. McKibbin. *Can J Research* 4, 39–51(1931).—Samples of soil, timothy and red clover were secured from the Chateauguay River basin, Quebec, and analyzed to det. the cause of the variation in Ca content of clover and timothy previously observed. The Ca content of timothy and red clover increased directly with the total Ca content of the underlying soil and decreased as the 'lime requirement' of the soils increased. No proportionate increase of protein or of P as the Ca content of the hays increased was observed. The timothy hays from the area investigated were extremely low in Ca content but otherwise normal. The ratios $\frac{CaO}{P_2O_5}$ and $\frac{\text{protein}}{CaO}$ for these hays are, resp., abnormally low and abnormally high. In the red-clover hays these values were normal. J. W. Shipley

Nature and course of the nutrient intake of various vegetables. T. Remy and F. Weiske. *Landw. Jahrb.* 71, 315–31(1930).—The rate of intake of a no. of vegetables is studied by cultural trials. The significance of the cultural intake and growing period is considered in studying the proper fertilizer treatment and the appropriate fertilizer. George R. Greenbank

Fertilization of cucumbers and strawberries with carbon dioxide gas. H. Lundegårdh. *Kgl. Lantbruks Akad. Handl. Tid.* 69, 1044–56(1930).—The theoretical basis of $CO_2$ fertilization has been investigated (Sveriges Trädgårdsodling Årsbok 1923), and practical tests with $CO_2$ fertilization on various hot house plants have been made (Der Kreislauf der Kohlensäure in der Natur, Jena, 1924, Centralanst. f. försöksväs. på jordbruksomr., Medd. no. 331(1928)). Tests were repeated in hot houses, with alc. burned as the source of $CO_2$. A l. of 95% alc. gives 6000 cal. on burning and induces air currents for distribution. $CO_2$ fertilization increases the fruit no. and wt. of cucumbers 28.5–45%, with a $CO_2$ atm. 3–4 times normal. Lamps were filled every morning, lighted, and burned about 20 hrs. until extinguished spontaneously, then the dil. alc. residue was removed to avoid evapn. of denaturant. With strawberries, ripening was earlier, the fruit no. increased 12%, the wt. of fruit higher, and the leaf growth greater. A profit is shown by comparison of the alc. purchased vs. increased return from sale of cucumbers. E. M. Symmes

Potato scab and fertilizers. Eichinger. *Das Superphosphat* 7, 8–14(1931).—Superphosphate and $(NH_4)_2SO_4$ have a decided effect in reducing scab on potatoes. Sulfate of potash magnesia (a mixt. of $K_2SO_4$ and $MgSO_4$) and probably $K_2SO_4$ tend to reduce the occurrence of scab. KCl has no protective action, but seems to favor scab formation to a slight extent. Because of its alk. nature basic slag favors scab formation. Scab formation is promoted to a marked extent by $NaNO_3$ and to a less extent by $Ca(NO_3)_2$. K. D Jacob

Preparations containing rotenone for use as insecticides. I. Aqueous suspensions. Howard A. Jones and William M. Davidson. *J. Econ. Entomol.* 24, 244–57 (1931).—Aq. suspensions of rotenone were prepd. by two methods: (1) Rotenone solns. in water miscible solvents were added to water, and powdered prepns. were mixed with water. (2) Permanent suspensions contg. 0.05–0.5 g. rotenone per l. with the rotenone in highly dispersed condition were prepd. by the addn. to water of pyridine solns. and acetone solns. contg. tannic acid. Mixts. of certain dry products with pptd. rotenone also gave satisfactory suspensions. Permanent suspensions of rotenone were more easily obtained under slightly alk. conditions, but they were difficult to obtain in hard water. Toxicity expts. on various species of insects indicated that aq. suspensions of rotenone are of definite value in the control of certain types of insects. Rotenone decomposes rapidly in pyridine, less rapidly in acetone contg. tannic acid and very slowly in pure acetone soln. This decompn. is accompanied by a corresponding loss in toxicity (cf. following abstract). Pure dry rotenone shows no change in toxicity on standing. C. H. Richardson

The toxicity of rotenone in solution and suspension. W. M. Davidson and Howard A Jones. *J Econ Entomol* 24, 257–62(1931).—The loss in toxicity to insects of rotenone in pyridine solns. and acetone solns. contg tannic acid is described. The pure acetone and alc solns. of rotenone did not lose toxic activity upon standing The yellow decompn material obtained in a pyridine soln. of rotenone was much less toxic to insects and fish than pure rotenone. Aq suspensions of rotenone made from fresh acetone and alc. stock solns. decreased in toxicity to insects upon standing It is recommended that stock solns. of rotenone in pyridine and acetone be used immediately after prepn. Solns. in acetone and alc may be allowed to stand a limited time without loss in toxicity C. H. Richardson

Some comparative tests with rotenone, nicotine and pyrethrum. Merrill M Darley *J Econ Entomol* 24, 111–5(1931).—A soln. of rotenone (concn. 1:100 000) contg a com. petroleum prepn. (concn 1 200) compared favorably as a contact poison with nicotine at 1 10,000 and pyrethrum at 1 74,800 concn. the tests being made upon 2 species of aphids. Pyrethrins at 1 37,400 were effective against the spotted cucumber beetle (*Diabrotica duodecimpunctata*) and the Mexican bean beetle (*Epilachna corrupta*), but nicotine at 1 5000 and rotenone at 1 50,000 were ineffective. A com. petroleum prepn at 1 100 was used in each spray Tests indicated that the toxicity of rotenone for the common red spider (*Tetranychus telarius*) was appreciably greater than that of nicotine and pyrethrins. The relative toxicity of rotenone was greater for this animal than for the aphids C. H Richardson

Genuine derris root may contain no rotenone. R C. Roark. *J Econ Entomol* 24, 328–30(1931).—Expts have shown that rotenone is far superior in insecticidal value to deguelin, tephrosin and toxicarol, the other insecticidal constituents of derris. Therefore all the matter extd with ether from derris root may not be equal to rotenone in toxicity Numerous samples of root sold as derris root have recently been found to contain no rotenone. The rotenone content of derris root varies from 0 to 5.5%, whereas the total ether ext. ranges from 5 to 23%, there is no consistent relation between the two The compn. of the ext. from derris root, *i. e.*, the ratio of one constituent to the other, also may vary considerably A sample found to be rich in toxicarol entirely lacked rotenone. This lack of uniformity in proprietary derris prepns accounts for many of the inconsistent results reported by entomologists. The common derris root now on the market may be expected to contain about 2% rotenone Cubé root (*Lonchocarpus nicou*) from South America contains as much as 7.6% rotenone An ext. of cubé root prepd. in Peru or Brazil may soon be placed on the American market. C. H Richardson

An insecticidal method for the estimation of kerosene extracts of pyrethrum. H H Richardson *J Econ Entomol.* 24, 97–105(1931).—The speed with which pyrethrum exts. paralyze house flies (*Musca domestica*) varies directly with the concn. The speed of paralytic action is variable, but the variation falls within the limits of error due to random sampling This was not true of the mortality after 24 hrs. Differences in speed of paralytic action between a 0.75 lb. (per gal.) and 1 lb kerosene ext. of a fairly powerful grade of pyrethrum powder (0.26% pyrethrin I) were easily distinguishable and statistically significant. Differences in percentage mortality, analyzed similarly, were not significant. C. H. Richardson

Problems in the manufacture of liquid household insecticides of the petroleum extract of pyrethrum type. Alfred Weed *J Econ Entomol* 24, 95–7(1931).—The problems which confront the manufacturer of pyrethrum products are (1) the concn. of the toxic constituents to be used, (2) the use of pyrethrum powder or concd exts. in prepg the products, (3) the selection of satisfactory petroleum fractions and perfumes. C. H Richardson

The effect of soap on the toxicity of a pyrethrum product known as "Red Arrow." A. E. Baderrtscher *J Econ Entomol* 24, 268–77(1931).—This is a study of a com. mixt. contg pyrethrum ext. with the addn. of K coconut fatty acid soap in various proportions The green spiraea aphis (*Aphis spiraecola*) was used as the test insect. Red Arrow" dild with tap water does not give max. efficiency probably because the surface tension of the aq carrier is too high to permit sufficient penetration into the trachea of the insect. The toxicity of this product is increased about 4 times when dild with 0.4% soap, the surface tension of the aq carrier then being nearly 30 dynes. "Red Arrow" loses little if any of its toxicity upon standing C. H Richardson

Experiments with white oil-pyrethrum for the control of the oriental peach moth. Byrley F Driggers. *J Econ. Entomol* 24, 319–25(1931), cf. *C. A* 24, 3313.—The newly hatched larvae of *Laspeyresia molesta* are killed more easily when crawling over sprayed new growth than when crawling over sprayed old growth, because of the great

absorptive power of the old growth for the oil Reduction of fruit infestation amounted to 30–70%. The effects of parasites and their relation to spraying operations are discussed. C. H. Richardson

Tests with nicotine activators. E. P. Felt and S. W. Bromley. *J. Econ. Entomol* 24, 105–11(1931).—Field tests were carried out with nicotine solns. contg various petroleum oil emulsions, Na oleate, K oleate, com. soap flakes and Ca caseinate prepns. The results indicate the influence of a complex of factors on the toxicity of the various mixts. C. H Richardson

Nicotine in the control of ectoparasites of poultry. F. C. Bishopp and R. D. Wagner. *J. Econ. Entomol.* 24, 56–62(1931).—The feather mite (*Liponyssus silvarum*) is controlled by treating roosts and spraying the houses with nicotine sulfate soln The common chicken mite (*Dermanyssus gallinae*), the fowl tick (*Argas miniatus*) and the sticktight flea (*Echidnophaga gallinae*) are controlled by spraying poultry houses with strong solns. of nicotine sulfate. Fowls are treated for the various species of chicken lice by making a light application of nicotine sulfate (40%) to the upper surface of the perches ½ *hr before the fowls go to roost. With proper ventilation of poultry houses* and correct dosage this method will not injure fowls. Disadvantages of the method are discussed C. H Richardson

Comparative performance of nicotine tannate and lead arsenate against the codling moth. Robert S Filmer *J. Econ Entomol* 24, 277–83(1931).—If a sufficient quantity is maintained upon the foliage during the period of codling moth activity nicotine tannate controls this insect as well as Pb arsenate. Nicotine tannate in appropriate concns. *injures neither fruit nor foliage In its present form nicotine tannate* disappears rapidly from the foliage, 60–70% loss occurring in 10 days after application. Before it can be used as an efficient substitute for arsenicals its adhesive qualities must be improved C. H Richardson

Report of committee to formulate plans for investigation of the codling moth from biologic and control standpoints. A. L. Quaintance, Leroy Childs, G A. Dean, B. A. Porter, P. J Parrott and W. A. Ross. *J Econ Entomol* 24, 18–23(1931).—Results of lab. and field tests from 23 Federal and State entomological labs. are given. The following insecticides are considered Mn arsenate, $Na_2SiF_6$, $BaSiF_6$, K fluoaluminate, petroleum oil-nicotine mixt., petroleum oil-pyrethrum mixt., petroleum oil-Pb arsenate mixt., petroleum oil-derris mixt., highly refined (white) petroleum oil emulsion, nicotine tannate and rotenone. Removal of As spray residue also is considered. Mech control methods (banding, chemically treated bands, bait traps, soil treatment), use of parasites and biol. data are reported C. H. Richardson

The effect of hydrogen-ion concentration on the toxicity of nicotine, pyridine and methylpyrrolidine to mosquito larvae. Charles H Richardson and Harold H. Shepard *J. Agr. Research* 41, 337–48(1930).—The toxicity of 0 03 *M* nicotine solns. to mosquitos increased with increasing $p_H$ value, reaching a max. at $p_H$ 9 7 (the free base). Similar results were obtained when either HCl or $H_2SO_4$ was used to adjust the $p_H$ of the soln. At each nicotine concn the free base was about 5 to 7 times more toxic than was nicotine sulfate soln. at $p_H$ 5 0. The addn. of an inorg hydroxide had no apparent effect upon the toxicity of a nicotine soln. Pyridine solns. of 0 03 *M* and 0 12 *M* were about twice as toxic as solns. of the same molar concn. titrated to $p_H$ 5.0 and 4 9, resp., with $H_2SO_4$ Methylpyrrolidine soln was about 10 times as toxic as methylpyrrolidine-HCl soln. of $p_H$ 3 0 The toxicity of these materials in aq soln is directly related to the concn of the undissocd. mols. The toxicity of nicotine solns. is largely dependent on the dissocn of the pyrrolidine N J. R Adams

Trapping for the Japanese beetle (Popilia japonica Newman) during the seasons of 1929 and 1930. O K. Courtney. *J. Econ Entomol* 24, 219–20(1931).—The operation of traps with a bait mixt. contg geraniol and eugenol is described C. H Richardson

The tolerance of beans to sprays and dusts for the Mexican bean beetle. H. C. Huckett. *J. Econ Entomol.* 24, 200–4(1931).—Further studies with com. brands of arsenicals, $BaSiF_6$ and cryolite in spray and dust mixts. against *Epilachna corrupta* indicate that certain forms of arsenicals cannot always be used with safety upon bean plants. Mg arsenate, $BaSiF_6$ and cryolite are the safest to use at recommended concns. C. H Richardson

Hints at new spraying procedures. P. J. Parrott, F. Z. Hartzell, Hugh Glasgow and S. W. Harman. *J. Econ. Entomol.* 24, 297–302(1931); cf. C. A. 24, 3312.—This investigation was conducted to find materials or practices that would amplify present control measures for the rosy aphis (*Anuraphis roseus*), and the eye-spotted bud moth (*Spilonota ocellana*) on apple trees. $NaNO_3$, one lb per gal., made the trees unattractive

to rosy aphis without apparent injury to the trees. Fall applications of nicotine or ground tobacco to apple trees reduced the number of aphids. Tar distillate sprays were very effective against apple aphid eggs and nymphs of the spruce gall aphid (*Adelges abietis*) but were ineffective against eggs of the leaf roller. These tar distillate sprays appeared safe to use on the trees. American creosote oil emulsified with sulfonated castor oil and alkali killed eggs of the rosy aphis and caused no serious injury to the trees. Sulfonated fish oils apparently may be used in place of the sulfonated castor oil to reduce the cost of this spray. These methods may offer a marked advantage over spring spraying for control of the rosy aphis. C. H. Richardson

A study of arsenical residue on apples in Pennsylvania with respect to efficient spraying practice. H. E. Hodgkiss and D. E. Haley. *J. Econ. Entomol* 24, 83–8 (1931).—In Pa. protection of apples from second brood larvae of the codling moth (*Carpocapsa pomonella*) requires a definite spray procedure ending early in June. In this way it is possible to control the insect with Pb arsenate and to keep the As residue within the export tolerance of 0.1 grain per lb. of apples. Analyses of fruit are given. C. H. Richardson

What summer oil sprays may do to apple trees. Joseph M. Ginsburg. *J. Econ. Entomol* 24, 283–90(1931).—Refined (white) petroleum oils, viscosity 80–320° Saybolt at 100°F., and sperm oil were sprayed on apple and peach trees during the spring and summer months. The oils were emulsified with soap or powdered skim milk, and the emulsions diluted to contain 0.5–3% actual oil. Some trees were sprayed during two successive seasons and accumulative effects on the fruit and foliage were studied. Peach trees are less susceptible to petroleum oil injury than apple trees. Continuous oil spraying of apple trees during the growing season produced physiol. changes in growth processes and fruit production. Oil injury is more pronounced and more severe from early than from late spraying. Sperm oil was less injurious to peach and apple foliage than any of the other animal or vegetable oils tested. C. H. Richardson

Experiments in spray residue removal. L. R. Streeter, P. J. Chapman and G. W. Pearce. *J. Econ. Entomol* 24, 240–4(1931).—The standard washing machine using HCl as a solvent entirely and satisfactorily removes As residue. Methods successful in the Pacific Northwest are not entirely adaptable to the needs of the Northeast. In the Northeast a machine is required which combines the washing and wiping principle. No single machine now available entirely meets these requirements. Results of chem. analysis of sprayed fruit are given. C. H. Richardson

Investigations aimed to reduce the cost of pear psylla control. F. Z. Hartzell. *J. Econ. Entomol* 24, 71–7(1931).—Economy can be obtained in part by modifying the environment of the orchard, by using lubricating oil emulsions, and by decreasing the concn. of nicotine in the sprays. Care must be exercised in the use of petroleum oil sprays on weak trees. C. H. Richardson

The compatibility of lime with fluosilicates. R. H. Carter. *J. Econ. Entomol* 24, 263–8(1931); cf. *C. A.* 24, 455.—The compn. and chem. properties of fluosilicates in relation to insecticidal use and injury to foliage are described. The addn. of small quantities of $Ca(OH)_2$ to $Na_2SiF_6$, $K_2SiF_6$ and $BaSiF_6$ materially decreased the solv., probably because of the introduction of a common ion from the reactions. Strong alk. solns. were formed when an excess of lime was present as the result of further chem. reactions. C. H. Richardson

Mercury salts as disinfectants of seeds. Vittorio Casaburi. *Industria chimica* 5, 1362–8(1930); cf. *C. A.* 25, 553.—By using an emulsion of 1,4-$Cl_2C_6H_4$ in petroleum taken up with talc in conjunction with Hg salts, a powerful disinfecting action is obtained, with a smaller quantity of Hg salts. A. W. Contieri

Tests with *p*-dichlorobenzene–oil emulsion against the San José scale. Oliver I. Snapp and J. R. Thomson. *J. Econ. Entomol* 24, 328(1931).—A petroleum oil of 168 sec. viscosity (Saybolt) and a volatility of 0.60% was used in these expts. *p*-$C_6H_4Cl_2$ was dissolved in it in the proportion of 2 lb. per gal. The oil was emulsified with K fish oil soap and the spray contained 0.25–1.5% actual oil. The addn. of *p*-$C_6H_4Cl_2$ to an oil does not increase its effectiveness for the control of San José scale. C. H. R.

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The influence of plant growth on the activity of root bacteria (Grau) 11C. Removal of spray residues from apples (Neller) 12. Burning accident from $NaClO_3$ (Deem) 13. Effect of various Mn compounds on the quinhydrone electrode (Ostrom, Kashihara) 2. "Lime-nitrogen" (Brit. pat. 336,677) 18. Apparatus for making lime-nitrogen (Ger. pat. 516,445) 18. Dicalcium phosphate and $KNO_3$ (Brit. pat. 336,692) 18. Purification of gases and the manufacture of fertilizers (Belg. pat. 371,622)

**Fertilizer.** C. Vilain Brit 330,651, July 15, 1929 Natural dolomite is treated with $H_3PO_4$ and the product may be treated with $NH_3$

**Fertilizers.** Soc d'études pour la fabrication et l'emploi des engrais chim. Fr 691,155, July 27, 1929 A compd fertilizer is prepd by treating natural chlorides with a strong mineral acid such as $H_2SO_4$, $HNO_3$ or $H_3PO_4$, isolating the K salt formed and using the liberated HCl to attack natural phosphates and mixing the sol phosphate with the K salt Cf *C A* 25, 1625

**Fertilizers.** Soc d'études scientifiques et d'entreprises industrielles Fr. 691,628, April 28, 1930 A fertilizer is composed of a mixt of natural phosphates and blast furnace or P furnace slags

**Fertilizers.** G Ohrr & Sons Co Fr 691,113, April 17, 1930 Phosphatic fertilizers are made by sending a current of hot acid through a restricted receiving zone, mixing this current with a current of finely divided phosphatic material and sending the mixed current through the restricted receiving zone The phosphatic powder may be aerated to render it more fluid An app is described Fr 691,111, describes the prepn of a fertilizer by submitting a phosphatic material to the action of an acid in a closed vessel and afterward introducing $NH_3$ into the vessel Fr 691,115, describes the prepn of a fertilizer by forming currents of acid and finely divided phosphatic material, mixing the currents, introducing the mixed current into a vessel and regulating the concn. of the acid current and the duration of the charging to reduce to a min the losses of volatile substances during the transport

**Powdered deodorizer for accelerating the ripening of organic fertilizers.** Kazuyoshi Yamaji U S 1,701,018, Feb 10 A cereal powder contg a large quantity of enzymic material such as barley, wheat or beans is mixed with bran, water is added and the mixt is heaped for fermentation, after which it is dried and powdered and mixed with dried and powdered germinated seeds of cereal such as barley, wheat or beans high in enzymic content and tri-Ca phosphate also is added to the mixt, which, as thus prepd, is suitable for treating org fertilizer or use as a deodorant

**Insecticides.** Maurice Bourdrionnet. Fr 691,130, April 18, 1930. An insecticide and rat-killer is composed of a mixt of HCN with 3 0% of oxalic acid and 2-5% of CNBr.

**Insectifuges.** Deutsche Gold- und Silber-Scheideanstalt vorm Roessler. Ger. 510,373, Apr 20, 1923 Pulverulent compns for combating flea-beetles, etc., comprise a solid absorbent, *e g*, kieselguhr, mixed with nitrobenzene and a substance which repels the insects by its odor, *e g*, "oleum animale," phenol or cresol. Substances improving the adhesion, *e g*, talc, may be included

**Destroying insects and other animal pests.** I G Farbenind A.-G. (Carl Taube and Hans Kukenthal, inventors) Ger 510,106, Oct 10, 1920 Esters of $H_2SO_3$ are used, alone or mixed with diluents, other insecticides, inflammability-reducing substances, etc

**Bactericides; fungicides.** I G Farbenind A.-G (Rudolf Lehmann and Richard Michel, inventors) Ger 510,185, Nov 24, 1928 Mixts of halophenols (or their derivs) with esters of substituted aromatic carboxylic acids are used, with or without other disinfectants, etc A mixt of trichlorophenol acetate 1 and methyl *p*-hydroxybenzoate 3 parts is specified

**Plant-protecting agents.** I G Farbenind A G. Ger 513,775, Dec. 6, 1927. The agent consists of hydrocarbons of the diaryl type, combined with other fungicides or insecticides and optionally mixed with solvent, adhesive or spreading agents The examples mention biphenyl, 4,4'-dichlorobiphenyl, 2,2'-diaminobiphenyl and dinitrobiphenyl

**Mordants for seeds.** I. G Farbenind A.-G. Fr 691,091, May 5, 1930. Mordants for seeds are composed of thio derivs of alkylarsenious acids such as methylarsine sulfide, or the condensation product of methylarsine and β thionaphthol, arsenomethane and dithioglycolic acid or methylarsine oxide and thiosalicylic acid Cf *C. A* 25, 1620.

**Herbicide.** Gustav Litsche Fr 691,663, April 29, 1930. A herbicide is composed of $CuSO_4$ and about 3 times the amt of $H_2SO_4$ of 60° Bé

**Weed killers.** Chem Fab. Oker & Braunschweig A.-G Ger. 510,141, Dec. 5, 1928 The corrosive action on metal tanks, sprayers etc, of weed killers comprising heavy metal salts, is reduced by addn of a nitrate, sulfate or thiosulfate of an alkali, alk. earth, or earth metal The addn must not give an insol ppt. with the heavy metal salt Thus, 1% of $NaNO_3$ may be added to a 2% soln of $CuCl_2$

# 16—THE FERMENTATION INDUSTRIES

C. N. FREY

**Constitution of fusel oil obtained from fruits.** G VEGEZZI AND P HALLER. *Mitt. Lebensm Hyg* 21, 321-5(1930)(in Italian).—The constitution of fusel oil depends upon the source. An av sample is a limpid, yellow brown liquid, $d^{15}_{15}$ 0.8305-0.8300, acid trace, esters 1.3% by vol calcd. as EtOAc, furfural 0.01, aldehydes 0.3, fusel oil and EtOH 99.4. Fusel oil from fruit is the best, because its value is detd. by the AmOH content. Fusel oil from fruit contains BuOH. A considerable no. of samples analyzed contained abnormal products, such as $SO_2$, formaldehyde, fatty acids and amines. Fusel oil from fruit contains an appreciable amt. of compds. boiling higher than AmOH, in 1 case 13.4%.
E. M. SYMMES

**Production of alcohol from spent mohwra (Bassia latifolia) flowers.** D. L. SARASWADDHE AND V. G. PATWARDHAN. *Poona Agr. Coll Mag* 22, 45-9(1930).—The spent mohwra flowers resulting from distillery operations are a nuisance in certain Indian localities. Approx. 11% of total sugar may be obtained from the carbohydrates in the spent flowers by heating the flowers with 0.05 *N* $H_2SO_4$ for 4 hrs. under 3 atm. pressure. By diluting the ext. from the original flowers with that from the spent flowers the addnl. sugar ferments completely, giving a proportionately higher total yield of alc. from a given wt. of flowers. Under these conditions neutralization of the $H_2SO_4$ before fermentation is unnecessary.
K. D. JACOB

**The composition and determination of the barley proteins. III. Fourth report on barley proteins. The proteins of barley during development and storage and in the mature grain.** L. R. BISHOP. *J. Inst. Brewing* 36, 336-49(1930); cf. *C. A.* 24, 1929.—Analytical data and graphical presentation are given of the proteins of varieties of English barleys, in various stages of maturation, and in mature grain before and after storage. After allowance is made for the various standard errors of the detns. it is possible to deduce that: The relationship between the quantities of the individual proteins and the total N is characteristic of the variety. Within each sep. variety, the weights of the individual proteins are simple regular functions of the total N content per thousand corns. Immature grain, if given sufficient time, reaches the natural equil. and the proportion of the various proteins will be the same as in mature grain of the same total N content per thousand corns. It is suggested that in pure grain the protein proportions may be represented in amts. per thousand corns as follows: $S = aN - bN^2$, $H = pN + qN^2$ and $G = xA$, where $S$ = salt sol. N, $H$ = hordein N, $G$ = glutelin N and $A$ is total N per thousand corns. The values of the factors ($a$, $b$, $p$, $q$ and $x$) are regarded as characteristic of the variety.
PETER J. F. WEBER

**Institute of brewing research scheme. II.** LLOYD HIND. *J. Inst. Brewing* 36, 263-8(1930).—A report is made by the research organizer covering the autumn and winter months of 1929-1930.
PETER J. F. WEBER

**Preliminary note on barley proteins. The influence of the method of grinding on the estimation of barley proteins.** G. HOFMAN-BANG. *J. Inst. Brewing* 36, 381-8(1930).—Before making estns. of different proteins in Danish barleys, the reliability of Bishop's method (cf. *C. A.* 22, 3729, 24, 1929) was investigated. The proteins were detd. on barleys ground to varying degrees of fineness as ascertained by shaking in a screen grader. To obtain consistent results and reach a const. value for the various proteins, the barley had to be ground in a ball mill so that 95% passed a sieve with meshes of 0.253 mm.
PETER J. F. WEBER

**Algerian musts of the 1930 vintage.** L. G. FILAUDEAU AND A. BONIS. *Ann. falsi* 24, 5-8(1931); cf. *C. A.* 24, 2231.—A discussion of the results (not given in detail) found on examn. of 128 representative samples from the Department of Oran, 271 from the Department of Alger and 90 from the Department of Constantine, from which it is concluded that the quality of Algerian wines of the 1930-vintage is, on the whole, satisfactory, and even slightly better than that of the 1929 wines. H. POUGET, SABATIÉ AND WALLAERT. *Ibid* 8-11.—A brief discussion of the quality of the 1930 vintage in Algeria, based on the analysis of 253 samples, from which it is concluded that the constitution of the wines should be fairly well balanced, and the alc. content higher than in 1929.
A. PAPINEAU COUTURE

**New apparatus for the rapid determination of the volatile acidity of wine.** MARCEL MARTIN. *Ann. falsi* 24, 36-7(1931).—The simplest method for detg. the volatile acidity of wine consists in subtracting non-volatile from total acidity, but in order to obtain consistent results it is essential that the evapn. of the volatile acids be always carried

out under strictly identical conditions The app. described consists of an electrically heated water bath, the steam from which is passed through the sample while the latter is being heated on the bath The construction is such that the quantity of steam passed through the sample is always the same A PAPINEAU COUTURE

Dry, unpressed wine and natural wine. J. WERDER AND C. ZACH *Wein u. Rebe* 11, 272–6(1929).—Dry, unpressed wine, but not natural wine, after decolorization by animal charcoal, shows a blue luminescence in filtered ultra-violet light. B C A.

Rum fermentation. MARTIN FICKER AND STEFAN SZÜCS. *Zentr Bakt Parasitenk*, 2 Abt., 82, 199–211(1930).—The aroma produced during the fermentation of rum is due to the action of acetic, butyric and lactic acid bacteria. JOHN T. MYERS

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Alcohol production for motors in Brazil (FREISE) 21 Polarographic studies with dropping mercury cathode. XVI Electroreduction of AcH (SMOLER) 4. The antagonostic substances formed during bacterial fermentation (KLEIN) 11C.

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Rectifying alcohol. HEINRICH PROSKE. Ger 515,195, Dec. 21, 1928 Operative details are described. The principal features are the maintenance of an excess pressure of about 0 06 atm. in the still, and the use of a thermometer with a movable scale, which is adjusted in steam before the distn

Acetyl methyl carbinol. T H. VERHAVE Brit 337,025, June 26, 1929 A mash, such as a saccharified potato mash contg suitable N compds., a phosphate such as superphosphate and a carbonate such as $CaCO_3$, is fermented with bacteria such as *Aerobacter aerogenes* which under normal conditions produce 2,3-butylene glycol, and the mash is subjected to aeration insufficiently strong to prevent the formation of butylene glycol and the aeration is continued after the main fermentation period until at least most of the butylene glycol formed has been converted into acetyl methyl carbinol. Volatile fermentation products may be recovered by suitable washing devices, and the acetyl methyl carbinol produced may be converted into diacetyl by the action of oxidizing agents such as $FeCl_3$

Acetic, butyric and propionic acids by fermentation. DISTILLERS CO., LTD., and H. B. HUTCHINSON. Brit. 337,153, Sept. 30, 1929 A dild. molasses soln. or other suitable sugar soln. of low concn. (various examples of which are given) is fermented with thermophilic organisms (which may be procured from animal excrement or from decompg cellulosic material) and stronger sugar soln is added under regulated conditions such that the concn. remains sufficiently low to prevent the formation of non-volatile fatty acids. Numerous details of procedure are described. Cf. *C. A.* 24, 2543

Fermentation. OLGA K. SAUER NÉE BUCHHOLZ Ger. 513,511, Dec. 20, 1927. Yeast and bacteria prepns. are rendered stable and capable of germination by mixing to a paste or emulsion with fats at temps. not injurious to the organisms, without subsequent drying. Petrolatum, liquid petrolatum and cacao butter are mentioned as suitable fats.

Promoting fermentation reactions with activated carbon. DARCO SALES CORP Brit. 336,207, April 2, 1929 The yield and speed of fermentation reactions (as in the production of alc., fusel oils and vinegar) are improved by adding to the fermenting mass (which may comprise a sugar or molasses soln. and suitable microörganisms) an active adsorbent agent such as activated "vegetable char" together with org nitrogenous food substances such as a protein material. The use of "Darco" (produced from lignite) is particularly mentioned. Brit. 335,972 relates to similar processes in which the microörganisms and active charcoal are first added (preferably intimately assocd.) to a soln. of medium d. of the material to be fermented and, after the d. has been reduced by the fermentation, it is increased above the initial d. by the addn. of a soln. of high d. of the material to be fermented. An example is given of the fermentation of a molasses soln. by yeast.

Fermenting sacchariferous liquids. EUGEN STICH U. S. 1,792,450, Feb. 10 In processes such as alc. and yeast production, an app is employed in which aeration is effected through porous diaphragms of a special degree of porosity (suitably arranged in 2 layers of material, the upper of which, in contact with the liquid, has pores of a diam. of 0 16 to 6$\mu$ while the lower layer has pores of larger diam.). Diaphragms of this particular character are stated to be suitable for producing better yields with a reduced air supply.

Pasteurizing apparatus for beer, etc. OSKAR KARY. Ger. 516,458, June 5, 1928.

# 17—PHARMACEUTICAL CHEMISTRY

W O EMERY

Contribution of the pharmacist to the progress of chemistry and other sciences. GODOY TAVARIS. *Bol assoc brasil pharm* 11, No. 11, 13–22(1930).—Historical review. CARLOS A. ARELEDO

Corrosive sublimate tablets. CARLOS H LIBERALLI. *Bol assoc brasil pharm* 11, No. 11, 31–7(1930).—The addn. of NaCl to increase the soly of $HgCl_2$ as recommended by many pharmacopeias is not advisable. Complex formation decreases the antiseptic action which is proportional to the concn. of $Hg^{++}$ ions. L. recommends the addn. of tartaric acid which does not interfere with the dissocn of the mercuric salt. C. A. A.

A new medicine for the treatment of piroplasmosis. L. TORBACK. *Bull agr Congo Belge* 21, 484–8(1930).—A new medicine called "Piroblue" has been recommended as a cure for cattle piroplasmosis. It is a mixt. of trypan blue and Na cholate one of the acid constituents of bile. This medicine may be used up to concns. of 4% and in quantities from 50 to 100 cc. A complete sterilization of the blood is not obtained but this is desirable as the presence of parasites in the blood aid resistance to infection. J. R. ADAMS

Beauty creams. FRED WINTER. *Am Perfumer* 24, 232, 234(1929).—A review. E. J. C.

The measurement of the adsorption capacity of medicinal charcoals. HEDWIG LANGECKER. *Klin Wochschr* 9, 2296–3000(1930).—Animal charcoals are, in general, better adsorbents than plant charcoals. In comparing the adsorbing power of a large series of charcoals, with methylene blue, morphine and $HgCl_2$ as test adsorbates, a fairly good correlation was obtained, particularly between the last 2. Occasional discrepancies do occur, *e. g.*, a strong adsorption of methylene blue, with weak adsorption of the other 2 by the same charcoal. H. EAGLE

Components of the drug "Salpamisra." C. GRIEBEL AND G. STEINHOFF. *Arch Pharm* 269, 37–49(1931).—The East Indian drug "Salpamisra" (probably derived from *Allium macleanii*) contains $H_2O$ 9.25, ash 3.75, free acid (as malic) 1.00, fructose 2.04, polysaccharide (calcd. as fructose) 69.63, saponin (in the alc. ext. as calcd. from the difference) 3.97, $Et_2O$ ext. 0.60, insol 11.00%. Hydrolysis of the saponin ($C_{36}H_{60}O_{10}$) yields in addn. to sapogenin ($C_{27}H_{40}O_3$), galactose, arabinose, methylpentose and galacturonic acid. The hemolytic index is 6700, the fish index 13,300. The polysaccharide gives on hydrolysis mainly fructose and is, therefore, to be regarded as trifructosan ($C_6H_{10}O_5$)$_3$. W. O. EMERY

Liquor plumbi subacetatis fortis—its preparation and assay. PHILIP A. BERRY. *Chem Eng Mining Rev* 22, 421–3(1930).—Liq. plumbi subacet. fort. owes its virtue to the fact that it is a highly basic Pb soln. No standards requiring a high degree of basicity have been previously suggested, neither has any method of estn. been put forward to ensure this. The following method is proposed for estg. both the Pb and Ac radicals. To a known wt. of sample add a known excess of standard $H_2C_2O_4$ soln., make up to a definite vol., filter and in an aliquot portion of the filtrate det. the excess of oxalic acid by titration with $KMnO_4$. In another aliquot portion det. total acidity by titration with 0.1 N NaOH. The difference gives AcOH. The detn. is not affected by impurities present to an extent exceeding 50% of that permitted by the B. P. To prep. the liquor triturate 320 g. powd. PbO to a smooth paste with 100 ml. distd. $H_2O$, transfer to a bottle, wash in the rest of the PbO with 650 ml. $H_2O$, shake well, add 240 g. AcOH, shake vigorously for several min. and again at intervals for 24 hrs., filter and pass through the filter water to make up to 1 l. An excess of PbO results in the sepn. of a highly basic Pb acetate from the soln., with a resultant loss of both Pb and Ac radical. The white deposit formed in making this soln. is composed of basic Pb carbonate together with basic acetate of the compn. $Pb(CH_3CO_2)_2 \cdot 2PbO \cdot 4H_2O$. The d. of the official liquor is at present too definite, a range of 1.275–1.300 is suggested. The method of assay proposed is equally suited for Pb acetate. W. O. E.

History of Austrian Pharmacopeias. OTTO ZEKERT. *Pharm Monatsh* 12, 2–4, 22–5(1931).—An address describing in word and picture certain of the earlier Austrian pharmacopeial documents and apothecaries. W. O. E.

Arbutin content of certain known Ericaceae. L. ZECHNER. *Pharm Monatsh* 12, 4–6(1931), cf. *C. A.* 24, 685.—Some 15 ericaceous plants were examd. with respect not only to their arbutin but also their hydroquinone content. The greatest amt. of arbutin occurs in *Arctostaphylos*. W. O. E.

Electrometric studies of complex formation. I. The citrates of bismuth. C.

MORTON *Quart J Pharm Pharmacol* 3, 561–74(1930).—From the results of an electrometric study in which the glass electrode was employed, it is concluded that: The view that Bi citrate is a complex "bismuthyl citric acid" is incorrect. As ordinarily prepd, the normal citrate is obtained. In the presence of alkali citrates or bicarbonates, as in the Cowley process, sparingly sol basic complexes are formed, the compn of the complex cation being a function of the $p_H$. The process of "neutralization" by alkalies consists in the reversible formation of a series of complex cations, the final product being the neutral, sol and stable 4:1 complex, $3Bi(OH)_3 \cdot BiC_6H_5O_7$. "Bismuth and ammonium citrate" is a mixt of this basic salt and of $NH_4$ citrate in the mol proportions 1:3. The methods given in the B P (1914) and the Brit Pharmaceutical Codex (1923) for the prepn of solns. of "bismuth and ammonium citrate" are unsatisfactory, and suggestions are offered for the prepn of non precipitable neutral solns. of definite compn. W O F

**Calcium phosphate B P.** NORL L. ALLPORT AND T TUSTING COCKING *Quart J Pharm Pharmacol* 3, 578–83(1930). Analyses of several com samples of Ca phosphate showing the variable proportions of CaO and $P_2O_5$ are given. The reaction of $Ca_3(PO_4)_2$ is $p_H$ 9.2, and that of $Ca(H_2PO_4)_2$ is $p_H$ 4.5. Previous workers have shown that $Ca_3(PO_4)_2$ is slowly decompd by $H_2O$ to form $3Ca_3(PO_4)_2 \cdot Ca(OH)_2$. Evidence is here adduced which suggests that, under certain conditions, a salt is formed with a still higher Ca content, and having the approx compn $2Ca_3(PO_4)_2 \cdot Ca(OH)_2$. Expts have been made which indicate that it is impracticable to manuf $Ca_3(PO_4)_2$ by a process of pptn in the presence of $H_2O$. W. O F

**Critical observations on the directions for glass testing of the German Pharmacopeia, sixth edition.** L. KROLL *Sprechsaal* 20, 350(1927); *J Soc Glass Tech.* 13, Abstracts 173–4; cf. *C A* 21, 2047.—The German Pharmacopeia directs that medical glasses be ¾ filled with an aq soln contg 1 cc of 0.1 *N* HCl per l and 5 drops of Me red soln *and heated for ½ hr in a boiling water bath. After this time the red color* of the soln should not have completely disappeared. For ampoule glasses for solns of alkaloid salts, 5 g of the coarsely crushed glass is heated for ½ hr in a boiling water bath with 100 cc of water, 0.3 cc of 0.01 *N* HCl and 1 drop of Me red soln in a Jena glass flask previously rinsed out with boiling distd water. After this time the red color of the soln should not have completely disappeared. Tests for pipets, dropping glasses, wide neck glasses and app glass should be given. Variable results can be obtained by heating the glasses in the steam or in the boiling water, by loosely closing the necks with cotton wool or by securely sealing with cork stoppers, and by having the vessels standing or floating in the water. Preliminary cleansing of the vessels with distd water at the ordinary temp., to remove dust and grease particles is necessary and ought to be precisely expressed. For pipets, dropping bottles and app requiring after-working in the blowlamp an intermediate or semi hard glass is suggested. The test for ampoule glass should be more precisely defined, particularly with reference to the size of the crushed glass particles, which should be sieved to a definite uniform size and freed from dust by washing with abs alc. The nicotine HCl test is superior to any other durability test, because of the extreme sensitiveness of the reagent and the fact that an estn. can be made in the course of an hr without the necessity of applying heat. G G

**Rapid volumetric determination of nicotine by means of silicotungstic acid.** B. KASANSKY. *Z. anal Chem* 83, 107–14(1931).—Nicotine forms a difficultly sol salt with silicotungstic acid of the formula $2C_{10}H_{14}N_2 \cdot 2H_2O \cdot 12WO_3 \cdot SiO_2 \cdot 5H_2O$ in faintly acidic solns. If, after filtering off the salt, it is decompd with caustic alkali and the freed nicotine distd with steam, the distillate can be titrated with acid. The ppt can also be weighed. The modification of the method now proposed consists in first distg off the nicotine with steam and titrating the distillate with silicotungstic acid, stopping at the point where no further clouding is produced by adding the reagent. A 12% soln of the reagent was used in the expts described. To carry out the detn in a sample of tobacco, weigh out 8.20 g. of the material into a 500 cc. round bottomed flask, add 150 cc. of water and 50 g. NaCl. Mix well to a paste and add a suspension of 5 g. MgO in a little water. Distl with steam into a 500 cc measuring flask contg a little concd. HCl. After distg for 1.5–2 hrs. the distillate should show a neg. test for nicotine when tested with silicotungstic acid. Fill the flask up to the mark, mix well and transfer, with a pipet, 100 cc. into a 200–250 cc flask. Add 2 g. of solid $NH_4Cl$ and titrate. Standardize the reagent by means of pure nicotine soln which has been subjected to the same treatment. The analysis of 11 samples of tobacco and nicotine exts. indicates that the method gives satisfactory results. W. T HALL

**A note on three oil-bearing grasses from Burma.** D RHIND. *Agr. J. India* 25,

327–9(1930).—A yield of oil amounting to 0.26% of the dry matter was obtained by the steam distn. of fresh *Cymbopogon clandestinus*, a grass which grows abundantly in dry rocky open spaces on hillsides in central Burma. The oil was of a light straw-color and had a pleasant odor somewhat resembling that of ginger grass oil. The oil tends to form an emulsion with water and a redistn. is necessary to effect complete sepn. A new species of annual *Cymbopogon*, smaller than *C. clandestinus* and differing from it in having glabrous pedicelled spikelets, yielded upon steam distn. 0.72% of the dry matter as a pale straw-colored oil, which tended to emulsify in water. Steam distn. of *C. virgatus*, an undescribed perennial species of *Cymbopogon*, yielded 0.55% of an oil having a rather unpleasant odor somewhat resembling that of Botha grass oil. The oil had the following properties: $d_{15}$ 0.9756, $\alpha^{100}$ −28°33′, $n_{15}$ 1.49107, acid value 1.9, ester value 6.5, ester value after acetylation 72.8, and alc. content calcd. as $C_{10}H_{17}OH$ 21–22%. K. D. Jacob

Studies of chemical sterilization and bacteriostasis. I. Standard inhibition control for germicidal tests. Justina H. Hill. *Am. J. Pub. Health* 21, 192–3(1931).—The following method of making inhibition controls is proposed by which valid germicidal tests may be made by any accepted method. Let *D* represent the no. of cc. of drug employed in the test, *B* the amt. of inoculum employed, *S* the amt. of the mixt. of *D* + *B* used for sub-culture and *T* the no. of cc. of broth used for sub-culture. The inhibition control then consists of the following steps: (1) Mix 1 *D* and an amt. of sterile broth equal to 1 *B*. (2) Transfer the equiv. of 1 *S* of this mixt. to 1 *T*. (3) Mix the equiv. in sterile $H_2O$ of 1 *D* with 1 *B*. (4) Transfer the equiv. of 1 *S* of this mixt. to the 1 *T* previously used in step (2). Such inhibition controls should be made with every dilu. of drug employed and with every type of organism used. It is wise to run such controls in triplicate to allow for unavoidable expti. variation. J. A. K.

Pyrethrum. II. Culture, yield and economic future. J. Chevalier. *Bull. sci. pharmacol.* 37, 235–9(1930). III. Industrial and pharmaceutical preparations. The estimation of the activity. *Ibid.* 422–31; cf. *C. A.* 24, 2804.—The pyrethrins I and II are esters of pyrethrolone, a ketonic alc., and of chrysanthemummonocarboxylic acid and chrysanthemummethyldicarboxylic acid. The flowers of pyrethrum contain at an av. 2.5–3 g. pyrethrin per kg. at a max. 5 g. Stems contain 1/4 to 1/5 as much. The industrial exts. are solns. in hydrocarbons or $H_2O$-sol. emulsions. The pyrethrins can be isolated as semicarbazones, but this method is not suitable for analysis. The extn. with EtOH or MeOH destroys the active substance. Chlorinated org. solvents are not satisfactory. Pyrethrin I is more efficacious than II. In the practical test on insects, different preparations show a large variation of activity. The species of the animal and the temp. have much influence. C. recommends the test on the frog. About 0.2 mg. pyrethrin injected into the lymphatic sac will kill the animal within 3 hrs. The test is unreliable at low temp. The method used for the extn. of male fern by detn. of the effect on fish showed pyrethrin active in dilutions 1:100,000. This is too sensitive for practical purposes. Com. prepns. should be tested on the class of animals they are sold for. A. E. Meyer

The culture of valerian and burdock. G. Hinard and Mlle. Prades. *Bull. sci. pharmacol.* 37, 460–77(1930).—The compn. and growth of the plants is considered in relation to the compn. of the soils in different parts of France and Belgium. A. P. M.

Essential oil of Asarum sieboldi var. seoulensis Nakai. I. T. Kaku and T. Kondo. *J. Pharm. Soc. Japan* 51, 8–17(1931), German abstr. 3–7.—K. and K. isolated from *Asarum sieboldi var. seoulensis* Nakai an essential oil (yield 2.21%) (I). I has the following properties: $d_4^{18}$ 0.9088, $n_D^{22}$ 1.5141, acid no. 1.85, sapon. no. 28.4, sapon. no. after acetylation 56.1, $\alpha_D$ −0.75 and MeO 21.4%. I contains palmitic acid (II), a substituted phenol (III) with mol. formula of $C_6H_2(OH)(OC_6H_5)(O_2CH_2)$. III is under further investigation. I, after removal of II and III, was fractionated under reduced pressure. The constituents isolated are *l-pinene*, a ketone $b_{15}$ 80–110° (*semicarbazone*, m. 185°, which, on treating with HCl, gave a free ketone, b. 200–20°, $d^{19}$ 0.9362, $n_D^{22}$ 1.5005, not purified further, which resembled *eucarvone*), *safrole*, which on oxidation gave piperonylic acid, and *methyleugenol*, $C_{11}H_{14}O_2$, $b_{11}$ 127–9°, $d_4^{15}$ 1.0443, $n_D^{22}$ 1.5340, which on oxidation gave veratric acid, m. 180°. F. I. Nakamura

Common diabetic drug. IV. Constituents of the bark of Aralia chinensis L. var. grabrescens (3). S. Kuwata. *J. Pharm. Soc. Japan* 51, 17–31(1931); German abstr. 7–9; *C. A.* 24, 656.—From the alc. ext. of the bark of *Aralia chinensis L. var. grabrescens* K. isolated *α-taralin* (I) and *β-taralin* (II). I is sol. in alc., but insol. in $H_2O$ and $Et_2O$, it contains a large amt. of ash (chiefly Mg, Ca and Na). It decomp. at 202–4° after electrodialysis. Analysis indicates the mol. formula of $C_{14}H_{22}O_{14}$. Hydrolysis takes

place according to the equation: $C_{34}H_{52}O_{13} + 3H_2O = C_{10}H_{16}O_4 + 2C_6H_{12}O_6 + C_6H_{12}O_6$. *Octaacetyl-ester* decomps. 143°. Catalytic reduction of I gave glucose (decompn. 220°) which shows strong acid and Liebermann's reaction. The hemolytic action of I is similar to that of saponin of Kahlbaum and senegin of Merk. The action is weakest in a neutral soln. F. I. NAKAMURA

**Digitalin of Nativelle and digitoxin.** V. HASENFRATZ. *Compt. rend.* 192, 806–8(1931).—H. attempts to prove that the digitalin of Nativelle and the digitoxin of Schmiedeberg are the same definite chem. substances by expts. showing that these compds. have identical products of hydrolysis. The reaction of Windaus and Stein (*C. A.* 23, 1646) representing the hydrolysis of digitoxin into digitoxose and digitoxigenin ($C_{34}H_{52}O_{13} + 3H_2O \longrightarrow C_{10}H_{16}O_4 + 3C_6H_{12}O_5$) also represents, according to H., the hydrolysis of digitalin of N. It is pointed out that digitalin of N. and digitoxin have the same toxicity (cf. Raymond Hamet, *C. A.* 23, 2757). ALBERT L. RAWLINS

**Experimental studies on heart tonics. IV. The main factors of digitalis standardization with a new assay method.** WILLIAM SYRIL AND LOUIS DUBOIS. *J. Pharmacol.* 40, 373–401(1930). cf. *C. A.* 24, 5381.—Rabbits are anesthetized by intravenous injection of barbital derivatives, and the drug to be tested injected into the jugular vein. Blood pressure tracings are made (in some instances using ouabain to supplement the prepn.) until the pressure drops to zero. The prepn. tested may subsequently be used without the further complication of inaccuracy by dilu. C. RIEGEL

**Trypsin preparations suitable for the prevention of adhesions.** ROBERT P. WALTON. *J. Pharmacol.* 40, 403–11(1930).—Bacteria-free enzyme prepns. could be obtained by pressure filtration of water glycerol solns. of trypsin, and from this, by pptn. with alc. and ether, a dry sterile powder. These prepns. were found to be effective in preventing peritoneal adhesions in dogs. C. RIEGEL

**Analysis of disinfectants.** LESLIE HART. *Soap* 5, 111–5(1930).—The methods of the Food and Drug Administration St. Louis station are given for the following detns.: water, alkalies, phenols, neutral oils and fatty or resin acids, mineral oils, mineral oil in creosote oil, Liquor Cresolis Compositus, unsaponif. material and fatty acids, total alkali, glycerol, saponif. cresols, water in pine oil emulsions, pine oil and fatty and resin acids. E. SCHERUBEL

**Hypophosphites.** F. H. ALCOCK. *Chemist and Druggist* 113, 613–4(1930).—Detailed criticisms are given on the monographs of the various hypophosphites of the new Brit. Pharm. S. WALDBOTT

**Glycerinum acidi borici, Brit. Pharm.** J. F. BOYLE. *Pharm. J.* 125, 453(1930).—The present Brit. Pharm. requires a soln. of 300 g. $B(OH)_3$ in 450 g. glycerol to be evapd. to 500 g. at a max. temp. of 150°. On a large scale a higher temp. is needed for evapn., which causes darkening of the product. A simplification of the proportions instead of an increase as proposed for the new Pharm. is suggested. S. WALDBOTT

**Unguentum hydrargyri compositum.** J. H. RIDGWAY. *Pharm. J.* 125, 453 (1930).—The formula ung. hydrargyr. Brit. Pharm. 400, cera alba, Brit. Pharm. 50, camphora 100, adeps benzoatus 450 is recommended in the place of the Brit. Pharm. formula in which the yellow beeswax imparts to the prepn. an unsightly greenish color. S. WALDBOTT

**Comments and criticisms, British Pharmacopeia revision.** ANON. *Pharm. J.* 125, 453, 483, 511, 536, 561, 647–8, *Chemist and Druggist* 113, 553–4, 587–8, 613–4, 644–5, 685–6, 746, 770–1(1930), cf. *C. A.* 25, 772.—More or less detailed comments were made thus far by 31 pharmacists. S. WALDBOTT

**Acidum carbolicum liquefactum. Infusions.** B. G. W. HOARE. *Pharm. J.* 125, 483(1930).—The acidum carbolicum liquefactum proposed for the new Brit. Pharm. is said to contain 30 grains in a fluid drachm. A sample made according to the new formula had a sp. gr. of 1.063, hence it contains a little below 46.5 grains per fluid drachm. Fresh infusions are superior in aroma and in efficacy in certain cases, to concd. infusions, to introduce these would be a backward step. Infusions of ergot, broom, chiretta and rhatany might be deleted. S. WALDBOTT

**Syrupus ferri phosphatis compositus.** F. GOLDBY. *Pharm. J.* 125, 561(1930).—A decoction of cudbear instead of cochineal is recommended as a permanent, bright coloring agent. Possibly a sol. powd. ext. of cudbear may be used. S. WALDBOTT

**Note on linimentum camphorum.** J. F. DUCKWORTH. *Pharm. J.* 125, 647 (1930).—Peanut and ordinary cottonseed oil are not suitable for the prepn. of a satisfactory camphor liniment since the latter prepd. with these oils become solid or opaque at 0°. The *non freezing cottonseed oil* is suitable and should be adopted in the new Brit. Pharm. S. WALDBOTT

**Liquor carminii, Brit. Pharm. Codex.** J. F. BOYLE AND J. H. FRANKLIN. *Pharm.*

*J* 125, 648(1930).—Evapn. of the $NH_4OH$ soln. of carmine to near neutrality, as directed by the Codex, causes much pptn of the coloring matter. It is suggested that after evapn until the $NH_3$ is expelled, just enough soln. of $NH_4OH$ be added to redissolve all of the pptd carmine, or dissolve the carmine in $NH_4OH$ and preserve the soln. with glycerol S. Waldbott

A qualitative comparison of various digitalis substances. Harry Gold, Wm. Hitzig, Ben Gelfand and Herman Glassman *Am Heart J.* 6, 237–54(1930).—The substances used were tincture digitalis of an American grown leaf, the same of a German grown leaf, the chloroform fraction of digitalis, tincture of adonis, ouabain and digitoxin. All have the same qual. cardiac actions, but there are extraordinary individual differences in response to the same prepn. R. C. Wilson

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Standardization of the trypanocidal activity of some aryl derivatives of arsenic acid (Launoy, Engler) 11H. Chlorogermanites of alkaloids (Tchakirian) 6. Explosions occurring during the use of $C_2H_4$ (Johnson, Cabot) 24. Gases from crude oil cracked in the vapor phase [for use in preparing perfumes] (Markovich, Pigulevskii) 22.

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Chiris, A. Contribution à l'étude des huiles essentielles. Grasse: Antoine Chiris. 55 pp. Reviewed in *Chimie & industrie* 24, 1507(1930).

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Synthetic drugs. I. G. Farbenind A.-G. Brit. 337,136, Oct. 8, 1928. Acetates of 9-aminoacridine or its substitution products, which are readily water sol. and suitable for therapeutic use, are obtained by treating the base with HOAc and isolating the product. Examples are given of the prepn. of acetates of 7-ethoxy-3,9-diaminoacridine, 9-aminoacridine, 7-methyl-9-aminoacridine and 3,9-diaminoacridine. 7-Methyl-9-aminoacridine is prepd. from *o*-chlorobenzoic acid and *p*-toluidine by a process similar to that described in Brit. 176,038.

Synthetic drugs. I. G. Farbenind A.-G. (Hubert Oesterlin, Karl Streitwolf and Alfred Fehrle, inventors). Ger. 517,002, Apr. 8, 1928. *o*-Phenolglycinamidearsonic acids and their substitution products are prepd. from *o*-aminophenolarsonic acids and their substitution products by the customary methods. Thus, 3-amino-4-hydroxybenzenearsonic acid may be treated with $CH_2O$ and KCN to yield the nitrile of 4-hydroxybenzene-1-arsonic-3-aminoacetic acid, from which the acid and its amide are obtained in turn. Other examples are given also.

Therapeutic preparations. Salo Bergel. Ger. 513,694, April 24, 1929. Antisyphilis spirochetes prepns. are obtained by the intrapleural, intraperitoneal or intravenous injection of animals with lipoid or lipoid albuminous substances, nucleoproteins, or albumin, inoculating them with weakened and then with fully virulent syphilis-spirochetes in the breast or abdomen and ear vein, and working up the exudations from the breast and abdomen with the ext. from the lymphatic glands, milk, ovaries, etc., and with the blood serum.

Medicinal aqueous-oil emulsions. Clauss & Strauch. U. S. 1,791,878, Feb. 10. An emulsion suitable for injection into the tissues is prepd. by dissolving a cholesterol (such as metacholesterol) and beeswax in olive oil, and adding a water sol. drug such as insulin. Myricin may be added as a stabilizing ingredient.

Complex iron compounds of aliphatic hydroxycarboxylic acids. I. G. Farbenind A. G. Brit. 335,965, June 5, 1929. Acids such as hexanetetrolic acid, gluconic acid, trihydroxyglutaric acids, glucuronic acid, saccharic and mucic acids and their isomers or salts are treated with Fe or an Fe compd. and the reaction mixt. is simultaneously or subsequently neutralized with a basic substance such as alkalies or $NH_3$ or org. bases. Water-sol. *therapeutic compds.* are obtained, and details are given of the production of Na ferrous and ferric gluconates, K-Na ferrous and ferric saccharates, quinine K ferrous saccharate and Na Fe mucate.

Anesthetics. I. G. Farbenind A.-G. (Max Bockmühl and Leonhard Stein, inventors). Ger. 516,285, Jan. 16, 1929. Alkamine esters of halophenyl carbonic acids are prepd. by condensing halides of halophenyl carbonic acids, or their substitution products free from N, with aliphatic amino ales. having a tertiary N atom. Thus, *p*-chlorophenyl carbonic acid chloride (prepd. from *p*-chlorophenol and $COCl_2$) may be caused to react with $Et_2NC_2H_4OH$, yielding $ClC_6H_4OC(O)OCH_2CH_2NEt_2$ HCl, m. 132°. Other examples are given also.

Extracting organic substances. I. G. Farbenind A.-G. Fr. 694,602, April 28, 1930. Org. substances are extd. from animal or vegetable materials, *e. g.*, alkaloids from roasted coffee or tobacco, or sugar from beet roots, by means of liquid $NH_3$.

Hormones. SCHERING-KAHLBAUM A.-G. Brit. 336,470, Dec. 6, 1928. For purification of crude hormone prepns. such as those derived from animal liquids or organs, yeast or maize shoots, impurities of an ester like character are saponified by Twitchell reagent, Darining saponifer, lipase of castor seed, pancreas lipase or other catalytically acting agent. The saponified material may be extd. with MeOH, the ext. neutralized with alc. $Ba(OH)_2$, the filtrate concd. and then taken up in water with ether, and the hormone obtained by evapg. the ethereal soln.

Hormones. SCHERING KAHLBAUM A. G. Brit. 336,471, Dec. 1, 1928. Liquids contg. hormones such as urine of pregnant mammals or an aq. ext. of the anterior lobe of the hypophysis are mixed with a water sol. org. liquid such as alc. in quantity insufficient to ppt. the hormone but sufficient to ppt. impurities. The hormone is subsequently pptd. as by addn. of ether, $CHCl_3$ or ethylene chlorohydrin.

Tuberculosis vaccine. CARL OTTO. Ger. 516,403, Dec. 7, 1926. Pus from a dead tubercular cow is injected into a healthy cow and the latter, at the end of the incubation period, is inoculated subcutaneously with croton oil. The pus produced at the point of inoculation is removed, coagulated, and filtered. The residue is mixed with ground periosteal substance and the mixt. finally sludged with the filtered pus serum.

Alkaloids. SOC. A. S. FARMAKON. Fr. 694,055, April 16, 1930. Opium is treated with a solvent for fatty materials, preferably petroleum ether, then the soln. is agitated with acidulated water, preferably contg. HCl. The acid soln. is neutralized to ppt. the alkaloids.

Digitalis glucosides. WELLCOME FOUNDATION LTD. and S. SMITH. Brit. 337,091, Aug. 8, 1929. A new glucoside is obtained by stirring the total glucosides of the leaf of *digitalis lanata* with acetone or methyl ethyl ketone, filtering fractionally pptg. the filtrate by adding water, removing the sepd. solid, adding salt to the clear liquid, drying the ppt. thus formed, and extg. it with MeOH or EtOH; on adding water to the soln. and standing, crystals of the new glucoside are obtained. Various details of purification and auxiliary treatment are given.

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Purification of caustic soda obtained by the lime process. ALFONS KRAUSE AND WACLAW KLUKA. *Przemysl Chem.* 15, 6–12(1931).—Caustic soda obtained by the CaO process contains $Na_2CO_3$, NaCl, $Na_2SO_4$, $Na_2SiO_3$ and traces of $Al_2O_3$ and $Fe_2O_3$ as impurities derived from the raw materials. Their removal by the chem. method is impossible, but it can be accomplished by concn. and cooling. Studies on the solubilities of the above salts in NaOH solns. of varying concn. and at various temps. show that the concn. of the NaOH should be increased up to 72–5% at least, higher concn. not to exceed 100% being preferable. Cooling decreases the soly. of all the impurities. For the removal of $Na_2SO_4$ to a very low figure cooling of the NaOH to about 50° is necessary. The degree of cooling required for the removal of other impurities depends on the concn. It is well to conc. the NaOH in the presence of a definite amt. of $CaCO_3$, which forms insol. compds. with $Na_2CO_3$ and $Na_2SO_4$ and thus causes their removal from the soln. Among the impurities in the purified soda $Na_2CO_3$ takes first place and NaCl second. There is relatively little $Na_2SO_4$, and only traces of $Al_2O_3$ and $Fe_2O_3$. A. C. ZACHLIN

Evaporation of electrolytic caustic soda. J. A. LEE. *Chem. Met. Eng.* 37, 404–8 (1930).—An account is given of the continuous evapn. and salt recovery system at the South Charleston plant of the Westvaco Chlorine Products, Inc. The original soln. contains about 8% NaOH and 17.5% NaCl, and the final products from the steam evapn. plant are: 53 short tons of NaOH per 24 hrs. in soln. (d. 1.53) contg. also about 0.9% NaCl in soln. and more in suspension, and NaCl brine for return to the electrolytic cells. The water evapd. is about 1 million lb. per day, and the steam used, at 10 lb./sq. in. gage, about ¾ million lb. Evapn. is in 3 stages, a double effect followed by a single; then follows a continuous crystallizer and Laughlin centrifugal filter, which delivers the final caustic liquor. Swenson evaporators, Dorr thickeners and rake classifiers are employed. The materials of construction used are Ni cast Fe, Ni tubes and Monel metal. B. C. A.

Causticizing soda by Lewig's method and the use of various iron ores for this purpose. V. S. YAVLOV. *J. Chem. Ind.* (Russia) 6, 1020–7(1929).—The reaction between

soda and several Fe ores was found to be very sensitive to such factors as time, temp., subdivision of the materials, and make-up of the mix. A change in any one of them requires great readjustment in the others to bring about the same degree of reaction or the same velocity. The surface area of the reacting substances is the most important factor of all. Under the usual factory conditions the currents of hot air often carry away the finest particles of the ore, and heat sometimes produces a fusion of the reactants with resulting diminution of the surface area. In studying the factory phase of this reaction it appears that further work should be concerned with the use of more finely subdivided ore and the use of lower temps. Special lab. analyses were worked out to obtain more accurate results than those of routine analysis. A. C. ZACHLIN

Causticizing ammonium chloride with magnesium oxide. KOJI NISHIDA AND SOEMAN NAKAMURA. *Abstracts from Repts. Central Lab. S. Manchuria Ry. Co.* 1929, 37–9.—The $NH_4Cl$ soln. must be dild. to 2.34 *N* for perfect recovery of $NH_3$. This soln. uses 3 times as much fuel for distn. V. F. HARRINGTON

Dicalcium phosphate or "precipitate," and its commercial production. REP. WEBERS. *Metallborse* 20, 2059–60, 2735–6 (1930).—A review of methods of manuf. of $CaHPO_4$ from superphosphate and bones. E. M. SYMMES

Preparation of zinc oxide by the wet method. TATSUO IRIYE. *Repts. Imp. Ind. Research Inst., Osaka, Japan* 11, No. 16, 56 pp. (1930).—The powd. Zn ore is roasted and treated with $H_2SO_4$. The $ZnSO_4$ thus obtained is treated with NaOH soln. under pressure. The crude $Na_2ZnO_2$ is freed from other metallic impurities and treated with $CO_2$. Pure $Zn(OH)_2$ is oxidized to ZnO by heating. F. I. NAKAMURA

Catalytic reduction of carbon monoxide under ordinary pressure. VII. Effect of alkalies on iron-copper catalysts. S. KODAMA AND K. FUJIMURA. *J. Soc. Chem. Ind., Japan* 34, Suppl. binding 14–6 (1931) (in German), cf. *C. A.*, 25, 1039.—With a Cu-Fe catalyst prepd. from the nitrates, 3.0 cc. of oil contg. a small quantity of a substance like vaseline was obtained at 270° from 141 l. of water gas. Addn. of 0.0005–0.05 mol. of $Na_2CO_3$ to the above catalyst increased its initial activity and favored formation of higher hydrocarbons. With catalysts contg. alkalies there is a high gas contraction at first, the activity diminishing gradually. The catalyst may become coated with the higher hydrocarbon. No diminution of activity occurs with alkali free catalysts. The best catalyst contains Fe 1 atom, Cu 1 atom, $Na_2CO_3$ 0.005 mol. E. M. S.

Solid carbon dioxide from Mexico. J. W. MARTIN. *Ind. Eng. Chem.* 23, 256–8 (1931).—Oil well gas, contg. 95% $CO_2$ and 5% combustible gas, issues from oil wells in the Quebrache field, Mexico, at 100°F. and a pressure of about 1000 lb. per sq. in. After purification, the gas is cooled to the liquid state and then expanded to form solid $CO_2$, which is shipped by rail to the Gulf Coast and by boat to New York. The plant cost is 1/6 and the transportation expense, including duty, 1/3 of the total cost. F. D. ROSSINI

Carbon dioxide in its new field of usefulness. J. C. GOOSMANN. *Ice and Refrigeration* 80, 45–9 (1931).—A review of the origin, liquefaction and solidification of $CO_2$. Various methods now in use for the solidification of $CO_2$, together with the thermodynamics of each and a tabulation of the power required per ton of solid $CO_2$ manufd., were described previously (August, 1930). The chronology of $CO_2$ discovery is given, with a brief history of patent literature. Early methods of producing and compressing $CO_2$ snow to "dry ice" are described, and the development of the present methods of production is discussed. ALICE W. EPPERSON

Regaining iodine from phosphates. HANS JORDT. *Chem.-Ztg.* 55, 86 (1931).—From the analysis of the crude $I_2$ it is concluded that this by product is obtained by the Dansk Svovlsyre und Superphosphatfabrik of Kopenhagen electrolytically, and the procedure is condemned as non lucrative. J. is of the opinion that by treating the gases evolved from superphosphate manuf. with $CS_2$, active C, $H_2O_2$ and $O_2$, the $I_2$ can be brought by filtration to a sufficient state of concn. to render further purification profitable economically. B. S. LEVINE

Evaporation of natural salt brines. V. P. ILYINSKII AND V. M. FURFENO. *J. Chem. Ind.* (Russia) 6, 1163–8 (1929).—The phase diagrams of Na and Mg chlorides and sulfates were studied in relation to sea water and lake brines. The processes of evapn. of natural brines with crystn. of NaCl were classified according to the types of Glauber salt, astrachanite, epsomite, hexahydrate and biphosphate. A new type of evapn. was established, based on Caspian Sea brine, accompanied by a labile system. NaCl deposits in the astrachanite sector, as a result of which NaCl deposits out in a pure state to the amt. of 30–40%. The labile equil. in the epsomite sector is disturbed by fluctuations of temp., which cause a deposition of epsomite (on the av. found for stable equil.) depending upon arras of crystn. as worked out in the lab. The amt. of

NaCl depends on the relative NaCl content of the dry residue, and to an even greater degree on the coeff. of metamorphosis. The yield of salt declines sharply with increase in the coeff of metamorphosis On the basis of industrial observations and data in literature concns were established at which crystn of NaCl begins in the various reservoirs under normal conditions and at an av temp of 25° A C Zachlin

Salt and its production in history Hanns Freydank. *Kali* 23, 145–51, 161–8, 177–81(1929) E. J. C.

The utilization of bittern. I. The recovery of Glauber's salt. Toraro Kato *Abstract from Rept Central Lab S Manchuria Ry Co* 1929, 40–1 —One hundred parts bittern and 40 parts NaCl are dild with water until d = 24° Bé Cooling to —10° gives 47% of the $Na_2SO_4$ in the bittern and cooling to —19°, 70% V F H

Quinquennial review of the mineral production of India for the years 1924 to 1928. Salt. W A K Christie *Records Geol Survey India* 64, 276–87(1930) —About ¾ of Indian salt production is from sea water, ¼ from rock salt and the rest from areas of internal drainage The salt works are described Borax. E H Pascoe *Ibid* 345–7 —Borax is not known to occur in India, although the country exports borax obtained from hot spring deposits in Kashmir and salt lakes in Tibet. Sodium compounds (other than salt) W A K. Christie. *Ibid* 432–6 —$Na_2CO_3$ (usually) and $Na_2SO_4$ deposits (occasionally) occur Soda is evapd from lake waters A H E

The dehydrating action of coal ash. Muneyari Tanaka *Abstracts from Rept Central Lab S Manchuria Ry Co* 1929, 36–7 —Fuchun coal ash and Japanese acid clay at 260° have action only slightly inferior to $AlCl_3$ in the formation of anthraquinone derivs from phthalic anhydride and phenols V. F Harrington

Driers in soda factories. V G Bakhurov *J Chem Ind* (Russia) 6, 694–8 (1929) —One of the main points of weakness of the usual soda process is the low efficiency of the driers which show a heat utilization for evapn purposes of only 45–50% The performance of the drier can be improved by replacing by a centrifuge the continuous filter which feeds the $NaHCO_3$ into the drier, and shortening the rotary drier itself A complete heat and material balance is calcd. for an av plant A C Zachlin

Performance of the Kessler apparatus. V N Schultz, U M. Volchenko, I V Iosflovskii and L. V Suponitzkii *J Chem Ind* (Russia) 6, 928–40(1929) —A careful study was made of material and heat balance in the Kessler app in the Degoonin $H_2SO_4$ chamber process plant. The exceptionally high heat efficiency of this particular app depends in part on the high temp of gases entering the saturator Utilization of heat in the Kessler app. was distributed as follows concn of $H_2SO_4$ 77 9%; outgoing gases 13 2%; loss to surrounding medium 8 9% A C. Zachlin

Revivification of foam solutions for fire protection with carbon dioxide. C B White. *Chem & Met Eng* 37, 379–80(1930) —By a few simple addns to the fire-protection pump the soln. of $NaHCO_3$ is circulated from the bottom of the storage tank, through a small tower, and back to the upper part of the tank, it is recarbonated in the tower by gas from a cylinder The method is preferable to adding addnl. $NaHCO_3$, because if that is done, the $Al_2(SO_4)_3$ or other acid soln which must also be added has to be increased *pro rata*, and eventually both will have to be scrapped. B. C. A.

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Potash salt recovery in cement burning (Kuusk) 20. Apparatus for $NH_3$ synthesis and like catalytic gas reactions (Ger. pat. 510,249) 1. Sulfonic acids of the fatty series (Fr. pat 694,692) 10. Manufacture of liquid household insecticides (Weed) 15.

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Hydrocyanic acid. Imperial Chemical Industries, Ltd., T S Wheeler, H. A. T. Mills, J. McAulay and W B Fletcher. Brit. 335,947, March 27, 1929 In prepg HCN by reaction between hydrocarbon gas and $NH_3$ as described in Brit 335,585 (*C. A.* 25, 1642), the reaction mixt may contain one mol proportion of $NH_3$ to one atomic proportion of C, or less, if the mixt also contains H

Hydrocyanic acid stabilization. Hans Lehrecke (to Deutsche Gold & Silber-Scheideanstalt vorm. Roessler). U. S 1,792,103, Feb 10 As a stabilizing agent there is added to liquid HCN a small proportion of an ester of a halogen substituted org. acid such as Et bromoacetate.

Nitric acid. E. I. du Pont de Nemours & Co. Brit. 336,638, April 17, 1929. Absorption in water or $HNO_3$ soln. of gases contg N oxides (such as those produced by the arc process or by the catalytic oxidation of $NH_3$) is effected under pressures

of 50–150 lb. per sq. in. in a specially constructed tower (details of which are described) comprising 10 to 20 sections for gas and liquid contact. The gases are alternately scrubbed with liquid in each section and further oxidized on their passage to the next higher section. Cf. C. 1. 24, 2840.

Nitric acid production by catalytic oxidation of ammonia. E. I. du Pont de Nemours & Co. Fr. 635,255, March 27, 1928. In a process involving oxidation of $NH_3$ to nitric oxide, further oxidation of the nitric oxide to $NO_2$ and absorption in water condensed from the oxidized mixt., the oxidation and absorption are effected under pressure (e.g., under 4–10 atms. or higher) and the oxidized mixt. is cooled quickly to effect separation of water before oxidation of the nitric oxide takes place. An arrangement of app. and various details of procedure are described.

Recovery of nitric acid. Marion G. Milliken (to the Hercules Powder Co.). Can. 281,571, Feb. 24, 1931. Waste gases from nitrating operations are treated for the recovery of $HNO_3$ by mechanically removing $H_2SO_4$ mist, introducing $NH_3$ and separating substantially pure $NH_4NO_3$ formed by combination of the $NH_3$ with $HNO_3$ vapor of the waste gases.

Sulfuric acid. Henri N. M. Corbeau. Fr. 694,080, April 17, 1930. The residual gases from the Pb chambers are practically perfectly denitrated, and the loss in S is suppressed by submitting the gases to the action of $H_2SO_4$ only after they have reached a degree of oxidation corresponding to the presence of NO and $NO_2$ in equimol. proportions, the treatment with $H_2SO_4$ being then reduced to about 5–10 sec. The gases are given a final washing with alkali carbonate or bicarbonate.

Sulfuric acid. I. G. Farbenind. A.-G. Fr. 636,098, May 5, 1928. Constituents of $HNO_3$ are eliminated from impure $H_2SO_4$ contg. more than 60% of $H_2SO_4$ by adding $SO_2$ dissolved in an appropriate solvent to the $H_2SO_4$ to be purified and treating the mixt. with a current of gas at a high temp.

Cooler for sulfuric acid. A.-G. Georg Egestorff's Salzwerke und Chem. Fab. Ger. 516,256, July 22, 1928.

Residue of sulfonic acids from oil refining. Stanislaw Pilat and Jaroslaw Serafin. Fr. 694,220, Apr. 19, 1930. The residue of sulfonic acids obtained in the refining of oils with $H_2SO_4$ is neutralized with alk. earth hydroxides and treated with an alkali carbonate to obtain alkali sulfonates, which may be treated with mineral acids to obtain the free acids. The products are used as wetting, emulsifying and fat splitting agents.

Oxidation of ammonia. I. G. Farbenind. A.-G. Fr. 694,791, May 1, 1930. $NH_3$ is oxidized with catalysts of the Pt group, covered with Rh alone or with a mixt. of Rh with other metals of the Pt group. The Rh is heated to redness to make it adhere better before use as a catalyst.

Apparatus for the catalytic oxidation of ammonia. Soc. Anon. d'Ougrée-Marihaye. Ger. 510,444, April 17, 1928.

Mono- or di-alkali cyanamides. Jean Marcoules. Fr. 694,093, April 17, 1930. $CaCN_2$ is caused to react with an alkali phosphate in dil. or concd. soln. and at any temp.

Alkali phosphates. Metallges. A.-G. Fr. 694,677, April 29, 1930. Alkali phosphates, particularly $Na_3PO_4$, are prepd. by heating NaCl or other alkali chloride in a cyclic operation with FeS in the presence of O and steam, the $Na_2SO_4$ formed is heated with Fe-P to obtain $Na_3PO_4$ and FeS which is used again.

Alkali phosphates. Metallges. A.-G. (Freiherr Conrad von Gutschwald, Hans Weidmann and Gerhard Roesner, inventors). Ger. 510,382, June 1, 1929. See Brit. 333,492 (C. 1. 25, 1643).

Pyrophosphates. Metallges. A.-G. Fr. 693,913, April 15, 1930. Acid di-Na pyrophosphate ($Na_2H_2P_2O_7$) is made by evapg. under vacuum solns. of phosphoric acid contg. the corresponding amt. of NaCl. Temps. which would cause the formation of insol. metaphosphates are avoided.

Phosphorus compounds. Victor Chemical Works. Fr. 694,278, April 22, 1930. An app. is described for the manuf. of P compds., consisting of a combustion chamber and means for leading in gases contg. P.

Anhydrous chlorides. I. G. Farbenind. A.-G. (Max Jaeger, Robert Suchy and Wilhelm Moschel, inventors). Ger. 513,529, Mar. 30, 1928. Addn. to 502,646. Anhyd. chlorides of La, Ca, Zn and Ce are obtained by the method used in 502,646 (C. 1. 25, 544) for anhyd. $MgCl_2$ e. g., by heating a mixt. of metal chlorides and oxides of La, Ca, Zn or Ce. In one example, a mixt. of $CaCl_2$ and CaO are heated electrically in a current of $Cl_2$ and CO or HCl. In another, NaCl and KCl are heated with $CeO_2$.

**Alumina.** MAX BUCHNER U S 1,702,410, Feb 10 Aluminiferous material such as clay is treated with $HNO_3$ insufficient to combine with all the alumina in the material, and the Al nitrate soln is sepd and decompd by heat Cf *C. A.* 24, 5947.

**Alumina.** WM GUERTLER Ger 516,278, June 11, 1929 In the manuf. of $Al_2O_3$ by heating Al silicates with $CaCl_2$ or like chloride at 650–1000°, the HCl evolved is caused to act again on the reaction mixt when the latter has cooled to below 400°. Ca silicate is thus decompd and $CaCl_2$ is recovered The reaction product is worked up by extg $CaCl_2$ with water, and extg $Al(OH)_3$ from the residue with HCl, the $AlCl_3$ soln being then worked up in known manner Details are given

**Ammonium carbamate.** I G FARBENIND A.-G Brit. 336,206, July 1, 1929 Reaction under pressure is effected with excess of liquid or gaseous $NH_3$ and $NH_4HCO_3$, $(NH_4)_2CO_3$ or bicarbonates of alkali metals or of Mg (in which latter cases carbonates of the alkali metals or Mg are also formed) Mixts of salts produced may be sepd. by treatment with water, aq or liquid $NH_3$, MeOH, etc., and the reactions may be carried out in the presence of water

**Diammonium phosphate.** I G FARBENIND A G Brit 336,008, July 10, 1929 Di $NH_4$ phosphate soln is mixed with the dry salt to obtain a moist product which can be dried at a temp of about 60–80° without loss of $NH_3$ The soln used is preferably made from $H_3PO_4$ still contg some of the $H_2SO_4$ used to decompose the crude phosphates, evapd to a sp gr of 1.4–1.5 and cooled The contained Ca is thus pptd as sulfate and is removed, the soln being then neutralized The pptd. Fe and Al may be left in the soln

**Calcium carbonate.** LOUIS PERIN Fr 694,507, Aug 1, 1929 Chemically pure $CaCO_3$ is obtained by converting the natural carbonate into chloride and treating the chloride with $(NH_4)_2CO_3$ which ppts. pure $CaCO_3$ The $(NH_4)_2CO_3$ is recovered by treating the residual soln. with CaO and carbonating with $CO_2$, the $CaCl_2$ being then treated as indicated.

**Dicalcium phosphate and potassium nitrate.** A HOLZ and T VAN D BERDELL Brit. 336,692, July 30, 1929 Material contg tri Ca phosphate is treated with a mixt of $H_2SO_4$ and $HNO_3$ (preferably in the ratio of 1 to 4 mols.), $CaSO_4$ is removed from the soln of $H_3PO_4$ and $Ca(NO_3)_2$ formed, and the latter is then treated with KOH or $K_2CO_3$ Di-K phosphate formed is immediately converted into di Ca phosphate, and the latter is removed and dried, the remaining $KNO_3$ soln may be evapd to dryness, the salt may be mixed with di Ca phosphate contg some $CaSO_4$, and the latter may be converted into $(NH_4)_2SO_4$ Cf *C. A.* 25, 1324

**Carbon monoxide.** HENRY DREYFUS. Fr 694,223, April 19, 1930 Mixts of $CO_2$ and $H_2$, particularly those resulting from the washing waters of industrial mixts. of these gases, are passed over chromite heated to 800–900°, and the resulting gases are passed over hot C (coke, coal, wood, etc.) in any manner used for making CO from $CO_2$

**Carbon dioxide.** I G FARBENIND A.-G Fr 694,871, May 2, 1930 Liquid $CO_2$ is prepd by the catalytic dissocn under pressure of CO or gases contg it, and condensing under pressure the $CO_2$ formed Examples are given using Ni as a catalyst.

**Solid carbon dioxide** KARL FEHRMANN Ger 513,514, Nov 4, 1928. A method and app are described for regulating the evapn of solid $CO_2$ by using the gas pressure developed

**Solid carbon dioxide.** GES. FÜR LINDE'S EISMASCHINEN A G Ger 513,528, Apr. 17, 1929 Addn to 463,125 Solid $CO_2$ is obtained by sepn of its vapor from a solidified mixt. and resolidification App is described

**Chromium oxide.** I G FARBENIND A G Brit 336,671, July 19, 1929 A *product suitable for use as a pigment, polishing agent or for metallurgical purposes* is obtained by igniting (suitably at about 900°) Cr hydroxide obtained by reducing an alkali chromate or dichromate (free from coloring impurities such as Fe) with S in soln or partial soln and suspension Alkalies and polysulfides, etc., may be used as initial materials for the reduction, and the color of the ignited product varies from yellow to blue as the temp of reduction is increased (reduction temps of 105–120° being suitable) $Na_2S_2O_3$ may be crystd from the spent liquor and the latter then reused, or part of the S may be recovered by treatment of the liquor with $H_2SO_4$

**Phosphorus oxychloride.** J S. DUNN, I BRIERS and IMPERIAL CHEMICAL INDUSTRIES, LTD Brit. 336,065, Sept. 6, 1929 Ca phosphates such as rock phosphate or double superphosphate are reacted on by phosgene under such conditions as constantly to expose fresh surfaces to the reacting gases (as by agitation with admixed pebbles in a rotary kiln), and the $CaCl_2$ (formed from $CaCO_3$ in the raw material) is prevented from forming a protective covering The mass may be washed with water at inter-

vals and reused after drying, and inert solids such as coke or washed residues from a previous operation may be added Alternatively, the phosphate may be mixed with C activated by treatment with Cl at 1000°, and Cl alone or mixed with CO may be used instead of phosgene The temp may be raised during the reaction from about 350° to 600° (or higher if Cl alone is used).

Phosphorus oxychloride. J S. Dunn, F. Briers and Imperial Chemical Industries, Ltd Brit. 337,123, Sept. 6, 1929 $POCl_3$ is produced by reaction of $COCl_2$, or its equivs such as CO and Cl, upon natural Ca phosphate such as phosphate rock, which has been subjected to a preliminary treatment to remove other reactive Ca compds. such as $CaCO_3$ (suitably by conversion of the latter into sol. compds and washing out these) In a modified procedure, Cl may be passed over a mixt. of the phosphate with active C. Various details of treatment are described.

Sodium sulfide. I G Farbenind A.-G Brit 336,251, June 10, 1929 Anhyd Na sulfide is made by reducing $Na_2SO_4$ in the mass with H or other suitable gaseous reducing agent at such a temp (suitably 500–600°) that the mass is maintained in the solid state throughout the reaction The reaction may be accelerated by the addn of a small proportion of Na sulfide or the crude melt obtained in its manuf., NaOH S Fe or Ni or mixts or compds of these Cf *C A*. 24, 2253

Zinc hydrosulfite. Hans Pick. Austrian 120,389, July 15, 1930 In the manuf. of $ZnS_2O_4$ by treating Zn suspended in EtOH with $SO_2$, better yields are obtained by effecting the reaction in the presence of a small quantity of a metal less electropos. than Zn, *e. g.*, Sn or Ag The addnl metal may be pptd in the presence of the Zn, or an inert carrier on which the metal has been pptd. may be used. An example is given

Zinc oxide. Compagnie française de transformation métallurgique (René H L. Aubert, inventor) Fr. 693,947, Apr 15, 1930 In the manuf of ZnO the greater part of the heat necessary for the distn. of the metal is obtained from the radiant heat of the combustion flame of the Zn vapors. A suitable app is described

Enriching natural phosphates. Aktiebolaget Kemiska Patenter Fr 694,946 May 3, 1930 Natural phosphates are enriched by heating them with $H_3PO_4$ so as to form tribasic phosphates of alk. earth metals.

Reactivating carbon, silica gel, etc. Josef Mucihka Austrian 120,098 and 120,101, *June 15, 1930* The materials are entrained in a current of a reactivating liquid or gas, in a manner analogous to that employed in cleaning filter sand App is shown (120,098) Austrian 120,101 describes modified app for the same purpose

Hydrogen and carbon monoxide from methane, etc. I G Farbenind A.-G Brit. 336,635, April 8, 1929 Gaseous hydrocarbons such as $CH_4$ or gas mixts. contg it (other than coke-oven gases or other gases contg liquid hydrocarbons) are passed, with water vapor (and if desired with further addn. of air or O), through a water gas producer in which coke or other carbonaceous fuel is undergoing gasification which is carried out without addn. of $CO_2$ (the coke having a temp of at least 800–1000°) As starting material there may be used a natural gas or waste gases from $NH_3$ synthesis, hydrogenation of coal, cracking, etc Various details and modifications of procedure are described Cf *C A* 25, 783

Hydrogen and carbon monoxide from methane, etc. I G Farbenind A.-G Brit 336,944, April 8, 1929 Various details are described of a process generally similar to that of Brit 336,635 (preceding abstract)

Hydrogen and oxyacids of phosphorus. I. G Farbenind A.-G Brit 337,109. Aug 24, 1929 P or P acids of lower stage of oxidation than $H_3PO_4$ are heated under pressure with anhyd $H_3PO_4$, *e. g.*, yellow P 10 parts is heated for 3 hrs with $H_3PO_4$ 85 parts at 300° under 83 atm pressure, by which an acid contg 80% $P_2O_5$ is obtained.

Metallic sodium and potassium. José Ylla-Conte Fr 694,587, April 26, 1930 An app is described for the production of K and Na by reduction of the carbonate or hydroxide with C under reduced pressure produced by pumps drawing off the gases formed Cooling means is placed between the reaction chamber and the pumps

Catalysts. I G Farbenind. A.-G Fr 694,076, April 17, 1930 Very active catalysts are prepd. by disseminating catalytic substances in an extremely fine state of division, preferably in the atomic state, in particularly refractive stabilizers not modified under the conditions of the process and bringing the substance into the state of catalytic activity without using high temps. If oxides or salts are used, they are reduced with active H in the stabilizer

Polymerization products. I. G Farbenind A.-G. Fr. 693,920, April 15, 1930 Polymerization products of good mech. properties are made by heating diolefins, such

as butadiene, while adding alkali metals or their alloys or org compds of alkali metals in portions during the polymerization.

**Urea-formaldehyde condensation products.** I G Farbenind A.-G. (Johannes Kuchenbuch and Karl Eisenmann, inventors) Ger. 516,995, Apr. 13, 1929. Addn. to 490,012 (*C. A.* 24, 2256) and 495,790 (*C. A.* 24, 3615). Products of reduced inflammability are obtained by effecting the processes of the prior patents in the presence of halogenated aromatic alcs. or of di- or polyhydric alcs. partly etherified or esterified with one or more halogenated aromatic radicals. Suitable condensation media are *o*-chlorobenzyl alc., glycol monobromophenyl ether and glycol bromosalicylate. Examples are given.

**Plastic masses.** Deutsche Hydrierwerke A.-G. Ger. 513,771, Jan. 24, 1926. A softening and gelatinizing agent for such plastic masses as cellulose esters, lac, etc., consists of esters of hydroaromatic carboxylic acids which have a wholly or partly hydrated nucleus. These may be combined with other softening agents. Preferably, the agent is an ester of dicarboxylic acids obtained by the oxidation of partly hydrated naphthalene with a wholly hydrated ring, or of hydronaphthols.

**Artificial materials.** I G Farbenind A.-G. Fr. 694,944, May 3, 1930. Artificial materials are made of fibrous materials agglutinated with condensation products of dicarboxylic acids of ethers or thioethers and polyhydric alcs. or their solns. The product is submitted to a hardening under pressure. Examples are given of the use of the condensation products of diglucolic acid with glycerol in acetone, thiodihydracrylic acid with glycerol in a mixt. of dioxane and acetone, etc.

**Composite articles of materials such as rubber and bakelite.** B. O. Warwick and M. Warwick (trading as Warwick's Time Stamp Co.). Brit. 336,292, July 12, 1929. Materials such as uncured rubber and bakelite powder are united by molding together under heat and pressure to form a hardened mass.

**Pectins and mucilages.** Henri Olivier. Fr. 694,460, July 27, 1929. Pectins and mucilages contained in plantain seeds are extd. with water in a closed vessel at a temp. above 100°.

**Casein.** Charles C. T. Porcher and Jeanne Brigando. Fr. 694,032, April 16, 1930. Casein contg. little ash is prepd. by pptn. with lactic acid, AcOH, HCOOH, HCl or $H_2SO_4$ at the isoelectric pt. of a $p_H$ value of 4.7. The casein is afterward heated in its serum to 60–65°, the serum decanted and the casein washed in acidulated water. Paracasein and Ca paracaseinate are prepd. from com. lactic casein.

**Dialyzing membrane.** Filtres Philippe. Fr. 695,007, Aug. 2, 1929. A membrane for dialyzing org. products in the presence of solvents is made by dipping a support, *e. g.*, of cloth into a bath of rubber and drying. Fr. 695,008 describes the application of the membranes for the *purification of mineral oils*.

**Porous material for heat insulation, filters, etc.** I G Farbenind A.-G. Brit. 336,318, July 19, 1929. Siliceous material, such as that obtained in the manuf. of alumina by treating burnt clay with HCl, is heated with alkali such as a 20% NaOH soln. and then further heated (suitably to 300–500°) to effect swelling and production of a porous product suitable for heat, sound or elec. insulation, filters, diaphragms, absorbents, fillers of rubber, lacquer, paper, etc. Numerous examples of siliceous materials and alk. reagents which may be used are given. MgO and $MgCl_2$ may be employed to strengthen the product, and org. fillers may be burnt out to increase the porosity of the product if desired.

**Bearing material.** Charles F. Noftzger. U. S. 1,791,834, Feb. 10. Bearings are formed of ground sericite schist and an insol. condensation product of a phenolic compd. and $CH_2O$.

**Use of diethyl phthalate as a cooling fluid in heat-exchange systems such as engine-cooling systems.** Dan J. Killen (to Waldemar C. Wehe). U. S. 1,791,818, Feb. 10. Diethyl phthalate is used alone undild.

**Apparatus for calcining seaweed.** J. C. Morrison. Brit. 336,500, Dec. 16, 1929. Structural features.

**By-product whiting.** John W. Church and Harvey G. Elledge (to The Pure Calcium Products Co.). Can. 309,082, Mar. 3, 1931. Whiting is produced by the reaction of $Ca(OH)_2$ and $Na_2CO_3$, sepn. of the major portion of the NaOH formed, formation of a slurry of the impure $CaCO_3$, treatment of the slurry with $CO_2$ to convert the remaining NaOH into a carbonate, further treatment of the slurry with $CaCl_2$ to form NaCl and the washing out of the NaCl.

**Applying hood caps to bottles.** Carleton Ellis (to Ellis-Foster Co.). U. S. 1,792,006, Feb. 10. Binder-carrying caps such as those of heavy paper treated with a mixt. of carnauba wax 80, rosin 18 and S 2% are applied to a container such as a

bottle while maintaining the temp sufficiently high to render the binder of the cap plastic, but low enough not to cause undesirable adhesion between the cap and container

Use of aqueous oil emulsions to take up shocks in shock-absorbing devices. NOEL B NEWTON. U S 1,791,832, Feb 10. Emulsions may be used such as those prepd. from water 10 gals., lard oil 2½ gal., $Na_2CO_3$ 7 lb. and soft soap 2 lb. or from olein 3–5, MeOH 1, mineral oil of 0.885 sp. gr. 19, glycerol 1, KOH 1 and water 75 parts.

Treated receptacle for preventing tarnishing of silverware. GEORGE E HERRING. U S 1,791,504, Feb 10. Tarnishing is inhibited by treating the inner surfaces of a silverware case with a substance such as Pb acetate which arrests the tarnishing action of $H_2S$ and $SO_2$.

Wetting, etc., agents. DEUTSCHE HYDRIERWERKE A.-G. Fr. 694,250, April 22, 1930. Piperidine and its homologs either alone or with org. acids are used as washing, cleaning, wetting or emulsifying agents. Cf. *C. A.* 25, 1048.

"Lime-nitrogen." ELEKTROCHEMISCHE GES. and H. GROHMANN. Brit. 336,677, July 20, 1929. Ca carbide is heated in N which is supplied through channels uniformly throughout the mass (as through cardboard tubes in the mass). The mass is heated to 800° or higher and it fuses but remains sufficiently viscous that the channels are not closed.

Apparatus for making lime-nitrogen. GUSTAV HILGER. Ger. 516,445, Sept. 20, 1929.

Device for blowing combustion air into shaft kilns for lime, etc. MASCHINENBAU-ANSTALT HUMBOLDT. Ger. 516,087, Feb. 22, 1929.

Rotating furnace for dehydrating gypsum. ETABLISSEMENTS POLIET ET CHAUSSON. Fr. 695,029, Aug. 6, 1929.

Protecting leather, wallpaper, wood and other materials from fungi. I. G. FARBENIND. A. G. Brit. 336,244, May 1, 1929. The materials (including textile materials other than those of wool) are protected against mildew or other fungi by treatment with a hydroxydiarylmethane or hydroxytriarylmethane contg. one or more univalent halogen phenol residues, *e. g.* ox hide is treated with a caustic alkali soln. of the condensation product from formaldehyde and 2 mol. proportions of *p*-chlorophenol (dil. $H_2SO_4$ being added to neutralize the alkali). Various other examples are given.

Pencil compositions. EAGLE PENCIL CO. Ger. 516,229, July 16, 1929. Addn. to 505,144 (*C. A.* 24, 3951). The compn. described in Ger. 505,144 is modified by using other sulfonated oils, *e. g.*, sulfonated olive oil, in place of Turkey red oil.

Stencil sheet. SHINJIRO HORII. U S 1,792,095, Feb 10. Sheet material such as Japanese yoshino paper is coated with a compn. comprising a mixt. of esters of polysaccharides such as cellulose acetate, cellulose nitrate, starch acetate, starch palmitate or mannan acetate with naphthenic acid glycerides and a heavy hydrocarbon oil. Cf. *C. A.* 25, 1646.

Materials for electrodynamic microphones. CLINTON R. HANNA (to Westinghouse Elec. & Mfg. Co.). U S 1,792,200, Feb 10. A conical diaphragm has a coil support at its smaller end formed of material such as celluloid to which a coil is united by a cementing material such as a cellulose acetate compn. which when applied contains an ingredient having a solvent action on the material of the support.

Photographic sound records. F. K. CROWTHER and BRITISH TALKING PICTURES, LTD. Brit. 336,559, July 4, 1929. Various mech. details of manuf. are described.

Dental amalgams. DEUTSCHE GOLD- UND SILBER SCHEIDEANSTALT VORMALS ROESSLER (Fritz Ungerer, inventor). Ger. 513,957, May 9, 1928. The amalgams are formed by shaking the constituents in a closed vessel in the presence of a small quantity of dil. NaOH.

Apparatus suitable for heating thermoplastic dental materials, etc. DANIEL S LOCKWOOD. U S 1,792,434, Feb 10. Structural features.

Dental cement. JORGEN E THOMSEN. U S 1,792,200, Feb 10. A dry powder suitable for use as a dental cement on addn. of water alone consists of approx. 145 parts by wt. of a silicate cement and 40–60 parts by wt. of pure $H_3PO_4$ or its equiv. in the $P_2O_5$ radical, the ingredients being mixed together at a temp. sufficiently low (suitably at room temp.) to retain the mixt. in an unstable condition capable of reacting with the added water to form a plastic mass capable of hardening.

"Frost-preventive" or thawing agents for use on railway switches, etc. G. ERDBRÜGGER. Brit. 336,739, Sept. 9, 1929. Ground raw carnallite is used in mixture with liquid bitumen or crude mineral oil.

"Artificial ice" skating rinks. H. REESER. Brit. 336,218, June 4, 1929. A suitable foundation is covered with a layer which may be formed from Na hyposulfite 70

and borax 30 parts with a small quantity of alum, and the surface may be covered with a soap and stearin compn

Mixed felt for use as a box toe material. HENRY P. SHOPNECK (to Arden Box Toe Co). U. S. 1,791,537–8, Feb 10 A short-fibered material such as wood pulp 60, is used with leather fibers or wool and cotton fibers 30 and asbestos fibers 10%, felted and impregnated with a thermoplastic material. Cf *C. A.* 24, 1478.

Filter for use in tobacco pipes. Z. BRAZAY. Brit. 337,200, Dec. 5, 1928 Filter wads are formed of material such as cotton or filter paper which has been treated with dil $H_2SO_4$, heated sufficiently to carbonize the fibers on their outer surface, and then impregnated with $FeCl_3$ or other material such as citric, tartaric or tannic acid adapted to fix the nicotine. The $H_2SO_4$ still present after the carbonization is neutralized with $NH_3$

Apparatus for supplying fire-extinguishing foam to oil tanks, etc. MINIMAX A.-G. and PYRENE CO., LTD. Brit. 337,221, Nov. 14, 1929 Structural features.

Composition for fireproofing fibrous materials. S. A. I. G. (SOC. ANON. INVENZIONI GUADAGNIN) Brit. 336,863, Dec. 10, 1929 Articles are immersed or treated under pressure with a soln. formed of $NH_4Cl$ or $(NH_4)_2CO_3$ 12, $H_3BO_3$ 8, $NH_3$ 8 and water 70 parts.

Fire-extinguishing compositions. MINIMAX A. G. Ger. 516,426, July 28, 1927. Compns. comprising $CCl_4$ and $NH_3$ (or a compd. thereof) are rendered stable to storage by means of a phys. or chem. drying agent, which may be added to the compn. or located in the container therefor Suitable drying agents are soda-lime, anhyd. $Na_2SO_4$, $P_2O_5$, and silica gel *Cf. C. A.* 25, 1348.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Quinquennial review of the mineral production of India for the years 1924 to 1928. Glass-making materials. G. V. HOBSON *Records Geol. Survey India* 64, 392–9 (1930).—Chem. analyses of Indian glass sands are given ($SiO_2$ 96.00, 98.95, 99.39, 98.10 and 99.80). ALDEN H. EMERY

Dependence of the properties of glass on its thermal history. E. BERGER. *J. Soc. Glass Tech.* 14, 280–94(1930).—The properties of glass depend upon the state of aggregation within the mass. Annealing produces an inner state of equil. and hence a change in double refraction, density, etc. H. F. KRIEGE

The decomposition of refractory silicates by fused ammonium fluoride and its application to the determination of silica in glass sands. A. C. SNEAD AND G. FREDERICK SMITH *J. Am. Chem. Soc.* 53, 483–6(1931).—The use of an $NH_4F$ fusion for decompn. of glass sands is rapid and quite satisfactory for routine analyses. M. A. EDDY

Manufacture of photographic lenses. ROBERT S. GUILFORD *Glass Ind.* 12, 23–7 (1931).—The methods employed at the Hawkeye Works of the Eastman Kodak Company are described H. F. KRIEGE

Destruction of glass by superheated steam. F. H. ZSCHACKE. *Chem.-Ztg.* 55, 41 (1931); cf. *C. A.* 24, 4130.—No glasses are completely immune to the attack of water vapor, but a typical compn. and list of sources are given for glass which is satisfactorily resistant. T. H. CHILTON

Term "pounds of glass per pound of coal" is misleading. JOHN W. ROMIG. *Glass Ind.* 12, 28–9(1931).—The factors requiring consideration in a discussion of melting efficiency are furnace construction, regenerative capacity, temp. in the tank, quality of fuel and pull on the tank. H. F. KRIEGE

A little-known action of animal glue and other adhesives on glass. GUSTAV GÜNTHER. *Chem.-Ztg.* 55, 37–8(1931).—A sign was affixed to a store window with dextrin and the glass underneath was "ruined," and damages were sought. It was demonstrated that any adhesive might, when removed after drying, cause an irregular frosting effect, if the glass was old and had been frequently polished A flexible paste is recommended for such cases. T. H. CHILTON

Notes on clay and burned clay products. G. S. STAIRS. *Eng. J.* 13, 688–93 (1930).—Some of the properties of clay as a material and the methods of manuf. of such clays which are of importance to structural engineers are indicated. The manuf. of brick and the manuf. of structural tile are outlined Advantages and disadvantages

of the car *tunnel* and the down-draft *kilns* are listed A flowsheet of mfg processes in the clay product industry and a brief discussion are included W. H Boynton

Behavior of soluble salts during the burning of clays—the problem of efflorescence. IV Conditions for the formation of sulfate efflorescences in ceramic materials. A Simon and K Schmider *Z angew Chem* 43, 380-2(1930), cf *C A* 24, 1949.—Clay material contg quartz, or quartz material was admixed with varying quantities of lime (corrtg MgO) and heated at 1000° for 3 hrs and then maintained at this temp for 5 hrs in air contg 0 5 or 2% $SO_2$ For the same lime content the amt. of sulfate formed rises with increasing $SO_2$ concn , the amt. of $SO_2$ absorbed being directly proportional to its concn Similarly, for the same $SO_2$ concn the quantity of this gas absorbed and of sulfate formed increases with the rise in lime content, but at a much lower rate than the latter The temp interval 300–600° is most favorable for the absorption of $SO_2$, max absorption probably occurring between 400° and 500°. In the firing of ceramic materials, therefore, the interval 300–600° should be passed as quickly as possible in order to avoid absorption of the $SO_2$ produced by the combustion of the S of the coal No absorption occurs at 750° and above, the sulfate detected in the expts. carried out at 1000° is formed during the heating up to this temp , and although the dissocn pressure of $CaSO_4$ in the presence of $SiO_2$ is already exceeded at 750°, greater energies than are present are necessary before decompn occurs The drying and preheating of ceramic material, therefore, should be completed as far as possible in the absence of $SO_2$, while for sharp firing, coal contg S may be used without adverse effect. B C A

Technical analysis of clays with the aid of the microscope. H Möhl. *Sprechsaal* 62, 731-4(1929).—The methods employed are described, together with the microscopical characteristics of various clays B C A

Manufacture of light-weight units of clay and combustible admixtures. Alg E Buch *Ziegelzeit* 62, 31-2(1931).—A fat clay is essential as binder while a variety of admixtures such as sawdust may be used H F K

Effect of temperature on the cracking of plastic clay; with some notes on Temperature gradients inside the clay during steady heating in a saturated atmosphere and on drying at 100°. S R Hind and F Wheeler. *Trans Ceram. Soc* (Eng). 29, 314-25 (1930) cf *C A* 24, 5935.—It was shown that clay cracks vigorously when heated in a satd atm. Hence the failure during drying cannot be due to unequal contractions of different parts of the ware nor to the bursting force developed by entrapped water vapor A definite relationship exists between the crit. temp. and the water content of the clay in a satd. atm. The actual range over which cracking occurs is a property of the clay With 4" cubes of clay heated at a regular rate the thermal diffusivity increases as the water decreases from 20 7 to 17.4%, after which it decreases Clays must be air-dried to a certain water content beyond which the drying process may take place at higher temps without serious results. H F. K.

Influence of atmosphere on the load-bearing capacities of fire bricks. H T. S. Swallow *Trans Ceram Soc* (Eng.) 29, 229-53(1930).—By use of the Mellor and Moore load test furnace as modified by Dale, several types of bricks were tested in oxidizing, reducing and steam atms It is suggested that the influence of a reducing atm at high temps. is apparent more in an increase in the amt. of contraction than in a reduction in refractoriness or load-bearing capacity At the temps. of these tests (1200–1280°) the action of steam appeared to be negligible as a reducing atm. The Fe content of the brick must be considered when tests are made under oxidizing conditions. It is suggested that the term "oxidizing atmosphere" be defined as that in which FeO cannot exist in stable equil. but is raised to at least $Fe_2O_3$. H. F. K.

Effect of repeated burning on the structure and properties of lime-bonded silica bricks. II. Determination of the proportions of quartz, cristobalite and tridymite. W. Hoghil and W J Rees. *Trans Ceram Soc* (Eng) 29, 281-4(1930); cf *C. A.* 23, 5289.—Using the optical method of reading the linear intercepts for each constituent in 2 directions at right angles, H and R. detd. the amts of the 3 forms of $SiO_2$ and of glass present after repeated burnings. The amt. of unchanged quartz decreases rapidly in the first 2 burnings and thereafter much more slowly By extrapolation, it is estd that at least 20 burnings under these conditions would be necessary to invert the whole of the quartz Tridymite increases and cristobalite decreases more in the first 6 burnings than later The quantity of glass remains const. III. Determination of the reversible thermal expansion. *Ibid* 284-7.—Test pieces were burned up to 12 times in a com kiln at cone 17, the temp of the specimens being raised 2.5° per min. The linear expansions for the intervals 15–240° and 15–1000° were, resp : 1 burn 0 73%, 1 152 %, 3 burns 0 74%, 1 130%, 6 burns 0 75%, 1 104%; 12 burns 0 49%, 840%. H. F. K.

**Some effects of firing temperature, kind of grog and grading on the properties of *fire-brick material.*** A. J Dale. *Trans. Ceram. Soc.* (Eng) 29, 320-38(1930).—A clay giving a refractory test result of cone 26 was used as a bond clay with several *highly refractory materials* Addns of over 60% of fused $Al_2O_3$ or precalcined diaspore give good results Greater rigidity of such materials below 1500° can be obtained by increasing the severity of the kiln treatment and decreasing the grain size of the grog Crude zirconia gave a very dense vitrified product which, however, squatted under load at relatively low temps Silica glass and quartzitic grog were about equal, the greater the grain size the greater the after expansion. Vitrified grog should be of finer gradation than the porous grog When the amt of clay is not excessive, the value of the clay bonded refractory is governed by the nature of the grog more than by the clay H F K

**Thermal expansion of refractory materials.** R V Widmann, A. Jourdain and H Cassan *Ceramique* 33, 239-50(1930) —Various *types of app* are described *Thermal expansion curves* are given for silico-aluminous refractories, French, English and German silica refractories, bauxite and magnesite A. J Monack

**The refractory lining of cupolas.** Joseph Romtschek *Feuerfest* 6, 113-8 (1930) —Lab tests of refractory brick and examn under actual working conditions indicate that the major factors in the destruction of a cupola lining are chem and mech action of the slag In some cases the life of a lining depends upon resistance to temp changes This factor becomes of greater importance the larger the brick R A. Soule

*Electric-furnace production of high-heat-duty refractories.* Fred W Schroeder. *Ind Eng Chem* 23, 121 6(1931) —The operation of the Corhart Refractories Co. is described *Diaspores and kaolins are carefully blended, melted in an elec furnace of* the dipping electrode resistance type and poured into sand molds, after which the blocks *are annealed for 6-10 days. The resulting product is vitreous, non-porous and re*fractory up to cone 37, has about 0.5 the linear coeff of expansion of first class fire brick and is *very resistant to the corrosion of glass* H F. K.

**Gas permeability of refractory material, especially at high temperatures.** H. Immke and W Meijer *Sprechsaal* 64, 85-7, 107-9(1931) —Two methods for detg gas permeability of refractories at high temps are described The permeability of 6 pyrometer tubes toward 12 gases detd at high temps shows that the gas permeability is directly proportional to the pressure and depends on the temp At very high temps the gas permeability decreases with increased temp It is also a function of the vis cosity of the gas C. H. Lorig

**The scorification of refractories. V. The relation of flux content and porosity to the scorification of fire brick.** Hermann Salmang and Otto Hirnstritt. *Feuerfest* 7, 1-8(1931) —A mixt. of very pure $Al_2O_3$ and $SiO_2$ (1:2) was prepd. Portions were treated with a flux (2% of $Fe_2O_3$, CaO, $TiO_2$ or $Na_2O$), molded into cupels and fired at 1410°. Six different synthetic slags were made from mixts of high-grade FeO, $Fe_2O_3$, $SiO_2$, $Al_2O_3$, CaO and $Na_2O$ The action of each slag on each sort of cupel for 1 hr at 1410° showed that, regardless of the flux, the depth of slag penetration was about the same The *max* was 13-14 mm. for the slag 3.46 CaO $1Al_2O_3$ 3.53 $SiO_2$ The influence of the flux was nullified by the high porosity (53-54 vol %). Crucibles *made from a 70:30 mixt. of burnt and unburnt kaolin contg either 0, 2 or 4% flux had* a porosity of ≈21 vol % FeO, as a slag, strongly attacked each type of crucible at 1500° *The action was greatest in the presence of 4% $Na_2O$ or $TiO_2$* The slag FeO $SiO_2$ perforated many crucibles Refractories with 2 or 4% flux were attacked by the various slags only slightly more than those contg none. Tests on com brick showed that the action of blast-furnace or open hearth slag is not directly dependent on porosity. Brick of the same chem compn and porosity is attacked to the same extent only when the microstructure is the same B. A Soule

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Graphical calculation of the composition of ceramic varnishes (Castiglioni) 26. Firing with powdered coal in German tempering foundries (Stotz) 9. Structure of silicates (Bragg) 6. Critical observations on the directions for glass testing of the German Pharmacopeia, Sixth Edition (Kronmar) 17. Transmission changes in ultra-violet glasses during high-temperature exposure to light (Nitchie, Schmutz) 3. Heat-treating furnace for enameled articles (U. S pat. 1,792,281) 9. Alloys for sealing to glass (*Brit* pat 337,083) 9. The ternary system: $K_2O$-CaO-$SiO_2$ (Morey, *et al*) 2.

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Tonindustrie-Kalender, 1931. 2 vols *Berlin:* Tonind-Ztg. M. 4. Reviewed in *Ceram Abstracts* 10, 236(1931).

WIDEMANN, R. V., JOURDAIN, A., AND CASSAN, H.: L'étude de la dilatation des materiaux refractaires. Paris: La Ceramique. 20 pp. Reviewed in *Ceram. Abstracts* 10, 236 (1931).

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Paddle mechanism for circulating molten glass. ALEXANDER F. MCNISH (one half to John Moncrieff, Ltd.). U. S. 1,792,286, Feb. 10. Structural features.

Apparatus for supplying molten glass to a suction-gathering machine. J. MONCRIEFF, LTD., and A. F. MCNISH. Brit. 336,883, Aug. 9, 1929. Structural features.

Device for gathering molten glass and similar materials. EGYESULT IZZOLAMPA ES VILLAMOSSAGI RESZVENYTARSASAG and J. LEVAI. Brit. 335,931, July 2, 1929. Mech. features.

Apparatus and method for circulating and feeding mold charges of molten glass. KARL E. PEILER (to Hartford Empire Co.). U. S. 1,791,634-5-6, Feb. 10. Mech. features.

Forming tubes or rods of glass. P. A. FAVRE. Brit. 336,460, Nov. 14, 1928. App. is described.

Apparatus for glass bottle manufacture. CHARLES BADGER (to Lynch Glass Machine Co.). U. S. 1,792,267, Feb. 10. Structural features.

Coloring glass. DEUTSCHE GASGLUHLICHT AUER GES. M. B. H. Fr. 694,828, May 1, 1930. Glasses are shaded in red with oxides of rare earth metals while preserving the dichroism by adding small quantities of colloidal colors known to color glass red, Au, Cu O or Se. Cf. *C. A.* 24, 5451.

Tempering glass. SOC. ANON. DES MANUFS. DES GLACES ET PRODUITS CHIM. DE SAINT-GOBAIN, CHAUNY ET CIREY. Fr. 695,035, Aug. 7, 1929. An arrangement is described for blowing air on to the heated glass. Fr. 695,040, Aug. 8, 1929. An app. is described for tempering glass. It consists of 2 hollow plates through which cooling liquid flows and between which the sheets of glass are mounted. Cf. *C. A.* 25, 571-2, 790.

Glass sheet. Y. BRANCART. Brit. 336,921, Feb. 14, 1929. Mech. features relating to the formation of the sheets (or their immediate treatment after formation) with a rotating rough roller run at such a speed that the glass is driven backward slightly toward the beginning of the plate. The impressions formed disappear at once. Brit. 336,924 relates to a generally similar process including rolling with smooth rollers. Cf. *C. A.* 25, 571.

Table for receiving or casting glass plates or sheets. C. LOCREILE. Brit. 336,550, April 9, 1929. Casting tables are made of a sandless concrete composed of fragments of porphyry and of a cement formed of a ground mixt. of burned lime, silica and alumina (the porphyry fragments being distributed in several layers through the thickness of the table in graded sizes with pulverized porphyry in the top layer).

Apparatus for making sheets of glass. MISSISSIPPI GLASS CO. Fr. 693,940, April 15, 1930.

Apparatus for rolling sheets of glass. N. V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Fr. 693,973, Apr. 4, 1930.

Rolling and fire-polishing glass sheets. A. BRANCART. Brit. 336,533, Feb. 23, 1929. App. and various details of procedure are described.

Plate glass rolling machine. N. V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Ger. 513,879, Nov. 29, 1929.

Sole plate for glass-annealing furnaces, etc. YVON BRANCART. U. S. 1,791,656, Feb. 10.

Furnace for annealing glassware. W. A. MORTON. Brit. 336,596, April 15, 1929.

Apparatus for making glass reënforced with wire. MISSISSIPPI GLASS CO. Fr. 694,215, April 19, 1930.

Safety glass. JOHN NEWTON. Fr. 693,919, April 15, 1930. Safety glass is made by incorporating 2 or more sheets of celluloid or cellulose acetate, etc., between 2 sheets of glass.

"Unsplinterable glass" sheets. T. W. *Hoar and J. F. W. Stuart.* Brit. 336,037, Aug. 1, 1929. Various details of app. and procedure are described for uniting the component sheets with use of fluid pressure in an autoclave.

Uniting glass sheets with non-brittle material. LIBBEY-OWENS GLASS CO. Brit. 336,732, Aug. 30, 1929. In uniting glass sheets with cellulose derivs. or synthetic resins or with a combination of the two, the latter is sprayed with a bonding medium such as a mixt. of di Bu phthalate and a polyglycol deriv. such as the monoethyl ether of diethylene glycol, and the sheets are united by heat and pressure. The glass may be sprayed with a cellulose deriv. compn. or synthetic resin compn. in a low b. p. solvent.

mixed with higher b p solvent or plasticizing substances Various details of procedure and compns are given

**Uniting glass sheets with sheets of cellulose derivatives.** S BARRATT. Brit. 335,890, June 29, 1929 For removal of knife marks and the like, a cellulose deriv. sheet is softened and pressed with a hard surface (which may be a gelatin-coated glass sheet with which it is to be united) Various details of heating and pressing the sheets together are described

**Joining glass sheets with an intervening sheet of celluloid or similar materials.** T W HOLT and J F W STUART Brit 337,158, Oct 2, 1929 Various mech details for uniting the sheets are described

**Composite sheets of glass and cellulose derivatives.** BRITISH CELANESE, LTD. Brit 335 878, March 13, 1929 Two glass sheets are united by an intermediate sheet formed of a cellulose deriv and an org tartrate such as di Bu or di Lt tartrate and dyes, synthetic resins and stabilizers such as urea also may be added The cellulose deriv sheet may be united to the glass by an adhesive such as gelatin or vinyl acetate resin or a suitable mixt of a cellulose deriv and synthetic resin

**Fused silica sheets suitable for window panes** J H SULLIVAN (to British Thomson-Houston Co, Ltd) Brit 336 923, Feb 14 1929 Fragments of cryst $SiO_2$ are fused *in vacuo*, the material while plastic is allowed to assume, by gravity, the form of a flat sheet, and is caused to harden under gaseous pressure, as by admitting air or by use of N under pressure (suitably 200 lb per sq in) App. and various details of procedure are described

**Purifying clay** WM FELDENHEIMER U S 1,791,959, Feb 10 A liquid suspension of the material is deflocculated impurities are sepd (as by sedimentation) and the slip is flocculated and thickened with reagents such as lime and HCl in quantities which render the clay non acidic, and the clay is sepd from the liquid

**Refining kaolin and clay.** ERICH MÜLLER Ger 516,144, Dec. 30, 1926 Water and water glass in const proportions are continuously fed to a mixing vessel to which kaolin or clay is also fed at such a rate that a suspension having a sp gr between 1 08 and 1 09 is produced It is stated that a streaky appearance develops on the surface of the suspension when the sp gr lies between the limits mentioned The suspension flowing from the mixing vessel is passed upwardly through a funnel shaped vessel to remove fine impurities, and then neutralized with HCl and worked up in known manner. Cf *C. A* 25, 783, 790

**Porous bricks.** T KOMÁ and F. GORLICH Brit. 337,231, Nov 20, 1928 An extrusion press is provided with means for injecting compressed air into the plastic material for forming the bricks before the material is fed to the extrusion nozzle

**Heat-insulating bricks, etc.** STERCHAMOLWERKE G M B H. Ger 516,377, June 8, 1926 Porous bricks, etc, are evacuated and then coated with a material impermeable to gas, *e g*, rubber The coating may be partly applied before evacuation

**Rotary ceramic furnace.** GEORG VON HERTZKA Ger 513,583, May 12, 1929 The bearing stones are partly of high $Al_2O_3$ content, and partly of chamotte stone

**Ceramic kiln** JEGOR I BROWN Ger 513,581, July 28, 1926 An electrically heated tunnel kiln for firing ceramic ware at high temps and with pre heating, firing and cooling zones is described

**Burning ceramic sludge.** LEOPOL, INTERNATIONALE PATENTVERWERTUNGS G. M B H and N V. "SOLOPOL" INGENIEURSBUREAU TOT EXPLOITATIE VAN HET, SYSTEM POLYSIUS Ger. 513,584, Sept 7, 1927 Ceramic sludge, especially crude cement sludge, is wholly or partly dried, heated in a rotary furnace until granulated, calcined and finally sintered

**Molding fused quartz.** DEUTSCH ENGLISCHE QUARZSCHMELZE GES. Brit 336,493, Dec 12, 1928 In forming articles such as insulators or tubes with ribs or flanges, a hollow blank of the material is expanded in a mold by compressed air and then further shaped by application of pressure mechanically

**Apparatus and hydraulic classification system for grading abrasives such as those used in continuous glass-grinding apparatus.** PILKINGTON BROS., LTD, F. B WALDRON and J H. GRIFFIN Brit. 336,587-8, July 12, 1929.

**Abrasive wheel.** JOHN R GAMMETER (to George W. Perks Co) U. S 1,792,083, Feb 10 An abrasive wheel body is formed with spiral grooves in its opposite faces, and wire convolutions are wound while hot in the grooves and permitted to shrink in them, and over these a bonding layer of material such as a rubber or synthetic resin compn. is cured under pressure to secure the wire convolutions to the face of the wheel.

**Compositions for grinding-wheels.** CARBORUNDUM CO. Brit. 336,631, July 17,

1929 A cement formed of S 95 and ground coke 5% is used in building up wheels of segmental abrasive blocks (various structural details of which are given).

Refractory earth. Fellner & Ziegler A.-G. *Fr. 694,818, May 1, 1930* Refractory earth is baked in a rotating tubular furnace at temps. of 1100–1300° and the furnace is preferably enlarged in the 800–1000° zone.

"Semi-porcelain" composition. J. E. Tams. *Brit. 330,172, Dec. 27, 1929* Asbestos powder 50, ball clay 40 and either ground stone 20 or feldspar 20 (or of each 10) parts are blunged with water into a slip or plastic mass for treatment in the usual way.

Enamels. W. E. Dougherty. *Brit. 330,797, Oct. 17, 1929* $TiO_2$ is used as an opacifier in enamels which do not contain F, and $CaCO_3$ or other suitable salt of Ca, Ba, Sr or Mg is preferably added to the batch to intensify the opacity produced by the Ti. Small quantities of Zr or Sn oxides may be added to counteract any tendency to yellowish color. Various details are given.

Coloring enamel, glass, etc. Deutsche Gasglühlicht-Auer-Ges. m. b. H. *Fr. 694,888, May 2, 1930* *To obtain red colored enamel, glass or glazes with Se, use is made of enamel, etc., which has a high content of rare earths.* Cf. *C. A.* 24, 5451.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. Witt

Quinquennial review of the mineral production of India for the years 1924 to 1928. Cement. A. M. Heron. *Records Geol. Survey India* 64, 359–70(1930).—The Indian cement industry has increased materially each yr. Several companies use a limestone which naturally contains the correct proportions of clay. Building materials. E. H. Pascoe. *Ibid.* 347–59. Marble. *Ibid.* 400–9.—Marbles of all colors are plentiful in India. Slate. E. L. G. Clegg. *Ibid.* 429–31. Alden H. Emery

Electro-melted cement as a new building material in the chemical industry. Constantin Redzich. *Apparatebau* 42, 277–8(1930).—The manuf. of a cement from bauxite and burned lime in an elec. furnace is described. The product has the following approx. compn.: $Al_2O_3$ 35–50, CaO 35–45, $Fe_2O_3$ 5–15, $SiO_2$ 5–10%. It is compared to portland cement and may supplant it. M. C. Rogers

*Blast-furnace-slag portland cement.* Giuseppe Tomarchio. *Atti III congresso naz. chim. pura applicata* 1930, 557–60.—Compn. and properties of various slag cements are reviewed. E. M. Symmes

Potash salt recovery in cement burning, with special reference to Esthonian potash ores. Jaak Kuusk. *Acta Commentationes Univ. Tartuensis (Dorpatensis)* AXX, No. 4, 1–36(1930)(in German).—Esthonia contains relatively large amts. of K ores capable of being burned to cement. In burning, K compds. are volatilized in part and can be pptd. electrostatically. Since the K compds. in different cement plants volatilize quite differently, and since the factors affecting the volatility are not known accurately, volatilization of K compds. was investigated in the lab. In a mixt. of K silicate with $CaCO_3$, in the ratio $2CaO \cdot SiO_2$, decompn. of K silicate and volatilization of K began simultaneously at about 1150°. With increasing temp. and duration of heating the amt. of K volatilized increased per unit of time. If less $CaCO_3$ were added to the K silicate than corresponds to Ca metasilicate, volatilization of K stops almost wholly, even at very high temp. Starting from these mixts., the volatility of K increases rapidly with increase in amt. of $CaCO_3$ added. Addn. of $Fe_2O_3$ affects K volatility very favorably because it increases the velocity of K silicate decompn. at low temp. The $Fe_2O_3$ added remains almost unattacked. Addn. of $Al_2O_3$ is unfavorable to K volatility because most of the CaO present changes to aluminate. Addn. of $CaSO_4$ is just as effective as addn. of $CaCO_3$. *In K volatilization from synthetic K aluminate the same general* results were obtained. The amt. of K volatilized at 1440° was low if only sufficient $CaCO_3$ were added to the aluminate to form only Ca meta aluminate. (Ca or $K_2$)$SiO_3$ and (Ca or $K_2$)$2AlO_2$ are unstable at the roasting temp. in question, while (Ca or $K_2$)$\cdot SiO_4$ and (Ca or $K_2$)$2AlO_2$ are unstable and lose $K_2O$. F. M. Symmes

Hydrated lime as used in engineering. R. J. Holden. *Eng. News-Record* 106, 148–9(1931).—Curves are given showing the total annual production of CaO and $Ca(OH)_2$ during the period 1906–1928 and the amts. used for building during that period, together with a brief discussion of the properties of CaO and $Ca(OH)_2$ with particular reference to deterioration on storage. There has been no increase in the production of CaO since 1906, but the production of $Ca(OH)_2$ has markedly and steadily increased. R. E. Thompson

**A study of methods of curing concrete pavements. Report of field investigation in Tennessee.** T. H. JACKSON AND E. W. BAUMAN. *Public Roads* 11, 209–35(1931).—The method of cure involving the application of wet burlap for periods varying from 24 to 96 hrs. without further curing compares favorably with the standard method. The application of Sisalkraft paper for periods of 24 to 48 hrs. without further curing is a reasonably satisfactory method of cure as compared with the standard method. In the poor earth cure it is not necessary to keep the earth satd. with water for the entire 10-day curing period. The sodium silicate method of cure gives results somewhat less satisfactory than those given by the standard method. Surface application of $CaCl_2$ appears to give results nearly as satisfactory as the standard method. Curing with bituminous materials, as used in these tests, was unsatisfactory; there was marked evidence of increased transverse cracking. Nothing is gained by the use of tar paper on the subgrade. L. B. MILLER

**Revision of "Directions for testing (D I N 1995) and delivery (D I N 1996) of road and construction materials containing asphalt and tar."** ANON. *Asphalt u. Teer* 30, 1253–62(1930). K. H. ENGEL

**Testing limestone for road building.** J. JACHTEL. *Asphalt u. Teer* 30, 1041–2(1930).—Soly. in $CO_2$-contg. water (indicative of grain size) and mech. hardness should be detd. The presence of $Ca(HCO_3)_2$ is a proof of harmful weathering. K. H. E.

**American road tars.** HUGO LABORR. *Brennstoff Chem.* 12, 89–90(1931).—Comparison of grades, consumptions and prices with corresponding German products. F. W. JUNG

**German patent development in bitumen emulsions for road construction.** A. VON SKOPNIK. *Teer u. Bitumen* 28, 581–5(1930). K. H. ENGEL

**Road asphalt and mechanical methods for testing it.** W. BIRKHALTER. *Asphalt u. Teer* 30, 931–46(1930). K. H. ENGEL

**Preparation of a new road binder.** C. F. BROADHEAD. Inst. Gas Eng., *Communication* No. 3, 23 pp. (1930).—See *C. A.* 24, 4372. G. G.

**Determination of wool content in roofing felts by chemical methods.** R. KORN AND B. SCHULZE. *Teer u. Bitumen* 29, 31–6(1931).—Admixed wood flour is insufficiently dissolved during treatment of the felt with 80% $H_2SO_4$. Shaking during the digestion reduces the residue to 6%. A felt sample equiv. to 10 g. dry, ash free material is boiled in $H_2O$ and macerated. The fibers, isolated and washed with ale., are shaken with 300 cc. $H_2SO_4$ (80%) for 3 hrs. The acid is removed with $H_2O$ and dil. $NH_3$ and the residue dried at 100–5°. Ash and, if warranted, 6% of the wood flour content are deducted from the wool residue. The wood flour of the felt should be estd. microscopically in ranges of 10%. K. H. ENGEL

**New methods of wood utilization and wood research.** HANS WISLICENUS. *Z. Ver. deut. Ing.* 74, 1169–78(1930).—A short outline of wood chemistry is followed by details of kiln drying, impregnation, wood decompn. processes, surface charring to enhance the grain effect, liquid infusion of living trees, turpentine recovery, wood cellulose, saccharification, artificial silk and metallized wood. E. M. SYMMES

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Protecting wood from fungi (Brit. pat. 336,214). 18.

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**Cement.** EMIL REUDER (to I. G. Farbenind. A.-G.). U. S. 1,791,681, Feb. 10. See Fr. 662,145 (*C. A.* 24, 482).

**Cement.** TREVOR M. CAVEN (*to* Frederick B. Hazard). *U. S.* 1,791,591, Feb. 10. A cement in dry powd. form suitable for monolithic linings or walls comprises about 5% silica in colloidal form, about 10% silica in diatomaceous form and about 85% silica in relatively coarse form, all these forms of silica being of approx. the same compn.

**Dolomite cement.** GUSTAV MATSCHAK. Ger. 500,138, Mar. 25, 1928. $MgSO_4$ is added to the product in order to react with any CaO formed during the firing and at the same time to raise the Mg content.

**Portland cement.** JAMES H. COLTON (to Pacific Portland Cement Co.). U. S. 1,791,800, Feb. 10. A portland cement mixt. is burned to form a clinker, the clinker is ground, the ground clinker is added to a raw cement mix to form a granular mixt. and this mixt. is burned to form a clinker.

**Waterproof cement.** S. A. I. G. (SOC. ANON. INVENZIONI GUADAGNIN). Brit. 336,860, Dec. 9, 1929. See Fr. 680,193 (*C. A.* 25, 566).

**Composition for waterproofing cement.** SAM C. BENNETT. U. S. 1,791,704, Feb. 10. A mixt. formed from $Na_2CO_3$ 9, $Al_2(SO_4)_3$ 1, $KMnO_4$ 0.03 and water about 20 parts is used together with pure cement in sufficient quantity to leave the compn. fluid so that

it may be applied as a liquid coating to waterproof and "rejuvenate" worn and discolored cement.

Rotary kiln for the preparation of fusible cement. ARNO ANDREAS Ger 513,582, Feb 7, 1929

Apparatus for granulating crude material and burning to produce cement. OTTO LELLEP Ger 515,172, Feb 10, 1929 Addn to 466,298 (*C. A.* 23, 497).

Hydraulic product. KARL BIEHL. Fr 695,079, May 5, 1930 A hydraulic product for addn to lime, cement, etc., is made by heating all sorts of clay, marl products of volcanic eruption, etc., and fine grinding

Concrete. LUDWIG HEYNEMANN Fr 695,099, May 5, 1930 A concrete which is resistant to sea water is made by adding to ordinary or superior cements or mixts of these with sand, etc., finely divided cinders from the combustion of powd coal.

Concrete composition CARLTON E MILLER U S 1,791,630, Feb 10 A concrete which sets quickly to a high strength is formed from an admixt. of portland cement with a preformed mixt. comprising $CaCl_2$ 2 and diatomaceous earth 3 parts (suitably 5% as much of this mixt as of portland cement)

Cellular concrete. TORKRET-GES M. B H Fr 694,287, April 22, 1930. A liquid absorbing substance such as Kieselguhr is added to cellular concrete so that the mass is plastic without losing its swelling power

Cellular or porous concrete. EMRIK I LINDMAN (to Aerocrete Corp of America). U S 1,791,820, Feb 10 Cement and water are mixed with a metal powder which is adapted to cause generation of gas and with slag so divided as to present fine hydraulizing particles and larger particles of a size and in sufficient quantity to prevent formation of cracks during setting (the slag not exceeding 80% of the wt. of the total dry ingredients of the concrete, and at least 10% having a grain size less than three-eighths of an in.).

Casting concrete pipes. ABRAHAM RUTENBERG Ger 516,437, May 17, 1929 See Brit. 318,285 (*C. A.* 24, 2206)

Dust-laying agent for roads, etc. FRITZ LYDTIN Ger. 513,846, May 15, 1925 Low temp tar (*e. g.*, generator tar, crude mineral tar, etc.) from brown or stone coal is used, alone or mixed with other residues or distn products

Asphalt or tar compositions. I G FARBENIND A.-G Fr. 694,789, May 1, 1930 Asphalt, tar or bitumen compns for roads, paint, etc., contain appropriate polymerization products of diolefins.

Colored mineral granules suitable for decorating roofing shingles. RALPH L. ATKINSON (to Arthur D Little, Inc.) U S 1,792,058, Feb 10 Material such as compacted raw clay or shale is reduced to granules of the desired size, these are send from material of finer size or dust, treated with water or a coloring agent such as Fe, Cu, Mn, Co or Cr compds if required, and heated to a hardening temp without fusion.

Artificial stone, etc. OSTERREICHISCH AMERIKANISCHE MAGNESIT A.-G and KONRAD LEDMANN Austrian 120,418, July 15, 1930 Addn to 108,151 In the manuf of shaped articles from fibrous materials and a Sorel cement, the compn is bound and hardened in the mold by means of a gas heated to a temp between 220° and 450°. Open, closed or perforated molds may be used, and the gaseous atm. may contain $CO_2$ Cf *C. A.* 24, 4913

Mold for casting plates from a mixture of magnesite, magnesium chloride solution and powdered stone or quartz. MICHAEL GUTTENBERGER. Ger 516,066, Aug 23, 1927

Molded material resembling wood, etc. A. HAWERLANDER (to Halizite Corp.) Brit 336,754, March 13, 1929 Fibrous material such as sawdust is first treated with a small quantity of a volatile liquid such as "petrol," is then incorporated with sufficient phenol $CH_2O$ resin condensation product to cover its surface and is molded under heat and pressure so as to permit venting of the volatile liquid before the binding agent hardens The material may be molded in contact with surface veneers of wood Various details of procedure are described

*Preservative for wood.* *HOLZINDUSTRIE-WERKE JOSEF BENZ A.-G* *Ger 516,407*, Dec. 14, 1929 Asphalt rubber melts are dissolved in a mixt of acetone oil with homologs of benzene and (or) with hydronaphthalenes

Preserving wood. LEO PATRICK CURTIN. Ger 518,075, Mar 12, 1927. See Brit. 291,857 (*C. A.* 23, 1241).

Impregnating wood. IMPREVA HOLZIMPRÄGNIERUNG UND HOLZVERWERTUNG A.-G Ger 513,848, Jan 16, 1925 The bottoms of masts are treated with a soln of bitumen, pitch, etc., in $CCl_4$.

Apparatus for impregnating wood with creosote and for compressed air or steam treatment. C GOODALL Brit 327,133, Sept. 18, 1929 Structural features.

Apparatus for the partial impregnation of wooden masts or poles. ERNST REICH and LUDWIG TRAMER. Austrian 120,412, July 15, 1930.

## 21—FUELS, GAS, TAR AND COKE

A C FIELDNER AND ALDEN H EMERY

Quinquennial review of the mineral production of India for the years 1924 to 1928. Coal. CYRIL S FOX *Records Geol Survey India* 64, 31–78(1930).—Complete statistical data for production and handling of Indian coal from 1919 to 1928 are given. Typical coal analyses are given. Coal reserves are estd. ALDEN H EMERY

The evolution of coal. HENRY BRIGGS *Chemistry and Industry* 50, 127–33 (1931).—Coal of all varieties has undergone and is still undergoing a species of slow spontaneous change involving the discharge of $CH_4$ and $H_2O$. B. calls this auto metamorphism. It may proceed entirely independently of outside influences, although heat (mild) and pressure accelerate, and certain influences, such as a large quantity of mineral matter, retard the action. The continued evolution of $CH_4$ from coal is confirmatory proof of this reaction. Analyses of coal of all ranks, ash-, S- and N-free, are plotted on a C–*H*–*O* trilinear diagram. *The gaseous evolution necessary to move from* one rank of coal to another is calcd. ALDEN H EMERY

Bibliography of United States Bureau of Mines investigations on coal and its products, 1910–1930. A C FIELDNER AND M W VON BERNEWITZ. Bur. Mines, *Tech Paper* 493, 56 pp. (1931).—Over 750 references to articles on coal and coal products by members of the staff of the U. S. Bureau of Mines are classified and cross indexed. The subjects covered include origin, constitution, analyses and classification of coal; chem. and phys. properties of coal and coke, *absorption and evolution of gases in coal*, corrosion and mine water, coal dust inflammation, methods of sampling, analyzing and testing, mining, coal prepn., storage and spontaneous heating, processing, including briquetting, high temp. and low-temp. carbonization, utilization, including combustion in power boilers, domestic furnaces, locomotives, marine boilers, kilns and oil stills, smoke abatement, lignite; and economics and statistics. ALDEN H EMERY

The primary oxidation of bituminous coal. W FUCHS AND O HORN *Brennstoff-Chem* 12, 65–7(1931), *cf. C. A.* 23, 1403, 24, 4767, 25, 396.—*For conversion into* humic acids, the humins of bituminous coals have been readily oxidized in a short treatment with $HNO_3$ (sp. gr. 1.40). The products possess the characteristics of hydroxy carboxylic acids, form permutite like K salts and ether-esters. They are partly sol., especially when damp, in org. solvents, as pyridine, acetone, "methylglycol," but are not always peptizable in alkalies. The peptized acids are identical with the original except for a difference in soly. (also produced by a $H_2O$ pyridine treatment) and a 20% greater K content in their K salts. The humin content of *striped (bituminous)* but not anthracite or boghead coal may be made water-sol. in this way. F W JUNG

The present status of low-temperature carbonization technic. CH. BERTHELOT. *Rev. métal.* 27, 672–9(1930).—From the standpoint of its present development in England and Central Europe low temp. carbonization is faced with 3 major difficulties: (1) high cost of production, which in some cases is 3 times that of high-temp. coke, (2) little profitable disposal of the primary tars in other than the fuel markets, and (3) the competition following new methods of utilizing high temp. carbonization gas. Hydrogenation and cracking methods are promising for increasing the value of the tars. H L OLIN

*Preparation of fiber coal (fusain) through artificial carbonization.* TH. LANGE AND P. ERASMUS *Braunkohle* 29, 463–9(1930).—Samples of silicified lignite with well preserved cell structure (*trunk and roots*) were carbonized by heating under water at 340° for 2 hrs. $SiO_2$ was leached out with $H_2F_2$. Microscopic slides showed that the org. material had been carbonized to *fusain*. Isolated cellular aggregates, filled with bituminous material, had changed to *vitrain*. Conclusion: Cell walls filled with humic acids were gradually resorbed and changed to vitrain. Wood which was filled with gases, $SiO_2$, etc., or which had lost its permeability to humic acids through drying, retained its structure and was carbonized to fusain. K H ENGEL

Relation between the contents of coal in volatile matter and in ash (supplementary note). M. LEGRAYE. *Ann. soc. geol. Belg.* 53, B55–7(1930).—Replying to a criticism of Denoel of a previous paper (*C. A.* 24, 710), L. gives more curves and discussion. He finally concludes that there is no relation between ash content and content in volatile matter, and that no conclusions can be drawn regarding the comparative origin of bituminous and anthracite coals. R. H. EWELL

**The relation between gross and net heating values and volatile matter of coal.** WILHELM GUMZ *Feuerungstech* 19, 1-3(1931).—From 100 analyses in the literature G derives the formulas $Q = 8150 + 6543V - 17{,}308V^2$ and $H = 8150 + 4489V - 13{,}864V^2$ for the gross and net heating values, resp., of the dry ash free coal $V$ being the fraction of this which is volatile ERNEST W. THIELE

**Diffusion as a factor in burning pulverized coal.** DOUGLAS HENDERSON *Power* 73, 288-9(1931).—While the mixing of air with a gaseous fuel is in part by diffusion, macroscopic fuel particles must be mixed mechanically with air D. B. DILL

**Testing coking coals.** WOLFGANG MELZER. *Arch. Eisenhüttenw.* 4, 169-75 (1930).—*A no. of tests are outlined for* Westphalian coking coals For works labs., extn. methods are too time-consuming, and sufficient information as to the coking qualities can be obtained by detn. of the softening point. H. STOERTZ

**Asturian coals. III. Rejuvenation of a gas coal.** BENITO A. BUYLLA. *Anales soc. españ. fis. quim.* 28, 959-66(1930); cf. *C. A.* 24, 2860.—In "bergnizing" a coal having volatil. matter 32% (yielding highly swelled coke 66.38 and primary tar 5.8%), 22.2% oils and 64% solid residue were obtained The residue contained volatile matter 28.94% and produced hard, coherent coke 69.54 and primary tar 9.41%. This *indicates the possibility of rejuvenating coal by hydrogenation.* E. M. SYMMES

**Coal as a raw material.** E. F. ARMSTRONG *Chem. Markets* 28, 158-60(1931).—A plea is made for the most efficient means of utilizing coal, coke, oil, etc. Hydrogenation after carbonization of the coal under conditions assuring a max. yield of oil and a char which may be used in the manuf. of water gas and $H_2$ appears economically best. W. H. BOYNTON

**Humic acids from brown coal. Preliminary communication.** HANS STACH *Z. angew. Chem.* 44, 118-20(1931).—Not only humic acid but also brown coal from which the bitumen has been extd. can be methylated. The ability to react with diazomethane proves the acid character of the extd. coal. A distinction is made between ortho- and meta humic acids the latter not being sol. in cold KOH E. SCHIOTTE

**Recent developments in by-products from bituminous coal.** A. C. FIELDNER. Bur. Mines, *Rept. of Investigations* 3079, 13 pp. (1931).—There has been steady gain in value and yield of by products from coal during the last 15 yrs., the design of ovens and by product recovery equipment has also shown const. improvement. The by product oven has recently supplied much base load gas for city use Natural gas and refinery gas are increasingly important competitors Cheap synthetic $NH_3$ has made the profitable recovery of by-product $NH_3$ a problem The Tern and C. A. S. processes for the conjoint recovery of S, $NH_3$ and cyanogen, European developments and the recovery of by product S peculiarly adapted to fungicidal and agricultural purposes as practiced in *America are described* The *solution of the phenol recovery problem and the reduction* of light-oil losses by improvements in refining are discussed ALDEN H. EMERY

***Concretions in coal.*** X. STAINIER. *Ann. soc. sci. Bruxelles 50, Ser. B*, 247-55 (1930).—The formations known as "coal apples" found in English pit-coals and in certain anthracite coals of the U. S., nodules found in Australia, ball coal in pit-coal of Hindustan and certain concretions found in Belgium are described S states that no decisive proof of the origin of these structures is available from these studies The phenomenon is probably more complex than one thinks and may be due to a combination of causes Even the term concretions is used for want of a better word. They are not true nodules, produced by concn. at a given point, of substances at first scattered through a rock Various possible theories are discussed ALICE W. EPPERSON

**Coal-cleaning problems.** L. W. NEEDHAM *Iron Coal Trades Rev.* 121, 525-7 (1930).—A review LESLIE B. BRAGG

**The hydrogenation of solid fuels.** CARL ZERBE. *Chem.-Ztg.* 55, 4, 18-9, 38-40, 94-6, 114-7, 136-7, 152-3(1931).—A review of the present status of the process, with particular reference to recent patents, and extensive bibliography. T. H. CHILTON

**Fusion points of the ash constituents of the Sonnenschein seam.** H. WINTER AND H. MÖNNIG *Glückauf* 67, 156-60(1931).—Fusion points of ash from different structural parts of the Sonnenschein seam detd. by the methods of Bunte and Baum (*C. A.* 22, 1457) and of Dolch and Pochmuller were fusain 1060-1150°, vitrain 1125-1200° and durain 1530°. In every case as the compn. of the ash approached that of pure clay, $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$, the m. p. was raised H. L. OLIN

**New researches on ash fusion points.** C. STAEMMLER. *Chem.-Ztg.* 55, 59-60 (1931).—Various Ca, Fe and Si salts were combined into mixts. and the fusion points detd. by thermocouples after the method of Bunte and Baum (*C. A.* 22, 1457). Sulfates always raised the fusion points of the mixts., probably because of some interaction between S and the oxides C. R. FELLERS

Furnace heating by means of pulverized fuel. G. E. K. Blythe. *Metal Ind.* (London) 34, 177-9, 231-2(1929). E. J. C.

At what temperature should purification masses be dried? Dr Vogel. *Ind Gas* 50, 301-5(1930).—Expts. on drying of $Fe(OH)_3$ were conducted to det. the correct drying temp. for purifying masses. Even at 110° not all water is removed after drying for a long time because of the colloidal character of the hydroxide and the lack of a definite hydrate. This holds for lux mass as well as for the weathered limonite which is used as a natural product. Every drying temp. is arbitrary. The method outlined is as follows: Weigh at least 1 kg. of substance in a flat dish and place in a drying furnace at 60-70°. After 2-3 hrs. take out the dish and expose to air for 15-16 hrs. (overnight). Repeat the cycle of heating, aeration and weighing (usually three) until const. wt. (within 1%) is obtained. The analyses for Fe of the mass should be related to the original wt. and not calcd. on dry wt. This is also true for the absorption capacity detn. for $H_2S$ (generally 74% by wt. of the Fe present, 10% of the mass itself). R. J. C. van der Horven

Alcohol as motor fuel. Report on practical large-scale tests. P. W. Ullmann. *Chem. Ztg.* 54, 818-9(1930). A suitable substitute for gasoline used in Brazil in 1916 consisted of a mixt. of abs. EtOH, $Et_2O$ and petroleum in the wt. proportions 75:15:10. R. E. Schaad

Alcohol production for motors in Brazil. Frederico W. Fryer. *Indus. Sugar J.* 32, 404(1930). In recent years much work has been done on the utilization of molasses for the manuf. of motor spirits. One plant with a capacity of 100 tons of motor alc. is operating at its full capacity. In a test of "Azulina," a national motor spirit containing 57% ether, on a motor car fitted with 2 F. A. G. motors of 100 h. p. each, av. fuel consumption was 1.41 "Azulina" per km., while the gasoline consumption in parallel tests was 1 l. per km. The price of "Azulina" is half that of gasoline. W. L. Owen

Suitability of fuels for Diesel engines. Louis R. Ford. *Power* 73, 301-3(1931).—Since the factors which control the behavior of fuel in the engine cylinder are not well understood, performance tests must be relied upon in selecting suitable fuels. D. B. Dill

Hydrogenation at high pressures. Giorgio Roberti. *Mem. accad. Italia* (Classe sci. fis. mat. e nat.) 1, Chim. No. 2, 15 pp.(1930).—As part of the general problem of utilizing national sources of fuels, the hydrogenation of the phenolic distillate from lignite was studied. $Cr_2S_3$ was found to be a satisfactory catalyst, as it induces the formation of satd. cyclic hexane at 100 atms. at temps. of 350-400°, and, at the same time, is much less sensitive to poisoning than other commonly employed catalysts. A. W. C.

The possibilities of a South African oil industry. O. Pelzmann. *S. African Mining and Eng. J.* 41, Pt. II, 281-2(1930).—P. discusses the low-temp. carbonization of S. African lignite followed by hydrogenation of the tar produced. A. H. E.

The history of gas. C. I. van Ruyn. *Ind. Gas* 51, 40-6(1931). R. J. C. v. d. H.

Natural gas problems. Alexander Forward. *Gas Age-Record* 66, 823-6 (1930).—A discussion. Leslie B. Braga

Statistics of the British manufactured gas industry. David Brownlie. *Gas Age-Record* 66, 973-7(1930).—A review. Leslie B. Braga

The Linz gas works—its development and its future position. Erwin Stoll. *Z. Bayer. Ver. Gas Wasserfach* 71, 29-40(1931). E. H.

Nomography in gas analysis. W. J. G. Davey. *Gas World* 92, 694-5(1930).—The graphical method is used for the detn. of $H_2$ and $CH_4$ in a gas after the other constituents and the calorific value have been detd. The other constituents usually detd. are $CO_2$, $O_2$, unsatd. hydrocarbons, CO and $N_2$. Examples are given showing the application of the method to carbureted water gas and vertical retort gas. F. H. B.

Institution gas research fellowship report 1929-30; influence of the inorganic constituents in the carbonization and gasification of coal; liberation of ammonia. A. H. Eastwood and John W. Cobb. Inst. Gas Eng., *Communication* No. 23, 24 pp.(1930).—See *C. A.* 25, 1037. G. G.

Heat transmission: modern methods of expressing correction data. M. Pourvoyeur. *Gas World* 92, 682-7(1930).—The principles of heat transfer are reviewed and expressed in math. form. Many heat transfer problems connected with the gas and carbonization industries are too complex to be expressed in simple generalized rules. In some individual cases it is possible to correlate and apply available data. The math. presentation is supplemented with graphs for the solution of heat-transfer problems, particularly those in which convection is taken into account. F. H. Berkeley

Gas meter calibration with the Mariotte bottle. L. Zipperer. *Gas Wasserfach* 74, 27-8(1931).—An insulated Mariotte bottle is a convenient means for calibrating

gas meters An illustration of such use and the method of calcg exact gas vols, are given with examples R. W. Ryan

**The new (large) Brandi-Marschka gas meter.** Pittsburgh Equitable Meter Co *Gas u. Wasserfach* 74, 67(1931), cf *C. A.* 24, 5135.—The principle of the Brandi-Marschka meter is old and has long been used by the Pittsburgh Equitable Meter Co Reply Brandl and Marschka *Ibid* 67–70.—Patents granted in various countries are listed R. W. Ryan

**Coal-grinding and -mixing equipment for gas works.** Otto Huppert. *Gas u. Wasserfach* 74, 49–56(1931).—When gas works are large enough there is a definite advantage in grinding and blending coal, as cheaper coal and waste coal and coke can be used and a good coke still obtained Operating and test data are given in support of this claim and a typical German installation is illustrated and discussed. Attempts to use low temp brown-coal coke in such blends were unsuccessful Recent work of Damm Fischer and others on the mechanism of coking is reviewed R. W. Ryan

**The physical basis and the manner of operation of the Progas-Union gas governor.** C. Barchmann *Gas u. Wasserfach* 74, 110–2(1931). cf *C. A.* 25, 190.—Addns. and correction to previous math derivations are given R. W. Ryan

**Experiences with a waterless gas holder.** Frank Prentice Inst. Gas Eng., *Communication* No 7, 8 pp (1930).—See *C. A.* 24, 4918. G. G.

**Gas dehydration.** E. W. Smith Inst. Gas Eng., *Communication* No 5, 37 pp (1930).—See *C. A.* 24, 4917 G. G.

**Effect of sodium carbonate upon gasification of carbon and production of producer gas.** David Fox and Alfred H. White *Ind. Eng. Chem.* 23, 259–66(1931).—$Na_2CO_3$ reacts in appreciable measure with C at temps. above 800° and the rate becomes rapid above 900° The reactions are $Na_2CO_3 + 2C = 3CO + 2Na$, $Na + CO_2 = NaO + CO$ $NaO + CO_2 = Na_2CO_3$ The net effect is to increase the vapor pressure of C to $10^6$ times its actual value The mechanism of the reaction is discussed The use of coke impregnated with $Na_2CO_3$ in the gas producer gives gases higher in CO than would otherwise be obtained In a water gas machine the gases are much richer in CO and $H_2$, but the increased reactivity of the fuel bed would be disadvantageous during blasting and offset any gains during steaming Alden H. Emery

**The new Omeco flue-gas tester.** Illies. *Feuerungstech.* 18, 242(1930).—This recorder dets. $O_2$ instead of $CO_2$. An automatic device takes in predetd. vols of the sample and of $H_2$ and passes them through a combustion furnace The contraction is recorded Ernest W. Thiele

**A new method of phenol recovery from gas liquors.** C. Schönburg *Brennstoff-Chem.* 12, 69–71(1931) cf *Glückauf* 64, 436(1928).—The disadvantages of dephenolizing with $C_6H_6$ are discussed. *Tricresyl phosphate* has been found to absorb 10–20 times more phenols and also has the advantages of non volatility, insolubility, and greater sp. gr. than the liquors Partition coeffs. for both are shown diagrammatically for phenol and cresol solns. and gas liquor The phenols, after absorption, are driven off from the high boiling tricresyl phosphate by heat or steam distn. under vacuum. Practice shows that only 4–5 parts of tricresyl phosphate are needed to dephenolize 100 parts of liquor contg. 3 g. phenol per l. and that a 6–8% phenol concn. so obtained in the phosphate requires only 5–6 parts steam per part phenol for complete recovery Use for several months shows a selectivity for phenols and the non soln. of tar App., shown schematically, is described F. W. Jung

**Tests on a Birmingham (town gas-fired oven) furnace installation.** C. M. Walter *Gas J.* 190, 576–7(1930).—Tests were carried out on a battery of 4 town gas fired oven furnaces to det. how far working efficiencies could be affected by the employment of special insulating material, improved recuperator elements, and in particular the precise control of primary and secondary air, and reduction of losses by leakage through doors and dampers. For a given operation of carburizing in the older type of furnace a fuel consumption of 16 000 cu. ft. of 500 B. t. u. gas was required The improved installation used 6230 cu. ft. of gas of slightly lower calorific value F. H. B.

**A new commercial application of the Walter Feld polythionate process.** Fritz Overdick *Z. angew. Chem.* 43, 1048–51(1930).—To remove $NH_3$ and S from coal gas the following reactions have been used $(NH_4)_2S_2O_3 + 2NH_3 + H_2S \longrightarrow 2(NH_4)_2S_2O_3 + S$, $(NH_4)_2S_2O_3 + 2NH_3 + H_2O \longrightarrow (NH_4)_2S_2O_3 + (NH_4)_2SO_4 + S$, $(NH_4)_2S_2O_3 + 3H_2S \longrightarrow (NH_4)_2S_2O_3 + 5S + 3H_2O$, $(NH_4)_2S_2O_3$ (hot) $\longrightarrow (NH_4)_2SO_4 + SO_2 + 2S$, or $(NH_4)_2S_2O_3 + 2(NH_4)_2S_2O_3 \longrightarrow 3(NH_4)_2SO_4 + 5S$ The S is burned to $SO_2$ for re-use Funke (*Gas u. Wasserfach* 68, 388(1925)) and Raschig (*C. A.* 15, 940) have investigated the process A modification at Leverkusen makes possible complete

removal of $NH_3$ and $H_2S$ without addn of foreign $NH_3$ if excess $H_2S$ is present, by gas washing in several stages $H_2S$ alone reacts very slowly with $(NH_4)_2S_4O_6$, but rapidly when $NH_3$ is also present Absorption of excess $H_2S$ (without $NH_3$) is done in the first stage, where $H_2S$ is concd, while in later stages the more difficult absorption of dil $H_2S$ is accomplished by the aid of $NH_3$ by the first reaction given E M SYMMES

**A new modification of the Feld polythionate process.** D STAVORINUS. *Het Gas* 51, 19–20(1931) —A short review of a new modification of the Feld process as developed by the I G and used at the mine Auguste Viktoria (cf Overdick, preceding abstract). It consists of cooling the crude gas from the ovens to 25°, thus removing tar and part of the $NH_3$, and then removing both $H_2S$ and $NH_3$ in 4 scrubbers by polythionate liquor circulating in the same direction as the gas In the first scrubber $H_2S$ is taken out to an extent of more than the equiv of $NH_3$ present, in the second scrubber no $NH_3$ is present, but thionate and $H_2S$ react to give free S Furthermore, the regenerated liquor (treated with $SO_2$) contg some free $SO_2$ is circulated over this scrubber In the third scrubber is used a mixt of thionate liquor with the $NH_3$ distd. off the primary cooler condensate the gas is thereby freed of its last traces of $H_2S$ A final washing for removal of the remaining $NH_3$ is carried out in the fourth scrubber run on $NH_3$ free thionate liquor, which is subsequently used in the first scrubber The spent liquor is worked up in the customary way S is filtered off and the liquor decomposed at 120–30° to give a strong $(NH_4)_2SO_4$ soln, which is freed of thiocyanate by fractional crystn. The present process is an improvement over the former ones in that $H_2S$ comes in contact with liquors of high $NH_3$ content. This has been found necessary for complete $H_2S$ absorption The thio sulfate formed from the tetrathionate of the active soln during the reaction with $NH_3$ and $H_2S$ is regenerated by the action of $SO_2$-contg gases in a separate little scrubber. B J C VAN DER HORVEN

**The storage of carbon monoxide.** OTTO HEINRICH WAGNER *Brennstoff-Chem* 12, 87–9(1931).—*In view of the possible use of CO as a motor fuel, three methods of storage have been investigated using (1) liquid absorbent, (2) solid absorbent and (3) a reversible chem combination* Ether pentane mixts were the best of the liquids (absorption increasing with decreasing b p), but liquid $CO_2$ and $NH_3$ showed no absorptive properties Of the solids, activated C when packed in cylinders showed only 40% capacity increase over an unpacked cylinder at 40 atm, and less at higher pressures Silica gel and chabasite showed a decrease in capacity at pressures under 100 atm Solns of ammoniacal and acid cuprous salts involved heating to deliver the absorbed CO and were corrosive. With solid cuprous halides, addn compds of the type $Cu_2X_2.2CO$ were formed very slowly during the first absorption but rapidly after a single removal of the absorbed CO The addn is quant. reversible and traces of $H_2O$ greatly increase its speed. Purification as well as storage is thus feasible. The vapor pressures of the $COCl_2$ and $COBr_2$ showed 235 mm Hg for the former at 20° and 1 67 atm for the latter. A 40-l cylinder holding 7 kg CO at 150 atm will contain 28 kg when filled with 100 kg solid $Cu_2Cl_2$. Warming to 50° then releases the CO for use, the vapor pressure of the addn compd being 5 atm at this temp Because of the cost of $Cu_2Cl_2$ the halides and ammoniates of Fe, Ni and Co as well as ZnO and CaO are being studied F. W. J.

**Ammonia synthesis by the low-pressure Mont Cenis process.** W F SCHOLVIEN. *Chem Met Eng* 38, 82–6(1931) —The Scholven, Germany, plant is described Coke-oven gas is the source of H CO is removed from the gas by washing with liquid N Conversion is effected at 400° and 100 atm Economic data and advantages of the process are given L W. T. CUMMINGS

**Development and inventions in tar distillation.** ERNST WEISE. *Asphalt u Teer* 30, 1124–7, 1147–9, 1169–70, 1232–5, 1287–92, 1312–5(1930), cf *C. A.* 24, 3886 — *This is a detailed digest of 106 recent patents* K H ENGEL

**Specifications for coal tar in Holland.** F. J. NELLENSTEIJN. *Asphalt u Teer* 30, 952–3(1930). K. H. ENGEL

**Analysis of coal-tar-asphalt mixtures.** H. MALLISON *Asphalt u. Teer* 30, 183–4 (1930) —Sepn of the components by sulfonation methods is not entirely trustworthy The asphalt is converted into sol and insol sulfonic acids Certain asphalts, sulfonated by themselves, showed slight increases in wt. When sulfonated in mixts with 85% tar, they were changed, almost quantitatively, into sol products K H ENGEL

**Thermal decomposition of coal-tar constituents. VII. Reaction products of the thermal decomposition of *m*-cresol.** YOSABURO KOSAKA. *J Soc. Chem Ind., Japan* 34, *Suppl binding No.* 1, 10–2(1931), cf *C. A* 24, 1958 —Pure *m*-cresol was decompd. at 700°, 800° and 900°, as was done with $C_6H_6$ (*J. Soc Chem Ind., Japan* 31A, 507, 31B, 126(1928)) except that at 900° *no packing material was used* because of C deposits formed. Fractions of the distillate up to 120° were mainly $C_6H_6$ and PhMe. Fractions

above 120° were treated with NaOH soln to sep acid constituents, the remainder was sepd. into picrate forming and non picrate forming substances The former were mostly naphthalene, anthracene, phenanthrene and derivs, the latter mostly $Ph_2$, $Ph_2O$ and derivs Differences in packing material have little effect. The yield of $C_6H_6$, PhMe and PhOH is a max. at about 800°, the yield of naphthalene and anthracene varies little with temp, but the $Ph_2$ yield increases with decompn temp VIII. Reaction products of thermal decomposition of *o*-cresol and *p*-cresol. *Ibid* 12–3 —Pure *o* cresol and *p*-cresol were decompd at 800° and the products compared with those from *m*-cresol treated similarly The main products were $C_6H_6$, PhMe, PhOH, naphthalene, anthracene, phenanthrene, $Ph_2$, $Ph_2O$ and their derivs. Nearly 21% of *m*-cresol, 12% of *o*-cresol and 8% of *p*-cresol remain undecompd. The PhOH yield is 19% with *o*-cresol and *p*-cresol, but 4.6% with *m*-cresol. *m* Cresol gives the most $C_6H_6$ and PhMe while *o*-cresol gives the most naphthalene and anthracene. IX. Qualitative consideration of the reaction mechanism of the thermal decomposition of cresols. *Ibid* 13–4 — The thermal activity of cresols has been considered previously (Fischer, *Abh d Kohle* 6, 172(1923), Hagemann, *Braunkohle* 28, 1005(1929)) A series of reactions based on exptl. data is proposed The difference in nature of decompn. of the 3 cresols seems to be due to the relative stability of OH and $CH_3$ groups, $CH_3$ being more stable than OH in *m*-cresol, and vice versa in *o*- and *p*-cresol. E. M. Symmes

Light oil from water-gas tar. N. A. Orlov. *Zhur. Prikladnoi Khim.* 3, 585–7 (1930) —Light oil obtained in the manuf of water gas which had a brownish color and $d_3^{15}$ 0.9240 was distd. and the 141–50° fraction was taken to sep styrene. This fraction, which had $d_0^{20}$ 0.8794 and $n_D^{20}$ 1.5121, on being treated with Br in chloroform soln. indicated the presence of about 30% of styrene. The bromination was carried out at 0° and the remaining hydrocarbons were distd. off with steam, the dibromide was twice recrystd. from alc. and m. 71–1.5°. In a vacuum distn. at 26 mm pressure the whole of the dibromide distd over at 150–2° and required only one recrystn. The light oil contains about 1.5–2% styrene This method, however, is not recommended because other products present are also brominated. The pure styrene was obtained from the dibromide by the action of Mg Attempts to obtain styrene without the use of Br by heating the fraction in an autoclave for 5 hrs. at 200° failed. Indene was easily sepd from the 176–85° fraction by the Weissgerber method (cf *C. A.* 3, 1152) with a yield of 4.2 or 4.7% corresponding to that from the original light oil. The indene content is probably higher because the liquid becomes very hot during the reaction and polymerization can be noticed A. A. Boehtlingk

Tar dehydration. Emert *Gas u Wasserfach* 74, 40(1931) —The longest possible tar well is desirable Heating coils were so placed as to minimize mixing by convection. A week before tar was to be loaded it was heated in about 24 hrs. to 50° and then allowed to stand without further heating for 5 days before loading R. W. Ryan

Functions of coke ovens. Edward G Stewart. Inst. Gas Eng., *Communication* No 6, 20 pp (1930) —See *C. A.* 24, 5136. G. G

Production, properties and use of coke. D Altmäuser. *Montan. Rundschau* 22, 521–4(1930) —Some statistics are given on the production of gas, coke and coal tar products in Germany For gas making the C content of the coke should be high and the H content low The size of lumps recommended is 2–9 cm. diam. (0.75–3.5 in.), depending on the size retort used. Channing Wilson

Present position of the metallurgical coke industry in Central Europe. Ch. Berthelot *Rev metal* 27, 487–500(1930) —The present tendency in the Central European metallurgical coke industry is to improve furnace design and furnace equipment, and to analyze more intensively factors entering into the net cost of coke manuf C. H. Lorig

The reactivity of metallurgical coke. Dufraisse. *Rev métal* 27, 509–11(1930); cf *C. A.* 24, 5080 —The surface of coke was modified by applying solns of CaO and flux The reactivity of 3 cokes to which 3 solns. were applied was detd. for 800°, 900°, 1000° and 1100° Lime solns. decrease the reactivity of coke, thereby raising the $CO_2$ content of the combustion gases. C. H. Lorig

The determination of coke strength. Fritz G Hoffmann. *Brennstoff-Chem* 12, 61–5(1931), cf *C. A.* 24, 5081 —The effects of fissuring, cooling or quenching strain and coke hardness upon the accuracy of the results obtained in tumbler, compression and shatter tests are discussed in detail. Causes of fissures in coke from various types of ovens, as well as in the carbonizing of briquetted coal, are studied. The use of an automatic screening, weighing and recording device is suggested for continuous detns. on a small part of the oven output. The tumbler with attached double screen is recom-

mended as the best-suited hardness test. The importance of testing carefully screened coke and the preferability of hand- to fork picked samples is stressed F. W. Jüngo

Low-temperature pressed coke. E. Roser. *Brennstoff-Chem.* 12, 85–7(1931).—By using thin-walled, slightly tapered alloy steel cylinders of 300 mm. mid-diameter and 2800 mm. height, fitting in pairs into 400-mm. Otto ovens, a series of carbonizations at oven temps. of 750° has been made. A strongly swelling slack of 18% volatile carbonaceous matter (V. C. M.) and 5.4% ash was coked 4 hrs. A coking slack of 22.1% V. C. M. and 5.1% ash, and a 1:1 mixt. by vol. of this slack and an anthracite fine of 10.5% V. C. M. and 7% ash were coked 5 hrs. In each case a hard, large-sized and uniform coke resulted. Gas and tar yields were not detd. Analytical data are given for the coke obtained. Consumption and production data for light oil products in Germany are given in support of a low-temperature process. F. W. Jüngo

Dry quenching of coke. Wm. O. Renkin. *Fuels and Steam Power* (*A. E. S. M. Trans.*) 53, 65–85(1931).—See *C. A.* 25, 1059. G. G.

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The reductivity of over-crusted coke (Piwowarsky) 9. Ammonia liquor as a fertilizer (Bidchas) 15. The microbiological aspect of peat formation (Thaysen) 8. The present nature of coals resulting from their history (Durrer) 8. The dehydrating action of coal ash (Tanaka) 18. Separation and synthetic preparation of phenol (Mitsushita) 10. Apparatus for eliminating CO from motor-vehicle exhaust gases (U. S. 1,791,912) 1. Separation of tars, tar oils, etc. (Brit. pat. 336,945) 22. Purifying light oils recovered from coal gas, etc. (Brit. pat. 336,636) 22. Clarifying plant for coal industry (Ger. pat. 516,454) 1. H and CO from $CH_4$, etc. (Brit. pat. 336,635) 18. Separation of dust from gases (Brit. pat. 336,201) 13. Purifying light hydrocarbons produced by destructive hydrogenation of coal (Brit. pat. 335,885) 22. Purification of gases, etc. (Belg. pat. 371,622) 4.

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Fuel. Wilhelm Clemens. Ger. 513,512, July 1, 1926. Dried pressed peat is pulverized, kneaded into a plastic condition with added substances and finally pressed into molds. The pulverized mass may be coked. App. is described.

Fuel briquets. Soc. anon. la carbonite. Ger. 513,731, May 6, 1924. Briquets of high calorific value, suitable for driving gas producers, etc., are obtained by distg. wood, peat or lignite below 500°, mixing the residue with oxidized tar below 500° and pressing. Cf. *C. A.* 24, 1960.

Fuel for motors. N. V. de Bataafsche Petroleum Maatschappij. Fr. 694,053, Apr. 16, 1930. Fuel suitable for motors is obtained by heating carbonaceous materials such as petroleum, asphalts, etc., in the presence of a compd. of Mo acting as a catalyst and in the presence of H under pressure, the conditions being chosen so that no splitting of the mols. of the treated materials takes place with formation of gaseous or low b. p. products. Examples are given.

Fuel for internal-combustion engines. Johann W. Michael. Ger. 515,816, Nov. 20, 1929. Addn. to 515,076 (*C. A.* 25, 1660). Soot is mixed with powd. fuels giving a relatively large amt. of ash, *e. g.*, lignite, wood charcoal or cellulose.

Vaporizing heavy fuels for internal-combustion engines. Rector Gasifier Co. Brit. 336,243, July 9, 1929. The fuel is heated, sprayed radially to a common center from several orifices and an inert gas is passed at right angles through the sheet of spray thus formed.

Catalytic heating device for fuel of internal-combustion engines. Oscar H. Wallin. U. S. 1,792,337, Feb. 10. Various structural details are described.

Removing carbon deposits from internal-combustion engine cylinders. Thomas & Hochwalt Laboratories, Inc. Brit. 335,963, June 5, 1929. A C-loosening compn. is used contg. a halogenated aromatic hydrocarbon (such as chloronaphthalenes, chlorobenzenes, bromobenzenes, halogenated toluenes or xylenes, benzal chloride or benzyl chloride, which may be dissolved in alcs., ether, acetone, EtOAc, kerosene, gasoline, $C_6H_6$ or the like) which is introduced into the hot cylinders. Examples with proportions are given.

Acetylene. Charles de La Rochette. Ger. 513,692, Mar. 6, 1929. Details are given of a plant for producing an $C_2H_2$-air mixt. for motors and other combustion machines.

Solid acetylene. I. G. Farbenind. A.-G. Fr. 694,001, April 15, 1930. $C_2H_2$ is stored and transported by cooling the gas to just below its m. p. and compressing the snow thus formed into cakes.

Wagon for the low-temperature distillation of bituminous fuels in tunnel ovens. N. V. Machinerieën en Apparaten Fabrieken. Ger. 516,153, Oct. 18, 1927.

**Destructive hydrogenation.** IMPERIAL CHEMICAL INDUSTRIES, LTD., R. HOLROYD and C. COCKRAM. Brit. 337,028, July 18, 1929. At the beginning of a multi-stage process for the destructive hydrogenation of bituminous coal, the coal is heated either *in vacuo* or in an inert gas or with H, with or without oil or catalysts, to a temp. at or just above that of initial thermal decompn. at which the ulmic constituents disintegrate. Preferably H is used under pressure in the presence of high-temp. tar or oils derived from a later stage of the process and in the presence of catalysts, and sufficient H is used to deoxygenate the coal and yield a fusible product. The material is then further hydrogenated and liquid products are fractionated from the resulting substances. Various details and examples are given.

**Destructive hydrogenation.** C. F. R. HARRISON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,991, July 19, 1929. Destructive hydrogenation under pressure is effected in a vertical tower in the presence of a massive metallic catalyst of large surface area such as plates, wire, ribbon or gauze. Various details of app. are described. Cf. *C. A.* 25, 192.

**Destructive hydrogenation of pastes of coal and oil.** C. F. R. HARRISON, E. D. KAMM and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,610, July 16, 1929. Various details of app. and procedure are described for a process in which all the products from the reaction vessel pass through a common exit to a catch pot which is kept at such a temp. (suitably about 350°) that heavy oils are condensed while the vapors of middle and light oils are led away and the heavy oils are returned to the reaction vessel.

**Furnace and retort for drying, roasting or distilling solid materials such as coal.** F. K. WOODROFFE. Brit. 336,657, July 18, 1929.

**Coal.** MAURICE DÉNOS. Fr. 694,979, May 5, 1930. The combustion properties of coal are improved by sprinkling it with water contg. soda, S, red ocher and $CaC_2$.

**Apparatus for cleaning coal by air separation.** ALWYN G. OPPY and GRANGER B. SADLER. U. S. 1,792,440, Feb. 10. Structural features.

**Apparatus for cleaning and purifying coal.** HARRY L. MCLEAN (one third each to George W. Wilmot and Frances H. Blatch). U. S. 1,792,179, Feb. 10. Structural features.

**Washer for coal, ores, etc.** ANTOINE FRANCE. Ger. 516,145, Nov. 21, 1926.

**Liquid products from coal, etc.** N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 694,192, Apr. 18, 1930. Valuable liquid products are prepd. by treating coal, tar, petroleum products or residues, lignite or cellulose by heating under pressure in the presence of H and a catalyst composed of Mo compds. intimately mixed with finely divided absorbent substances such as absorptive charcoal.

**Apparatus for determining the humidity of brown coal, etc.** HANS TRAUTHWEIN. Ger. 513,701, April 6, 1928. The water is evapd. in a closed chamber in a rotary drum app. and the condensate is measured.

**Lignite cooling plant.** MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 513,860, Jan. 26, 1929. Addn. to 460,570. Cooling plates are arranged after the manner of venetian blinds.

**Drying peat.** WILHELM CLEMENS. Ger. 513,572, Jan. 25, 1927. To crude peat pressed peat is added, and the whole is further pressed and then treated with drying agents.

**Montan wax.** I. G. FARBENIND. A.-G. Brit. 335,929, July 1, 1929. Purification of montan wax is effected by extn. under pressure and at an elevated temp. (suitably 135° or 150°) with org. solvents of the wax acids and esters (but not of the coloring substances) such as aliphatic alcs., esters, ketones and ethers, open chain or cyclo-aliphatic liquid hydrocarbons or chlorinated hydrocarbons, alone or mixed or with a smaller quantity of aromatic hydrocarbons. Examples with details of procedure are given.

**Removing phenols from ammonia liquor.** GEWERKSCHAFT MATHIAS STINNES. Ger. 517,001, Apr. 30, 1929. In removing phenols from ammonia liquor by means of a circulating org. solvent, the latter is desulfurized, before freeing it from phenols, by treatment with a suitable liquid or gas. Thus, the solvent may be washed with water, which may then be passed to the ammonia washer, or aerated to render it fit for use again. Alternatively, the solvent may be treated with coke-oven gases, which may traverse a cycle in which the $H_2S$ taken up by the gases is removed by a solid purifying material or by an alk. wash. Cf. *C. A.* 25, 801.

**Gas purification.** F. BÖNNEMANN. Brit. 336,425, Oct. 12, 1929. See Fr. 682,838 (*C. A.* 24, 4616).

**Gas purification.** DAVID L. JACOBSON (to Koppers Co.). U. S. 1,792,097, Feb. 10. Gas is washed with an alk. suspension of a compd. of a metal of the Fe sub-group of the 8th group of the periodic system, such as Fe oxide, contg. in soln. a hydroxy deriv. of

an org non-paraffin compd., such as 2% or less of a phenol, which retards formation of thio compds. Cf. *C. A.* 25, 802.

**Purifying gases.** I. G. Farbenind. A.-G. Brit. 336,319, July 20, 1929. Coke-oven gases, low temp. distn. gases, cracking gases and gases other than those mentioned in Brit. 329,688 (*C. A.* 24, 5983) such as gases intended for the manuf. of synthetic $NH_3$, MeOH, etc., are freed from volatile S compds. such as $H_2S$ and largely from $CO_2$ if present in appreciable proportion, by washing with high b. p. hydrocarbons or phenols or their mixts. under 10 atm. or higher pressure at such a temp. that the concn. of $H_2S$ amounts to less than 0.3% by volume of the gas. The pressure is preferably released in stages. Various details and examples are given.

**Purifying gases.** Heinrich Koppers A.-G. and Christian J. Hansen. Ger. 513,933, Nov. 1, 1927. $NH_3$ and $H_2S$ are removed from gases in the proportion of 2:1 by a washing liquid causing the formation of Fe, Mn or Zn thionate, and the excess of $H_2S$ is removed by a second washing causing the formation of polythionates. $H_2SO_3$ is added to the second washing fluid. Cf. *C. A.* 24, 1726.

**Gases rich in olefins.** I. G. Farbenind. A.-G. (Fritz Winkler, Paul Feiler and Carl Messerknecht, inventors). Ger. 513,815, Nov. 11, 1926. Gases rich in olefins are obtained by rapidly heating powd. bituminous coal to dull red heat and rapidly cooling the gas evolved. Superheated steam may be admitted to the glowing fuel. The examples describe the production of gas contg. 10 to 21% $C_nH_{2n}$ from lignite by this method.

**Heating and illuminating gas.** Albert F. Kunberger (to United Gas Improvement Co.). U. S. 1,702,172, Feb. 10. A mass of coal is heated to incandescence with an admixt. of finely divided iron or Fe oxide in a chamber, and a mixt. of H and superheated steam is introduced into the heated mass, simultaneously addnl. coal is introduced into the chamber together with an admixt. of a small proportion of finely divided Fe oxide, and the gases within the chamber are subjected for a time to steam pressure of 30–300 lbs. per sq. in. to cause the H to combine with the C to form hydrocarbon gases. App. is described.

**Coal gas.** Ges. für Linde's Eismaschinen A.-G. (Paul Schuftan, inventor). Ger. 513,815, Aug. 7, 1928. The small quantities of reactive gas remaining in coke-oven gas are removed, before splitting the gas by cooling to low temps., by passing it over an absorptive agent such as active C impregnated with metal or metallic salts, or over active $SiO_2$-gel. This removes the NO and traces of hydrocarbons remaining after the removal of the hydrocarbons, $H_2S$ and water by the usual methods.

**Washing coal gas.** H. Koppers A.-G. Brit. 336,484, Sept. 27, 1929. In final water cooling of coal distn. gases, the water, before re cooling, is washed or treated with tar to remove deposited naphthalene. App. is described.

**Expansion machines for separating benzene from coal gas.** Ges. für Linde's Eismaschinen A. G. (Paul Schuftan, inventor). Ger. 513,764, Sept. 14, 1926. Addn. to 511,567 (*C. A.* 25, 1266). Details are given for lubricating the machine by oil to which homologs of $C_6H_6$ or hydrated naphthalene are added to lower the congealing point. Glycol, ketones or monohydric alcs. may be added to the water ice soln. to prevent excessive loss by evapn. at low-vapor pressures.

**Mixed oil gas and water gas.** J. A. Perry (to Humphreys & Glasgow, Ltd.). Brit. 336,525, March 2, 1929. In the operation of a carbureted water-gas set, oil gas is obtained by passing sep. streams of a hydrocarbon fluid through the generator and through the carbureter, the hydrocarbon material being cracked by passage through the fuel bed, and the gas is withdrawn separately from that formed in the carbureter and superheater. Various details of app. and operation are described. Cf. *C. A.* 25, 1003, 1662.

**Water gas.** Mitallges. A.-G. and C. Mueller. Brit. 336,821, Nov. 4, 1929. Powd. and granular fuels are gasified by O in admixt. with steam, and part of the gas produced is reintroduced into the producer together with the gasifying medium, in which it is burned with a part of the O before the gasifying medium reacts with the fuel to be gasified.

**Non-poisonous gas from blue water gas.** W. H. Fulweiler (to Humphreys & Glasgow, Ltd.). Brit. 335,869, May 2, 1929. One portion of blue water gas is passed over a heated catalyst such as Ni and another portion is passed with steam over a heated catalyst such as activated Fe oxide to form chiefly H, the 2 gases are mixed, with removal of $CO_2$ and water vapor either before or after admixture. Some CO may remain.

**Continuous water-gas production.** J. Pintsch A.-G. Brit. 336,965, July 22, 1929. In the continuous production of water gas by passing steam and water gas together with the fuel through a tube surrounded by a heating app. for the reacting

gases (as described in Brit 295,717 (*C. A.* 23, 2278)), the mixt of previously produced water gas and steam is admitted progressively and cumulatively to the reaction tube at a number of points along the tube as well as through a space at the top of the tube Details of app are described

Water-gas generator. W B Chapman, C. W. Andrews and H. B Young (to H A Brassert & Co and Western Gas Construction Co) Brit 335,203, Nov. 27, 1928 A generator is described having means for continuous ash removal, in the operation of which the air steam ratio is such as to maintain a zone in which the ash is liquefied and a cooler zone below this in which the ash tends to solidify for removal by a mech device

Water-gas generator. H G Terzian (to Humphreys & Glasgow, Ltd). Brit. 336,902, April 20 1929 A generator using bituminous fuel has a perforated tubular gas off take in the axis of the upper part of the generator and openings communicating with an annular chamber surrounding the carbonizing zone, and both blast and run gases pass through this annular chamber Various auxiliary structural details also are described.

Combined water-gas and steam generator. Carl Marischka U. S 1,702,178, Feb 10 Structural features of an app with a boiler chamber surrounding a generator shaft, a heating jacket surrounding the boiler chamber, and tubes disposed entirely within the heating chamber and connected at their ends with the boiler chamber

Gas producer. J A MacDonald Brit. 336,932, July 20, 1929

Gas producers. Poetter G m b H Fr 694,116, April 17, 1930 See Ger 503,750 (*C. A.* 24, 5985)

Vertical gas producer C. H Landes and T F. Hurley Brit. 336,022, July 19, 1929

Grateless gas-producer for the continuous gasification of coal dust or granules. Janos Kaliczky Austrian 120,427, July 15, 1930

Gas producer and associated furnace and boiler. Babcock & Wilcox, Ltd Brit. 336,356, Aug 22, 1929

Charging apparatus for gas producers A L. Galusha Brit. 337,005, July 23, 1929 Structural features.

Degasifying chamber for gas producer. Carl Bleyer Ger 510,351, Feb 8, 1927.

Prevention of gummy deposits in gas mains, etc. W. H Fulweiler (to Humphrey & Glasgow, Ltd) Brit. 336,456, Dec 17, 1928 Gum forming constituents such as indene and styrene are left in the gas and the latter is treated with mono- or poly-hydric derivs of $C_6H_6$ or its homologs, as by spraying

Tar distillation. George T. Gambrill, Jr (to The Barrett Co) Can 309,014, Mar 3 1931 A method and an app for distg tar are specified The tar is heated without sepn of the vapor, then the vapor is released and simultaneously the tar is blown with an inert gas preheated to a temp approx that of the tar, the vapor and inert gas are withdrawn, the mixt is cooled to sep condensible constituents, and the inert gas is heated and returned for further contact with addnl portions of the tar. Cf *C. A.* 25, 803

Coking coal. A Pott Brit. 335,910, April 27, 1929 A coking coal is first dried and heated externally to a temp just below its decompn temp and is then transferred to another app in which it is externally heated to effect distn at a temp not exceeding 550° (the second app being preheated to about the temp of the coal before introduction of the latter into it)

Wet or dry cooling plant for coke. C Otto & Co G m b H Ger. 516,442, Aug 3, 1926

Coke ovens. Rudolf Wilhelm Fr 694,019, April 16, 1930 Construction of door is described

Coke ovens with heat regeneration. Robert J. A de Stordeur. Fr 693,054, Dec. 14, 1929

Coke oven for making semi-coke. Soc. générale de fours à coke systèmes Lecocq Brit. 336,809, Oct. 27, 1928 Structural features of app with a vertical or inclined chamber oven lined with metal plates or partitions supported at a distance from the heated refractory walls and heated by radiation only (each metal chamber being enclosed on all its faces by the heating walls)

Multiple regenerative coke oven. C. Otto & Co. G. m b H. Ger 513,503, May 30, 1928 Details of arrangement.

Coke-oven construction and operation K. Beutner Brit 337,278, Jan 3, 1929 Distillates are withdrawn from the bottom of the charge into a lower compartment forming part of a divided fuel support, whence they pass to an outlet pipe Steam may be introduced for production of water gas Cf. *C. A.* 24, 2868

# 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W F FARAGHER

**Artificial aging of mineral oils.** III. F. Evers and R Schmidt *Wiss Veröffentlich Siemens Konzern* 9, No 1, 357–68(1930), cf *C A* 23, 3565, 25, 404.—The catalyst and procedure previously recommended for aging tests on mineral oils are used to show that the aging curve may be expressed by the equation $y = 2.3 \log x \; C + K$, where $C = 10.1$ and $K = -11.3$ From the aging const of a mineral oil, the sapon value, acid value and tendency to polymerization during various stages in aging can be calcd., and a close approximation made of the av life of the oil under elec conditions. B C A

**Heat calculation for flash distillation [of petroleum hydrocarbons].** G. H. Fancher *Chem Met Eng* 37, 307–8(1930).—In calcg. the heat added during vaporization of hydrocarbons by means of Turner and Harrell's equation (*C A*. 24, 2280), more reliable results can be obtained by taking into consideration the av. sp gr and the temp rather than the mol wt of the vapor formed The value of the latent heat used in this calcn should be obtained from the relation $l = (1/d)(110.9 - 0.09\,t)$, where $l$ is the latent heat of vaporization in B t. u per lb., $d$ the sp gr (at 60°F compared to water at 60°F) of the liquid vaporized and $t$ is the temp in °F., this value is more accurate than that obtained from Hildebrand's or Trouton's rules B. C. A.

**Determination of carbon residue in petroleum products—Conradson carbon.** B Rosenbaum *Chem.-Ztg* 55, 106(1931).—Corrections are given for several Conradson C detns previously reported (*C A* 25, 804), with the explanation that the quality of these products has changed in the meantime The possibility of a definite relation between Conradson C and viscosity is pointed out. D F Brown

**Ultrafiltration of petroleum.** A. Zaharia and E Lucatu. *Bul. soc. chim. Romînia* 12, 90–4(1930).—In an attempt to settle the question as to whether paraffin, resins and asphalt are present in petroleum in colloidal or in true soln., petroleums of different types from 5 localities were subjected to ultrafiltration Vulcanized rubber membranes of 0.04 mm thickness and a vulcanization coeff of 1.7 were used in the Brukner app under a pressure of 150 atm Two membranes were used that gave an effective filtration surface of 25 sq cm The resins of petroleum which are separable by 70% EtOH were found to be ultrafilterable All the paraffin in the petroleums used was ultrafilterable but the asphalt, both hard and soft, was removed quantitatively by ultrafiltration This behavior indicates that the asphalt is colloidal but that the resins and paraffins are not The asphalt retained by the ultrafilter was dissolved in $C_6H_6$ and cyclohexane and was again retained by the filter Several passages of an oil through the same filter removed the resins and left the pure dry asphalt, which dissolved readily in that portion of the petroleum that was ultrafiltered This expt shows that the asphalt exists in petroleum as a lyophile colloid Oden E Sheppard

**Contact filtration of bright stocks.** V. Matusevich *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1930, No. 12, 64–75.—A mixt. of long residuum from Dossor (85) and Makat (15) crude oil was treated with acid and in 2 stages with clay Substitution of a NaOH wash for the 1st stage clay treatment resulted in the formation of emulsions and in high ash content of the finished oil. Lab and plant results showed that long residuum requires 7–10% and cylinder stock 8–12% of 96–98% $H_2SO_4$, which is applied as a fine shower, with air agitation Long residuum is best treated at 30–35° and cylinder stock at 45–55°, since at higher temps the sludge discolors the oil The time of contact is detd by testing the oil on a glass plate and discontinuing agitation when large lumps of sludge begin to form (usually 20–45 min.) The main body of sludge is sepd from the oil at once and the remainder is allowed to settle for 15–48 hrs in settling tanks at not over 50–55° (heating even with steam coils is detrimental). Coagulation of the sludge with water, NaOH soln., clay, water glass, etc., fails to give good results Operations are controlled by color tests (2% naphtha soln of oil in a Dubosc colorimeter). Clay should be applied to acid oil but the oil should be free from sludge. With long residuum a mixt of clay (10% by wt of oil), pretreated with acid and water (1:3), is mixed with the oil and circulated through a Foster-Wheeler pipe still (construction and operating details are specified) and a mixing tank, where the temp should reach 165° (max. permissible temp. in pipe still is 170°) When the temp reaches 90–100°, 5–10% more clay is added (total 15–25%). If all of the clay is added at the beginning, foaming is excessive. This clay treatment requires 6–8 hrs. but lab results show that 40 min contact gives the best color. The use of superheated steam shortens the time of treating

but the product is impaired Loss of oil to clay is about 1·1 by wt Similar results are obtained with cylinder stocks but more clay is required Clay is sepd from the oil on a filter press of the frame type, this is unsatisfactory because of loss of time. The following results were obtained in treating long residuum

| | | | | | |
|---|---|---|---|---|---|
| 98% $H_2SO_4$, % by wt. | — | 6 | 9 | 12 | 15 |
| Color of acid oil, mm | — | 41 | 55 | 70 | 80 |
| Sp gr | 0 9182 | 0 9055 | 0 9046 | 0 9022 | 0 8997 |
| Flash point | | Practically unchanged | | | |
| Conradson C, % | 3 70 | 1 68 | 1 48 | 1 16 | 1 07 |
| Color after clay treatment, mm | 3 5 | 50 | 68 | 87 | 91 |

V. Kalichevsky

**Dielectric constants of petroleum and its products** V. Zhuze *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 12 88 98.—The dielec. consts. of petroleum and its products increase with the increase in sp gr., b p and mol wt of oils. The same relation holds for paraffins contrary to the conclusions of Pécheux (*C. A.* 21, 109). The dielec const. is very closely equal to $(n_D)^2$ For paraffins, the const increases with the increase in m p The temp coeff. of the const is neg for petroleum products. In abs value it increases with the d except for the paraffins, for which it shows a decrease. The temp coeff of paraffins is 2–3 times smaller than that of liquid mineral oils. The dielec const of naphthenic acids increases with increase in sp gr., b. p., surface tension, index of refraction and mol wt. V. Kalichevsky

**Absolute viscosities of petroleum products from Groznui fields.** L. Selskii and E Shcheglova *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No. 12, 130–1

V. Kalichevsky

**Cold setting of surakhanui crude oil.** A Velikovskii and S. Nifontova *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 10, 109–11.—Satisfactory lab. results were obtained V. Kalichevsky

**Ligroin and gasoline content of straight-run and cracked distillates from Groznui crude oils** L Selskii *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 12, 124–9

V. Kalichevsky

**Many products from Burman crude oils.** G Egloff. *Oil and Gas J.* 29, No 30, 46, 133(1930).—The situation and production of the fields are discussed and the products obtained are described J. R. Strong

**Analysis of petroleum and its distillates for reducible substances and adsorbable matter by means of the polarographic method with the dropping mercury cathode.** B Gosman and J Heyrovsky *Trans Electrochem Soc* 59 (preprint) 23 pp (1931), cf *C A* 24, 3419.—The electroanalytic method with the dropping Hg cathode and automatic polarographic recording of the current voltage curves has been applied to the estn of (1) electrolytically reducible substances and (2) adsorbable (surface-active) matter in petroleum and its distillates The analysis of electroreducible substances is carried out by shaking the petroleum with a soln of $NH_4Cl$ and submitting the aq ext to polarographic examn after the atm $O_2$ has been expelled by $H_2$ or by the addn. of a sulfite About 0 005% of reducible substances may be detected in this way. Many sorts of petroleum were found to contain acidic substances, probably *naphthenic acids*, which may be extd by aq alk solns and which possess a prominent anticatalytic action in the reaction between $O_2$ and sulfite. These anticatalysts suppress maxima occurring on current voltage curves at pos potentials, thus indicating their neg charge and strong adsorbability The content of adsorbable substances is detd by adding the petroleum or its soln in MeOH from a microburet to an acidified MeOH soln of $CuSO_4$ The max on the current voltage curve, due to the latter soln., is hereby depressed and the dilu at which a half suppression is reached is taken as characteristic for the adsorbability in the petroleum cut *Naphtha* from different sources has been found to contain the least adsorbable substances (dilu. no., 10–400), then gasoline (400–2000) and lubricating oil (3000–13 000) Crude oil is most adsorbable with dilu nos up to 41,000 C. G F

**Knocking and effect of antiknock compounds.** J. Lorentzen *Z. angew Chem.* 44, 130–6(1931).—The causes of knocking were investigated in combustion expts made in a cylindrical chamber with mixts. of air with pentane and hexane Variations in the proportions of the mixts showed that the reactions are different when knocking occurs and when it does not Change of position of the spark in the chamber proved that knocking sets in when an incomplete combustion is propagated through the chamber and a pressure wave is reflected from the wall, causing an explosion of the partly oxidized products The flame is propagated about twice as fast under knocking conditions as

otherwise Turbulence increases the combustion velocity In the exptl arrangement used, knocking occurred in a turbulent gas mixt only at pressures above 8 atms The addn to the fuel of antiknock compds, lead tetraethyl and iron carbonyl, had no effect When the combustion products of the same antiknock agents were introduced into the combustion chamber previous to the ignition of the fuel, it was impossible to produce knocking below 5 atm pressure, and when turbulence was produced at the same time, no knocking was observed, although the initial pressure was raised to 9 atm

D F Brown

**Benzene and the evolution of ideas on motor fuels.** Brunschwig *J usines gaz* 54, 569–76(1930) —Current theories on the causes and prevention of motor knock, the methods of refining fuel benzene, gum formation and the action of inhibitors, and methods of testing for gum forming tendency are discussed K H Engel

**Knock rating of motor fuels. Note on experiments carried out in 1930.** Anon *J Inst Petroleum Tech* 17, 69–71(1931) —From the results of a 2nd series of knock-rating tests participated in by the research labs of the Anglo American Oil Co, the Anglo Persian Oil Co and the Asiatic Petroleum Co, it was agreed that the bouncing pin was the best means of measuring knock intensity if the engine was small enough for it to function properly The Sub Comm of the I P T agreed upon the octane no for *expressing knock ratings in the future The results from the older types of testing* engines can be compared with those from the Horning engine only by working out the correlation for each type of fuel separately Emma E Crandal

**Gases from crude oil cracked in the vapor phase.** M B Markovich and V. V. Pigulevskii *Neftyanoe Khozyaistvo* 18, 425–44(1930), cf *C A* 25, 405 —Fuel oil was cracked in the vapor phase and the gas produced was sepd into 3 fractions (*a*) permanent gas, (*b*) Blau gas + *e*, liquid at 15° under 100 atm pressure and (*c*) light gasoline These fractions contained, resp, in % by wt, H 2 4, 0 2, 0 0, satd hydrocarbons 49 0, 29 6, 3 0, $C_2H_4$ 25.2, 17 1, 0 0, $C_3H_6$ 12, 24 3, 4 0, butylene 2 9, 9 0, 35 0, bivinyl 2 0, 6 6, 18 0, vapors of higher unsatd hydrocarbons 0 0, 2 5, 0 0, $N_2$, $CO_2$, $O_2$, etc, 3 0, 0 4, 0 0 The work was undertaken to det the possibility of using cracked gas in the *manuf of synthetic chem compds to replace natural fats, for prepg glycols, perfumes,* etc. A A Boehtlingk

**The vapor-pressure curves of motor spirits.** P. Meyer *J Inst Petroleum Tech.* 17, 42–68(1931) —The Ramsay–Young boiling-point law, deduced from the Clausius–Clapeyron equation, may be expressed in the form $\log P = K_1 - K_2(t/T)$ Vapor pressures of a large no of air free motor spirits were detd, in Andrew's app, and by the methods of Rhodes and McConnell, Beistle and Prather, Tizard and Marshall and Bridgeman, Aldrich and White All the results fell approx upon the graph represented by B, A and W.'s equation, in which the consts of the Ramsay–Young equation are evaluated $\log P = 6\ 76 - 3\ 88(t/T)$ Two methods were developed for calcg the true hydrocarbon vapor pressure from the apparent vapor pressure to avoid the exptl. difficulty of removing dissolved air from a mixt of volatile hydrocarbons By the first method, the apparent vapor-pressure curve is regarded as made up of the true vapor-pressure curve plus an air pressure curve The 2nd method utilizes the apparent molal heat of vaporization for calcg Emma E. Crandal

**Vapor-phase treatment of cracked gasolines in the Vickers cracking unit.** B P Fradkin and D A Strom *Neftyanoe Khozyaistvo* 18, 445–8(1930) —Gasoline obtained in the Vickers cracking unit is evapd again and passed in the vapor phase through fuller's earth filters The yield of the final gasoline amounts to 91 1%, while 0 2% of fuller's earth is consumed, based on 11 regenerations During this process the fuller's earth is continuously heated by flue gas, the temp being kept at 230–5°. The untreated gasoline has a Stammer color of 3 2, gum 0 5%, no corrosive action, unsatisfactory doctor test, and a sp gr of 0 734 The treated gasoline has a color of 2 1, 0 3% of gum, satisfactory corrosion and doctor tests, and a sp gr of 0 737 A A Boehtlingk

**Destructive hydrogenation in bomb-polymerization in cracking.** S A Kiss *Ind Eng Chem* 23, 315–8(1931) —The initial retardation of the decompn in destructive hydrogenation, carried out in a closed bomb, is explained by the Poynting effect which abstracts the "activated molecules" from the liquid phase and transforms them into "non activated molecules" *Formulas are developed for the kerosene yield and the gas* and gas plus-gasoline yield, also for the amt. of polymerization D F Brown

**Cracking unit of Jenkins.** B Chirkin *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 10, 67–92 —A complete description is given of the units bought from the Graver Co, including detailed drawings, dimensions, guarantees, etc. V K

**Design of liquid phase cracking equipment.** P. Ryabukh *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 12, 76–82 —If the cracking rate doubles for every 10°,

the av cracking rate ($C_{av}$) for the temp interval $T_1 - T_2$ is $C_{av} = 14.3C_1/(T_1 - T_2)(1.074^{T_1-T_2} - 1)$, where $C_1$ = cracking rate at $T_1$. The length of the heating coil ($L$) is the sum of the length required to heat the oil ($L_1$) and the length necessary to supply the heat for cracking ($L_2$), calcd as follows: $L_1 = L_1'c_1/c_0n\theta - L_1c_1$, where $c_0$ = cal used in heating 1 g of oil to the cracking temp., $c_1$ = cal absorbed in cracking 1 g of oil, $n$ = the velocity of the oil in pipes in m./sec., $\theta$ = heating time in sec. At temps. below 480° $L_2$ is not over 2% and may be neglected but at 480° it may reach 25% of the total length. The temp drop in the reaction chamber under adiabatic conditions is $T_1 - T_2 = c_1(1 - \alpha) + c_2/(1 + \beta)S$, where $c_2$ = heat lost to the surroundings, $\alpha$ = the fraction cracked before the oil reaches the chamber, $\beta$ = the fraction recycled; $S$ = the av. sp. heat of the oil between $T_1$ and $T_2$. For *isothermic* conditions $t_1 = T + (Z - 1)/Z \cdot GS_g(Z - 1)$, $t_2 = T + Q/GS_g(Z - 1)$, where $t_1$ = the temp of the gases entering the heating coil, $t_2$ = the temp of the gases leaving the heating coil; $Q$ = the heat absorbed in the reaction chamber, $G$ = the wt. of gases used per hr.; $S_g$ = the sp. heat of gases, $Z = e^{Q/GS_g\delta_m}$, where $e$ = the base of the natural log and $\delta_m$ = the temp difference satisfying the relationship $\delta_m = Q/KH$, where $K$ is the coeff of heat transfer between hot gases and the oil, and $H$ = the surface of heating coils. Sample calcns. are given.

V. Kalichevsky

**Heat balance in cracking reactions.** V. Khokhlov and P. Markosov. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No. 12, 83–7.—The work of Ryabukh (preceding abstr.) is criticized and a method recommended for calcg. cracking reactions is outlined.

V. Kalichevsky

**Present methods for investigating gasolines.** N. Kalantar. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No. 12, 55–63.—Various analytical methods are described.

V. Kalichevsky

**Refining of cracked gasolines with clays from Surakhanui.** E. Gintburg and A. Markaryantz. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No. 10, 93–8.—Clay alone gives unsatisfactory results but might be of value in combination with acid or hypochlorite.

V. Kalichevsky

**Perfect flexible method for treating [gasolines and naphthas].** C. O. Willson. *Oil and Gas J.* 29, No. 31, 38(1930).—A method has been perfected by the Union Oil Co. of Calif. for economically treating all grades of gasoline and naphtha by a continuous acid treatment followed by contact with clay. This company also uses the heat from the recycle stock of their Cross stills to rerun the treated pressure distillate.

J. R. Strong

**Determining gum contents of gasoline.** Oscar C. Bridgeman and Elizabeth W. Aldrich. *Oil and Gas J.* 29, No. 37, 42, 100, 200, 201(1931).—The Cu-dish method gave on the av. much higher results than either the use of a glass, silica or porcelain dish in an atmosphere of steam or the air jet method with glass dish and air blowing on the surface of the liquid at the rate of 300 ml. per sec. On high gum gasolines the glass-dish method gave higher figures than the air jet, but for low gum gasolines they are about the same. The values decreased rapidly from zero air flow to 300 ml. per sec. and from there on did not change. Inert gases ($CO_2$ and N) gave somewhat higher results than those obtained with an atm. of air. The methods thus far proposed have not been correlated with gum deposit in an engine. It is felt that a lab.-flow method can be devised that will simulate engine-manifold conditions and that can be used as a preliminary criterion for the choice of a method to be employed in the detn. of gum content. This all seems to hinge on the true gum content, hence a method must be found to det. the true gum content.

J. R. Strong

**Determination of the gum content of cracked spirits.** W. Littlejohn, W. H. Thomas, and H. B. Thompson. *J. Inst. Petroleum Tech.* 16, No. 84, 684–95(1930).—This method of detg. gum, decided upon for tentative use in the laboratories of the Anglo-Persian Oil Co., is the outcome of a series of expts. in which the effects of varying many factors were tested. A 25-cc. sample of gasoline is evapd. in a hemispherical glass dish 7 cm. in diam., on a steam bath, with the aid of a jet of air at 0.5 in. pressure. If the residue in the dish is not dry at the end of 1 hr. it is allowed to remain on the bath 15 min. after it is visually dry. Drying is continued in an oven at 150° for 1.5 hrs. If the gum exceeds 11 mg. in wt., a new detn. is made upon a sample just small enough to bring the quantity of gum under the 11 mg. limit. Results for vapor-phase cracked gasolines are more affected by the change from the old method of drying at 100° for 1 hr. than are those of gasolines formed by liquid phase cracking.

Emma F. Crandal

**Action of inorganic refining reagents on alkyl sulfides in naphtha.** P. Borgstrom and J. C. McIntire. *Ind. Eng. Chem.* 23, 321–3(1931).—Expts. were run on the removal of alkyl sulfides dissolved in various samples of naphtha. The sulfides used were

ethyl, propyl, isopropyl, alkyl, butyl, isobutyl and sec-butyl sulfide. The reagents used were silica gel, mercuric acetate, mercuric chloride, solid mercurous nitrate, Zn sulfide, cupric sulfide, ferrous oxide, ferric oxide, cupric oxide, cobaltic oxide, Ni oxide, yellow mercuric oxide, Pb oxide, Al oxide, Zn oxide, chromic oxide, basic Cu carbonate, ferric nitrate, stannous chloride, Zn chloride and cupric chloride The results show that the lower sulfides are more readily removed by mercuric acetate than the higher ones The removal of the isobutyl and isoamyl sulfides was about the same as that of the normal compds More sec-propyl and sec-butyl sulfides were removed than the corresponding normal compds The action of mercuric chloride varied greatly An appreciable difference was noted with mercurous nitrate according to the naphtha used. This reagent appears, however, to be the best available for the removal of alkyl sulfides.
D. F. Brown

**Influence of water and steam in the rectification process.** K Kostrin *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1930, No 10, 99–103, cf *C A* 21, 1178 —*Condensation of steam in the rectifying columns and not the steam itself has a harmful* effect on rectification V Kalichevsky

**Origin and refining of sulfur oils.** W. Friedmann *Oil and Gas J.* 29, No 31, 32, 100, 107(1930) cf *C A* 24, 5080 J R Strong

**Practical aspects of modern dehydration** M L Garrison *Petroleum World and Oil Age* 27, No 12, 67, 71, 72, 75, 77, 79(1930) Emma E Crandal

**Determining the congealing point of fuel oil.** N I Chernozhukov and A M. Gutzait *Izvestiya Teplotekh Inst* (*Trans Thermo Tech Inst Russia*) 1930, No. 3, 33–5 —Put the fuel oil into a 200-cc flask (about half full) provided with a thermometer, stir the oil at a rate of 80–100 revolutions per min on a water bath which is 3–5° cooler than the congealing temp of the fuel oil. When the oil reaches the bath temp transfer it to a test tube provided with a thermometer which has been brought to the bath temp Insert the test tube in a second tube, and place the assembly in a cooling bath the temp of which is kept 5° below that of the fuel oil The congealing point is found by tilting the test tube at an angle of 45° at each degree A A Bohitlingk

**Sapropelites from the river Barsas (Siberia).** N M. Karavayev and J. B. Rapoport. *Izvestiya Teplotekh Inst* (*Trans. Thermo-Tech Inst Russia*) 1930, No 3, 59–60 —Three types of deposits were found near the river Barsas (1) dark-yellow, very dense, in layers, very difficult to grind, (2) dark gray, in layers, the layers becoming more distinct after drying, they can easily be sepd and disintegrate into scales on grinding, (3) a piece of wood root with bark on it These sapropelites contained moisture 1.2–3 5%, ash 16–29 8%, S 0 6–1 0% and volatile matter 60 5–80 0%. The elementary analysis of the combustible part gave: C 76–79 6%, H 7 3–9 6% and N 0 28–0 72%. The calorific value was 8150–9100 kg. cal. A low-temp carbonization in a Fischer retort yielded 38 27–57 21% semicoke, 33 81–50 90% tar; water and the gas and loss amounted to 7.83–10 83% The coke so obtained was dense and was good only as a low grade com fuel The tar contained 2 35–3 84% phenols, 2 35–3 00% acids, 0 51–1 2% bases and 87 0–93 5% neutral components of 0 8437–0 8972 sp gr The tar distn produced 16 7–25 4% b below 200°, 35 0–43 6% b. below 275° and 56 1–64 1% residue b above 275°. The gasoline fraction had a sp gr of 0 7608–0 7750 and an I no of 136 7–142 3 It had an unstable color which, after treatment with $H_2SO_4$ of 1 84 sp. gr., washing with caustic soda and water and redistn , was stabilized, the loss through treatment amounting to 21 65% The original gasoline fraction contained 21 50–21 3% of unsatd compds and 9 3–15 9% of aromatic compds Its sp gr after treatment and redistn was 0 7679 The kerosene fraction was also unstable in color. It contained 13–14 11% phenols, traces of bases, 85 89–87% of neutral components and had a sp. gr. of 0 817–0 8030 The gas oil distillate was semi-solid (b 280–350°) and contained up to 0 68% of paraffin, calcd on the tar In a destructive hydrogenation of 70 g of the gas oil and 10 cc of gasoline, with 2 g of $Al_2O_3$ as catalyst, 67 5% of liquid product was obtained The heating was continued for 4 hrs at 415–25° The original H pressure was 70 atm ; the final and max. pressures were 65–75 atm and 200 atm , resp An insignificant amt. of C and gas was formed The liquid had 33 15% b. below 170°, 16 31% b 170–230°, 14 29% b 230–80° and 5 28% b 280–350°, the residue was 18 06% and the loss 5 89%. Expts. carried out with $Al_2O_3$ and $Al_2O_3$ + CuO by heating the mixt for 2–3 5 hrs produced similar results. A destructive hydrogenation of the residue b. above 280° in the presence of $Al_2O_3$ and CuO yielded 33% b below 175°, 13 25% b 175–260°, 11 45% b. 260–80°, 14 37% b 280–340° and 27 93% of residue (including loss) All fractions were unstable in color. Cracking of the 280–350° fraction at 405–50° for 1 5 to 2 25 hrs at a pressure of 18–62 atm yielded 51 85–77.7% of a product b up to 280° and 22 3–32 45% of residue. The I value varied between

62.38 and 35.94. The gasoline and kerosene fractions, although off color, are suitable for com. purposes because they contain some aromatic compds and unsatd compds.
A. A. BOEHTLINGK

**Oil-field waters of Alberta and Saskatchewan.** W. P. CAMPBELL. *Trans Can. Inst Mining Met* 32, 316–32(1929).—The water problem in oil borings is discussed. A high chloride content generally indicates deep water; absence of chlorides and presence of sulfates and H carbonates indicate surface water. B. C. A.

**The making of low pour point oils.** E. R. LEDERER AND E. W. ZUBLIN. *Oil & Gas J.* 29, No. 32, 64, 101(1930). cf. *C. A.* 25, 1367.—There are 5 important methods for making an oil with low pour point (1) solvent processes; (2) cold pressing; (3) cold settling, (4) centrifuging, and (5) Weir process. Solvent processes have attained little importance as yet because of the possible loss of solvent. These processes make an oil equal to the best com. products. Cold pressing is applicable to overhead oils only, and depends entirely upon crystn. of the wax into needles rather than plates. By careful control of the distn. and pressing in 2 stages it is possible to make an oil whose pour point is 0°. Cold settling consists in diluting the stock with about 70% of light naphtha, chilling and settling. The wax must be amorphous, not cryst. The viscosity of the oil must be sufficiently low to permit the wax to settle out. The oil must have a low sp. gr. for the highest possible gravity differential between soln. and wax. *Before centrifuging*, the oil is slowly chilled in soln. with 70% of light naphtha, at a rate of 5° per hr. to about —60°F. Truly cryst. wax cannot be sepd. by centrifuging. The Weir process consists in filtering cold with the aid of Hyflo-Super Cel. One lb. per gal. is added to the *diluted oil, and the cooled mixt. is forced through a filter. The Hyflo-Super Cel* is abrasive and cannot be handled with pumps.
J. R. STRONG

**Gasoline and lubricants by hydrogenation.** R. T. HASLAM AND W. C. BAUER. *Oil and Gas J.* 29, No. 37, 34, 165, 166(1931).—Hydrogenated oils are, in general, equal or superior to all others in the relationships that are the usual indications of quality. In the White motor, oil consumption was least for the hydrogenated oil and with the exception of one other oil the C deposit was lower. Tests in the Mack motor were more severe, but results were still favorable to the hydrogenated oil. The hydrogenated gasolines are very sensitive to addn. of tetraethyl lead, have low S and gum, and are equal to $C_6H_6$ for blending purposes. Hydrogenated gasolines are unlike most cracked gasolines in that the heavier fractions have the best antiknock qualities.
J. R. STRONG

**Turbine oils.** ANON. 5th All Russian Thermo-Tech. Congress. *Izvestiya Teplotekh. Inst. (Trans. Thermo-Tech. Inst. Russia)* 1930, No. 1, 66–9.—Emba turbine oil distillate from the Konstantinovski refinery after being used for 6 months in a turbine caused the bearing temp. to rise up to 70°, a great amt. of sludge composed mostly of carbenes and asphaltenes being pptd. The same oil when overrefined became too viscous and the amt. of acid formed which was able to cause corrosion was quite appreciable. The same over refined oil with water being admitted during the test run in a steam turbine produced, after 4 months' use, a great excess of sludge. Oil of the above type but slightly acidic and contg. an insignificant amt. of sludge changed very little in the presence of water, although it did not stand up in the de-emulsification test, the latter fact being explained by the formation of Cu and Fe soaps, while the same oil under normal conditions worked quite satisfactorily. A sample of Baku turbine oil was satisfactory under normal working conditions. To regenerate used turbine oils they may be centrifuged to sep. out water and sludge, while oils high in acid require refining. The lubricating system of the steam turbine should be blown out with steam to remove impurities. Considerable data concerning turbine oils before and after use are given.
A. A. BOEHTLINGK

**Make asphalt by vacuum reduction.** D. H. BANCROFT. *Oil and Gas J.* 29, No. 36, 30(1931).—Asphalts of improved quality are being made in the El Dorado, Ark., *plant of the Lion Oil Refining Co.* by reducing the bottoms in a high vacuum. Heavy Smackover crude oil is processed through a combination dehydrator, topping unit and vacuum reducing tower. In addn., this unit makes a lubricating distillate, gas oil and gasoline. Asphalt can also be made from low-gravity Smackover fuel oil. The lower the abs. pressure the lower will be the ductility and the penetration.
J. R. STRONG

**Improving crude-oil asphalts.** A. I. VORONOV AND N. I. LOGVINOV. *Neftyanoe Khozyaistvo* 18, 449–60(1930).—Road asphalts meeting the various standard specifications were prepd. from paraffin base, mixed base and asphalt base fuel oils by distg. the oils under high vacuum or with steam or refinery gas, followed by blowing with air. The oil sepd. in distn. was suitable for prepg. lubricating oils and cylinder stocks or it could be used *for cracking*. Careful distn. was required to avoid the conversion of tars

into asphaltenes, which increase the brittleness of asphalt. An extensive bibliography on asphalts is appended A A BOEHTLINGK

Solubility of asphalts and pitches in various, less common, organic solvents. EMIL J FISCHER. *Asphalt u Teer* 30, 1332–4(1930) —See *C A* 24, 2589. K H ENGEL

The chemical nature of bitumen from Petchora. N D ZELINSKII *Compt. rend acad sci U R S S* 1930A, No 14, 351–2 —The bitumen is a black, viscous mass mixed with vegetable residues and possesses a rather sharp, characteristic odor A sample was extd with benzene. After the benzene was distd off, the residue was distd under vacuum (11 mm.) The distillate was a yellowish oily liquid which distd under ordinary pressure without decompn between 190° and 305°, and had the following compn: C = 86.48% and H = 13.34%, $d_{20}$ = 0.8590 The rather high d indicates the predominance of heavy hydrocarbons of cyclic nature. The residue from the first distn was distd. under high vacuum and the remaining mass was a hard tar of the following compn.: C = 85.00% and H = 10.64%. This tar constitutes the main part of the Petchora bitumen L JACOVLEFF

Carbonization (of wood) in modern portable furnaces. ANTONIO BERNAD *Instituto Forestal de Investigaciones y Experiencias* 2, No. 5, 68–80(1929) —The disadvantages of the old method of wood carbonization (slowly burning open piles of wood) are such as to cause the gradual disappearance of this method. The use of portable metal furnaces improves the quality and yield of charcoal, eliminates the necessity of const. attention to the burning, prolongs the working season, prevents interruption by adverse weather conditions and supplies a source of power for running machinery The details of construction and operating expenses are given. The Spanish woods used for the manuf of charcoal are *Pinus sylvestris, P halepensis* and *Eucalyptus globulus* H. K. S

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Solid $CO_2$ [*from oil well gas*] (MARTIN) 18. Residue of *sulfonic acids from oil*-refining (Fr. pat. 694,236) 18. Temperature-indicating devices for oil-cracking apparatus (U. S. pat. 1,792,086) 1. Destructive hydrogenation of pastes of coal and oil (Brit. pat. 336,610) 21. Liquid products from coal, etc. (Fr pat. 694,192) 21. Apparatus for extracting gases from oils (Fr pat. 693,985) 1. Apparatus for supplying fire-extinguishing *foam to oil tanks* (*Brit.* pat. 337,221) 18. *Dialyzing membrane* [*for purification of* mineral oils] (Fr. pat. 695,007) 18.

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*Purifying petroleum oils.* KARL T. STEIK (*to Standard Oil Development Co*) U. S. 1,791,941, Feb. 10 Oil is treated with a liquid mixt. of $SO_2$ and $SO_3$.

System for treating petroleum oils with reagents such as acid and adsorbent earths. SAMUEL J. DICKEY and ERNEST W. ROTH (to General Petroleum Corp of Calif.). U S 1,792,003, Feb 10. The oil under treatment is repeatedly and successively mixed with a mixt. of *finally* purified liquid and reagent sludge, the sludge is drawn from the mixts. formed, and successive treatments are effected with mixts. contg successively higher percentages of unexhausted reagent. An arrangement of app is described.

Desulfurizing petroleum oils. FRANCIS M ROGERS (to The Standard Oil Co.). Can. 309,099, Mar. 3, 1931. Straight run, low-boiling petroleum distillates are desulfurized by passing the vapors through adsorbent clay maintained at a temp around 650°F., whereby a substantial part of the combined S is disengaged as $H_2S$.

Distillation apparatus with entrainment separators for vacuum distillation of petroleum oils. ALEXANDER C. SPENCER (to Standard Oil Development Co.). U. S. 1,791,940, Feb. 10. The vapor stream from a vacuum still is cooled without substantial condensation. The direction of flow of the stream is then suddenly changed, its linear velocity decreased and the vapors are passed to a condensing zone. Various details of app., including an entrainment separator, are described.

Hydrocarbons. MELANTI A.-G. Fr. 694,682, April 29, 1930. Carbonaceous or hydrocarbon materials are converted to liquids of lower b. p. by prepg a mixt. of the substance to be treated with a colloidal soln of a metal such as colloidal Zn, and treating

the mixt. under pressure and heat, *e. g.*, by injecting it in the atomized state with the aid of H or gases contg H into appropriate reaction vessels

Purifying hydrocarbons. General Technical Co., Ltd. Fr. 695,004, Aug. 2, 1929. *Fractions of various hydrocarbons (petroleum, tars, etc.), particularly fractions* of low b. p. (benzene, gasoline) are distd. by adding to the fraction a non-miscible liquid or a mixt. of non miscible liquids, the b. p. of which is lower than that of the lightest sulfured compd. in the mixt. The mixt. is afterward distd. at the boiling temp. of the non miscible liquid introduced so that the sulfured impurities are sepd. from the hydrocarbons *and a distillate is obtained free from* S. *Water*, alc., *certain higher* alcs. and ketones or halogen derivs. of hydrocarbons, alcs., aldehydes or ketones may be used.

Decolorizing and stabilizing hydrocarbon mixtures. I. G. Farbenind. A.-G. (Walter Rosinsky and Karl Smeykal, inventors). Ger. 516,279, Aug. 17, 1928. The mixts. are treated with a small proportion of an aldehyde- or ketone-sulfoxylate at atm. *or raised temp. An alc. may be added during the treatment, and afterward* distd. off. Thus, crude lubricating oil may be treated with an equal amt. of MeOH and 1% of Na formaldehyde sulfoxylate and the alc. then removed.

Removal of naphthenic acids from hydrocarbon oils. Francis M. Rogers (to The Standard Oil Co.). Can. 309,100, Mar. 3, 1931. Naphthenic acids are removed *from hydrocarbon oil by vaporizing the oil and passing the vapors upward through* a tower maintaining molten NaOH in the lower part of the tower and producing a small amt. of reflux in the upper part of the tower to prevent entrainment of Na compds.

Hydrocarbon oil conversion. Gustav Egloff and Jacque C. Morrell (to Universal Oil Products Co.). U. S. 1,791,618, Feb. 10. After heating oil to a cracking *temp. in a heating zone such as a coil of pipe in a furnace, vapors thus formed* are subjected to dephlegmation and the dephlegmated vapors are subjected to catalytic treatment such as with Ni on pumice and the treated vapors are condensed and the distillate and uncondensed gases are collected, the uncondensed gases are scrubbed, passed through a desulfurizer and then admitted to a flowing stream of dephlegmated vapors prior to the subjection of the latter to the catalytic treatment. App. is described.

Hydrocarbon oil conversion. Wm. R. Howard (to Universal Oil Products Co.). U. S. 1,791,622, Feb. 10. A body of oil is maintained at a cracking temp. under super-atm. pressure in a zone of vapor evolution, vapors are taken off and subjected to a primary reflux condensation and the reflux condensate is returned to the zone of vapor evolution and there heated to the prevailing temp. but out of direct contact with the other material in such a zone (suitably by a reflux still within the main still) and vapors are evolved from the reflux condensate and these vapors are combined with the uncondensed vapors from the reflux condensation, and the combined vapors are subjected to secondary dephlegmation and condensation. App. is described.

Converting heavy hydrocarbon oils into lighter products. Lester Kirschbraun (to Universal Oil Products Co.). U. S. 1,791,566, Feb. 10. A stream of oil is heated to a cracking temp. (suitably in a pipe coil in a furnace) and then transferred to a reaction *zone, and the temp. imparted to the oil stream is controlled in accord with variations in* the thermal condition of the oil stream as it is transferred to the enlarged reaction zone, to maintain it at a substantially uniform predetd. temp. App. is described.

Purifying light hydrocarbons produced by destructive hydrogenation of oil, coal, etc. R. Scott and Imperial Chemical Industries, Ltd. Brit. 335,885, May 31, 1929. Purification is effected by *passing the material, while still in the vapor state and under* a pressure of at least 10 atm., through a solid purifying agent such as bauxite or fuller's earth. App. and various details of procedure are described. Regeneration of the purifying material may be effected by treatment with air at 400–500°.

Purifying light oils recovered from coal gas, etc. J. A. Shaw (to Koppers Co.). Brit. 336,636, Nov. 6, 1928. Materials such as light oils recovered from coal gas and distillates from tar and petroleum are purified by washing with acid and then with an alk. soln. of Na phenolate in 2 stages, first in such quantity that most or just all of *the acid present is neutralized and practically all* the phenols liberated *from the phenate* dissolve in the oil, and second to effect neutralization and remove the phenols and any remaining acid. $H_2SO_4$ is usually employed. There are thus obtained from the first alkali washing solns. contg. practically no phenols, and from the second solns. of Na phenolates practically free from sulfates, sulfonates, etc., and these latter, with or without sepn. and recovery of the phenols, *may be used for purifying gas or for softening water*, etc.

Light hydrocarbon oil distillation and purification. D. A. Howes, R. Scott and Imperial Chemical Industries, Ltd. Brit. 336,615, July 22, 1929. Kerosene and light hydrocarbons produced by destructive hydrogenation, cracking or straight distn.

are distd at a suitable temp below 300° in the presence of gaseous $NH_3$ and in the absence of inorg acids, to improve color and restrict tendency to gum formation Various examples are given.

**Apparatus with superposed drums and heating flues for distilling hydrocarbon oils.** Jackson R Schonberg (to Standard Oil Development Co) U S 1,791,937, Feb 10

**Cracking hydrocarbons.** Paul Verola Fr 694,495, July 31, 1929. In cracking hydrocarbons by heat treatment, the gases produced in the process are reintroduced partially or wholly into the liquids before, during or after the cracking thereof has taken place, whereby the properties of the residual oil are improved

**Cracking hydrocarbons.** Soc d'études et réalisation "Eréal" (Soc. anon) Fr 694,744 Apr 29, 1930 Gaseous products rich in hydrocarbons are decomposed to obtain valuable by products by passing them through an incandescent mass The speed of the current or the height of the layer traversed or both are regulated so that at the exit of the mass temps are obtained which do not exceed that necessary for a product of good quality The temp of the mass is about 1000–1200° and of the exit gas 600–700°.

**Cracking hydrocarbon oils.** Fritz Hofmann and Carl Wulff U S 1,791,562, Feb 10 See Brit. 301,395 (*C A* 23, 4059)

**Cracking oils.** I G Farbenind A.-G Brit. 337,046, July 26, 1929 Metal compds of 1,3 diketones sol in hydrocarbon oils, such as the W, Mo, Cr, V, Mn, U, Nb, Zr, Ce, Sn, Ti, Al, Cu, Zn, Co or Ni compds of acetyl-, propionyl , and butyryl acetonates, are used, singly or in various mixts with each other or with other suitable substances, as catalysts in converting into lower b p compds materials such as mineral oils, tar oils or oils obtained by the destructive hydrogenation of carbonaceous materials Various details and examples are given, and the process may be carried out at 300–600° with or without high pressure or use of H

**Cracking oils.** A. P Sachs (to Petroleum Conversion Corp) Brit 336,380, Oct 6, 1928 In a cracking process in which the heat for the conversion is supplied by a heated carrier circulated cyclically, the $H_2S$ which accumulates in the gas is washed from it by spraying the gas with water after it has been cooled to condense the vapors produced (and preferably after it has passed through the circulating blower) Various details of app and procedure are described

**Cracking mineral oils.** S Seelig Brit. 336,822, Nov 7, 1928 See Fr. 684,456 (*C. A.* 24, 5477).

**Apparatus for cracking oil.** Gustav Egloff and Harry P. Benner (to Universal Oil Products Co) U. S 1,791,617, Feb 10 Oil is passed in a single passage through a pipe coil in which it is heated to a cracking temp , and a valve-controlled connection is provided for passing heated oil in liquid phase from the coil into either of the opposite extremities of an enlarged horizontal vapor chamber sepd. from the coil, and means, such as pipes of restricted diam , is provided for increasing the velocity of the oil as it reaches points near the entrances to the vapor chamber The vapor chamber communicates with a condenser, and the app is arranged for conducting the oil treatment under superatm pressure Cf *C A* 24, 4385

**Apparatus for distilling and cracking hydrocarbons.** Nikolaus Mayer. Austrian 120,428, July 15, 1930 Addn to 118,255 (*C A.* 24, 4927)

**Oils.** I. G Farbenind A.-G (Carl Wulff, inventor) Ger 513,814, April 23, 1927. Aryl carbonates, formed by treating the phenols with $COCl_2$, are used as transformer and switch oils

**Refining mineral oils.** Richfield Oil Co of California Fr 695,077, May 5, 1930 See U S 1,790,622 (*C A* 25, 1374) Fr 695,078 describes a process for refining hydrocarbons by vaporizing them and bringing them into contact with a soln of at least one metallic salt, *e g* , a salt of Zn

**Refining oils and waxes.** Compagnie provençale de Raffinage de corps gras minéraux Fr. 694,469, July 27, 1929 Mineral oils and waxes are refined by dissolving them in naphthalene decahydride and treating with $H_2SO_4$ in the usual manner The decahydride is afterward recovered by distn

**Atomizing heavy oils.** Karl Modl. Austrian 120,725, Aug 15, 1930 The atomization of heavy oils in a gas stream is facilitated by introducing a readily vaporized fuel into the gas stream The method may be applied in connection with internal combustion engines

**Fractional condensation of oil vapors.** Harald Nielsen and Bryan Laing. Ger 513,613 Oct 30, 1928 The vapors are passed through a rotary washer under which various fractions condense as the temp. falls App is described

**Condensing and separating apparatus suitable for use in steam distillation of**

mineral oils. Wm W Holland (to Standard Oil Co of Ind.) U. S. 1,792,164, Feb 10. Structural features of a baffle and gravity sepn. app.

Decolorizing oils such as vapor-cracked gasoline or other mineral oil or distillate. N V Mijn Bouw en Cultuurmaatschappij Boeton Brit. 333,952, Nov 3, 1928. Decolorization is effected by solns. of alkali metal hydroxides in substantially water free org. solvents miscible with the oil such as MeOH, EtOH, BuOH, glycerol or acetone, and small quantities of reducing agents such as Zn, Al, aldehydes or polyhydric phenols may be present. The alkali may be recovered by dissolving the still residue in water and calcining. Cf. *C. A.* 25, 1374.

Refining gasoline. August P Bjerregaard. U. S. 1,791,521, Feb. 10. After removing water from gasoline the dry gasoline is mixed with a high test alc. and this mixt. is treated with dry caustic alkali.

Refining cracked benzine. Otto Zechetmayr. Ger. 513,870, June 20, 1928. The benzine is led through layers of porous material contg. hydroxides of alkali or alk. earth metals. The layout is described.

Use of mercury cyanide as an "antidetonant" with motor fuels. A. J. Ducamp. Brit. 333,828, Dec. 4, 1928. Several mixts. are described.

Separating paraffin from oil. Robert E. Manley (to Texas Co.) U. S. 1,792,234, Feb. 10. A wax bearing Lubricating-oil stock is mixed with an added more volatile carrier oil such as a light asphalt base lubricating oil which is less volatile than kerosene, and the carrier oil is then distd. off together with the paraffin wax under less than atm. pressure. An arrangement of app. is described.

White petrolatum. Hugh F Gallagher (to Standard Oil Development Co.) U. S. 1,791,928, Feb. 10. A petrolatum yielding material is treated with fuming $H_2SO_4$ in the presence of a heavy, normally liquid hydrocarbon material such as lubricating oil distillate to obtain a liquid product contg. suspended sludge, a readily settling sludge such as asphaltic bottoms is added to this product so that the suspended sludge is pptd., and petrolatum is obtained from the residual reaction mixt. App. is described. Cf. *C. A.* 24, 495.

Fractionating tars, oils, etc. J Karpati. Brit. 330,945, June 18, 1929. See Fr. 691,560 (*C. A.* 25, 1063).

Tank and distributing nozzle system, etc., for treating bottom settlings or cut oils with water, steam and soda ash. Wm. Yantis. U. S. 1,791,695, Feb. 10. Structural features.

Distilling bituminous materials. Werschen-Weissenfelser Braunkohlen A.-G. Ger. 513,596, Oct. 6, 1928. Details are given of a vertical retort with an endless band or chain for circulating the bituminous material.

Treating bituminous sands, etc. Karl A Clark (to Governors of the University of Alberta). U. S. 1,791,797, Feb. 10. In sepg. bitumen from bituminous sand, silt or clay the material is mixed with a reagent such as Na silicate giving an alk. reaction on hydrolysis, and the mixt. is introduced into a body of hot water to effect sepn. of the bitumen from the sand, silt or clay, a water sol. inorg. compd. of a multivalent metal such as $CaCl_2$ is introduced into the hot water to coagulate the reagent and the silt or clay and the bitumen is recovered from the surface of the water. App. is described.

Continuous production of dispersions of thermoplastic material such as bitumens, gums and waxes. George A Brown (to Bennett, Inc.). U. S. 1,792,067, Feb. 10. Various details of app. and operation are described.

Lubricating and insulating oils. I. G Farbenind. A.-G. (Mathias Pier and Ernst Hochschwender, inventors). Ger. 516,316, June 1, 1927. See Fr. 668,102 (*C. A.* 24, 1499).

Lubricants. Standard Oil Development Co. Fr. 694,225, April 19, 1930. Lubricants are obtained from a heavy hydrocarbon oil contg. impurities of a gummy or resinous nature by eliminating all the non-crystn. impurities from the oil, *e. g.*, by distn. and subsequent treatment with $H_2SO_4$ and treating the purified oil with a gas rich in H under pressure and at a temp. at which decompn. is relatively slow, *e. g.*, 371–426°.

Reconditioning lubricants such as crank-case oil from internal-combustion engines. M Clarny and F C. Frolander. Brit. 336,202, June 6, 1929. The lighter fluid impurities are absorbed by a wick and are evapd. from the wick in an app. which is described and which may be arranged to operate continuously in connection with an engine.

Apparatus for cleaning used oil by heating and filtering. Firma Hermann Bensmann. Ger. 516,153, Feb. 22, 1927.

Composition for removing carbon deposits and rust from internal-combustion engine cylinders or other surfaces. George R. Wagner (one-half to Wm. L. Smith)

U S 1,792,032 Feb 10 Kerosene 1 gal., lubricating oil 1 qt., "lubricating graphite" 1 0–1 5 oz., ether 3 oz and spirits of camphor 3 oz

Turpentine oil, pine oil and rosin from coniferous woods. Francesco C Palazzo U. S 1,792,392, Feb 10 See Fr 676,859 (*C A* 24, 3110)

Turpentine. Jean B H. Fonga Fr 36,635, April 18, 1929 Addn to 668,493 (*C A* 24, 1737) Turpentine from maritime pine is treated with a solvent, the distn temp of which is below that of the turpentine, and the resinic acid normally present is pptd by adding lime or other alk earth base The solvent is recovered and a turpentine of reduced acidity and absolute purity is obtained

## 23—CELLULOSE AND PAPER

CARLETON E CURRAN

Construction of the crystalline part of cellulose. II. H Mark and K H Meyer *Cellulosechemie* 11, 91 100(1930) cf *C A 23*, 5077 *24*, 1500.—Cellulose interference to x rays can be explained by a monoclinic structure, it leads to an atomic arrangement which is illustrated, and to micelles with a length of about 500 and width of about 50 A U The micelle surface reactions and the "permutoid" reaction are taken into account. According to the Hudon rule, the principal valence chain model makes possible the estn of the rotatory power of various cellulose derivs which is in agreement with practical knowledge A method for x ray comparison of cellulose prepns is given and minor structural differences are discussed C A Brautlecht

Cellulose in the light of the x-rays. Wm Bragg *Cellulose* 1, 80–3, 110–3 (1930).—See *C A* 24, 2287, 5151 C A Brautlecht

Structure of ramie cellulose as deduced from x-rays. O L Sponsler and W H. Dore *Cellulosechemie* 11, 186–97(1930).—*On the basis of new exptl evidence with* x rays, S. and D deduce a structural formula which appears to agree with known chem and phys characteristics Three dimension models, employed for comparison with location of atoms in the space lattice, showed the following characteristics (1) The structure-forming units are arranged parallel and lengthwise in continuous chains. (2) The individual chains are arranged in rectangular order of dimensions 6 10 × 5 40 A U (3) Individual units in each chain repeat every 10 25 A U (4) One can assume individual cells to have the dimensions 6 10 × 5 40 × 10 25 A. U. (5) In the individual cell in every chain there are 2 $C_6$ units (6) In the elementary cell the atoms are so arranged that a no of planes appear whose space intervals have a simple numerical relationship to 10 25, namely, there are planes present which lie in intervals of 5 15, 3 40, 2 58, etc It is concluded that the proposed mol structure agrees with the x ray analysis and apparently with all phys and chem characteristics; the cellulose structure is built up of glucose units, the amylene oxide ring formula agrees best with the x ray findings, the glucose units are built up into endless chains through glucosidic condensation, combination between units is of a 1 1 and 4 4 type bridge; the 1:4 bridges which are characteristic of cellobiose do not exist in the structure of ramie cellulose, the chains are rectangular 6 10 × 5 40 A U separately arranged with the greatest length along the diagonal direction, a group of 8 glucose units is the simplest unit which the cellulose structure can represent, agreeing with the crystallographic unit with axes: $a = 10\,80$, $b = 12\,20$, $c = 10\,25$ A U, the ramie fiber is a hollow cylinder in whose walls the crystallographic units are so arranged that the diagonal of the 6 10 × 5 40 space always takes a tangential position, the cellulose structure is stabilized, in length by primary valence forces which hold together the glucose units, transversely by the secondary valence forces of O atoms, the suggested structure permits the elasticity of the fiber in the direction of its length, explains in length and breadth, various coeffs of elasticity and allows for computation of swelling phenomena, the structure indicates, in conformity with Irvine's methylation results, that the OH groups attached to the 2nd, 3rd and 6th C atoms are open for substitution It is shown that ester formation is possible, without change of the fiber structure, only by spreading apart the longitudinal chains, the fiber structure can thus be weakened, and, if the introduced groups are large, the secondary valence forces can be sufficiently weakened so as to lose the ability to retain the fiber-like arrangement, since ramie cellulose is like other cellulose fibers it is probable that similar celluloses have a similar structure, the presence of xylose units in several celluloses can be carried through to the accepted belief that oxidation of glucose units leads to gluconic acid, which on subsequent decarboxylization yields xylose; and, that these changes would not appreciably change the suggested arrangement of the original fiber structure. C. A. Brautlecht

Acetolysis of bamboo cellulose. S Ogiri and M Nara *Chem News* 142, 134–5 (1931) —See *C A* 25, 1072 G. G

Bamboo II Bamboo lignin. K. Sisido *Cellulose Ind* (Tokyo) 6, 167–70 (1930) *Abstracts* 29–32 (in German); cf. *C. A.* 25, 1069 —Bamboo is especially suitable for a study of lignin formation in vegetable material, because the shoots grow extraordinarily quickly Shoots 6 8 m long were divided into 3 parts, each part being then dried and pulverized, and the dry powder extd exhaustively with alc.-$C_6H_6$ and dried *in vacuo* Lignin was removed with 72% $H_2SO_4$, and its methoxyl no detd by the Zeisel method The methoxyl nos for the samples were also calcd on the assumption that this no represents lignin Both calcd and observed values show a decrease from the base to the tip of the shoots, but good agreement is not found It is considered probable that in the samples more remote from the base of the shoot the whole of the methoxyl is not fixed to lignin, and it is concluded that the lignin is methylated gradually according to the growth of the bamboo, or combines with the residue which contains Me in order to give the higher values detd. Some properties of bamboo lignin have been compared with those of wood lignin, and it is found that they behave similarly Thus C H, ash and methoxyl contents are similar in amt. to those from spruce wood lignin Also both spruce wood and bamboo chips give a green coloration on immersion in concd HCl, while, on sepn, the lignin gives a grayish violet coloration before, and a salmon pink after washing with boiling water This suggests that bamboo lignin also has a heterocyclic structure The distribution of O in the lignin as hydroxyl, methoxyl, etc, is discussed B. C. A

Integral relationship of cellulose to difficultly soluble xylan in the structural substance of red beech (Fagus silvatica). I. E Schmidt, K. Meinel, K. Nevros and W Jandersur *Cellulosechemie* 11, 49–68(1930) —Previous observations by Schmidt, *et al*, have shown that (*a*) dil aq $ClO_2$ affects lignin markedly and can be used to identify lignin or its fragments, (*b*) lignin does not undergo change with the carbohydrate part of the cell wall (*c*) oxidation products of lignin which are insol in water can be removed through salt formation with alkaline salts such as $Na_2CO_3$, or action with $H_2SO_4$ in form of $NaHSO_3$, phenols or pyridine, (*d*) the unsatd part of the cell wall (lignin) can be removed quantitatively, (*e*) the polysaccharides of the cell membranes are converted into water sol. forms, especially *d* galactose and carbohydrates which behave as derivs of *d* galactose such as *l* arabinose, which differ from the carbohydrates of cell membranes that are built up from *d* glucose and its conversion products such as *d* mannose Investigation of the skeleton substance of the wooded cell walls of cryptogams and phanerogams showed that COOH-contg polysaccharides always participated in the building up of skeleton substance, a synthesis best explained by the ester theory The above evidence led S, *et al*, to investigate the quant relationships of single polymer units of the skeleton substance and the manner of their combination In red beech it was shown that the skeleton substance treated with 0 04 to 0 2% NaOH quant. loses an easily sol xylan, while ester like combinations of acetyl groups are split off The residue from the treatment with 0 04 to 0 2% NaOH is entirely acid free and consists of cellulose and xylan The skeleton substance contains two xylans, an easily sol (I) and a difficultly or less sol one (II) II can be sepd from the acid free mixt. of cellulose and I by soln in 5% NaOH at ordinary temp On the assumption that cleavage products of cellulose, such as result by 5% NaOH action, are dissolved simultaneously with xylan, there is a stoichiometrical relationship of one part xylose anhydride ($C_5H_8O_4$) in II to 3 glucose anhydride ($C_6H_{10}O_5$) in the cellulose. This observed regularity of skeleton substance in red beech is dependent upon the kind of after treatment during the breaking up of the wood with $ClO_2$ when an excess of OH ions is prevented (which can be the cause of specific side reactions), also on age, standing, time of cutting, etc. It was found that the proportion of cellulose to II was 3 1 for red beech independent of age or geographical origin. Thus for the first time a marked mass-weight association is shown between two colloids. This leads to a view of the compn of wood which apparently contradicts the incorporation theory based on a mixt of cell membrane cellulose, pentosans, hexosans and lignin Part I is devoted to the method of hydrolysis with $ClO_2$ and $Na_2SO_3$ with reference to improvements of the method With *p*n limits of 6 8–7.5, after $ClO_2$ treatment, lignin can be removed quant by $Na_2SO_3$ Part II is devoted to the action of NaOH of different concns (0 04 to 17%) on the skeleton substance of red beech With concd alkali solns the work was carried out under N. The carboxyl-contg part of the skeleton substance is removed completely by 0 2% (0 05 *N*) NaOH. Polymeric carboxylic acid and polymeric xylose anhydride is extd, simultaneously with the hydrolysis of acetyl groups The easily sol I is sol in 0 2% NaOH; the difficultly sol. II is attacked completely only by

5% NaOH When 3% or 1% NaCl soln is added to the alkali the plotted curve for % wt loss against concn of alkali takes a different course, being the same, however, for the 3 as for the 1% NaCl Salts, other than NaCl, also affected the wt loss. The const. wt. loss with 5–7% NaOH contg NaCl, implies that concns of 3% NaOH and upward cause soln of II and part of the cellulose Five % NaOH in presence of 3% NaCl seps xylan quant. from cellulose Thus from a mixt of cellulose and (II), 5% NaOH contg NaCl dissolves 21 39% xylan and leaves 78 61% cellulose, and upon dividing the % quantities by the equiv wts, 132 for xylan and 162 for cellulose, the quotients 1 3 are obtained C A Brautlecht

Integral relationship of cellulose to difficultly soluble xylan in the structural substance of red beech [Fagus silvatica]. II. E Schmidt, W Jandebeur and K Meinel *Cellulosechemie* 11, 73–9(1930), cf preceding abstract—Red beech wood meal treated with 0 25% $ClO_2$ in water oxidizes lignin, yielding products which can be removed by treatment with salt solns. having a $p_H$ of 6 8 $Na_2SO_3$ serves to dissolve lignin (1) by yielding Na ions to form salt like sol lignin derivs and (2) by $H_2SO_3$ from $Na_2SO_3$ to form sol products At a $p_H$ value of 6 8 (a higher $p_H$ affects the polysaccharides) salts other than $Na_2SO_3$, such as $Na_2CO_3$, $Na_3PO_4$, or K xanthate can be employed under the same conditions of temp (50–60°) leading to the same stoichiometrical relationship between cellulose and less sol of the two xylans present. Repeated alternate treatments of $SO_2$, in form of 4% $NaHSO_3$ soln, and water-sol. phenols such as resorcinol, with $ClO_2$ completely removes lignin from the cell constituents Polysaccharides are not attacked by this treatment and even after 400 hrs ' treatment with $ClO_2$, the ratio for delignified material of 3 mols. cellulose to 1 mol less soluble xylan remains the same. C A. Brautlecht

The relation of the viscosity of cellulose ester solutions and temperature. III. E. Berl, H Umstätter and E Karrer. *Z physik Chem*, Abt A, 152, 284–94(1931), cf *C. A.* 24, 5151—The previous equation is found to hold for nitrates or acetates of cellulose. The viscosity does not change after heating and cooling if no acid is present. The Berl-Büttler equation holds with sufficient accuracy for such viscose materials. An *improved app* is described V F Harrington

Some remarks on acetylcellulose. Fritz Ohl. *Farbe u. Lack 1931*, 51, 64.—A review. To test for the presence of cellulose sulfoacetate O dyes the sample with a 1% aq soln of methylene blue. Particles contg. sulfoacetate are dyed a darker blue than acetate particles. G G Sward

Changes in the viscosity of cellulose acetate-acetone solutions. C. G. Rittenhouse and C. J Staud *Paint, Oil & Chem. Rev* 91, No 9, 9–10(1931).—The viscosity of cellulose acetate-acetone solns. increased faster than the concn, an indication of a colloidal system. G G Sward

Chemistry of pectin and its relation to the formation of incrustations of cellulose. I. F. Ehrlich. *Cellulosechemie* 11, 140–51(1930); cf *C. A.* 24, 65—A summary of the chemistry of pectin, its general and com phases and its discovery by Braconnot in 1825 to the present being considered Much attention is devoted to pectic acids isolated from the com. pectins sepd. from beet sugar waste and cull citrus fruits. Attention is also given to galacturonic acids, their isolation, relationships and characteristics. II. *Ibid* 161–70—Enzymic transformations of pectin and possible formation of lignin from pectin are discussed Cyclic tetragalacturonic acids *a* and *c* can be opened by pectin ferments, especially by *Penicillium glaucum* and Perisporiaceae, the latter are easily obtained from sugar-beet pulp Taka-diastase acts on a partly neutralized soln of galacturonic acids *a* or *c* at a $p_H$ of 4–6 in the course of a day to yield tetragalacturonic acid *b* The new Perisporiaceae enzyme named "pectolase" by E. is obtained in especially active form from exts of old cultures of isolated Perisporiaceae molds, in dry form With 5% pectolase, galacturonic acids *a* and *c* could be converted into galacturonic acid *b* in a few min and this could be totally converted into cryst. *d*-galacturonic acid in 2 or 3 days The behavior of enzymes on tetragalacturonic acids leads E. to regard them as original components of pectin. The enzymes from molds which have the most intense action on the middle lamellae also act most intensely in the hydrolysis of tetragalacturonic acids. E. suggests that the tetragalacturonic acids which have been previously obtained only by acid hydrolysis of pectin are also intermediate products of the original pectin mol. which have been degraded by enzymic action. The mechanism of the action of pectolase on pectin involves, under specific conditions, (1) the splitting off of MeOH, (2) the reaction of the liberated pectic acids with Ca salts to *form an insol Ca salt of galacturonic acid a*, which seps. as a gelatinous coagulum. In studying metabolic changes in highly lignified plant parts, E. examd flax in the same manner as sugar beets. In old flax pectin, because of a hydration, the tetragalacturonic

acid ring is opened so that the galacturonic acid mols in the pectic acid are held together as members of an open chain. Very marked differences are shown by flax pectin as compared with other pectins, with regard to the alc. components of its hydratopectins. Whereas hydratopectins from beets, oranges, etc., yield 20–25% of araban contg. only arabinose, the fraction of flax hydratopectin sol. in 55–70% ethanol is a complicated hexopentosan mixt. of arabinose, xylose, galactose and fructose. On evapn. of the alc. soln. of this crude hexopentosan, 25% of a resinous substance resembling lignin is obtained. After washing with cold water, and repeated soln. in *NaOH* and pptn. with HCl, a dark-brown powder results which is insol. in water and acids but sol. in alkalies and $NH_4OH$ and shows no trace of carbohydrate. Its reactions and analysis show that furan nuclei are an integral part of it. E. concludes that the original substances of lignin in plants are really pectins and that the substances isolated from partly lignified flax straw represent intermediate products in the change from pectin to lignin. This resin and the hexopentosan from sugar free flax straw were firmly held to the parent substance, because prolonged extn. with 70% ethanol did not remove them. In comparing the lignin (resinous product above) with other lignin prepns. E. states that (*a*) wood contains practically no pectin, (*b*) the larger part of the lignin is found in the middle lamella of wood, analogous to the pectin of the new nourishing tissues of young plants, (*c*) it appears that the methoxyl and acetyl content is derived from pectin, (*d*) all kinds of pectins, in addn. to galactose, are characterized by a high content of pentoses or pentose like groups such as arabinose, xylose and tetragalacturonic acids (which can be regarded as carboxyl pentosans) and (*e*) it is very probable that a conversion of pectin into lignin is caused by chem. and enzymic processes during growth and aging. The change can be represented by the equation: $C_{36}H_{48}O_{38} \longrightarrow C_{35}H_{48}O_{31} + CO_2 + 10H_2O + 6O$. C. A. Brautlecht

Viscose. XXXIV. Effect of chlorination on the properties of cellulose. S. Masuda and J. Murakami. *Cellulose Ind.* (Tokyo) 6, 173–4(1930); *Abstracts* 33–4.—Previous work by the authors has shown that the properties of sulfite pulp are improved by chlorination of the material at 15°, and similar results are now found for cotton. The Cu no. of the purified cotton cellulose used was reduced from 5 to 4 as a result of chlorination for 15 min. at 24° and washing with water, under standard conditions and to 3 by similar chlorination for 30 min. B. C. A.

Recent developments in the preparation of viscose and viscose silk. Hanns Schmidt. *Chem. Fabrik* 1931, 73–7, 85–90, 97–100.—A review of improved methods and machinery with suggestions of possible simplifications. German and foreign patents are cited and 52 literature references are given. J. H. Moore

The enzymes of barley malt. VI. Fermentative decomposition of viscose silks. H. Pringsheim and E. Thilo. *Cellulosechemie* 11, 100–2(1930); cf. Otto, *C. A.* 23, 4955.—On fermentation certain small specific hydrolytic differences were observed; also that there does not appear the slight hydrolysis of viscoses pptd. in the presence of strong salt concn. in comparison to viscoses coagulated with $H_2SO_4$ alone. Viscose silks pptd. with $(NH_4)_2SO_4$ and then fixed with dil. $H_2SO_4$ are least decompd. and differences in behavior with other enzymes are probably due to differences in absorptive properties of the surface layers of the viscose filaments. C. A. Brautlecht

Silk fibroin as raw material for artificial-silk preparation. Hanns Schmidt. *Z. angew. Chem.* 44, 83–4(1931).—A review. H. H. Mosher

Factors during spinning which influence the physical properties of rayon. II. Philip C. Scherer, Jr., and Robert E. Hussey. *Ind. Eng. Chem.* 23, 297–300(1931); cf. *C. A.* 24, 3359.—For specific conditions in which only temp. was varied, elongation and tensile strength show definite min. and max. Foster Dee Snell

New bark [and sap] of wood of spruce, pine and red beech. C. G. Schwalbe and K. E. Neumann. *Cellulosechemie* 11, 113–28(1930).—Extns. of sugar like substances, hydrolyses, detns. of pentosans, extn. of bark with $Ca(OH)_2$ and $Ba(OH)_2$, acid hydrolysis after swelling with NaOH soln. and detns. of resin fat wax content were made. Wood-forming saps were investigated. Bark can be easily removed in the spring because the cambium cells are very tender. In fall and winter, these cell walls are heavily incrusted and the bond between bark and wood is a strong one. Dil. acids dissolve the incrusted substances in spruce and pine. Similar treatment has no action on the beech. Hot water extn. showed only negligible quantities of sugar in the bark of all 3 trees, indicating that sugars played no important part in the formation of the incrustation. Results of hydrolyses with dil. acids were different between the coniferous and deciduous barks. The conifers yielded more sugar from the inner bark than from sap wood, indicating the presence of easily hydrolyzable hemicelluloses in the barks of these trees. All representatives of hexosans, commonly found on wood hydrolysis

(except glucose), could be shown to be present, but no pentosans The pentosans were therefore not attacked by the dil acid *The bark contains more pentosans than* the sap wood but the ratio is less than that of the hexosans Since the bark-incrusting material is mostly hexosans, in coniferous woods, dil acids effect a partial soln. of incrusting material and therefore a weakening of the bond between bark and sap wood *The supposed mother substances* of the hemicelluloses, carbohydrates and pectin substances were detd , also the ether sol and substance volatile with steam, also ash and adsorbable tannins In addn , the presence of important org groups such as acids, ales , aldehydes phenols, etc , was tested for by pptn and color tests The total residues of all saps were small The ash in residues was high because of the presence of appreciable quantities of org salts From the ash analysis of autumn wood and bark, especially from the Ca content, S concludes that the mineral salts in the saps are stored in the bark, after the growing period Substances adsorbed by hide powder were very high in pine and lowest in beech and yielded pos tannin tests Reducing sugar con*tent of the saps was appreciable, being highest in the beech* These included hexoses, which were preformed in the sap The content of total fermentable carbohydrates after hydrolysis was greatest in the beech The pentose content of all the saps was remarkably small, but greatest in beech, although still small in ratio to hexoses This suggests that the pentoses are derived from hexoses and that they are transformed in the same measure as produced The ether exts were chiefly resins The fat and wax accumulation in the cambium layer of the beech in the autumn was not observed in the sap Substances volatile with steam (ethereal oils, terpenes, etc ) were found only in small quantity in the saps, chiefly in pine Oxalic, succinic and citric acids could *be sepd and identified in beech as well as in pine sap Lactic acid could be found* only in beech Tartaric, malic and acetic acids could not be found Oxalic, succinic and citric acids could have been formed by simultaneous oxidation and splitting of carbohydrates in the growing process Lactic acid is probably due to fermentation of the sap subsequent to extn The acids exist free, in part, and yield an acid reaction in the sap Neither LtOH nor MeOH could be detected Coniferyl alc. was found in pine sap Vanillin was found in the 3 saps, and it is assumed that coniferyl alc. is converted, in part, by oxidases or enzymes, into vanillin Aliphatic aldehydes were absent. Guaiacol was present in very small quantity The aromatic substances, which were found, all belong to the protocatechuic group and may be intermediate products in formation of lignin, although the quantity is less than that of lignin in the finished wood, especially in the conifers This is addnl support for the view that lignin is derived from the hexoses present in excess over the intermediate products (pectin, pentoses, pyrocatechol derivs ). Proteins are present only in traces and are probably derived from the protoplasm of the living cambium cells C. A. Brautlecht

**Apparent destruction of coniferous wood by larva of common beetle [Hylotrupes bajalus, L ].** R. Falck *Cellulosechemie* 11, 89–91(1930).—In studies to det. the changes in wood substance caused by insects inhabiting wood, F. examd fir wood attacked solely by this larva, dividing it into (1) the fine powder from the bore hole and (2) the adjacent wood The air-dry wood contained 9 6% water, the borings 9 4%. The borings which had passed through the food tube of the larva were of the same color and in other phys characteristics was similar to the pulverized wood, except as to degree of pulverization. Ash, cellulose, lignin, fat, wax, resin, pentosans and hemicellulose were detd in both the larva borings and sound wood powder. The lignin and resin contents were the same, total pentosan was practically the same, the larva borings contained 12 27% less cellulose The hemicellulose from the larva borings contained 2 96% less glucose (equiv to 2 67% less hexosan), 1 09% more pentosan in soln and 0 76% less pentosan in the residue $H_2SO_4$ (69%) at 10–12°, in a shaking machine for 2 days, removed 12 29% more cellulose and hemicellulose *from sound* wood powder than from larva borings Conclusion The larva of the common beetle removes about 21% cellulose and hemicellulose from the wood without changing the remainder. F. suggests that the lignocellulose complex, *pre-existent in the original* wood, is unaffected. C. A Brautlecht

**Apparent destruction of wood by larva of Annobium [common wood worm].** R. Falck *Cellulosechemie* 11, 128–9(1930), cf preceding abstract.—Analysis of sound pine wood meal and of the finely disintegrated wood after digestion in *Annobium striatum* showed practically no difference between the 2 products as to fats and resins, alkali sol. material, pentosans and lignin The insect apparently consumes about 9% cellulose, and, since the lignin content is the same, it is probable that the cellulose consumed is loosely, or not at all, combined with lignin in the original wood Of the hemicelluloses a slight difference exists in the hexosan part, *being 2 62% less in the worm*

product (= 10% of the total hexosan fraction), the pentosans in the soln are 0.53% higher and in the residue 1.5% less. These results compared with those having to do with the common beetle are the same as to kind but differ in quantity. The analytical data lead to the conclusion that insects living in wool which do not yield a different colored residue utilize only a certain cellulose fraction, which is not combined with lignin or is only slightly combined. C. A. Brautlecht

The visible digestion of wood for pulp. H. R. Hammond. *Chemist Analyst* 20, No. 2, 17–8(1931).—A glass cylinder digester capable of withstanding 150 lbs. pressure is shown. W. T. H.

Some observations on digesting sulfate pulp. David Johansson. *Svensk Papperstid.* 33, 916–28(1930).—Digesting in autoclave and testing the resulting pulp gave the following results. (1) The strength of the ground pulp increases with the increasing Roe Cl no., being max. at Cl no. 7. Ease of grinding decreases with increasing Cl no. (2) The max. removal of lignin occurs with a 25% $Na_2S$ content. A lower $Na_2S$ content raises the lignin content. The strength no. is lowest for soda pulp and highest for $Na_2S$ pulp. (3) In spite of careful treatment and low final temp. during digesting it was impossible to make soda kraft pulp of the same strength as sulfate kraft pulp. Addn. of bleach liquor does not increase the strength. The lignin content is higher for soda pulp than for sulfate pulp for corresponding yields and appearance. (4) Shortening the chips down to 10 mm. does not affect the strength of the pulp. (5) Sulfate pulp from douglas fir, goblolly pine and southern yellow pine from the U. S. compared with sulfate pulp from Swedish pine and spruce showed that the Swedish pulp, in spite of its shorter fiber, gave a stronger paper. Wilhelm Segerblom

Determination of the bleaching of sulfite pulp by potassium permanganate. H. J. *Svensk Papperstid.* 33, 928,31(1930).—In detg. the bleaching of sulfite pulp in the lab. by the Bjorkman no. method it was found that dry undefibered pulp gave varying results. It is necessary to defiber indirectly digested pulp before treating with $KMnO_4$. An improved method is described, involving dry pulp, defibering in $H_2SO_4$ soln., successive treatments with $KMnO_4$, $Fe(NH_4)_2(SO_4)_2 \cdot 6H_2O$, $H_2SO_4$ and $KMnO_4$, and calcg. in percent of $CaOCl_2$ by a special curve. Exact data as to quantities, times and temp. are given. Wilhelm Segerblom

Uses of paper in electrical apparatus. W. H. Anderson. *Elec. J.* 28, 99–103 (1931).—See *C. A.* 25, 1080. W. H. Boynton

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Protecting wallpaper from fungi (Brit. pat. 336,244). 18.

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Cellulose. Heinrich Körber. Austrian 120,351, Jan. 15, 1930. Cellulosic materials such as sulfite or soda cellulose are refined by treatment with hydrocarbons. The treatment may be effected in the hollander and the hydrocarbons may be used in the form of an aq. emulsion. Thus, unbleached cellulose in 15–20 times its wt. of water may be treated at 80° for 1 day with 10% of its wt. of hydrogenated naphthalene.

Cellulose. I. G. Farbenind. A.-G. (Emil Hubert and Karl Weisbrod, inventors). Ger. 513,693, Oct. 11, 1927. Stable solns. of cellulose in $CuO \cdot NH_3$ are obtained by adding catalyzers, especially CN compds., before or during the dissolving process to prevent deterioration of the soln. by the action of atm. O. The amt. of CN compd. added does not exceed 5%. Examples of CN compds. mentioned are $K_4FeC_6N_6$, KCN, $HgC_2N_2$ and $K_3FeC_6N_6$.

Bleached cellulose from materials such as wood. Erik Hagglund. U. S. 1,792,009, Feb. 10. Raw material such as beech wood is partly decompd. by boiling with alkali and the partly decomposed material is then treated in aq. suspension with Cl for a time sufficient to impart a uniformly brown color to the material, and after this, decompn. is completed by addn. of hypochlorite, by which intermediary lower Cl-contg. acids are formed which change the color from brown to yellowish white; the material is then washed and subsequently further bleached with $Ca(OCl)_2$.

Saccharifying cellulose. Commercial Alcohol Co., Ltd., J. S. Arthur and R. Gogarten. Brit. 337,017, April 20, 1929. Cellulosic material which has a low water content or which is dried down to about 10% moisture content or less is treated with steam until it has a moisture content of about 20–40%, treated with HCl gas under cooling until decompn. is effected, and then, without removing the HCl, further treated with steam or a mixt. of steam and inert gas to saccharify the decompn. products (the vessel preferably being heated to 60–70° during the saccharification). Various auxiliary treatments are described.

Cellulose saccharification. Commercial Alcohol Co., Ltd., J. S. Arthur and R. Gogarten. Brit. 336,934, April 20, 1929. In the treatment of sawdust or other

cellulosic or closely related materials, the material is dried (*suitably to a moisture content* of about 10% or less) and is treated with steam and a volatile acid gas such as HCl or HF uniformly to distribute the acid and water throughout the material, and decompn is then effected with the same acid under such conditions of low temp (suitably —10° to —15°) that no substantial formation of sugar occurs. Saccharification is then effected without removing the acid by direct steam heating or by indirect heating to 50–100°, followed by de-acidification and conversion of the sugars to monoses by treatment with steam under pressure or by boiling with acidified water. Brit. 336,935 relates to a generally similar procedure in which, however, the starting material may contain up to 50% of moisture

Treating cellulose. CAMILLE DREYFUS. Fr 694,879, May 2, 1930 The properties of cellulosic materials are improved by treating them with alk. liquids at a temp below atm., *e g*, a 10% NaOH soln may be used at —10°. The product may be activated subsequently with AcOH or HCOOH with a view to esterification

Molded products from cellulosic material. FREDERIC H SMYSER (to General Elec. Co) U S 1,792,254, Feb 10 A cellulosic material such as sawdust, bagasse or cornstalks having natural substances capable of yielding resinous compds is digested with NaOH, and $H_2SO_4$ is added to the digested mass to ppt. the dissolved resinous *constituents the material is filtered and the mass is washed until neutral*, dried at about 80° and there is added to the dried mass about 5–40% of hydrated lime, the material is powdered and is molded under heat and pressure

Cellulose derivative. SOC. LYONNAISE DE SOIE ARTIFICIELLE and PIERRE CHEVALET. Ger 516,462, Dec 23, 1926 A formylacetylcellulose is prepd by treating cellulose at a low temp with HCOOH in the presence of a small proportion of $H_2SO_4$, then kneading the mass with AcOH contg more $H_2SO_4$, and finally pptg the product with water or EtOH An example is given

Cellulose derivatives. LEON LILIENFELD Ger 516,461, May 20, 1924. See Brit. 231,809 (*C. A* 19, 3592).

Cellulose derivatives. HENRY DREYFUS Fr 694,881, May 2, 1930 Weighted or mordanted materials of, or contg, cellulose esters or ethers are prepd by incorporating a weighting or mordanting metallic radical, or an agent capable of pptg this radical, with the spinning soln. used for making the materials. The metallic radical may be used in the form of a thiocyanate. Examples are given of the use of compds. of Sn and Fe.

Nitrocellulose. IMPERIAL CHEMICAL INDUSTRIES, LTD Fr. 694,623, April 28, 1930. Nitrocellulose is prepd by making, without disaggregation, a uniform cellulose having a high apparent d and giving limpid solns, by systematic subdivision of pulp in the form of plates or sheets to obtain pieces or tablets practically uniform, and nitrating these uniform tablets with a mixt. of $H_2SO_4$ and $HNO_3$

Alkali cellulose press. HANS HASELMANN Ger 513,863, May 8, 1927. Details of construction are given.

Cellulose esters. JOHANNES ALLES. Ger. 513,541, Mar. 29, 1928 Solns and plastic masses of cellulose esters are prepd by using esters of copal resin acids with mono- or di hydric alcs as solvents or softening agents. In an example, nitrocellulose, Congo copal benzyl ester and a solvent of the acetone, AcOAc or AcOAm type are mixed, and the product is diluted with spirits, $C_6H_6$, etc Other examples are given.

Cellulose esters. I G FARBENIND. A.-G (Albert Gundlach and Theodor Becker, inventors) Ger 516,250, Feb 24, 1927 Esters of cellulose with higher homologs of AcOH are prepd by treating cellulose or its conversion products with chloroacetic anhydride and higher homologs of AcOH in the presence of a catalyst, *e g*, $H_2SO_4$ or $ClCH_2COOH$. The soly. properties of the products can be improved by after-hydrolysis Examples are given Cf *C A* 25, 1671

Cellulose aliphatic acid esters. K. WERNER. Brit. 336,349, Aug. 15, 1929 In the production of cellulose aliphatic esters with preliminary removal of water from air-dried cellulose, before esterification, by treatment at temps up to 50° with sufficient aliphatic acid and anhydride (*such as acetic, propionic or butyric acids and anhydrides*) to complete the esterification reaction, the removal of water is facilitated by the presence of a small quantity of catalyst insufficient to promote esterification such as $H_2SO_4$ 0.02–0.05% or $SO_2Cl_2$ 0.05% (calcd on the wt. of the cellulose) and a milling process is preferably used for the pretreatment. Various details and examples of procedure are described

Apparatus for cellulose acetate production. JEAN ALTWEGG (to E. I. du Pont de Nemours & Co). U. S. 1,792,059, Feb 10 An app is described comprising a column having an inlet adjacent to one end and an outlet adjacent to the opposite end, and pro-

vided in its interior with rotatable stirring devices of varying form, which increase in size from inlet to outlet according to the texture of the material to be treated' by these devices.

**Apparatus for production of cellulose xanthate.** M. Dassonville Brit. 337,149, July 1, 1929. Numerous structural details are described of a rotatable app. through the journals of which $CS_2$ may be fed to the reaction chamber and heating or cooling agents similarly fed to a jacket around the reaction chamber. Cf. *C. A.* 24, 3646.

**Hydroxyalkylcellulose xanthates in manufacture of artificial threads, films, etc.** L. Lilienfeld Brit. 335,993, March 25, 1929. Hydroxyalkylcellulose xanthates such as those described in Brit. 335,994 (following abstract) may be worked up into threads alone or with other materials such as cellulose xanthate or alkali sol. derivs. of cellulose, gelatin, or softening or plasticizing agents, etc. (various examples of which are given). Numerous details of procedure are described for making products such as artificial threads and films, staple fiber, plastic masses, adhesives and cements, coatings and fabric dressings, artificial leather, transparent sheets, etc.

**Xanthated hydroxyalkyl derivatives of cellulose.** L. Lilienfeld. Brit. 335,994, March 25, 1929. Products of this type are produced by xanthating hydroxyalkyl derivs. of cellulose obtained either by the action of a hydroxyalkylating agent on cellulose in the presence of an alk. agent such as caustic alkali or by hydroxyalkylating alkali cellulose. Various halohydrins may be used as reagents and numerous examples, details and modifications of procedure are given. The final products may be isolated from the reaction masses or solns. (suitably after neutralizing with a weak acid such as HOAc) by pptn. with MeOH or EtOH, Al salts, $NH_4Cl$ or $(NH_4)_2SO_4$, NaCl, $Na_2SO_4$, $NaHSO_4$, $CO_2$, $SO_2$, $H_2SO_4$ or HCl, or by dialysis. Catalysts such as salts of Cu, Ni, Ag, Zn or Fe may be added to the alkali cellulose or to the reactive mixt., and instead of NaOH or KOH there may be employed sulfonium hydroxides such as trimethylsulfonium hydroxide. "Near conversion products" of cellulose such as cellulose hydrate, hydrocellulose or oxycellulose may be used in the process.

**Transparent celluloid stable to light.** Schering Kahlbaum A.-G. Brit. 336,980, Oct. 5, 1929. Celluloid of otherwise usual compn. contains a small proportion of added ingredients capable of combining with O compds. of N to form colorless non injurious compds., such as urea or urethane.

**Apparatus for treating viscose silk with liquids after spinning.** Acme Rayon Corp. Fr. 694,971, May 3, 1930.

**Tantalum spinneret.** Miner M. Austin (to Fansteel Products Co.) U. S. 1,791,785, Feb. 10. A Ta spinneret is provided with a hard resistant oxide film formed directly thereon to protect the spinneret against corrosion and wear.

**Artificial fibers.** I. G. Farbenind. A.-G. (Harry Meyer, inventor.) Ger. 513,063, Nov. 15, 1928. Mat viscose fibers are produced from viscose to which the water insol. liquid residues from the catalytic production of alc. have been added.

**Device for connecting artificial threads to winding apparatus in the dry spinning process.** J. E. Pedder and Courtaulds, Ltd. Brit. 330,718, Aug. 21, 1929. Structural features.

**Cellulose acetate yarn.** Camille Dreyfus and William Whitehead (to Camille Dreyfus). Can. 309,131, Mar. 3, 1931. Artificial textile products are produced by spinning a soln. of an acetone-sol. cellulose acetate in a solvent mixt. contg. 95–8% of acetone b. 56° and 5–2% of MeOH b. 64.5°.

**Cellulose acetate yarns.** Camille Dreyfus and William Whitehead (to Camille Dreyfus). Can. 309,130, Mar. 3, 1931. Artificial textile materials are produced by spinning solns. of acetone-sol. cellulose acetate contg. less than 1% of moisture in a solvent mixt. of approx. 60% acetone and 35% denatured alc. contg. substantially 95% of EtOH.

**Artificial silk.** J. P. Bemberg A.-G. Ger. 517,018, Nov. 8, 1927. In the manuf. of artificial silk from ammoniacal copper solns. of cellulose by stretch spinning, the aq. pptg. bath contains a readily sol. gas, preferably a gas having a reducing action, e. g., $SO_2$ or $H_2S$. The bath may be preliminarily deaerated wholly or in part. Cf. *C. A.* 24, 3901.

**Artificial silk.** I. G. Farbenind. A.-G. (Hermann Schmidt and Emil Hubert, inventors.) Ger. 516,370, June 12, 1926. Cuprammonium cellulose solns. are spun into pptg. baths contg. free $CO_2$ but no other dissolved gas.

**Artificial silk.** Wm. P. Dreaper. Fr. 693,928, April 15, 1930. See Brit. 328,627 (*C. A.* 24, 5496).

**Artificial silk.** Risuke Furusho, Yasuzo Utsumi and Asayuemon Toda. Fr. 694,285, Apr. 22, 1930. The thread of artificial silk after desulfurizing, etc., is brought

conditions that swelling of the cellulose deriv takes place Various details and examples are given.

Esterification of wood. I G Farbenind A.-G Brit. 336,969, July 22, 1929. Acylation of wood such as beech, aspen, fir or pine is effected with an anhydride of an org acid such as acetic, butyric or benzoic anhydride, in the absence of inorg catalysts The wood may be used in dry disintegrated form or in the form of sheets which may be superficially acylated, and may be initially deresinified and dewaxed with solvents and treated with steam

Treating bagasse fibers. Ernest C H Valet (to Cellulosa Hemmer Valet, S A) U S 1,792,202, Feb 10 In order to render bagasse fibers suitable for paper manuf, etc, they are treated with a clear satd soln of lime and there is subsequently added a soln contg a sulfite such as $Na_2SO_3$ and the fibers are then treated in a soln of KOH, NaOH and a sulfite and are subsequently washed in a soap soln

Sieve cylinder apparatus for dewatering cellulose pulp. J. Strindlund Brit. 336,879, June 11, 1929 Structural features

Feltable bituminous pulps. Charles L. Keller (to Richardson Co) U. S 1,792 098, Feb 10 Fibrous material is subjected to a "pre beating" to form a half stock and the latter is coned to bring it to an easily handled plastic stage, transferred to a mixer, premixed ' with added bituminous material and the "premixed" stock is transferred to a beater and subjected to heating to prepare the fibers for felting, and production of a product in sheet form

Nitrocellulose from wood-pulp board. N. Picton and Imperial Chemical Industries, Ltd Brit. 336,235, May 27, 1929 Wood pulp board is cut into substantially uniform pieces (suitably about one-eighth of an in square) by a cutter which does not affect the agglomeration of the fibers and the pieces are nitrated with acid contg not less than 40% $HNO_3$ to produce a nitrocellulose of high d and uniform compn suitable for the *manuf of propellent explosives, blasting explosives, varnishes, celluloid*, etc Various details of procedure are described

Tanks and associated agitating apparatus for treating paper pulp. Joseph E Bond U S 1,791,705-6, Feb 10

Dewatering paper pulp, etc. Richard Kastner and Herbert Schmolka Austrian 120,690, Aug 15, 1930 Addn to 115 901 (*C A* 24, 2295) In the method of Austrian 115,901, the heating of the materials in the press is effected by passing an elec current through the materials, the metallic sieves acting as electrodes.

Dirt trap for paper pulp, etc. Franz Hassmann Ger 516,212, June 3, 1928

Paper. I G Farbenind A.-G (Rudolf Richter, inventor). Ger 516,023, Aug 12, 1928 Ornamental or effect paper is prepd by addn of finely comminuted leather, colored or uncolored, to the paper stuff

Paper stock. Harry P Bassett U S 1,792,351, Feb 10 Cotton linters or similar material is subjected to a combined slight beating and acid treatment with a weak acid soln such as a 0.05–1.0% soln of $H_2SO_4$ at a temp between 20° and 100° to effect partial hydrolysis of the material, and the latter is then treated with a weak alkali soln

Recovering fibers from the waste waters of the paper, cellulose, etc., industries. Georg Watzinger Austrian 120,610, Jan 15, 1930 A gas under pressure is dissolved or emulsified in the waste waters, and the pressure is then released so as to liberate bubbles of gas within the liquid These carry the suspended fibers to the top of the liquid, whence they are removed App is described.

Paper-making machine [Fourdrinier type]. Beloit Iron Works Ger. 516,121, June 3, 1926 See Brit 268,180 (*C A* 22, 1238)

Suction box for paper-making apparatus, etc. George Peebles (to Selbec, Inc.) U S 1,791,535, Feb 10

Doctor blade mounting for paper machines. L S Johnson and F. W. Vickery Brit 336,554, May 14, 1929 Structural features

Apparatus for reënforcing paper or other fabrics with unspun fibers. G E Gibbs (to American Reënforced Paper Co) Brit. 336 830, Nov. 8, 1928 Structural features

Printing and waxing paper webs in a single operation. Harry C. Cole U. S 1,792 414, Feb 10 Various details of app and operation are described

Preparation for coating paper. Soc I F. Laucks, Inc Fr. 694,224, April 19, 1930 The prepn is made by incorporating a mineral substance with a protein in the liquid state derived from oleaginous seeds The seeds are freed from oil and extd with a feebly alk salt such as $Na_2SO_3$ and the protein is pptd with lime.

Apparatus for coating paper with wax. A Green. Brit 335,968, July 2, 1929 Structural features.

Sizing for paper. ARTHUR W. BURWELL (to Alox Chemical Corp.). U. S. 1,791,860, Feb. 10. A material for use in sizing paper consists essentially of water-sol. alkali metal salts of normally liquid water-insol., petroleum insol., relatively high mol. wt. aliphatic and hydroxy-carboxylic acids such as those formed by oxidizing a paraffin-base fuel oil distillate and is capable of being retained in a paper in quantity up to 50% by wt. App. is described, suitable for oxidation of the oil.

Paper sizing. B. WIEGER (to Becker & Co. (1924), Ltd.). Brit. 335,902, July 1, 1929. Paper or pulp is sized with an emulsion prepd. by adding to the molten sizing material, while rapidly agitated, 1–3% of an aq. dispersion of a protective colloid (preferably alkali casein) and colophony is preferably employed as the sizing material, although there may be used other natural or artificial resins, solid or semi-solid hydrocarbons, waxes, fats, higher fatty acids or their mixts., with or without drying oils. Various details and examples are given.

Automatic device for regulating the drying of paper, etc., sheets. JOSEF MUCHKA. Austrian 120,248, July 15, 1930.

Drying cardboard, etc., by pressing. RICHARD PRÜCKNER. Austrian 120,700, Aug. 15, 1930. The press is housed in a casing having means for adjusting the temp. and pressure of the air in the casing. Operative features are described.

Water-resistant paper product. WM. C. LODGE (to Oswego Falls Corp.). U. S. 1,792,382, Feb. 10. There is added to the pulp sizing in the proportion of 3 parts rosin or rosin substitute and approx. 1 part wax or wax substitute, and a fixing or pptn. treatment is employed for the production of a final paper product contg. about 1% wax and not more than 3% rosin, which is suitable for bottle hood cups, etc.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Report of Chief Inspector, Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, for 1930. B. W. DUNN. *B. E. Report* No. 24, 83 pp. (March 3, 1931), cf. *C. A.* 24, 2296.—Only 15 minor accidents involving 2 injuries to persons and a total property loss of only $71 resulted during the transportation of *explosives* in the U. S. during 1930. None of these accidents was with com. blasting or military explosives, but involved toy torpedoes, fireworks, etc. In comparison, *inflammable liquids* caused 602 accidents with 9 deaths, 4 injuries and loss of $380,847, while *acids and corrosive liquids* caused 356 accidents, with 15 injuries and loss of $21,057. Defective tank cars carrying $H_2SO_4$ and faulty packing of $HNO_3$ were the causes of most accidents with acids. The report gives statistical details and contains much information of interest to manufacturers, dealers and consumers of explosives.

C. G. STORM

Static charges in smokeless powder. H. E. NASH. *Army Ordnance* 11, 293–6 (1931).—To est. the danger of ignition from static electricity in a smokeless powder dry house, expts. were conducted in a special unit of one tray, 36" × 48" × 6", holding 100 lb. of powder, under varying conditions of moisture content of powder, and humidity, temp. and velocity of air current. Conclusion: (1) A moisture content of less than 1% is necessary for the existence of a measurable static charge. (2) A negligible amt. of static electricity exists on powder being dried in a heated air current. (3) Agitation of the powder causes larger static charges, but the max. charge is lower than that capable of causing ignition. With E. C. powder, the static found was less than 1/10 that required to cause ignition.

C. G. STORM

Variation of $\int p\,dt$ with loading density for different types of powders. H. MUTAOUR AND G. AUNIS. *Compt. rend.* 192, 90–2(1931), cf. *C. A.* 25, 818.—The *types of powder* were a 20% centralite with a mixt. of nitrocotton 66, nitroglycerin 25, a 9% centralite powder made from the same mixt., a powder without centralite made from a mixt. of nitroglycerin 50, nitrocotton 50 and flake nitrocellulose powder. Various sizes of grains were used. Percent variation of $\int p\,dt$ is independent of grain size except for very low d. of loading with 50% nitroglycerin powder. A graph is given, with abscissas the inverse of max. pressure, ordinates the inverse of $\int p\,dt$, which shows that between 2500 and 3000 kg. max. pressure the inverse of $\int p\,dt$ is practically a *linear function of* max. pressure.

E. M. SYMMES

Limits of inflammability of gases and vapors. H. F. COWARD AND G. W. JONES. Bur. Mines, *Bull.* 279, 114 pp.(1931), cf. *C. A.* 22, 2058.—This is a thoroughly revised and enlarged edition of this *Bull.*

ALDEN H. EMERY

**The ignition limits of hydrogen-air mixtures in the explosion bomb.** Fr Dieterlen *Tech Mech u Thermodynamik* 1, 429-34(1930).—Values of ignition limits of H air mixts given in the literature vary from 0.041 to 0.10 and from 0.60 to 0.80 parts $H_2$ by vol for the lower and upper limits, resp., this is mainly due to widely different app used. In the tests made photography was used to det. the pressure time diagram, and the movement of the flame front was recorded by spark photography with the Lindner app. (*Forschungsarb Gebiete Ingenieurwesens* No 326 (1930)) It was found that in addn to the lower limit there was a combustion limit which is explained by the influence of convection. The proof thereof was obtained by variation of test conditions and Schlieren photographs. The characteristic reactions at the upper limit vary widely from those at the lower limit. An explanation is attempted by the use of the Schlieren photographs. F. M. Symmes

**Nitration of diethylene glycol.** Wm H Rinkenbach and H A. Aaronson *Ind Eng Chem* 23, 160-3(1931).—Com diethylene glycol contains usually about 5% ethylene glycol. The latter was removed by fractional distn and freezing. Pure diethylene glycol has a f. p. of —11.5° instead of —11.3° given in the literature. There were investigated the effects of the ratio of $HNO_3$ to $H_2SO_4$ in the mixed acid, the % $H_2O$ in the mixed acid, the ratio of $HNO_3$ to diethylene glycol in nitration, the soly. of the dinitrate in spent acid, the effect of temp. in nitration, oxidation loss in nitration and purification losses. Diethylene glycol dinitrate is unstable in the presence of acid, is easily decomposed by heat and empirical heat tests are no more applicable than with nitroglycerin. Diethylene glycol dinitrate remained stable for 1 yr. at ambient temp. It is toxic like nitroglycerin. F. M. Symmes

**High brisance studies. III. Dynamite and Penthrinit in plastic and frozen states.** Alfred Stettbacher *Z ges Schiess-Sprengstoffw* 26, 8-10(1931), cf. *C. A.* 25, 1674.—Nitroglycerin, nitroglycol or gelatin Penthrinits frozen at a temp. as low as —40° are more brisant than when in liquid or plastic form, as shown by tests on 7-mm Fe plates. At —75° to —80° glycol dinitrate merely deflagrates, blasting gelatin explodes with greatly reduced brisance, pure nitroglycerin explodes with unaltered effect, while Penthrinit exhibits increased brisance. S believes that these differences in behavior cannot be satisfactorily explained by differences in chem. or phys. properties. The tests made serve to emphasize the high brisance of the Penthrinits under all conditions. C. G. Storm

**Firedamp, its characteristics and detection.** Colin McLuckie *Iron Coal Trades Rev.* 121, 800-1(1930).—The amt. and rate of emission of gas from coal were detd. They vary widely in different seams, varying from a trace to 8.8 cu. ft. per ton of coal in 48 hrs. in the samples reported. Sampling of the gas by means of rubber pump and balloon is described. Leslie B. Bragg

**The testing of blasting caps.** A. Haid and H. Koenen *Z ges Schiess-Sprengstoffw.* 25, 393-8, 433-9, 463-8(1930).—The general principle proposed by Esop and developed by Wöhler (*C. A.* 21, 3744) of testing blasting caps against desensitized nitro compds. gives satisfactory results, provided test conditions are uniform. TNT of standard purity is screened through 0.5 mm. mesh with a duster screen of 0.15-mm. mesh. Talc was selected as the most desirable desensitizing agent, with specifications for screen test and settling test. The TNT and talc are intimately mixed in varying proportions, the talc content varying by 5% increments, and the mixts. are pressed at 1250 kg./cm.$^2$ in blocks 25 mm. in diam. and 41-2 mm. high, with a cavity for insertion of the blasting cap. These blocks do not become insensitive on storage as do mixts. contg. oils. The blocks are detonated on Pb plates 3 cm. thick, and the diam. of the depression is measured after filing the rough edges. This diam. decreases with increasing talc content until it is only the diam. of the block when the latter fails to detonate. The initiating effect of a blasting cap is measured by the percentage to which the talc may be increased before failure results. Straight $Hg(ONC)_2$ caps failed at 25% talc, compound TNT caps at 50% and tetryl caps at 62%. A series of tests was also made by the Cu cylinder method of Kast and the Trauzl Pb block test, which compared the effects of TNT charges desensitized with 30% talc when initiated with caps loaded to equal height with (*A*) $Hg(ONC)_2$ and $KClO_4$ 90/10, (*B*) $Hg(ONC)_2$, (*C*) TNT, (*D*) tetryl, (*E*) pentaerythritol tetranitrate. In *C*, *D* and *E*, priming charges of a mixt. of Pb trinitroresorcinate and $PbN_6$ were used. The order of brisance was found to increase from *A* to *E*. In every case, increased d. of charge in the caps gave higher brisance. The latter was shown to vary with the rate of detonation of the cap charge. Brisance is calcd. as $\Delta \times$ rate of detonation $\times (T/273) \times V$. General confirmation of the above relations was also obtained in tests of the caps alone on 7-mm. Pb plates. Variations in the form of the base of the cap (flat or concave) do not affect the initiating

effect of the cap as they do the results of the Pb plate test Both Cu and Al caps gave substantially the same results In studying the effect of variations in granulation of the TNT used in the desensitized charges, it was found that granulations from 0 15 to 0 50-mm mesh showed equal sensitiveness (desensitization limit 10% talc), the same TNT pulverized to dust in a ball mill was more sensitive (50% talc), when it was fused and pulverized, its sensitiveness decreased (30 35% talc) Variations in pressures used in blocking the TNT talc mixts had a negligible effect on the results, with pressures from 750 to 2000 kg /cm² the desensitization limit was the same (10% talc) Lower pressures gave a decrease in sensitiveness An app is described and illustrated for cutting open blasting caps in order to remove the charge intact for examn and analysis C G Storm

**Explosions occurring during the use of ethylene.** Franklin D Johnson and Hyam Cabot *Arch Surgery* 22, 195–224(1931) John T Myers

**Under-water explosions—"torpedo" effect.** M Tonegutti *Z ges Schiess-Sprengstoffw* 25, 446 7(1930) Tests conducted by T lead to conclusions exactly opposite to those of Stettbacher (*C A* 24, 6018) Charges of 14 g TNT (d 1 4) and of 17 g Penthrit 80/20 (d 1 6) in cylindrical metal cartridges 21 mm in diam were *detonated on 0 5-mm Fe plates resting on an Fe cylinder enclosing a sealed air chamber* Tests were made in air and also with the entire app under 0 5 m of water Photographs of the Fe plates show that with both explosives the under water effect was appreciably greater than that obtained in air C G Storm

**Explosion in an acid-mixing plant.** S. H Newman and H E Watts *British Home Office Report* 1931, 18 pp —The explosion occurred in an acid mixing tank in the plant of Hickson and Partners, Ltd, Castleford, Yorkshire, Eng, on July 4, 1930 *$HNO_3$ (97–98%) was being added to 2–3 tons of $H_2SO_4$ (approx 80%) recovered from* spent acid from the manuf of mono- and di nitro compds of $C_6H_6$ and PhMe Violent evolution of fumes was followed by flame and an explosion which caused much damage to the plant and the loss of 13 lives Investigation showed that the storage tank from which the $H_2SO_4$ was drawn contained large quantities of a mixt of nitro compds resulting from long accumulation When $HNO_3$ was added to samples of these nitro compds mixed with $H_2SO_4$, a marked rise in temp occurred with a strong evolution of fumes *A mixt of the nitro compds (2 vols) with $HNO_3$ (3 vols) was highly combustible* Of this mixt 376 g was loaded in an 18 pounder steel artillery shell, provided with a booster of 50 g. tetryl, in which a no 8 detonator was placed On firing the latter, the charge detonated, causing fragmentation equal to that produced by picric acid It was concluded that the reaction of the $HNO_3$ with the nitro compds in the $H_2SO_4$ caused the explosion of the mixing tank C G Storm

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Nitro and amino compounds Safe practices in production of explosives materials (Ainsworth) 25. Starch explosion hazards reduced by safety measures (Price, Brown) 12. Nitrocellulose from wood-pulp board (Brit pat 330,235) 23. Recovery of $HNO_3$ (Can pat. 308,879) 18.

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**Explosives.** Charles V. A E Baron. Fr. 694,466, July 29, 1929 Explosives are coated with coal or vegetable tar, petroleum, etc, by dissolving the coating substance *in a suitable solvent such as $CCl_4$ or mineral oils, mixing with the explosive and* heating, with stirring, in an autoclave. The solvent is afterward recovered by distn under vacuum

**Explosives.** Walter Friederich Fr 694,057, April 16, 1930 Cyclic ketone-ales or cyclic ales such as tetramethylolcyclohexanone, tetramethylolcyclopentanone or octomethylolcyclohexanediol are converted into nitrates The nitrites may be used alone or mixed with other explosives

**Explosives.** Oskar Matter Ger. 513,033, May 27, 1926 Pure, readily explosive Pb azide is prepd. by treating Na azide with alk earth soln (*e g*, $(AcO)_2Ba$) and then with $PbCO_3$

**Explosives.** Leopoldo Parodi-Delfino Ger. 513,567, Oct. 30, 1925 Nitro powders, with or without a nitroglycerol content, are gelatined and stabilized by addn of phthalide or homologs Thus, artillery explosive may consist of nitrocellulose, nitroglycerol and phthalide.

**Nitroglycerin.** A Schmid and J. Meissner. Brit. 330,253, July 5, 1929. Sepn. of nitroglycerin from residuary acid is effected by passing the crude liquid through a vessel having an inclined longitudinal axis so that the particles move generally parallel to this axis, the acid downwardly and the nitroglycerin upward Various details of app and operation are described

"Gas" cartridge. Byron C. Goss (to Lake Erie Chem. Co.). U. S. 1,792,010 Feb. 10. A compn. contg. gelatin and glycerol is used as the container material of cartridges such as those contg. an asphyxiating or disabling chemical to be fired from a pistol.

Fire-producing compositions. Ferdinand Ringer. Austrian 120,172, June 15, 1930. A fire producing compn. cast in stick or rod form comprises a combustible base giving only a little ash, *e. g.*, cellulose nitrate or acetate, together with oxidizing agents and readily combustible substances, *e. g.*, $KClO_3$ and S, with, if desired, addns. for regulating the rate of combustion, *e. g.*, $(NH_4)_2C_2O_4$. The proportions of the ingredients are selected so that the stick or rod can be ignited by friction, blown out and ignited again as required. Glass powder, Carborundum or the like may be included to increase the sensitiveness to friction. A suitable compn. is cellulose nitrate 60–75, camphor 6–14, $KClO_3$ 11–20, $K_2Cr_2O_7$ 2.5, $(NH_4)_2C_2O_4$ 2.5, S 2.5, glass meal 5–15 and ZnO 3–10%.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. Olney

The chemistry of turkey-red dyeing. Lytle R. Parks. *J. Phys. Chem.* 35, 488–510(1931).—The history of turkey red dyeing is reviewed and the chemistry of the various operations studied. A new short process is proposed which gives a color just as bright and fast as any produced by the older methods. H. W. Leahy

Nitro and amino compounds. Safe practices in production of dyestuffs and explosives materials. Cyril Ainsworth. *Am. Dyestuff Reptr.* 20, 126–7(1931).—Prevention methods and remedies for poisoning by various nitro and amino compds. are given. Robert Houghton

Formic acid in the textile industry. K. L. Schanbacher. *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 76–9; *Am. Dyestuff Reptr.* 20, 144–7(1931).—The use of HCOOH in the dye bath as a swelling agent, in cross dyeing and as an exhausting agent is discussed. Milton Harris

Use and misuse of chlorine in textile bleaching. W. L. Savell and J. W. Ivey. *Am. Dyestuff Reptr.* 20, 97–100(1931).—Cl bleaches may be used from atmospheric temps. (cold) to 120°F. in the form of strongly alk. to slightly acid hypochlorites. Bleaches are prepd. by dissolving Cl in caustic soda soln. $NaHCO_3$ is unsuitable and unnecessary as a constituent of bleach liquors. Stock solns. are generally made at a concn. of approx. 30 g. per l. of available Cl. Milton Harris

Bleaching with liquid chlorine or hydrogen peroxide 100 volume for hosiery. C. H. Dupois. *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 83–4; *Am. Dyestuff Reptr.* 20, 151–2(1931).—A discussion of formulas and their sp. application in bleaching. Milton Harris

The chemical analysis of sized cloth. G. Smith. *Am. Dyestuff Reptr.* 20, 118–22 (1931).—See *C. A.* 24, 3115. Milton Harris

Change of some properties of sericin particles on the surface of the (silk) cocoon on drying. H. Kaneko, T. Hayashi, S. Chino and M. Miyasaka. *Bull. Sericult. Silk Ind.* (Japan) 2, 2–3(1930).—During the drying of the cocoon the sericin particles on the surface undergo dehydration and their phys. properties change in such a way that the amt. of dyestuff absorbed is decreased and the surface tension, viscosity, *n* and turbidity and colloidal properties of the sericin soln. in water are altered. B. C. A.

Boiling-resistance tests of acetate silk. Walter Permazin. *Chem.-Ztg.* 55, 93–4 (1931).—Methods are described for testing the resistance to boiling of acetate silk yarn. Skeins are washed in ether, then tested by boiling for 1 hr. in distd. water and dried for 2 days at room temp. For testing breaking strength, elongation and elasticity, the boiled skeins are kept for 48 hrs. in 60% humidity, and 100 threads are then tested in the Schopper app. Elasticity values obtained by loading a weighted thread with an added weight equal to 50% of the breaking strength, and measuring the contraction on unloading, agree with the results of the other test. The depth of dyeing of skeins with standard dyes is compared with that of standard boiled skeins of varying resistance. The loss of gloss is detd. by Kempf's app., in which light is reflected from the threads onto a photographic film and the resultant brightening of the film is measured photometrically. I. H. Odell.

Determination of $p_H$ of cotton cloth and study of its relation to tensile strength. S. I. Kolsky and B. M. Jones. *Am. Dyestuff Reptr.* 20, 133–8, 157–9(1931).—Slight

decreases in $p_H$ tender the cloth while increases tend to make it stronger. Ordinary bleached cloth was strengthened by treatment with dil alkali MILTON HARRIS

The effect of cleansing agents on linen and cotton. EMIL J. SIMOLA. *Acta Chem. Fennica* 3, 89-94(1930).—One g per l. of $MeCH_2SO_2NClNa\ 3H_2O$ has a little less weakening action on linen and cotton than has 0.5 g per l of perborate bleaching agent because of the greater stability of the former on boiling A mixt. of 5 g of soap with 3 g per l of soda weakened cotton 15% in 25 washings and 22% in 50 washings. For linen the values were 25 and 52%, resp For soda alone (6 g per l.) the values were 6 and 12%, resp., for cotton and 6 and 3%, resp., for linen Ten g per l of Marseilles soap, with a water content of 26%, weakened cotton 10% in 25 washings and 28% in 50 washings, with values of 26 and 46%, resp., for linen Soaps prepd from linseed oils, soy bean oils, Na and K stearates, oleates and palmitates showed that in water of 4 degrees hardness the greatest weakening of cloth occurred with soaps contg acids of high I no or high degree of unsatn The cloth wt increased in all washings, being greatest when water of a high degree of hardness was used The weakening of cloth when distd water, water of 4 degrees hardness and water of 25.4 degrees hardness were used were, resp., 5–15, 8–19 and 24–39% For water of 4 degrees hardness the greatest weakening occurred with soaps contg Na salts of acids of high I no or high unsatn as in soy bean oil and linseed oil, being about 25% for cotton and 35% for linen in 25 washings When soaps contg Na salts of satd acids as in coconut oil and tallow were used the weakening effect on cotton was 10% and on linen 15% in 25 washings The drying of the cloth also greatly affects its strength, the weakening varying directly with the time necessary to dry The cloth weakening was directly proportional to the amt. of Ca and Mg salts of unsatd. acid pptd on the cloth fibers. These salts have some effect on the air oxidation of the cloth, and catalyze its autoxidation during drying, hence it is imperative that the cloth be dried as rapidly as possible. Ca and Mg salts must be prevented from forming, or, if this is not possible, they must be prevented from oxidation during drying of the cloth Satd acids will cause a pptn on the cloth fibers, but the salts are not oxidized, and have less weakening action on the cloth. Satd acids prepd from unsatd acids were difficult to purify, and discolored the cloth on long standing. Substances may be added which keep Ca and Mg salts in emulsion form and prevent pptn on the cloth fibers One cu. m. of water of 12 degrees hardness requires 2 kg. of Na soap to soften, and results in a pptn of Ca and Mg salts, so the most effective method of preventing their formation is to soften the water preliminary to its use Perborate solns have about the same effect on cloth weakening as soaps contg a high percentage of unsatd acids S. A. K.

*Newer preparation for emulsifying, wetting out and washing.* A. SALMONY-KARSTEN *Z. ges. Textil-Ind.* 33, 677(1930).—"Flerhenol M Superior" is described as a dyeing oil for rayon and rayon mixts with silk and wool, "Flerhenol B T Special" is an anhydrous coned product for degreasing vegetable fibers; "Appret-Flerhenol," a finishing oil stable with $MgSO_4$; "Neo Flerhenol," a wetting out agent with unusual brightening and softening properties, "Visco-Flerhenol I" and "Visco Flerhenol A" are for brightening and dyeing cotton and rayons; "Eufullon II" and "Eufullon Extra" for fulling and washing of woolens All of these products are stable to hard water, easily sol., rinse well and are inexpensive. H. F. LEUPOLD

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The photoelectric measurement of luster (DESBLEDS) 2. Experiments with N fertilizers on cotton (MANDRUIGIN) 15. Textile soap (HALBERSTADT) 27. Purely aliphatic strepto-pentamethin dyes (KÖNIG, REGNER) 10. Constitution of colorless and colored triphenylmethane derivatives (LIPSCHITZ) 10. Protecting [textile materials] from fungi (*Brit. pat.* 336,244) 18.

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Annuaire des soies et des soies artificielles, 1930. Paris: L'Édition textile 757 pp. F. 55 *Reviewed in Chimie & Industrie* 24, 1287(1930).

HEGEL, K. T.: Textilchemische Erfindungen. Lfg. 6. Wittenberg: A. Ziemsen Verlag Paper, M. 10 Reviewed in *J. Soc. Dyers Colourists* 47, 40(1931). Cf. *C. A.* 24, 3377.

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Dyes. SCOTTISH DYES, LTD. Ger. 512,821, May 12, 1927. See Brit. 278,039 (*C. A.* 22, 2667).

Dyes. I. G. FARBENIND A.-G. (Wilhelm Eckert, inventor). Ger. 513,600, Oct. 23, 1928 N-contg dyes are produced by nitrating naphthoylenearylimidazole and

reducing the product Thus 1,4,5,8-naphthoylenedibenzimidazole (obtained by condensing 1 4 5,8-naphthalenetetracarboxylic acid with *o* phenylenediamine as described in Ger 490 632) is nitrated with $HNO_3$ and reduced with $Na_2S_2O_4$ to give a dye which colors cotton scarlet in a green vat Other examples are given

Dyes I G Farbenind A -G Brit 337,021, June 21, 1929 Anthraquinone dyes for wool are made by condensing the Cu compd of a 1 hydroxy-4 haloanthraquinonesulfonic acid with an alkyl, aryl, cycloalkyl, aralkyl or acylamino compd, the amino residue entering the 4 position Suitable starting materials include acetyl *p*-phenylenediamine *m* phenylenediamine and acetyl *m* tolylenediamine

Vat dyes L Cassella & Co, Ges Brit 336,495, Dec 10, 1928 See Ger 507 558 (*C A* 25, 823)

Dyes. Soc anon pour l'ind chim à Bâle Brit 336,775, Oct 3, 1929 Isodibenzanthrone is chlorinated (1) with $SbCl_5$ in $PhNO_2$ to form a blue violet dye, (2) with sulfuryl chloride and I in $PhNO_2$ or (3) with Cl and I in $PhNO_2$, to form a similar dye, or (4) with $FeCl_3$ in trichlorobenzene, also forming a similar dye

Dyes (dibenzanthrone derivatives). I B Anderson, R F. Thomson, J Thomas and Scottish Dyes, Ltd Brit 336,268, May 9, 1929 By the alkali fusion of *Bz* 1,*Bz* 1' dibenzanthronyls substituted by phenoxy, nitro or simple amino groups (but having the 2 position free) dyes are obtained producing reddish blue, greenish black or greenish gray shades on cotton Several examples are given

Azo dyes I G Farbenind A -G Brit 336,038, July 10, 1929 Dyes are formed in substance or on the fiber (which may be regenerated cellulose or cellulose esters or ethers) by coupling a diazo, tetrazo or diazoazo compd free from sulfonic, hydroxy and carboxy groups with a 2',3' hydroxynaphthoyl-4 amino-1 alkoxymethylbenzene Numerous examples of coupling components are given

Azo dyes I G Farbenind A -G Brit. 335 893, April 30, 1929 A diamine of the general formula $NH_2—R—R'—R—NH_2$ in which R is an aromatic and R' a hydroaromatic residue (all of which may be substituted or not) is tetrazotized and coupled with 2 mol proportions of the same or different coupling components one of which may be a diazo compd or may be diazotized and coupled with another component Numerous examples are given of dyes of different colors for dyeing wool, silk, etc

Azo dyes Soc anon pour l'ind chim à Bâle Brit. 335,896, June 25, 1929 Cotton is dyed olive green in the presence of Cr salts by the dye produced by coupling 2 sulfo-4-oxy α β naphthophenazine with diazotized 4 nitro-2 amino-1 phenol 6 sulfonic acid, and instead of the latter compd there may be employed *o* anisidine, *p* nitroaniline, sulfanilic acid or *p* nitroaniline-*o* sulfonic acid Various other dyes also are described derived from components of similar type, and methods are given for producing azines used as intermediates

Azo dyes Imperial Chemical Industries, Ltd, and R Brightman Brit 336 350, Aug 15, 1929 Azo dyes for wool are formed by coupling tetrazotized *m,m'*-tolidine with one mol proportion of salicylic acid and one mol proportion of 2 naphthol, a 2 naphtholmonosulfonic acid, 2 naphthylamine-6 sulfonic acid or 2 methylamino naphthalene 7 sulfonic acid Cf *C A* 25, 599

Azo dyes. Imperial Chemical Industries, Ltd Fr 694,730, April 29, 1930 New azo dyes are prepd by diazotizing a *p*-nitroamine or a *p*-acetamidoamine of the $C_6H_3$ series contg at least one alkoxy group in the mol, combining with a naphthol, naphtholsulfonic acid or a *N* substituted 2,8-aminonaphtholsulfonic acid, reducing or hydrolyzing the product obtained, diazotizing again and coupling with a 1,8- or a 2,8-aminonaphtholmono- or di sulfonic acid Thus, 5-nitro-2 anisidine is diazotized and coupled with 2 phenylamino-8 naphthol-6 sulfonic acid The product is reduced, diazotized and coupled with 1 8 aminonaphthol 2,4-disulfonic acid, giving a product which dyes viscose silk a deep blue Other examples with a list of components and the colors obtained are given

Azo dyes. Imperial Chemical Industries, Ltd Fr 694,559, April 26, 1930 Azo dyes are prepd by coupling with coupling components a tetrazotized diamine of the general formula $NH_2C_6H_3NHXNHC_6H_3NH_2$ in which X is a chain of 2 or more $CH_2$ groups or a chain of $CH_2$ and CO groups, or by combining a diazotized amine of the general formula $YC_6H_3NHXNHC_6H_3NH_2$, in which X has the same significance and Y is a $NO_2$ or acylamino group, with a constituent which contains no $NH_2$ group, reducing the $NO_2$ group or hydrolyzing the arylamino group, diazotizing and coupling with another constituent The dyes give regular colors on regenerated cellulose silk

Copper compounds of azo dyes. I G Farbenind. A -G Brit 336,971, July 22, 1929 Substantive *o*-carboxyazo dyes contg Cu are formed by the action of a copperiz-

ing agent such as $CuSO_4$ on dyes obtained by coupling tetrazotised 4,4'-diaminodiphenyl-3,3'-dicarboxylic acid with 2 similar or dissimilar mol proportions of an aminonaphtholdisulfonic acid or a nuclearly substitution product of such an acid (other than acids substituted in the amino group). The dye may also be prepd in the presence of a suitable coppering agent. The dyes thus formed produce mainly blue and gray shades on cotton and viscose. Several examples are given.

**Monoazo dyes.** I. G. Farbenind. A.-G. Brit. 330,580, June 14, 1929. Monoazo dyes which dye wool from an acid bath bright yellow to red to violet to brownish shades fast to washing and to milling are formed by combining with a usual coupling component contg. at least one sulfone group a diazotised aniline deriv. contg. a hydrogenated benzene nucleus in *p*-position to the $NH_2$ group and which may also contain a halogen atom or an alkyl or alkoxy group in *o*-position to the $NH_2$ group. Numerous examples are given.

**Disazo dyes.** E. I. du Pont de Nemours & Co. Brit. 330,646, July 12, 1929. Disazo dyes for cotton are made by coupling diazo compds. free from sulfo and carboxy groups with a 4'-aminobenzoylaminobenzoyl J-acid, diazotising the monoazo product and coupling it with a sulfo- or carboxy-indole. Numerous examples are given.

**Disazo dyes.** J. R. Geigy A.-G. Brit. 337,224, Nov. 15, 1928. See Fr. 681,551 (*C. A.* 24, 5307).

**Disazo dyes.** Melchior Hörnberg (to Chemische Fabrik vorm. Sandoz). U. S. 1,792,335, Feb. 10. By coupling one mol. of a tetrazodiaryl with two mols. of 3'-amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolones or by combination of the intermediate *products of one mol. of a tetrazodiaryl and one mol. of an aryl-o-hydroxycarboxylic* acid with one mol. of a 3'-amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolone or by coupling the intermediate product of one mol. of a tetrazodiaryl and one mol. of a 3'-amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolone with one mol. of an azo component substantive azo dyes are obtained, which when diazotized on the fiber can be developed with unsulfonated azo components (for instance β-naphthol, *m*-diamines, phenylmethyl-pyrazolone) to shades varying from orange to red, heliotrope and dark brown, which are fast to washing and can be discharged with formaldehyde-hyposulfite to pure white effects. The direct dyeings can also be fixed with formaldehyde or by an after treatment with *p*-nitrodiazobenzene. The same diazotizable azo dyes can be obtained by substituting, for the 3'-amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolones, the corresponding 3'-nitro-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolones, and by reducing in the nitro dyes thus obtained the nitro group to the amino group by treatment with $NaSH$. Several examples with details of procedure are given.

**Disazo dyes for acetylcellulose.** British Dyestuffs Corp., Ltd., James Baddiley and James Hill. Ger. 513,703, Nov. 9, 1930. See Brit. 270,428 (*C. A.* 22, 1092).

**Vat dyes.** I. G. Farbenind. A.-G. (Max A. Kunz, Karl Köberle and Erich Berthold, inventors). Ger. 516,313, Apr. 28, 1929. Green blue vat dyes contg. halogen are prepd. by treating benzanthronepyrazolcanthrone or its derivs. with $HClSO_3$ in the presence of a catalyst, *e. g.*, Hg or I, and in the presence or absence of Br or other brominating agent. The products give greener shades than the dyes described in Ger. 493,274 (*C. A.* 24, 2011). Examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. (Heinrich Neresheimer, inventor). Ger. 510,781, Aug. 18, 1929. Addn. to 513,016 (*C. A.* 25, 1396). Blue to green vat dyes similar to some of those obtainable as described in Ger. 513,016, are prepd. by the action of acid condensing agents on *o*-anthraquinonyl-3-amino-1,2-benzanthraquinones contg. at least one acylamino group, which may be split off or substituted after the condensation. Thus, the condensation product from 3-chloro-1,2-benzanthraquinone and 1-amino-5-benzoylaminoanthraquinone may be treated with $HClSO_3$. Examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 694,152, April 18, 1930. The 4 H atoms of the $C_6H_4$ ring in anthraquinone-2,1-acridone are substituted by halogen atoms. The dyes are prepd. after the process of Ger. 207,211, *e. g.*, by condensing the benzylic ester of 1-chloroanthraquinone-2-carboxylic acid with 2,3,4,5-tetrahaloaniline and a final joining of the acridone ring, or by introducing other halogen atoms into anthraquinoneacridones, the $C_6H_4$ ring of which is substituted by less than 4 halogen atoms, or by substituting with H the halogen contained (in addn. to 4 atoms of halogen of the $C_6H_4$ ring) in another part of the mol. of the haloanthraquinoneacridones. Examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 699,997, April 15, 1930. The mixts. of isomeric 1,4,5,8-naphthylenediarylimidazoles obtained by the process of Fr. 690,813

reducing the product Thus, 1,4 5,8-naphthoylenedibenzimidazole (obtained by condensing 1,4 5 8-naphthalenetetracarboxylic acid with *o* phenylenediamine as described in Ger 430,632) is nitrated with $HNO_3$ and reduced with $Na_2S_2O_4$ to give a dye which colors cotton scarlet in a green vat. Other examples are given

Dyes. I G Farbenind A.-G Brit 337,021, June 21, 1929 Anthraquinone dyes for wool are made by condensing the Cu compd of a 1 hydroxy-4 haloanthraquinonesulfonic acid with an *alkyl, aryl, cycloalkyl, aralkyl- or acylamino compd*, the amino residue entering the 4 position. Suitable starting materials include acetyl *p*-phenylenediamine, *m* phenylenediamine and acetyl *m* tolylenediamine

Vat dyes. L Cassella & Co, Ges Brit 336,495, Dec 10, 1928 See Ger 507,558 (*C A* 25, 823)

Dyes. Soc anon pour l'ind chim à Bâle Brit. 336,775, Oct 3, 1929 Isodibenzanthrone is chlorinated (1) with $SbCl_5$ in $PhNO_2$ to form a blue violet dye, (2) with sulfuryl chloride and *I* in $PhNO_2$ or (3) with *Cl* and *I* in $PhNO_2$, to form a similar dye, or (4) with $FeCl_3$ in trichlorobenzene, also forming a similar dye

Dyes (dibenzanthrone derivatives). I B Anderson, R. F. Thomson, J Thomas and Scottish Dyes, Ltd Brit 336,268, May 9, 1929 By the alkali fusion of *Bz*-1,*Bz* 1'-dibenzanthronyls substituted by phenoxy, nitro or simple amino groups (but having the 2 position free) dyes are obtained producing reddish blue, greenish black or greenish gray shades on cotton Several examples are given

Azo dyes. I G Farbenind A.-G Brit 336,938, July 10, 1929 Dyes are formed in substance or on the fiber (which may be regenerated cellulose or cellulose esters or ethers) by coupling a diazo, tetrazo or diazoazo compd free from sulfonic, hydroxy and carboxy groups with a 2',3'-hydroxynaphthoyl-4 amino-1-alkoxymethylbenzene Numerous examples of coupling components are given

Azo dyes. I G Farbenind A.-G Brit. 335,893, April 30, 1929 A diamine of the general formula $NH_2—R—R'—R—NH_2$ in which R is an aromatic and R' a hydroaromatic residue (all of which may be substituted or not) is tetrazotized and coupled with 2 mol proportions of the same or different coupling components one of which may be a diazo compd or may be diazotized and coupled with another component Numerous examples are given of dyes of different colors for dyeing wool, silk, etc.

Azo dyes. Soc. anon pour l'ind chim à Bâle Brit. 335,896, June 25, 1929 Cotton is dyed olive green in the presence of Cr salts by the dye produced by coupling 2 sulfo-4-oxy α,β naphthophenazine with diazotized 4-nitro-2 amino-1 phenol-6 sulfonic acid, and instead of the latter compd there may be employed *o* anisidine, *p*-nitroaniline, sulfanilic acid or *p*-nitroaniline-*o*-sulfonic acid Various other dyes also are described derived from components of similar type, and methods are given for producing azines used as intermediates.

Azo dyes. Imperial Chemical Industries, Ltd, and R Brightman Brit. 336,350, Aug 15, 1929 Azo dyes for wool are formed by coupling tetrazotized *m,m'*-tolidine with one mol proportion of salicylic acid and one mol proportion of 2 naphthol, a 2 naphtholmonosulfonic acid, 2 naphthylamine-6-sulfonic acid or 2 methylaminonaphthalene-7-sulfonic acid Cf *C A* 25, 599

Azo dyes. Imperial Chemical Industries, Ltd Fr 694,730, April 29, 1930 New azo dyes are prepd. by diazotizing a *p*-nitroamine or a *p*-acetamidoamine of the $C_6H_4$ series contg at least one alkoxy group in the mol., combining with a naphthol, naphtholsulfonic acid or a *N*-substituted 2,8-aminonaphtholsulfonic acid, reducing or hydrolyzing the product obtained, diazotizing again and coupling with a 1,8- or a 2,8-aminonaphtholmono- or di sulfonic acid Thus, 5-nitro-2-anisidine is diazotized and coupled with 2-phenylamino-8-naphthol-6-sulfonic acid The product is reduced, diazotized and coupled with 1,8-aminonaphthol 2,4-disulfonic acid, giving a product which dyes viscose silk a deep blue Other examples with a list of components and the colors obtained are given

Azo dyes. Imperial Chemical Industries, Ltd Fr 694,559, April 26, 1930 Azo dyes are prepd. by coupling with coupling components a tetrazotized diamine of the general formula $NH_2C_6H_4NHXNHC_6H_4NH_2$ in which X is a chain of 2 or more $CH_2$ groups or a chain of $CH_2$ and CO groups, or by combining a diazotized amine of the general formula $YC_6H_4NHXNHC_6H_4NH_2$, in which X has the same significance and Y is a $NO_2$ or acylamino group, with a constituent which contains no $NH_2$ group, reducing the $NO_2$ group or hydrolyzing the arylamino group, diazotizing and coupling with another constituent. The dyes give regular colors on regenerated cellulose silk

Copper compounds of azo dyes. I. G Farbenind A.-G Brit. 336,971, July 22, 1929 Substantive *o*-carboxyazo dyes contg Cu are formed by the action of a copperiz-

ing agent such as $CuSO_4$ on dyes obtained by coupling *tetrazotized 4,4'-diaminodi*phenyl-3,3'-dicarboxylic acid with 2 similar or dissimilar mol proportions of an aminonaphtholdisulfonic acid or a nuclearly substitution product of such an acid (other than acids substituted in the amino group). The dye may also be prepd in the presence of a suitable coppering agent. The dyes thus formed produce mainly blue and gray shades on cotton and viscose. Several examples are given

Monoazo dyes. I G Farbenind A.-G Brit. 336,580, June 14, 1929. Monoazo dyes which dye wool from an acid bath bright yellow to red to violet to brownish shades fast to washing and to milling are formed by combining with a usual coupling component contg at least one sulfonic group a diazotized aniline deriv contg a hydrogenated benzene nucleus in *p*-position to the $NH_2$ group and which may also contain a halogen atom or an alkyl or alkoxy group in *o*-position to the $NH_2$ group. Numerous examples are given

Disazo dyes. E I du Pont de Nemours & Co Brit. 336,646, July 12, 1929 Disazo dyes for cotton are made by coupling diazo compds free from sulfo and carboxy groups with a *N* aminobenzoylaminobenzoyl-J-acid, diazotizing the monoazo product and coupling it with a sulfo- or carboxy-indole. Numerous examples are given.

Disazo dyes. J. R. Geigy A.-G Brit. 337,224, Nov 15, 1928. See Fr. 684,551 (*C. A.* 24, 5507)

Disazo dyes. Melchior Boeniger (to Chemische Fabrik vorm. Sandoz). U S 1,792,355, Feb 10 By coupling one mol of a tetrazodiaryl with two mols. of 3'-amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolones or by combination of the intermediate products of one mol of a tetrazodiaryl and one mol of an aryl-*o*-hydroxycarboxylic acid with one mol of a 3'-amino-4'-methyl-5'-sulfo-1-phenyl 5-pyrazolone or by coupling the intermediate product of one mol. of a tetrazodiaryl and one mol of a 3' amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolone with one mol. of an azo component substantive azo dyes are obtained, which when diazotized on the fiber can be developed with unsulfonated azo components (for instance β naphthol, *m*-diamines, phenylmethyl pyrazolone) to shades varying from orange to red, heliotrope and dark brown, which are fast to washing and can be discharged with formaldehyde-hyposulfite to pure white effects. The direct dyeings can also be fixed with formaldehyde or by an after treatment with *p*-nitrodiazobenzene The same diazotizable azo dyes can be obtained by substituting, for the 3'-amino-4'-methyl-5'-sulfo-1-phenyl-5-pyrazolones, the corresponding 3'-nitro-4'-methyl-5'-sulfo-1 phenyl-5-pyrazolones, and by reducing in the nitro dyes thus obtained the nitro group to the amino group by treatment with NaS. Several examples with details of procedure are given

Diazo dyes for acetylcellulose. British Dyestuffs Corp., Ltd., James Baddiley and James Hill. Ger 513,763, Nov 9, 1926 See Brit. 270,423 (*C. A.* 22, 1692).

Vat dyes. I. G Farbenind A.-G (Max A. Kunz, Karl Köberle and Erich Berthold, *inventors*) Ger. 516,313, *Apr.* 28, 1929 *Green blue vat dyes contg. halo*gen are prepd. by treating benzanthronepyrazoleanthrone or its derivs. with $HClSO_3$ in the presence of a catalyst, *e. g.*, Hg or I, and in the presence or absence of Br or other brominating agent The products give greener shades than the dyes described in Ger 492,274 (*C. A.* 24, 2611). Examples are given.

Vat dyes. I G Farbenind A.-G (Heinrich Neresheimer, inventor). Ger. 516,784, Aug 18, 1929 Addn. to 513,046 (*C. A.* 25, 1396) Blue to green vat dyes similar to some of those obtainable as described in Ger 513 046, are prepd by the action of acid condensing agents on α-anthraquinonyl-3 amino-1,2-benzanthraquinones *contg at least one acylamino group, which may be split off* or substituted after the condensation. Thus, the condensation product from 3-chloro-1,2-benzanthraquinone and 1-amino-5-benzoylaminoanthraquinone may be treated with $HClSO_3$ Examples are given

Vat dyes. I. G Farbenind A.-G Fr 694,152, April 18, 1930. The 4 H atoms of the $C_6H_4$ ring in anthraquinone-2,1 acridone are substituted by halogen atoms The dyes are prepd. after the process of Ger 267,211, *e. g.*, by condensing the benzylic ester of 1-chloroanthraquinone-2-carboxylic acid with 2,3,4,5-tetrahaloaniline and a final joining of the acridone ring, or by introducing other halogen atoms into anthraquinoneacridones, the $C_6H_4$ ring of which is substituted by less than 4 halogen atoms, or by substituting with H the halogen contained (in addn to 4 atoms of halogen of the $C_6H_4$ ring) in another part of the mol. of the haloanthraquinoneacridones. Examples are given.

Vat dyes. I. G. Farbenind. A.-G. Fr. 693,997, April 15, 1930. The mixts. of isomeric 1,4,5,8-naphthoylenediarylimidazoles obtained by the process of Fr. 600,843

and its addns are sepd into their 2 constituents The sepn is effected by treatment with concd $H_2SO_4$ or by transforming them in the presence of an appropriate diluent into their salts and sepg these. Examples and formulas of the products obtained are given.

**Vat dyes.** I G Farbenind A -G Fr. 693,919, June 14, 1929 The condensation products obtained from *N*-dihydro-1,2',2,1'-anthraquinonazines by means of $CH_2O$ or substances yielding $CH_2O$ (cf Fr 346,398) are submitted to an oxidation or dehydrogenation Examples are given.

**Vat dyes of the thioindigo series.** Karl Thiess, Theodor Meissner and Hans Heyna (to General Aniline Works) U S. 1,702,130, Feb 10 4,7,4',7'-Tetramethyl-5 5'-dibromoindigo and other similar halogen compds. dye cotton blue from an olive-green vat and are made by transforming amino compds. of the general formula

CX CMe CY C(NH$_2$) CMe CH

wherein X stands for halogen and Y stands for H or the COOH group, into indigo dyes according to the process generally used for the prepn. of indigo dyes from aromatic amino compds with a free *o*-position, or from *o*-aminocarboxylic acids Several examples with details of procedure are given.

**Vat dyes or intermediates.** I G Farbenind A -G (Walter Mieg and Robert Berliner, inventors) Ger 516,398, Dec. 9, 1928. Dianthraquinonylamine derivs contg a thioxanthone ring and either one acylamino group or an acridone ring is treated with $H_2SO_4$ at a low temp Oxidation of the products may be necessary. Thus, the condensation product from 4-aminoanthraquinonethioxanthone and 1 benzoylamino-5-chloroanthraquinone may be treated with $H_2SO_4$ at 20° and the product poured into water contg a little $NaNO_2$ Other examples are given also. The products are carbazole derivs Cf *C. A* 25, 824

**Dyes and intermediates.** W Smith, J. Thomas and Scottish Dyes, Ltd Brit. 336,982, April 16, 1929 1,1'-Dianthraquinonyl derivs. contg Cl, Br or sulfonic acid groups in the 2,2'-positions are prepd by condensing anthraquinone derivs. contg similar groups in the 2 position and a halogen atom or diazo group in the 1-position in the presence of Cu There may be employed as starting materials compds. such as 1,2-dichloroanthraquinone, 1-amino-2-bromoanthraquinone or 1-amino-2-sulfoanthraquinone The 2 2'-substituents in the products are easily replaceable by other substituents, *e. g.*, treatment with $NH_4$ forms 2,2'-diamino-1,1'-dianthraquinonyl which is converted to flavanthrone.

**Dyes and intermediates.** I G Farbenind. A -G (Max A. Kunz, Karl Köberle and Gert Kochendorfer, inventors) Ger 516,393, Feb 16, 1929 See Fr. 689,968 (*C A* 25, 1100)

**Dyes and intermediates.** I G Farbenind. A -G Fr 694,853, May 2, 1930. Condensation products, some of which are dyes and intermediates, are prepd. by treating with condensing agents the products resulting from the reaction of aromatic *o*-aminocarboxylic acids, their derivs. or substitution products with negatively substituted heterocyclic compds or with negatively substituted isocyclic compds. contg at least 4 rings, or the corresponding products resulting from the reaction of heterocyclic or isocyclic *N* compds contg at least 4 rings and having at least one atom of H capable of being substituted fixed to the N, with aromatic carboxylic acids, negatively substituted in the *o*-position to the COOH group, or their derivs. or substitution products. Thus, the condensation product of dibromo-3,4,8 9-dibenzopyrene-5,10-quinone with 2 mols. of the Et ester of 1-aminoanthraquinone 2-carboxylic acid is dissolved in concd. $H_2SO_4$ and heated to 110–120° for some time, the oxonium salt of the product being pptd by water On hydrolysis a product is obtained which dyes cotton in brown-red shades from the vat. Other examples are given

**Dye intermediates** I G Farbenind A G Brit. 336,394, Sept. 27, 1929 *p*-Arylaminophenolcarboxylic acids are made by treating a dry alkali salt of a *p*-aryl aminophenol contg a free *o* position to the OH group and no sulfonic acid groups with $CO_2$ with use of heat and pressure. There may be used as starting materials 4-hydroxydiphenylamine, 4 hydroxy-2'-methyldiphenylamine, 4-hydroxy-3'-methyldiphenylamine, 4-hydroxy-4' methyldiphenylamine, 4 hydroxy-3-methyldiphenylamine (obtained from toluhydroquinone and aniline), 4 hydroxy-3,4'-dimethyldiphenylamine (obtained from toluhydroquinone and *p*-toluidine), and 4 hydroxy-3'-methoxydiphenylamine.

**Dye intermediates.** I G Farbenind. A -G Brit 336,428, Oct. 14, 1929 Arylides of *m*-arylaminophenolcarboxylic acids such as those obtained according to the process of Brit. 333,783 (*C A*. 25, 603) are made by reaction of the carboxylic group

(with or without previous acylating of the N atom) with an arylamine in the presence of an acid-condensing agent such as $PCl_5$ and a diluent such as xylene, toluene, PhCl or dimethylaniline, or, the carboxylic acid may be first converted to the acid chloride by a reagent such as thionyl chloride and then condensed with an arylamine in the presence of a diluent. Numerous examples are given.

Dye intermediates. I G Farbenind A.-G Brit. 336,800, Oct. 18, 1929. Dihydroxyanilides of naphthalenedicarboxylic acids, capable of being coupled with a diazo compd., are made by condensing a naphthalenedicarboxylic acid (other than a *peri* or an *ortho* acid) in the presence of $PCl_5$ (or by using a naphthalenedicarboxylic acid chloride directly) with a hydroxyarylamine which has a free *o*- or *p*-position relative to the OH group such as 3- or 4-aminophenol, 1 methyl 2-amino-4-hydroxybenzene, 1 methyl 2 amino-5-hydroxybenzene or the like. The alkali salts of the products are sol. in water and have an affinity for vegetable fibers. Naphthalene-1,4- and 1,5-dicarboxylic acid chlorides (which may be used as initial materials) are made by treating the corresponding acids with $PCl_5$.

Dye intermediates. I G Farbenind A.-G Brit. 337,047, July 26, 1929 Aminohydroxyanthraquinones and their substitution products are obtained by condensing an acyl- or aroylaminophenol, or a homolog or substitution product, with phthalic anhydride, or a substitution product, in the presence of a substance such as $AlCl_3$, saponifying, and ring closing when necessary in the usual manner. Examples are given of the production of 2,3-aminohydroxyanthraquinone from 2,2'-dimethoxydiphenylurea, 1-amino-4-hydroxyanthraquinone from 1-benzoylamino-4-phenol and of several other similar reactions.

Dye intermediate (1-chloromethylnaphthalene). I. G. Farbenind A.-G. Brit. 337,289, Jan. 12, 1929. Cryst. naphthalene in aq. suspension is treated with nonpolymerized formaldehyde and concd. HCl (suitably with gentle heating).

Intermediates for azo dyes. I G Farbenind A.-G Ger 516,156, Feb 8, 1929 Nitroaryl arylides of the formula $HORNHCOR'NO_2$, in which R and R' are the same or different aryl radicals of the $C_6H_5$ series, and in which the $NO_2$ group is in the *m*- or *p*-position to the CO group, while the *o*- or *p*-position to the OH group is unsubstituted, are converted by treatment with alk. reducing agents into new compds. having a great affinity for cotton. The products are believed to be azoxy or azo compds. Examples are given.

Dyes of the anthraquinone series. Franz Ackermann and Carl Apotheker (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,792,348, Feb. 10 Reaction products such as those formed by heating, at 150–160°, aromatic amines such as $PhNH_2$ or *p*-anisidine with compds. such as (1,5- or 1,8)-diamino-(4,8- or 4,5)-dinitroanthraquinone, are subjected to careful reduction (suitably with Na sulfide or hydrosulfide), and there are thus obtained dyes sol. in various org. solvents and which are suitable for dyeing cellulose esters and ethers or products such as nitrocellulose lacquers blue to blue-green shades. Several examples with details of procedure are given.

Fuchsin dyes. Heidelberger Gelatine-Fabrik Stoess & Co (Albert Steigmann, inventor). Ger. 513,610, Dec. 14, 1928. Fuchsin dyes are produced by oxidizing and nitrating fuchsin in the presence of sulfurizing agents and optionally reducing the product. Thus, fuchsin is mixed with $Na_2S_2O_3$ or $Na_2S_2O_4$ and treated with $HNO_3$ and $H_2SO_4$. The Na and $NH_4$ salts of the dye color wool yellow in a weak AcOH bath. Another example is given. Cf. *C. A.* 24, 4639.

Sulfur dyes. I. G Farbenind. A.-G Brit. 336,061, Sept. 2, 1929. Sulfur dyes are made by sulfurizing a 2-(4'-hydroxyarylamino)-6-arylaminonaphthalene (suitably with a polysulfide of high S content and in the presence of an inert org. solvent such as an aliphatic alc. of high b. p., a cyclic alc. or glycerol). The dyes produce bluish to green shades on cotton from a Na sulfide bath or hyposulfite vat, and greener shades are obtained by sulfurizing in the presence of a Cu salt such as the sulfide or cyanide. Several examples are given.

Sulfuretted dyes. I. G Farbenind A.-G. Brit. 337,061, July 27, 1929 The S dyes obtainable, as described in Brit. 325,519 (*C. A.* 24, 4169), by heating halogenated dinaphthylene dioxides with S, with or without a high boiling diluent, or by submitting them to polysulfide fusion, are treated either in substance or on the fiber with alkylating or aralkylating agents as described in Brit. 317,776 (*C. A.* 24, 2306) Several examples are given.

Wool dyes. I. G Farbenind A.-G Fr. 694,088, April 17, 1930. One mol. of a secondary amine of the $C_6H_5$ series contg. 2 primary $NH_2$ groups in position *o*- with respect to the secondary amine group and at least one $SO_3H$ group is heated with one

mol of the $C_6H_6$ series contg 2 $NO_2$ groups in *o*-position and a $NO_2$ group in *p*-position with respect to an exchangeable atom or atomic group Thus, 2,6-diaminodiphenylamine-4 sulfonic acid is dissolved in water and the neutralized soln is condensed at 70–80° with 2 4 6 trinitroanisole in the presence of $Na_2CO_3$. The product is ppted. by NaCl and dyes wool in yellowish brown shades Other examples are given.

**Anthanthrone derivatives.** I G Farbenind A -G (Max A Kunz, Karl Köberle and Erich Berthold, inventors) Ger. 516,312, Aug 10, 1928 See Fr. 678,055,(*C. A.* 24, 3248)

**Dibenzopyrenequinones.** Georg Kränzlein and Heinrich Vollmann (to General Aniline Works) U S 1,792,169, Feb 10 Vat dyes are formed by the reaction (with introduction of O into the reaction mixt) at temps. of 110–50° of *o*-benzoyl naphthalene or other suitable *o* aroylnaphthalenes with benzoyl chloride or other suitable compd. of the general formula aryl—CO—X (in which X stands for a halogen atom or for the group —O—CO—aryl, as in aromatic carboxylic acid chlorides or carboxylic anhydrides), in the presence of $AlCl_3$. The reaction may require 20–60 hrs I xamples and details of procedure are given

**Diphthaloylnaphthalene.** I G Farbenind. A -G Fr. 694,890, May 2, 1930 1,2 5,6-Diphthaloylnaphthalene, m 410°, and its substitution products are prepd by treating 2',2'-dicyano-1,5-dibenzoylnaphthalene with an acid-condensing agent. If desired the cyano groups may first be changed to COOH groups. With sufficiently moderate conditions 2'-carboxybenzoylnaphthanthraquinone may be obtained as an intermediate product. The prepn. of 1,2,5,6-(2'2'-dichlorodiphthaloyl)naphthalene), m above 400°, is also described The products are *intermediates for dyes*

**Dyeing with vat dyes.** I G Farbenind A -G (Ludwig Löchner, inventor). Ger 513 526, Sept 12, 1928 Polychromatic effects are produced by using ester salts of vat dyes The goods are impregnated with an alk. soln of 2,3 hydroxynaphthoic acid arylides, and printed out successively with aromatic diazo compds. of vat dyes, with addn of $NaNO_2$ The vat dye is developed in the dried goods by acid and the rolled goods are then scoured and treated with a hot dil alk soln A small quantity of reducing agent such as $CH_2O$, glucose, etc, may be added to the vat dye printing paste In an example, the goods are soaked in a soln contg 2 3 hydroxynaphthoyl-*o*-toluidine Turkey red oil and NaOH, and dried For red shades, the goods are printed out with a paste contg the diazo soln from 4-chloro-2-toluidine-HCl, water, $NaNO_2$, AcONa and starch For blue shades the material is printed out with a soln contg ester salts of tetrabromoindigo, $NaNO_2$, water and starch Several other examples are given

**Dyeing or treating threads.** Henry Dreyfus. Fr 694 890, May 2, 1930 Liquids such as size or dyes are applied to threads while they pass below the edge of an annular or cylindrical member serving to guide the thread to a bobbin or cake of thread

**Dyeing cotton** Oranienburger Chemische Fabrik A -G (Kurt Lindner, Rudolf Kuhn and Max Traple, inventors) Ger 513,843, Jan 11, 1924 Dyes, especially naphthol dyes are applied directly to cotton, the process being carried out in the presence of hydrogenated phenols and nonsulfonated soap in the proportions 1 or less 4 Thus, the azo dye from dianisidine and 1-amino-8-naphthol-4-sulfonic acid (Chicago blue B) is used directly to color cotton blue in the presence of coconut oil, oleic acid and cresol Other examples are given

**Dyeing wool yarn.** Firma H Kranz. Ger 513,662, April 24, 1927. Details are given of app for receiving the spools and supplying the dye liquor

**Dyeing artificial silk.** Imperial Chemical Industries, Ltd. Fr 694,856, May 2, 1930 Textiles of regenerated cellulose are dyed regular blue shades by applying to the textile a diazo dye obtained by coupling a diazotized aminoazo compd. with a 1,8- or 2 8-aminonaphthol mono- or -di-sulfonic acid, the aminoazo compd being obtained by coupling with a naphthol or naphtholsulfonic acid or with a *N*-substituted deriv of 2,8 aminonaphtholsulfonic acid, either diazotized *p*-nitroaniline (or a substituted deriv excepting alkoxy derivs.) or diazotized *p*-aminoacetanilide (or a substituted deriv excepting alkoxy derivs), the coupling being followed by reduction of the $NO_2$ group in one case or hydrolysis of the acetylamino group in the other Examples and a list of components with the colors obtained are given Fr 694,857 describes a process for obtaining regular dyes on textiles of regenerated cellulose by applying to the textile a monoazo dye obtained by diazotizing an oxamic acid of the benzidine series and coupling with a naphtholsulfonic acid, a sulfonic acid of naphthylamine, 1,8-aminonaphtholsulfonic acid 1,8-dihydroxynaphthalenesulfonic acid, *m*-dihydroxybenzene deriv., *m* diaminobenzene deriv or *m* aminohydroxybenzene deriv Examples and a list of components with the colors obtained are given Cf *C A* 25, 1685

**Dyeing cellulose esters or ethers.** I G FARBENIND A.-G (Wilhelm Eckert, Carl E Muller and Walter Gmelin, inventors) Ger. 516,982, Feb 2, 1929. Addn to 515,029 (*C A* 25, 1685) The method of Ger 515,029 is modified by using naphthalimide-4 sulfamic acid or the corresponding derivs or their salts instead of 4 aminonaphthalimide or the derivs mentioned Examples are given

**Dyeing skins, furs, feathers, etc.** I G FARBENIND A.-G (Karl Marx and Karl Bittner, inventors) Ger 513,525, Apr 14, 1927 Use is made of a soln contg an oxidizing agent and a salt of the base *p*-$RC_6H_4NHC_6H_4NH$ alkylene-OH-*p'*, where R = H, $CH_3$, $OCH_3$ or halogen The material may be mordanted In the example, skins are treated with an aq soln of $H_2O_2$ and 4-hydroxyethylaminodiphenylamine-HCl to produce a yellowish tint when mordanted with Fe alum A blue-violet color is given by *4 hydroxyethylamino-4'-methoxydiphenylamine-HCl*

**Skein-dyeing apparatus.** J SCHUMPF Brit 336,174, Dec 27, 1928 Structural features

**Apparatus for dyeing width fabrics.** O OBERMEYER Brit 336,724, Aug 26, 1929 Structural features

**Apparatus for dyeing cloth webs.** WM E CAFFRAY (to Nashua Mfg Co) U. S 1,791,954, *Feb 10 Various structural details are described*

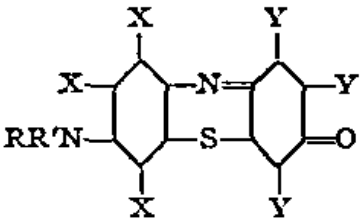
**Apparatus for dyeing ribbons, etc.** H A BLUNDELL and BLUNDELL BROS (LUTON), LTD Brit. 336,686, July 23, 1929 Structural features.

**Extracting dyes from dyed artificial materials.** WM WHITEHEAD (to Celanese Corp of America) U S 1,791,990, Feb 10 Dyed materials formed from artificial org cellulose derivs such as cellulose acetate are treated with a soln. such as $C_2HCl_3$ *together with about 2% of acetone, which acts as a swelling agent for the cellulose* deriv material and a solvent for dyes present.

**Reduction products of dyes.** I. G FARBENIND A.-G Fr 693,904, April 14, 1930 Stable reduction compds which are difficultly sol in aq alkalies are prepd by submitting to an alk. reduction the symmetrical or asymmetrical dyes of the thioindigo series which are substituted in their mol., at least once, by a halogen alkyl or alkoxy *group, the alkali being present in amt. less than that used practically for the prepn.* of the vat dyes in question Several examples are given

**Printing textiles.** I G FARBENIND A.-G Fr 693,996, April 15, 1930 Textiles are printed with stable reduction products of thioindigo dyes prepd by the process described in Fr 693,904 (preceding abstr.) and then treated in the usual manner. Examples are given. Cf *C A*. 25, 1391

*Textile printing. I G. FARBENIND A.-G Fr. 694,643, April 28, 1930* Fast printings are obtained on vegetable fibers by direct printing in the usual way with dyes of the formula:




in which R' is an aryl ring which may be substituted, R is H or an alkyl or aralkyl group, X is H or a univalent substituent, Y is H or a univalent substituent, particularly a halogen These dyes are described in Ger 445,270

**Printing.** I. G FARBENIND A.-G (Albrecht Schmidt and Ernst Pfeffer, inventors). Ger 515,305, Jan. 5, 1929 Prints obtained from vat dyes with the aid of methyl cellulose are fixed, without steaming, by means of a salt bath contg alkali and a reducing agent, *e g*, hyposulfite Examples are given

**Coloring textiles.** HENRY DREYFUS. Fr. 694,750, April 29, 1930 The solidity of dyes on textiles, etc., particularly anthraquinone derivs contg $NH_2$, alkylamino or arylamino groups, is improved by incorporating in the textiles before, after or during their dyeing, one or more urea bases such as diisoamylthiourea or tetramethylthiourea. A dispersion agent and a protective colloid may also be added Fr. 694,751 describes a similar process in which one or more alkylated diarylamino bases such as tetraalkyldiaminodiphenylmethane (or ethane) are used Cf *C A* 25, 1685

**Colored reserves in textile printing.** I G FARBENIND A.-G Brit. 336,968, July 22, 1929. Colored reserves are obtained by incorporating with the reserve, com

# 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Desirable properties in paints for toys. W ADLER *Farbe u Lack* 1931, 65, 76–7.—Suitable pigments of a wide range of colors for use in aq and non-aq media are discussed. G. G. SWARD

Adhesion in the painting and in the gluing of wood. F L. BROWNE *Ind. Eng Chem* 23, 290–4(1931).—To improve materially, the durability of house paints on wood means must be discovered for making coatings adhere permanently so that they will wear away instead of falling off in pieces (cf *C A* 24, 2313) Scientific approach to the problem requires a study of the nature of the adhesion between coatings and wood There are essential similarities between coatings clinging to wood surfaces and layers of glue joining surfaces in glued wood joints Knowledge already gained about the adhesion between glue and wood (*C A* 21, 3485 23, 1304) may therefore serve as a useful guide in the study of adhesion between coatings and wood F L. BROWNE

Notes on lead tungate. H A GARDNER *Am. Paint & Varnish Mfrs.' Assoc., Circ* No 377, 133–4(1931).—Pb tungate as a vehicle for quick-drying paints may be prepd by adding 30 parts litharge or 35 parts basic Pb carbonate to 100 parts of tung oil fatty acids at 300° F The paste so prepd is thinned while hot, preferably with solvent naphtha Pb tungate so prepd. is sol. in a no of common solvents while hot but gradually ppts from these solns. on standing after cooling Apparently its pptn does not preclude its use in paints G G SWARD

*Protection of surfaces with paint and varnish.* ASSER *Farbe u Lack* 1931, 78.—An address. G G. SWARD

Criticism of accelerated weathering tests. PAUL NETTMANN *Farbe u Lack* 1931, 77.—The usual accelerated weathering test is conducted without proper consideration of the various destructive forces Until these forces are evaluated, success in accelerated weathering tests will not be attained G G SWARD

Quinquennial review of the mineral production of India for the years 1924 to 1928. Barytes. A. M. HERON *Records Geol. Survey India* 64, 324–8(1930). Mineral paints. E. H. PASCOE. *Ibid* 409–11.—Red and yellow ocher are the only important mineral pigments in India. ALDEN H. EMERY

Bodied pilchard oils. STANLEY A. LEVY. *Am. Paint & Varnish Mfrs' Assoc., Circ. No. 377, 139(1931).*—*Some phys constants of pilchard oil thickened to various degrees are given* G. G SWARD

Glass color standards for varnish. STANLEY A LEVY. *Am Paint & Varnish Mfrs' Assoc., Circ.* No 377, 140(1931); cf. *C. A.* 24, 4408.—The $K_2Cr_2O_7$ and $NiSO_4$-I, values for addnl intermediate glass color standards are given. G G SWARD

Lacquer diluents of the petroleum type. JEFFREY R. STEWART *Am Paint & Varnish Mfrs' Assoc., Circ.* No. 378, 143–53(1931).—The kauri butanol no., the diln ratio, the soly in $Me_2SO_4$ and the aniline point (crit. soln temp in aniline) of 27 different lacquer diluents were detd. In most cases the last named test may be carried out as follows: Warm approx equal quantities (*viz.*, 3 cc aniline and 2.5 cc. diluent) in a 6-in test tube until miscible Allow the contents of the test tube to cool in a water bath and *note the temp. at which the soln becomes cloudy Repeat the process twice with 0.3* cc. addns of diluent each time. The max temp at which cloudiness appears is the aniline point The aniline point is inversely proportional to the other 3 properties. G G SWARD

Alcohols for cutting shellac. STANLEY A LEVY. *Am. Paint & Varnish Mfrs' Assoc., Circ.* No 377, 137–8(1931).—No differences were noted in the working properties of shellac cut with formula No 1 and with formula No 5 alc. contg alcotate and aldehol G. G. SWARD

Graphical calculation of the composition of ceramic varnishes. ANGELO CASTIGLIONI. *Industria chimica* 5, 1351–5(1930).—The quantities of the various constituents in a varnish are represented by the sides of polygons having as many axes as there are constituents, and whose length is proportional to the amts. present Thus when *mixts* of varnishes of known compn. are mixed with those of unknown compn., the compn of the resulting mix being known, the unknown quantities can be scaled off on the diagram by proportion. A. W. CONTIERI

Yellowing phenomenon in coating compositions. I. Oil vehicles. EDWARD F. MALONEY. II Water vehicles. F. C. ATWOOD. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 461–73; *Am. Paint J.* 14, No 52D, 25, *Paint, Oil & Chem. Rev.* 90,

No 17, 80 3, *Oil, Paint & Drug Rep* 118, No 19, 54 5(1930) —The theories of yellowing of oil paints are briefly reviewed, 17 references being given While a slightly elevated temp accelerates the yellowing of oil vehicles, temps below 225-50° do not affect water vehicles Data are given for the hiding power of 15 common pigments in a casein vehicle (compn not given) Max hiding power in sq ft per gal of paint was obtained with lithopone which gave 305 sq ft /gallon Some of the other values were Titanox-B 245, l ng whiting, 163, barytes, 112 The detns were made on black and white checkered linoleum (cf *C A* 24, 2312) G G SWARD

**Surface protection of the light metals** TH LEIB AND FR KOLKE *Korrosion Metallschutz* 7, 3-11(1931) —This is mostly a discussion of the problems encountered The use of the Jirotka-Bengough process and of combinations of oil base and nitrocellulose base coatings is recommended Data are given showing the resistance of such coatings against accelerated tests and outdoor exposure The use of oil base coatings, applied in 3 thin successive coatings, is recommended Among the pigments, zinc chromate and iron oxide were found to be the best Good results were also obtained with zinc white Expts were made with the application of oven drying coatings on untempered lautal, in such a manner that the drying and tempering took place simultaneously The advantage is that parts treated in this manner can be stored for a longer period of time without danger of corrosion If such parts are to be exposed to sea water, addnl protective coatings must be applied LEOPOLD PESSEL

**"Improved" linoleum brush-out test for hiding power.** STANLEY A LEVY. *Am Paint & Varnish Mfrs' Assoc., Circ* No 377, 135-6(1931) —Results of expts with a brush out board (cf *C A* 24, 2312) whose squares conform in brightness to the specifications of the A S T M are satisfactory. G G SWARD

**The nature of the resins in jack pine [Pinus banksiana].** HAROLD HIBBERT AND JOHN B PHILLIPS *Can J Research* 4, 1-34(1931) —Green and seasoned jack pines have an av crude resin content of 4 58% and an ether sol content of 3 52% The value of "total acids" present in the resin was the same in each case, but the proportion of "fatty" acids was greater in green wood, while the unsaponifiable matter was considerably less The seasoned wood contained a lower percentage of fats than the green wood and a correspondingly higher percentage of resin acids The amt. of unsaponifiable, polymerized terpenic substances was also higher There was a marked decrease in the amts of phytosterol and "resene" in the seasoned wood The isolated resin acids obtained by distn or esterification contained a high percentage of abietic acid formed by transformation of the original acids The percentage of natural (pimaric) acids was, however, quite high in the resin acids isolated by petr ether and recrystd only twice. A higher percentage of cryst acids was found in the resin acids from green wood than from seasoned wood, presumably because of the change into amorphous products during storage The fatty constituents were chiefly members of the unsatd series, present both as free acids, glycerides, or other esters The seasoned wood contained much less linolic acid in the glycerides than green wood Oleic acid was present in about the same proportion in both cases Linolenic was present in only very small quantity. The free fatty acids had practically the same percentage compn in both green and seasoned wood The amt of the total unsatd fatty acids was higher in the glycerides and free acids from green wood than from seasoned wood The latter contained a high percentage (30 2%) of oxidized acidic material in the fatty glycerides, indicating that extensive polymerization, or decompn of some kind, had taken place in the fats present in the green wood during the time of seasoning The quantities of essential oil obtained from the resins of each kind of wood were very small, amounting to 1.5 to 4 3% of the total crude resins The products showed no difference in properties, or variation in amt, with time of storage of the wood. Because of the small quantity available for investigation, only α pinene could be identified The percentages of phytosterol and resene were extremely small, and were appreciably less in the seasoned wood than in the green wood The amt. of polymerized terpenic material found in the unsaponifiable matter was much higher in the seasoned wood This was probably due to extensive polymerization of the essential oil having taken place during the storage of the wood J W. SHIPLEY

**Preparation of synthetic resins from alkali lignin.** MAX PHILLIPS AND HERMAN D. WEIHE *Ind Eng Chem* 23, 286-7(1931) —The condensation of lignin with various aromatic amines and with furfural yields sol., dark, fusible resins Possible uses for the products are suggested W. A. LA LANDE, JR

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Cr oxide [for use as a pigment] (Brit pat 336 671) 18. Asphalt or tar compositions

[for paint] (Fr pat 694,789) 20. Nitrocellulose from wood-pulp board [for varnishes] (Brit pat 330,235) 23. Organic isocolloids [for varnish] (Fr. pat 694,339) 10.

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**Paints.** N V DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Fr 694,640, April 28 1930 The agglomerating agent for colors contg metals is used in the form of an aq dispersion An example is given of the mixt of Al powder in white spirit which is poured into an aq dispersion of asphalt and the whole is stirred

**Bituminous paint** CRAIGBANK CHEMICAL CO., LTD., and J H TAYLOR Brit 336,117 Oct 26, 1929 A paint comprising bitumen or pitch, a volatile solvent such as turpentine, a pigment or mineral filler such as PbO and a vegetable drying oil such as boiled oil is stated to be improved by the addn of 5–15% of tannic acid

**"Weather-resistant" paints.** I G FARBENIND A.-G Brit 336,198 May 2, 1929 Paints such as those formed with the usual drying oils, have incorporated with them such a quantity of a basic pigment such as white lead and minium, as is necessary to combine into soaps all free and combined fatty acids present in the binding agent Other inert constituents such as colcothar, titanium white, lithopone or blanc fixe may also be added Examples with details are given Cf. *C A* 25, 1691

**Anti-rust paint.** ADOLF SCHNEIDER Fr 694,833, May 1, 1930 Fe or its oxides are heated in the presence of O to 750–1100° for a sufficient length of time to produce the gray highly oxidized compd., which is used in a finely divided state with suitable carriers or binders

**Pigments.** TITANIUM PIGMENT CO., INC Ger 516,314, Nov 11, 1926 See Brit 281,459 (*C A* 22, 3543)

**Zinc colors.** COMPAGNIE DES MINES, FORGES ET ACIÉRIES DE VITKOVICE and ADOLF ANDZIOL Fr 694,290, Apr 22, 1930 An app is described for treating pyrites with gases contg II, for the production of $H_2S$, which is used for the manuf of Zn colors from Zn lyes

**Lithopone.** SACHTLEBEN A.-G FÜR BERGBAU UND CHEMISCHE INDUSTRIE Brit 330,839, Dec 5, 1928 For rendering lithopone weather resisting it is quenched, after calcination, in water contg water-sol sulfates such as $MgSO_4$ or $Na_2SO_4$, and if the lithopone does not naturally contain some sol Ba salts a small proportion of a salt such as $BaCl_2$ or Ba sulfide may be added to it before the calcination, so that the sulfate treatment may form $BaSO_4$ around the particles of lithopone Cf *C. A* 25, 222

**Printing inks and pastes.** I G FARBENIND A.-G Brit 337,199, Oct 31, 1929 The process for prepg printing inks and pastes described in Brit 307,877 (*C A* 24, 252) is modified by substituting, for the resinous products used, unhardened sol products produced by the condensation of "polybasic" org acids with polyhydric alcs and one or more "monobasic" carboxylic acids contg at least 7 C atoms, such as the product which may be prepd by heating together glycerol, linseed oil, phthalic anhydride and colophony dissolved in toluene, which may be ground with Lithol Fast Scarlet R Various other materials may be added such as sol cellulose derivs., solvents, plasticizers, driers etc

**Treating drying oils.** GUSTAV RUTH AKT.-GES and ERICH ASSER Fr. 694,074, Apr 17, 1930 Useful products are obtained by heating drying oils, particularly linseed oil or a mixt of linseed oil and china wood oil, to about 270–280° until polymerization commences Air is then bubbled through and the heating continued to 310° or more Cellulose esters or ethers may be added

**Nitrocellulose varnish.** KAZUO TAKEMURA (50% to Kazue Oiwa). U S 1,791,870, Feb 10 A coating compn which is especially suitable for use on ironwork comprises nitrocellulose together with mixed solvents and about 3% of $K_4FeC_6N_6$ and pulverized bamboo (suitably about 5%)

**Nitrocellulose lacquers, etc.** W J JENKINS and IMPERIAL CHEMICAL INDUSTRIES, LTD Brit 336,615, April 11, 1929 Compns for the prepn of enamels or lacquers are made by dissolving water-wet nitrocellulose in a solvent which evaporates in air at normal temps and has a b. p not less than about 120° (such as ethylene glycol monoethyl ether or BuOAc) with the addn of a water-miscible or partly miscible volatile solvent such as industrial alc or EtOAc in sufficient quantity to keep the water in soln A solvent of higher b. p than the main solvent also may be added such as methylcyclohexanone, and water-wet or moist pigments may be added also, as may ingredients such as dammar gum, tricresyl phosphate and the like

**Coloring nitrocellulose lacquers and plastics.** I. G FARBENIND A.-G. Ger 516,315, Aug 29, 1929 Addn to 515 057 (*C. A.* 25, 1692) The dyes obtainable from hydrochlorides of dialkylated nitrosoanilines and monoalkylated *m*-aminophenols are used, instead of the dyes specified in Ger 515 057.

**Lacs and varnishes.** JOHANNES SCHEIBER Ger 513,540, Feb. 21, 1928. Linoleic

acid isomers (octadecadien 9,11-acid 1) obtained from ricinoleic acid are esterified with multivalent alcs., especially glycerol, and the product is used for the manuf. of lacs and varnishes. Resin may be added. Thus, technical ricinoleic acid is heated to 200° and distd. *in vacuo*. The product going over at 260–270° is heated to 200° with glycerol to give a bright oil. Other examples are given. Cf. *C. A.* 25, 1400.

**Coating composition.** Victor H. Turkington (to Bakelite Corp.). Can. 308,848, Feb. 24, 1931. Resinous compns. are prepd. by reaction of 100 parts of cresol, 200 parts of tung oil and 25 parts of $(CH_3)_4N_4$ at a temp. of 190–200°. Cf. *C. A.* 25, 834.

**Coating compositions containing *m*-styrene and softeners.** Walter E. Lawson (to E. I. du Pont de Nemours & Co.). U. S. 1,792,102, Feb. 10. Compns. suitable for coating metals, glass, wood, etc., comprise *m*-styrene and tricresyl phosphate, dibutyl phthalate, dixylyl ethane, glyceryl dibenzyl ether, butyl stearate or homologs of these compds. Cf. *C. A.* 24, 980.

**Coating metals with synthetic resins.** Herold A.-G. Brit. 337,192, April 30, 1929. Solns. of phenol aldehyde artificial resins are applied to metal surfaces while the latter are at a temp. above the b. p. of the solvent (which may be "spirit") to evap. the solvent and the coatings are hardened by heating. The rate of hardening may be restricted by the use of incomplete condensation products or by dilg. the coating soln. with cresols, glycerol, glycol or high b. p. polyglycols, or addn. of solids such as feldspar, zirconia or kieselguhr.

**Purifying and decolorizing rosins.** Robert C. Palmer and Clyde O. Henke (to Newport Co.). U. S. 1,791,633, Feb. 10. Rosin dissolved in a volatile hydrocarbon material such as petroleum naphtha is treated with resorcinol at a temp. (suitably about 90–110°) at which the resorcinol is in liquid form and below the b. p. of the hydrocarbon material, and after agitation, the materials are allowed to stand and the liquid resorcinol layer contg. the impurities is removed. Cf. *C. A.* 25, 424.

**Rosin decolorization and purification.** Durain C. Butts (to Hercules Powder Co.). U. S. 1,791,653, Feb. 10. Rosin is heated in an inert atm. such as $CO_2$ to a temp. substantially within the range of 280° to 350° while avoiding substantial decompn. or distn.

**Inlaid linoleum.** W. O. L'Estrange. Brit. 336,277, July 8, 1929. Mech. features.

**Condensation products from vinyl esters.** I. G. Farbenind. A.-G. Brit. 336,237, Nov. 16, 1928. In the production of polymerization products such as those of vinyl acetate, chloroacetate, chloride and benzoate and of lacquers from the resinous derivs. thus obtained there is added (before, during or after the polymerization) a small proportion of a basic substance sol. in org. solvents such as guanidine or its derivs., hydrazine or its derivs., ethylamine, formaldehyde or phenylhydrazones and N compds. having plasticizing properties (such as a condensation product of urea and formaldehyde) also may be added. Benzoyl peroxide also is added in polymerizing vinyl benzoate. The production of *lacquers* is described. Cf. *C. A.* 25, 389.

**Molded articles from synthetic resin compositions.** Bakelite Corp. Brit. 336,265, July 10, 1929. Articles with a raised surface design are made by applying a colored mixt. (such as a plastic phenol resin and bronze or other pigment) to a phenol resin compn. in a partially cured state and then completing the curing. Various details of procedure are described.

**Colored molding mixture containing a synthetic resin.** Bakelite Corp. Brit. 336,264, July 10, 1929. A mixt. comprising a potentially reactive resin, a filler such as wood flour and a pigment is subjected to extrusion whereby the colored particles are distributed along definite flow lines.

**Molding articles of artificial resin.** Herold A.-G. Brit. 337,184, Oct. 24, 1928. Articles of artificial resin such as balls, tubes or dishes are cast by the use of a cast mold of Pb or other easily fusible metal within an outer mold which may be made by either casting or dipping. Various structural details are described.

**Modifying resins, waxes and fatty oils.** Herbert Hönel. Austrian 120,679, May 15, 1930. Resins, waxes and fatty oils are heated with a subordinate amt. of a primary condensation product obtained under alk. conditions from $CH_2O$ and a phenol having a hydrocarbon substituent in the *p*-position to the OH group. In this way, the resins and waxes are rendered harder and of higher m. p., and fatty oils are made more viscous. Thus, an oily condensation product from *p*-amylphenol and $CH_2O$ may be introduced into 5 times its wt. of a fused coumarone resin m. 50–55°, the temp. being gradually raised to 200°; a clear resin m. 70–75° is obtained. Other examples and addnl. details are given.

**Synthetic resins.** Imperial Chemical Industries, Ltd., and R. Hill. Brit.

336,698, Aug 3, 1929 Blending of monohydroxylated fatty oils such as drying oils with resins such as those formed from glycerol and phthalic anhydride or similar components is facilitated by replacing some or all of the polyhydric alc. by a reaction product of a polyhydric alc. with a lower aliphatic aldehyde such as $CH_2O$, *e g*, glycerol and polymerized $CH_2O$ are condensed together, then phthalic anhydride and tung oil or linseed oil, or phthalic anhydride, tung oil, colophony and glycerol are added and the mixt. is heated until a homogeneous resin is produced Varnishes prepd from such products dry rapidly in the air or when heated and their drying may be facilitated by adding substances such as Co linoleate

Synthetic resins. BAKELITE CORP. Fr. 694,047, April 16, 1930. White masses of compns having a basis of phenol resinoid are made by the reaction of phenol about 100 with $CH_2O$ about 200 and di-Et phthalate 70 parts in the presence of oxalic acid acting as catalyst Water is removed from the reaction mass, a volatile solvent is added and the whole mixed with "albalith" The liquid mixt thus obtained is applied to a filling material The app used must not contain Fe or Cu Cf. *C A* 25, 1400

Synthetic resins. EDGARD ISRAEL. Fr. 695,036, Aug 7, 1929 Urea and $CH_2O$ are condensed with glucose or lactose as condensing agent, in the presence of a metallic oxide, preferably ZnO, and polymerized at 80°

Artificial resins of the glycerol phthalic anhydride type. BAKELITE CORP. Brit. 336,645, July 10, 1929 A 'polybasic" acid such as phthalic anhydride or succinic acid and a polyhydric alc. such as glycerol are heated together until "slag formation" begins and the reaction is then arrested by rapidly cooling the mass throughout so that transformation to a "slag condition" is prevented (as by casting in thin layers) The product may subsequently be baked for hardening or may be broken up, remelted and cast Dyes may be added and various details of temps. employed, etc., are given

Artificial resins. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr 694,669, Apr 29, 1930. Artificial resins are prepd by the reaction of amines such as $PhNH_2$ with insufficient aldehyde, then adding more aldehyde and heating under pressure to cause the resin to pass to the infusible state.

Artificial resins. IMPERIAL CHEMICAL INDUSTRIES, LTD Fr. 694,181, April 18, 1930 Rapidly hardening resins are made by the union of a polybasic acid polyhydric alc. resin with a condensation product of $CH_2O$ and urea or thiourea or with substances capable of giving a product of this kind, this union being effected in an alc. solvent and with the aid of heat. As solvents ethylene chlorohydrin, BuOH or hexahydrophenol may be used Cf *C. A.* 24, 740.

Artificial resins. LOUIS C. F. PÉCHIN. Fr 694,978, May 5, 1930. Artificial phenol aldehyde resins are hardened by heating them under vacuum to 95–105° in vessels placed in an oil of low d., and then to 140–180° under atm pressure still in the oil. Cf *C. A.* 25, 1692

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Determination of the fat content of oil seeds. M MONHAUPT *Chem.-Ztg* 55, 70(1931).—M modifies Dopfer's method for the detn of fat in oil seeds as follows: place 4 g of the ground seed in a round bottom, heavy glass bottle together with 40 cc of gasoline b 40–60°, 10–12 g of sand and 5 or 6 steel balls of 10–12 mm. diam and grind in a shaking machine for 1–2 hrs or until apparently "dust-free", allow to settle, evap. 20 cc. of the gasoline ext., weigh and calc. the % of fat according to the formula: $x = (100 \times 40 \times f)/4(20-1\ 0753\ f)$, in which $f$ is the wt of the oil residue from 20 cc. gasoline soln, and 1 0753 is the sp gr. factor for oil (1 00/0 93). P. ESCHER

The determination of unsaturation of fats and acids. III. Wijs iodine number. J. VAN LOON *Chem Umschau Fette, Oele, Wachse u. Harze* 37, 257–62(1930), cf. *C. A.* 24, 3663.—The Wijs method for detn. of I no. shows the theoretically true unsatn. value when correct exptl conditions are selected, except with triple bonds which become only ½ satd. by halogens There is no substitution by I even in prolonged action of the reagent. For official analyses the I no of the acids (after removal of the unsapon matter) should be detd. in addn. to that of the oil, because their I no is more const. than that of the oil If the total acids show an I no which increases on continued action of the reagent, a polymerized product or some unknown acid may be present. The Wijs method satisfies all scientific requirements and is applicable to general fat chemistry. P. ESCHER

Some physical constants of fatty acids. (Specific heat, viscosity, absorption of

ultra-violet light.) E. L. Lederer. *Allgem. Öl- u. Fettztg* 27, 237–41(1930).—The sp. heats of stearic, lauric and oleic acids were measured at several temps. and calcd. for others. A new formula for calcn. of viscosity, based on thermodynamic principles, is derived: $\log \eta = (q^\circ/4.571\,T) - 2.75 \log T + ET + C$, where $\eta$ = coeff. of viscosity (in poises), $T$ = temp., $q^\circ$ = heat of assocn. at 0° (cal. per mol.), $E$ = const., $C$ = const. The values of $q^\circ$, $E$ and $C$ for the following substances are, resp., butyric acid 1960, 0.001770, 2.9952, valeric acid 2330, 0.001663, 2.9050, caproic acid 2740, 0.001401, 2.8200, heptylic acid 3210, 0.001470, 2.5791, caprylic acid 3475, 0.001576, 2.4883, nonylic acid 3655, 0.001696, 2.4160, capric acid 3700, 0.001992, 2.3865, myristic acid 5030, 0.001670, 2.0221, stearic acid 5490, 0.001907, 1.7020, pentane 724, 0.002097, 3.0077, water 5825, 0.008222, —1.9613. The values of $\eta$ for butyric acid at 8 temps. between 0° and 160° were calcd. and found to agree within 2.2% with the values given in the tables of Landolt Börnstein. Measurements of the absorption of ultra violet light were made on the satd. fatty acids in the liquid state, rather than in soln. In making the measurements a photoelec. Na cell was used instead of a photographic plate. In this way it was possible to make more accurate measurements than heretofore. It was found that all the fatty acids observed showed sp. absorptions of the wave lengths between 270 and 280 mμ. This sp. absorption was observed in synthetically prepd., as well as in naturally occurring, fatty acids but not in triglycerides. It was further observed that the sp. absorption for the shorter chain acids was for the shorter wave lengths. Thus the sp. absorption range was between 270 mμ for propionic acid, and 280 mμ for stearic acid. The cause for this sp. absorption has not yet been definitely established. W. F. Bollens

**Method for estimation of total unsaturated fatty acids of higher unsaturation than oleic acid in fats and oils.** N. Baskin. *Allgem. Öl- u. Fettztg* 27, 243–4(1930).—The method is based on the conversion of unsatd. fatty acids of high mol. wt. into ether acids (cf. *C. A.* 24, 2142). The sapond. fat carrying excess alkali of 0.1% is polymerized in an atm. of $H_2$ for 2–3 hrs. at a temp. of 200°. This procedure reduces the unsatn. of those fatty acids contg. more than 1 double bond to that of oleic acid. The difference in I nos. of the sepd. fatty acids before and after polymerization is called the "Mutit" no. and is a measure of the fatty acids contg. more than 1 double bond. The "Mutit" no. of several oils is given: olein (tech.) 1.2, peanut oil 23, cottonseed oil 50, soy bean oil 50, sunflower seed oil 46, linseed oil 90, herring oil 54, cod liver oil 74.1. W. F. Bollens

**Characteristic fatty acids of vegetable and animal fats with reference to the biological families in which they occur.** T. P. Hilditch. *Allgem. Öl-Fettztg* 27, 219–22, 255–8 (1930); cf. *C. A.* 24, 4176.—A compilation is made of the percentage fatty acid compn. of a large no. of fats and oils arranged according to the biological families in which they occur. W. F. Bollens

**Manipulation and evaluation of the Mackey test.** Kehren. *Seifensieder-Ztg* 58, 29–32(1931).—K. summarizes former exptl. results as follows. The real cause of the temp. increase in the Mackey test is the rapid oxidation of the linolic or linolenic acid when present in the olein to be tested. This temp. increase is accelerated by iron soaps or other pos. catalysts and is inhibited by neg. catalysts like β naphthol. The presence of soaps should be confirmed by an ash detn. (upper limit less than 0.07%) and by a qual. test for Fe. When present, the temp. test should be repeated after removing the Fe soap from the sample by extn. with dil. HCl. The I no. and Kaufmann's thiocyanate no. should be detd. to detect any presence of linolic acid if a neg. catalyst is suspected. The presence of much unsaponifiable matter also reduces or retards the temp. increase. The standard limit of 100° or 150° after 1 hr. should be modified, since oleins which contain acids with more than 1 double bond show a rapid temp. increase after ½ hr., the cotton being more or less carbonized. *Directions for making the test are given in much detail.* P. Escher

**Further notes on the Mackey test.** H. Wolf and R. Heilingötter. *Chem. Umschau Fette, Oele, Wachse u. Harze* 38, 24–5(1931); cf. *C. A.* 25, 429.—The selection of the material for the cotton bearing cylinder may well be left to the (German) Olein Commission. *The samples of olein should be tested in the same condition as received,* it would be illogical to attribute the temp. rise due to the presence of any soap to the presence of "unsatd. fatty acids" in an otherwise unobjectionable sample. The soaps cause a temp. rise only after prolonged (1.5 hrs.) heating at 100°, while unsatd. acids usually show a temp. rise at a low temp. after ½ hr. An olein becomes a fire hazard *through* the presence of unsatd. acids, not by the presence of soaps. The present tendency is to reduce the time of heating to 1 hr. rather than to increase it to 3 hrs. The moment the thermometer in the cotton registers 70° should be considered the start-

ing time of heating It is not necessary to pass a stream of air through the app., since the natural ventilation through the tubes is sufficient P Tschirch

**The pyrolysis of vegetable oils of high acetyl value.** Raymond Delaby and Raymond Charonnat *Bull. sci. pharmacol.* 38, 17–23(1931) A E Meyer

**Yield differences in the oil mill.** E I Bitter *Chem. Umschau Fette, Oele, Wachse u. Harze* 38, 33–4(1931).—B. calls attention to unaccounted for differences (about 1%) in the oil mill between the calcd. yield based on lab. analysis and the actual yield in the factory. It is suggested that this difference is due to phosphatides or lipoids showing different solubilities under lab. and factory conditions P I Schirch

**Analysis of refined (olive) oils.** Gaetano Marcona *Atti III congresso naz. chim. pura applicata* 1930, 564–8.—From chem. and phys. tests of a great many samples of olive oil it is concluded that refined oil from the first extn. acts like a true olive oil as regards chem. and phys. consts. and various analytical tests, the exceptions are the Wood light test and the Bellier test. Oils from the second extn. show a reduction in av. quality and chem. and phys. tests. The characteristics of edible olive oil should be standardized strictly. Oils which have a $n$ above 62.8, a thermal index above 47, unsaponifiable content above 1.5%, and which do not correspond to the Bellier, Blarez and Tachini Morawsky tests should be excluded. Addn. of refined first-extn. olive oil should be limited, so as not to vary these tests. I M Symmers

**Correlation of oil content to presence of color in the stem of castor (Ricinus communis).** G B Patvardhan *Poona Agr. Coll. Mag.* 22, 16–8(1930).—In 32 samples of beans from red stemmed castor plants the oil content ranged from 40.15 to 54.97% with an av. of 45.91%, while in 24 samples from green stemmed plants the oil content ranged from 35.75 to 54.21% with an av. of 51.22%. The analyses were made on seed of parents which had proved true to stem color in the succeeding generations. K D Jacob

**Detection of castor oil and peanut oil in abrasin oil.** Hans Wolff and J Rabinowicz *Farben Ztg.* 36, 590–7(1930).—Castor oil can be detected by the formation of octyl alc. on fusion with KOH. The amt. can be calcd. from the acetyl values of the sample and of an FtOH (80–85%) ext. Peanut oil can be detected by the formation of arachidic acid and detd. by means of its $n$, which is 1.468–72, that of abrasin oil is 1.517. G G Sward

**Suggestions for the proposed unified methods of analysis of Turkey-red oil and similar products.** Wizöff *Chem. Umschau Fette, Oele, Wachse u. Harze* 38, 31–7(1931).—This is the text for the proposed standard methods of analysis as worked out by the German Commission for Fat Analysis jointly with the Intern. Soc. of Leather Chemists, the National Comm. of Trade Specifications and the Union of Turkish Red Oil Mfrs. The methods are based on extensive analytical investigations and on control checks by public analysts, but cover only sulfonated oils whose $SO_3$ can be completely split off by boiling HCl. P Tschirch

**Constituents of the leaves of pine (Pinus Thumbergii).** I Jenjiro Sakurai. *J. Pharm. Soc. Japan* 51, 31–9(1931).—S. isolated from the petr. ether ext. of the leaves of pine a wax-like substance (I) which had the following phys. properties: $d^{17}$ 0.9201, m. 78–80°, acid no. 29.84, sapon. no. 218.90, ester no. 189.06, sapon. no. after acetylation 219.18, and I no. 7.55. Sapon. of I (100 g.) gave mixed solid fatty acids (II) (85 g.). II was esterified and fractionated into the following constituents: lauric, palmitic, stearic, hydroxypalmitic acids. T I Nakamura

**Textile soap.** G. T. Halbfrstadt *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 67–70; *Am. Dyestuff Reptr.* 20, 109–12(1931).—A review. M H

**Lime-proof soaps.** W Schrauth *Seifensieder-Ztg.* 58, 61–3(1931).—The usual lime-proof soaps are the Na salts of sulfonated fatty acids which keep the Ca soaps, formed by hard water, in such a finely divided state that they are not deposited upon the fabric of the washed goods. S. describes a new type of soap like salts made by reducing the higher fatty acids to their alcs., sulfonating them and converting the sulfonates into their Na salts of the general formula $RCH_2SO_3Na$. These salts have the properties of soaps, excelling in emulsifying power, lauric Na sulfate shows with Traube's surface tension pipet 29 drops in spindle oil against 17 drops for regular coconut-oil soap. They are not easily hydrolyzed and are very stable toward Ca and Mg salts. P Tschirch

**Rancidity of soaps and its relation to the properties of fats.** F Wittka *Seifensieder-Ztg.* 58, 3–5(1931), *cf. C. A.* 25, 613.—W. prepd. soaps from various fats and examd. their keeping quality toward oxidation in the presence and absence of catalysts and light. Of the hardened fish oils whale oil resists oxidation most, herring oil is equiv. to edible tallow, sardine oil turns brown on exposure to light or to catalysts, the latter

2 oils on standing take on an intense odor of hardened oil, peanut, sesame and palm-oil are sensitive to air and light. Coconut oil and its soap keep longest, soaps from palm-kernel oil and Babassu fat do not keep quite as well. Soaps from corn, grape kernel and linseed oil soon turn rancid even without catalysts. Soaps with 15% or less of WW or FG rosin show little change, but larger quantities make them unstable and sticky.
P. Escher

Moisture determination in soaps and fats by distillation. E. Schleveer. *Seifensieder Ztg* 58, 96–7(1931).—From lab expts. S concludes that $H_2O$ detns. in soaps by the distn. method with petr. benzine yield low results, unless a sufficient amt. of olein (20 g. per 20 g. soap flakes) has been added before distn.; addn. of dry sand is superfluous. Butter needs no olein addn., and correct results are obtained by direct distn. with petr. benzine. S. prefers xylene in place of petr. benzine, since the latter holds some of the distd. $H_2O$ in min. suspension.
P. Escher

Indirect estimation of potassium and sodium in filled potassium-sodium soaps. G. Knigge. *Allgem. Öl- u. Fettztg.* 27, 223–5(1930).—The indirect method of Davidsohn (*C. A.* 24, 2009) is proved with a soap of known compn. Ground pumice is used as the filler. The results check very well with known compn. and also with results obtained by the perchlorate method.
W. P. Bollens

Surface tension of alkaline soap solution. Seizo Ogura. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 471–4(1930).—A modified Millard's app. was used to det. surface tension by the drop-wt. method. All measurements were made at 40°, and the tip of the pipet had a radius of 3.23 mm. The surface tension was calcd. from Tate's law $2\pi r\gamma = mg$, in which $2\pi r$ = the circumference of the tip, $\gamma$ = surface tension, $m$ = effective mass of the drop, and $g$ the acceleration due to gravity. One table and 3 graphs are given.
E. Scheuerer

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The effect of cleansing agents on linen and cotton (Simola) 25. Determination of vegetable oils in butter (de Souza Vieira) 12. Structure of synthetic mixed triglycerides (Bhattacharya, Hilditch) 10. Apparatus for extracting gases from oils (Fr. pat. 693,995) 1. Fractional condensation of oil vapors (Ger. pat. 513,613) 22. Residue of sulfonic acids from oil-refining [fat-splitting agents] (Fr. pat. 694,236) 18. Modifying waxes and fatty oils (Austrian pat. 120,679) 26. Continuous production of dispersions of waxes (U. S. pat. 1,762,967) 22.

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Extracting oils and fats. C. Schlotterhose and H. Brandt (trading as Schlotterhose & Co.). Brit. 337,679, March 28, 1929. The extn. process described in Brit. 316,581 (*C. A.* 24, 2002) is modified by subjecting the material to be extd. to a treatment with the vapor of the solvent, in direct or countercurrent, in addn. to or instead of treatment with liquid solvent. Various details of app. and procedure are described.

Extraction of oil, etc., from soy beans. M. Sato and C. Ito. Brit. 336,273, June 10, 1929. Extn. with a solvent such as EtOH is effected at a temp. above the b. p. of the solvent but below 120° (suitably at about 85°), and the soln. of fatty oil is drawn off and cooled to below 50° to sep. oil and obtain a liquid residue contg. coloring matter, sugar and lecithin. Brit. 336,274 (M. Sato and Y. Ishida) describes the extn. of soy beans and the like with a solvent such as alc. admixed with benzine or benzene of such concn. and quantity that the water in the resulting liquor is less than 10%. Extn. is effected above 65° and oil is sepd. by cooling. An arrangement of app. is described.

Extracting oleaginous materials with solvents such as in degreasing bones. Joseph Savage. U. S. 1,741,966, Feb. 10. A volatile hydrocarbon solvent is circulated in a closed circuit through an extn. chamber, passing through the chamber as vapor, under superatm. pressure, the vapors are condensed, extd. water is automatically sepd., and hot sepd. solvent is returned to the circuit at a temp. near the b. p. of the solvent at the pressure existing in the circuit. App. is described.

Glycerol distillation. I. G. Farbenind. A.-G. Brit. 336,608, July 12, 1929. Crude glycerol is treated, at its b. p. under the reduced pressure employed (suitably 20 mm. or 50 mm.) with finely divided liquids (such as wet steam or a mist of $CCl_4$ or benzine assocd. with air or $CO_2$) inert to glycerol and having a b. p. not exceeding that of water and assocd. with gaseous or vaporous carriers (the operation being continuous). Various details and examples are given.

Stabilizing fatty substances and soaps. R. T. Vanderbilt Co., Inc. Fr. 694,266, Apr. 22, 1930. Fatty substances and soaps are stabilized by the addn. of a phenolate prepd. by the reaction of a phenylphenol such as 2- or 4-hydroxybiphenyl with a base which is itself a stabilizer such as diphenylguanidine, triethanolamine or an alkylene-

diaryldiamine. If the fatty substance or soap is animal or vegetable a *p*-phenylphenol is used, if mineral an *o*-phenylphenol is used. Cf *C. A.* 25, 430

Soaps. A. Imhausen. Brit. 335,954, May 6, 1929. Soaps of high lathering power comprise grain soap and coconut oil or palm kernel oil paste soap contg little salting-out agent. Various details of manuf are given.

Soap. Albert A Besnard. Fr. 695,028, Aug 6, 1929 A soap which cleans the hands without water contains agar agar 2, psillium 3, glycerol 50, $Na_2CO_3$ 50, black soap in pulp 50, "$NH_3$" 25, Javel water 5 and distd water 815 parts.

Soap. Carlos Conen. Fr. 694,220, April 19, 1930. A soap is made by adding naphtha benzine or refined petroleum to a fatty acid and adding an alk. substance such as $Na_2CO_3$ in the dry state.

## 28—SUGAR, STARCH AND GUMS

J. K. Dale

Defecation of cane sugar juices. Nathan Levy W. *Bull assoc chim sucr dist* 47, 502–3(1930), cf. *C. A.* 4, 3310.—The author reviews his method for detg the right amt. of lime for defecation of cane juices F Camps-Campins

The use of lime and sulfurous acid in the defecation of sugar juices. Nathan Levy W. *Bull assoc chim sucr dist* 47, 500–2(1930).—The harmful effects of too much or too little lime in the defecation of cane sugar juices are reviewed. If excess lime is added and then followed by $SO_2$ to neutrality, all the evil effects of excess lime are produced and the subsequent $SO_2$ does not destroy them. The author advocates sulfitation before, instead of after, liming A slight excess of $SO_2$ is not harmful; the right amt. of lime, as detd. on raw juice, is then added There will be no deleterious result even though the resultant juice is slightly acid. F. Camps-Campins

Advances in beet-sugar manufacture in 1930. Edmund O. von Lippmann. *Chem.-Ztg.* 55, No. 17, *Fortschrittsber.* No 1, 33–6(1931). E. H.

The "Werkspoor" rapid crystallizer. R. Bonath. *Intern Sugar J.* 32, 306–9 (1930).—The earlier method of operating crystallizers was in series, utilizing the surrounding air for cooling Further developments were made with cooling jackets, and later fixed internal tube systems were adopted. A more successful type was developed by Lafeuille, who introduced a fixed tubular system, around which the hermetically closed cylinder contg. the massecuite rotated. The requirements of a crystallizer are (1) shortening the period of fermentation, (2) avoidance of formation of false grain, (3) simple and substantial design The "Werkspoor" crystallizer consists of a trough which may be either U- or bottle-shaped. The revolving water-cooled stirring system consists of a hollow drum, of large section, riveted to which are a number of semicircular hollow cooling pockets coupled by suitable pipe connections inside the central drum The transport of the massecuite from one end to the other of the crystallizer is effected by a screw-shaped element placed outside and independent of the cooling pockets. W. L. Owen

Starches and the constitution of starch. St. v. Náray-Szabó *Z. physik. Chem.*, Abt. A, 151, 420–4(1930), cf. *C. A.* 25, 16.—A discussion of recent work. W. L. Hill

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The effect of plowing-under cane trash upon the available N of the soil (Owen, Denson) 15. Potash fertilizers at the "Belle Etoile" distillery (Dubosc) 15. An inexpensive crystal or molasses separator (King) 1. Sugar anhydrides (Micheel, Micheel) 10. N-containing sugars (Bertho, *et al.*) 10. Continuous production of dispersions of gums (U. S. pat. 1,792,067) 22. Extracting [sugar from beet roots] (Fr. pat. 694,602) 17.

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Device for cleaning sugar canes. Ralph S. Falkiner. Ger. 513,928, Mar. 2, 1929.

Apparatus for storing sugar beet in water without loss of sugar. Firma R. Fölsche Ger. 513,927, Dec. 10, 1929.

Apparatus for mixing liquids with solids, particularly for liming sugar juices. Gilchrist Co. Ger. 516,359, July 19, 1925. Brit. 247,541 (*C. A.* 21, 668).

Refining sugar. Raffinerie Tirlemontoise, Soc. anon. Ger. 516,360, Oct. 1, 1926 See Brit. 278,302 (*C. A.* 22, 2680).

Carbohydrate derivatives. I. G. Farbenind A.-G. Fr. 694,696, April 30, 1930 Carbohydrate derivs. which are sol. in water and org. solvents and which are useful

for the prepn of films, lacquers, artificial silk, plastic substances, swelling and impregnating agents, etc., are made by treating a carbohydrate or one of its derivs with an alkylene oxide or one of its homologs or analogs in the presence of an aq alkali. Examples are given of the treatment of potato starch, dextrin or cotton with ethylene oxide, propylene oxide, etc.

**Dextrose.** Corn Products Refining Co. Ger. 513,570, July 22, 1923. Anhyd. dextrose is prepd from converted starch solns by crystn at 57–49°. The crystals are sepd from the mother sap by centrifuge. Cf. *C. A.* 24, 4652.

**Soluble starch.** Robert Haake and Walter Haake. U. S. 1,792,088, Feb. 10. A highly concd oxidizing liquid such as NaOCl soln is added in small quantities to the starch to be disintegrated and mixed with it while maintaining the starch in its powdery condition, thus elevating the heat of reaction to such an extent that the chem. transformation is performed without any residue and a sufficient evapn is effected of the slight surplus of moisture contained in the treating soln. added.

**Starch products.** International Patents Development Co. Ger. 516,761, July 3, 1928. See Brit. 294,979 (*C. A.* 23, 2065).

## 29—LEATHER AND GLUE

ALLEN ROGERS

**Tannery effluent. I. Effect of various gases on the nitrogen distribution.** Edwin R. Theis and Philip Kratz. *Ind. Eng. Chem.* 23, 69–71(1931).—The effect of $p_H$ value on evolution of gases from soak waters contg. $NaNO_3$ was that gases were evolved at $p_H$ values 1 to 5, and absorbed at higher $p_H$ values. Bubbling $O_2$ through soak water promotes formation of $NH_3$, indicating deamination; it causes the effluent to become very colloidal in character and retards the formation of volatile sulfides. $H_2$ furthers the formation of $H_2S$, causes deamination with subsequent reduction, and finally causes the formation of volatile acids. H. B. Merrill.

**Fat-liquoring of chrome leather. Effect of hydrogen-ion concentrations on oil adsorption.** Edwin R. Theis and Frank S. Hunt. *Ind. Eng. Chem.* 23, 50–3(1931).—The amt. of oil taken up by chrome leather is studied for numerous mixts. of sulfonated and raw oils and com. fat liquors, as a function of the $p_H$ value of both the skin and the fat liquor. Characteristic curves are obtained for each oil mixt. employed. Relation of the strength of the leather to the kind of fat liquor and to the amt. of oil adsorbed is shown. The adsorption of oil is shown as "oilation" by means of the dilatometer. H. B. Merrill.

**A note on the cause of certain red colorations on salted hides and a comparison of the growth and survival of halophilic or salt-loving organisms and some ordinary organisms of dirt and putrefaction on media of varying salt concentrations.** Madge E. Robertson. *J. Hyg.* 31, 84–95(1931).—Certain brick-red stains on salted hides are produced by the growth of halophilic organisms which come from marine salt used in curing the hides. There are many varieties of these organisms which flourish best in high concns. of salt and fail to grow below 6%. The organisms of dirt and putrefaction, though certain of them survived as high a concn. as 30% for a considerable time, failed to multiply above 8%. The non halophilic cocci survived at high salt concns. much longer than the non halophilic bacilli. John T. Myers.

**Glue making from chrome-leather scrap by the chromic hydroxide process.** C. Stiepel. *Chem. Ztg.* 54, 894–5(1930).—In this process the chrome complex in the leather is changed to a stable, non tanning hydroxide by "intensive liming." The process is similar to the magnesia process, but the yields obtained with the latter are inferior. The process is far superior to the various acid processes, is economical as regards time, labor and equipment, and yields a glue of good quality. H. B. M.

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Protecting leather from fungi (Brit. pat. 336,244) 18

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**Treating hides with liquids for tanning, etc.** Charles Wesley Nance. Ger. 513,929, Dec. 31, 1927. See Brit. 310,823 (*C. A.* 24, 748).

**Treatment of skins before tanning.** David L. Levy. Fr. 694,407, April 24, 1930. Skins are treated with a soln. of mineral or org. acids and alkali, alk. earth or metallic salts before the usual tanning operation. Cf. *C. A.* 24, 1247.

**Tanning agents.** I. G. Farbenind. A.-G. Fr. 694,257, April 22, 1930. Condensation products which are sol. in water and have very pronounced tanning and charg

ing properties are prepd by the reaction of urea, its homologs or substitution products and aliphatic aldehydes on di- or polyhydric phenols of the $C_6H_6$ series, their homologs or substitution products, *preferably in the presence of acid condensing agents*. Part of the phenols may be replaced by tanning substances of vegetable origin. Several examples are given. Cf. *C. A.* 25, 1116.

**Tanning compositions.** W. Sailer. Brit. 336,084, April 18, 1929. Sulfite cellulose lye phenols, cresols and natural tanning substances such as a bark ext. are caused to react with enzymes such as phenolases, peroxidases or dehydrases and with substances yielding O such as $H_2O_2$ or perborates. The products may be further treated with halogens and are suitable for use preliminary to chrome tanning.

**Greasing leather.** Hermann Bollmann and Bruno Rewald. Ger. 516,187, Sept. 7, 1927, 516,188, Oct. 25, 1927, and 516,189, Dec. 25, 1927. Addns. to 514,500 (*C.* 1, 1704). There is used (1) a mixt. of lecithin and train oil emulsified in a relatively large amt. of water (516,187), or (2) an aq. soln. of lecithin (516,188) or *(3) a mixt. or emulsion of lecithin and fatty oil with a small quantity of soap or sulfonated oil*, with or without a small quantity of mineral oil (516,189).

**Dyeing leather.** I. G. Farbenind. A.-G. (Bartholomaus Vossen, inventor). Ger. 513,842, Feb. 4, 1925. Leather is dyed by acid azo dyes built up by the process amine → 1-amino-8-hydroxynaphthalene-3,6-disulfonic acid → resorcinol → *p*-nitraniline, the amine indicating sulfanilic, picramic or naphthionic acids. The example describes the dyeing of deacidified chrome leather by the dye built up from picramic acid.

**Machine for mordanting hides.** Vereinigte Hutstoffwerke Bloch & Hirsch, C. F. Donner G. m. b. H. Ger. 513,698, Mar. 23, 1929.

**Coated fabric [imitation leather].** Arthur W. Burwell (to Alox Chemical Corp.). U. S. 1,791,711, Feb. 10. A coating compn. suitable for use in the manuf. of artificial leather" comprises nitrocellulose and a softening agent consisting essentially of the water-insol., satd. aliphatic, high mol. wt., carboxylic acid product obtainable by contacting a free-O-contg. gas such as air with a petroleum hydrocarbon mixt. consisting of a 48–43° Bé. petroleum distillate in the liquid state, in the presence of an "oxidation exciter" such as Mn oleate at a reactive temp. not above about 155° (suitably about 140°) and at a superatm. pressure but not greater than about 350 lb. per sq. in., to the point of incipient formation of petroleum insol. compds. in the mixt. An app. is described suitable for oxidation of the petroleum distillate.

## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

**The oil and the lipase-like enzyme in Para rubber seed.** Yoshitoka Iwamoto. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 408–11(1930).—Fallen seeds from Malaya were used in the expts. The following data give the kind of seed, the grade of oil from each kind, the color of the oil, its taste and its acid no., resp.: fresh with yellow white kernel, 1st, faint yellow, sweet, 7.21; older with dirty yellow kernel, 2nd, yellow, bitter, 24.71; partly putrefied, 3rd, brownish yellow, bitter, 77.10; badly putrefied with dark gray kernel, 4th, brown, very bitter, 110.86. The results show that fresh seeds are suitable for practical oil extn. Oil obtained by cold pressing is superior to oil by hot pressing, as shown by a higher yield, a lighter color, a sweeter taste and a much lower acid no. (19.70 vs. 45.22). A bitter taste is best removed by NaOH. Oil extd. with petr. ether from fresh seeds showed $d_4^{15}$ 0.9234, $n_D$ 1.4757, acid no. 7.12, I no. 138.8, solidifying point 2°, sapon. no. 189.20, Reichert-Meissel no. 2.28, acetyl no. 2.41, unsaponifiable matter 1.62, insol. hexabromide (fatty acids) 15.48. By the Pb salt Et$_2$O method, the fatty acids yielded 79.99% of yellow liquid acids and 17.81% of white solid acids. The former when oxidized with alk. $KMnO_4$ by the Hazura method gave dihydroxystearic, sativic and linusic acids. This shows that the liquid acids contain considerable oleic, linolic and linolenic acids. After recrystn. from 95% EtOH at —20°, the solid acids yielded a white cryst. powder which m. 62° and had a neutralization no. 204.62, which was probably a mixt. of 70% stearic acid and 30% palmitic acid. The high acid no. of the oil from decayed seeds suggested the presence of lipase. The following data give the acid nos. of the oils extd. with Et$_2$O from 4 samples before and after 92 days at room temp., resp.: (1) seeds with husks, 5.41, 15.72; (2) crushed kernel with husk removed, 6.30, 48.82; (3) crushed kernel with oil removed and then ground with rapeseed oil, 1.20, 93.37; (4) same as (3) but

the spaces between the threads of the lining, to reduce the stiffness of the boot and to prevent adhesion to the last Various details of manuf. are described

Use of forms in making balloons, gloves, cots or other dipped rubber goods from aqueous dispersions of rubber. ISAAC W ROBERTSON (to Thermo Process Co) U. S. 1,792,187, Feb 10 Various details of procedure are described

Puncture-sealing mixture for tires. P G MASTERS. Brit 335,980, July 5, 1929. A mixt. for placement in inner tire tubes is formed of castor oil 0 5 pint, talc 1 5 oz, cellulose 1 5 oz, such as wood dust, water 0 5 pint, gum acacia 1 oz or less, with or without a small addn of benzene, "petrol" or rubber soln

Rubber insulating material. WM BRYAN WIEGAND *Fr 694,333, April 23, 1930* Insulating materials contg rubber have added thereto C black retaining its adsorbent power in amt. up to 10% of the wt of rubber or 3% of the total mass An example of such a material contains rubber 984 6, ZnO 30, C black 29, monosulfide of tetramethylthiouran 3 5 and S 40 parts Other examples are given

Mercaptothiazole derivatives. WM P TER HORST (to Rubber Service Laboratories Co) U S 1,792,096, Feb 10 In producing products such as various rubber vulcanization accelerators, reaction is effected between an amine such as piperidine or diphenylguanidine and the product obtained by the reaction a salt of mercaptobenzothiazole with a Cl deriv of $CS_2$ Cf *C A* 24, 2470

Elastic material. OCTAVE PIRARD Fr 694,998, Aug 2, 1929 A light elastic material is made, *e g*, of wood charcoal 35, bark fiber 10 and pure rubber 55%.

Transparent sheets comprising synthetic rubber. I. G FARBENIND A -G Brit. 336,075, Sept 20, 1929 Reënforced sheets are made by applying a soft coating of a polymerization product of butadiene or its homologs to an open meshed fabric (such as tinned iron wire mesh or a vegetable fiber material) and hardening the coating (as by the action of O or by heating) Condensation products such as those derived from oxylene or other aromatic hydrocarbons with butadiene in the presence of a condensing agent such as $AlCl_3$ also may be used

Synthetic rubber. I G FARBENIND A G Brit. 336,339, Aug 2, 1929 Removal of polymerization products of diolefins from the reaction vessel is facilitated by lining the vessel with readily removable materials such as paper, cardboard, textile fabrics, leather, or films of sheet metal or cellulose derivs or polymers of diolefins or of rubber (which latter may be vulcanized or otherwise suitably treated), or waxes, readily fusible alloys or bitumen. Various examples and details of app and procedure are given

Synthetic rubber. I G FARBENIND A -G Brit. 337,019, May 25, 1929 In polymerizing diolefins such as butadiene by the action of alkali or alk earth metals or their mixts or alloys, in the presence of org solvents such as ether, the solns of the polymerization products are continuously removed from the catalyst as soon as the polymerization is effected, as by a flowing stream of solvent or soln. The products may be unsuitable for the production of soft rubber, but are suitable for the manuf. of various hard materials

Vulcanizing synthetic rubber. I G FARBENIND A -G Brit 335,970, July 2, 1929 Polymerization products such as those of butadiene or its homologs or analogs are vulcanized in the presence of an accelerator previously dissolved in a solvent or admixed with a liquefying agent, which gives a product of improved stretch and breaking strength Solvents of various kinds may be used such as water, alc, hydrocarbons, chlorinated hydrocarbons, ethers, weak acids and liquid bases Stearic acid may be used as a softening agent. Cf *C. A* 24, 3400

Rubber vulcanization accelerator. WINFIELD SCOTT (to Rubber Service Laboratories Co) U S 1,792 041, Feb 10 The reaction product of formaldehyde with crotonaldehyde dianilide is used as an accelerator Cf *C A* 25, 618

Rubber vulcanization. ALBERT A SOMERVILLE (to R. T Vanderbilt Co) U. S 1,791,876, Feb 10 In effecting vulcanization with the aid of an active accelerator such as mercaptobenzothiazole a small quantity of a peroxide such as $BaO_2$, $PbO_2$, $CaO_2$ or $SrO_2$ is added to inhibit or prevent scorching or prevulcanization Various examples are given

Apparatus for vulcanizing rubber coatings on hollow metal articles such as press-rollers of paper-making apparatus. CHRISTIAN H GRAY U. S 1,792,298, Feb 10 Structural features

Forming vulcanized joints in rubber articles such as air-tubes, rubber balls or other hollow products. DUNLOP RUBBER CO, LTD, and G R. MEAD Brit 336,076, Sept 21, 1929 Mech. features

# CHEMICAL ABSTRACTS

Vol. 25. MAY 10, 1931 No. 9

## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Filtering disks of sintered Pyrex glass. W. F. BRUCE AND H. E. BENT. *J. Am. Chem. Soc.* 53, 990–2(1931).—A layer of powd. glass (60-, 80- or 100-mesh), 1.5–2 mm. thick, is sintered in a Ni tube of suitable diam. About 2 min. at a bright red heat is required. The disk obtained may be sealed to a Pyrex tube. B. A. SOULE

Further applications of the centrifugal filtration tube. EVALD L. SKAU AND LOUIS F. ROWE. *Ind. Eng. Chem., Anal. Ed.* 3, 147–8(1931); cf. *C. A.* 23, 5355.—This device can be used to det. the approx. amt. of solid and liquid in a mixt. at any definite temp. Hence binary f. p. diagrams may be constructed or a eutectic compn. detd. B. A. SOULE

Portable electric stirrers in the chemical industry. HANS WOLLENBERG. *Chem.-Ztg.* 54, 804(1930).—A small, compact, well protected elec. stirrer which can be clamped on any vessel is described. A. L. HENNE

A modified slow-combustion pipet. KENNETH A. NOBS. *Ind. Eng. Chem., Anal. Ed.* 3, 159 (1931).—A modified Stalcup pipet for slow-combustion analysis is described, and the advantages of this method over the explosion method are pointed out. D. F. BROWN

Wash bottle for organic, poisonous or corroding fluids. WALTER FERMANN. *Chem.-Ztg.* 54, 804(1930).—To the conventional wash bottle a vent tube is added. The vent is closed with a finger, while the liquid is being forced out of the bottle. To interrupt the liquid stream the finger is lifted before blowing is stopped. This prevents disagreeable fumes from backing into the operator's mouth. A. L. HENNE

Comparative efficiencies of gas-washing bottles. F. H. RHODES AND D. R. RAKESTRAW. *Ind. Eng. Chem., Anal. Ed.* 3, 143–4(1931).—Each bottle was filled to the normal working height with NaOH (32.7 g./L.). Then air contg. 13.4% $CO_2$ was passed through at increasing rates of flow until that rate was found at which some $CO_2$ escaped absorption. The order of decreasing efficiency is: Friedrichs spiral, Schott & Gen. No. 101, No. 55c, No. 83, Muencke, Habermann. The order is approx. the same when 3.1% $CO_2$ is used. B. A. SOULE

Direct-reading volume-meter. M. T. CARLISLE AND RHEBA USHER. *J. Chem. Education* 7, 1562(1930).—This vol.-meter for irregular solids consists of a cylinder 4.8 cm. in diam. and 12 cm. long, the bottom of which is drawn out into a tube 10 cm. long contg. a bulb of 10 cc. capacity. A glass stopper with a finely graduated outlet tube, 30 cm. long and 5 mm. in diam., is inserted in the top of the cylinder. A leveling bulb of Hg is attached to the bottom tube. The cylinder and bottom tube are filled with water, after which the leveling bulb is brought up to a mark on the bottom tube. The level of the column of water forced up into the upper outlet is then read and the leveling bulb lowered again. After the test specimen is dropped into the cylinder, the operation is repeated and the difference in water levels noted. ANN NICHOLSON HIRD

Potentiometer for the determination of $p_H$. N. N. KAVTSEVICH. *Ann. Weissrussk. Staat. Akad. Landw. Gory-Gorki* 9, 245–60(1929).—Potentiometric measurement of the e. m. f. is discussed, and a simplified potentiometer which gives readings with an accuracy of 0.01 $p_H$ is described. The novel feature of the potentiometer is the introduction of a telephone in place of the galvanometer. J. S. JOFFE

Colloid mills. AUGUST CHWALA. *Kolloid-Z.* 54, 243–51(1931); cf. *C. A.* 25, 1122.—A review of German patents. ARTHUR FLEISCHER

An automatic constant-level device for liquid air. R. B. SCOTT AND F. G. BRICKWEDDE. *Rev. Sci. Instruments* 2, 171–2(1931). E. H.

Apparatus for the continuous extraction of large quantities of material at high temperatures. FRITZ WREDE. *Biochem. Z.* 231, 173–4(1931).—An app. capable of extg. 5 kg. or more of material has an outer vessel that contains a heating liquid (liquids of various b. ps. can be used for extn. at diff. temps.) and an inner container for the ma-

terial and the solvent The solvent is boiled in a flask outside the container, so connected that the solvent circulates through the material and then returns to the flask.
S MORGULIS

**Extraction apparatus.** R C BAKER. *J Soc Chem Ind* 50, 54T(1931) —A drawing showing a modified Soxhlet extractor is given, and the advantages possessed by the app over the usual type are presented
N A LANGE

**Note on centrifugal dust extractors.** M SRILLAN *Chaleur et ind* 10, 289–93 (1929), cf *C A* 24, 992 —S discusses the trajectory of an element of gas emerging from the rotor of a centrifugal pump and draws the parallelogram of velocities at the exit of a ventilator Thus is followed by a discussion of cyclone extractors
S L B ETHERTON

**An apparatus for determination of true vapor pressure.** E J SQUIRE *Petroleum World* 28, No 1, 66–79, 101–9(1931) —An app for detg true vapor pressure should be designed so that the sample may be introduced as it exists at the point of sampling, so that vapor pressures may be detd at different temps , and so as to be speedy enough in operation for routine testing The app here described can be said to meet these conditions and is suitable for liquids that do not attack Fe, Hg or glass, are not too viscous to be properly agitated, do not have an abs vapor pressure over 2000 mm of Hg, and do not contain emulsion.
R W KELLY

**Apparatus for purifying gases.** Z. VERESS. *Magyar Chem Folyoirat* 35, 155–7 (1929) —The current of gas drives the solvent into an absorption tower, whence it returns dropwise into the original container
B C A

**The technic of gas analysis.** A J ANTHONY. *Z. Biol* 90, 633–6(1930) —An *app* equipped with shaking attachment is described. The specific difficulties for nitrous oxide analysis are discussed
FRANCES KRASNOW

**Automatic analyzers of gas mixtures based upon thermal conductivity of gases and their industrial use.** DE FROBERVILLE *Chaleur et ind* 11, 469–71(1930) —A discussion of an article by Jarrier (cf *C A* 25, 1413), in which F meets the weaknesses of app described by J. PAUL JARRIER. *Ibid* 471–2 —J replies and gives more detail
S L B ETHERTON

**A new titration colorimeter.** K. MAYER. *Biochem Z.* 231, 314–6(1931).
S MORGULIS

**Helical pumps and their use in industry.** ERNST BLAU. *Chem -Zig* 54, 801–2 (1930) —Descriptive
A. L HENNE

**Improvements in the construction and use of the Berthelot-Mahler calorimeter.** RICCARDO DE BENEDETTI *Rivista tec ferrovie ital* 38, 56–60(1930) —Several details of the mech parts of the app are modified, and methods of calibrating and operating are suggested for serial work and for the detns with liquid combustibles G A B

**Generator for the production of carbon dioxide of high purity.** EDGAR J POTH *Ind Eng Chem , Anal Ed* 3, 202–3(1931)—The construction of a generator for $CO_2$ or other gases is described, for which the following advantages are claimed (1) It is compact and is constructed entirely of glass without ground-glass joints (2) It can be warmed and pumped free of occluded gases (3) It has a novel automatic feeding arrangement. (4) Reagents are completely used, and none of the gas produced is wasted
CHANNING WILSON

**Flow divider for fractionation under diminished pressure.** A M SCHWARTZ AND M T BUSH *Ind Eng Chem , Anal Ed* 3, 138–9(1931) —In vacuum distn. total condensation and return of part of the condensate as reflux permit complete and easy control of the reflux ratio A stillhead with a Hg check valve has been found suitable for this purpose Constructional details are given
B A. SOULE

**Glass temperature and float regulators.** D F OTHMER *Ind Eng Chem , Anal Ed* 3, 139–43(1931) —Constructional and operating details are given for a controller of pressure or temp when a flowing liquid causes the change of conditions The sensitive element is a vapor pressure bulb that operates a "flow diverter" A temp , never over 0 2° high, may be maintained for weeks The device is recommended for lab or semi works operations Several float valves are also described B A. S

**Glass electrode and vacuum-tube potentiometer.** DONALD H CAMERON *J. Am Leather Chem Assoc* 26, 7–23(1931) —Advantages and limitations of the electrode are discussed In tannery analyses, the chief advantage is freedom from poisoning and disturbance by oxidation reduction reactions, the chief disadvantage, aside from the rather laborious standardizations required, is the failure to function at $p_H$ values higher than 9 Different forms of electrode are described MacInnes' form, using the Ag AgCl electrode, is preferred A vacuum-tube potentiometer circuit, on the Wheatstone bridge principle, is described in detail
H. B. MERRILL

**A vacuum-tube method of temperature control.** FRANCIS O. SCHMITT AND OTTO H A SCHMITT *Science* 73, 289–90(1931) —The app is essentially a type FG-27 thyratron regulator tube with a toluene-Hg regulator inserted in the grid circuit. A large un-insulated metal water bath has been held for days to within 0 005°, well insulated baths may be held within 0 001°. J H. MOORE

**Something new in vacuum drying chambers.** HOLLAND-MERTEN *Chem.-Ztg.* 55, 153–4(1931) —A rectangular chamber, built by Vacuumtrockner, Erfurt, is described It is made up of independent heating elements, any no of which may be used, the sides of the elements forming the walls of the chamber Internal dead space is eliminated, internal condensation and steam leakage are minimized, and less wt. and floor space are required for a given capacity J. H MOORE

**The determination of the heat of wetting.** WALTER REIMER *Wiss Arch Landw*, Abt A, *Pflanze* 4, 383–91(1930) —A new *calorimeter* for detg the heat of wetting is described The heat tone is measured by the expansion of toluene, which surrounds the inner wall of the calorimeter and connects with a graduated capillary tube A sensitivity of 0 25 cal is possible Details of the construction and use of the calorimeter are given W GORDON ROSE

**Chemical engineering memoranda. XIII. Further notes on heaters, including air heating by steam.** CHARLES H. BUTCHER *Ind Chemist* 7, 95–6(1931); cf. *C A.* 25, 364 E. H.

**A very sensitive, self-registering heat-flow meter.** GEORG HOFBAUER *Arch Wärmewirt* 10, 398–402(1929) —The instrument, which is intended primarily for measuring heat flows through the walls of buildings, consists of 5 multiple couples, each contg 100 Fe-constantan elements, with junctions on opposite sides of a rubber sheet 0 3 cm thick, which is protected by thin outer rubber sheets and surrounded by a protecting ring Good accuracy can be attained with flows as low as 1.5 cal per sq cm per hr ERNEST W. THIELE

**The energy problem of electric heating.** F. MERKEL. *Arch Wärmewirt.* 10, 407–8(1929) —A general discussion of *heat pumps* with special reference to their use in *distn* ERNEST W. THIELE

**Packed heat from a new type of electric steam generator.** HOWARD BIDWELL AND LINUS H JONES *Ind Eng Chem* 23, 298–300(1931) —The problem of obtaining large quantities of high pressure steam for short periods for sterilization work has been solved by the construction of an elec. steam generator of original design The boiler of the generator is offset at an angle, almost the entire vol of water in the generator and reservoir being made available for steam Immersion heating elements are used, the size and energy consumption depending on the pressure and quantity of steam required The design incorporates the safety features of small diams Sterilizing pressure may be obtained within 30 sec from the time of closing the autoclave. A S S

**A practical hot stage for the microscope.** EDWARD H WALLACE AND MARY L. WILLARD *J Chem Education* 8, 706–11(1931) E H

**Modern electrically heated aluminum-fusing furnaces.** KIRCHRATH. *Metallbörse* 20, 2731–2, 2779–80(1930) —Furnaces, especially those built by Gautschi and Brandt, with Ni Cr heating elements, are described. The elements are either bands or spirals placed in recesses in the roof so that heat is radiated down on the charge. J. H MOORE

**Determination of the local strength of fabrics, felts, paper, rubber, film, wood, leather, metal, etc. II.** FRIEDRICH SCHUBERT. *Chem.-Ztg* 55, 134–5(1931); cf *C. A.* 25, 1708 —The *app* referred to in *C A* 23, 1187, 4103, has demonstrated its value It is described, its use and the results are discussed and a sample calcn is given J H. MOORE

**Early steps in the development of the Columbia soil rod.** BUELL B. LEGG. *Gas Age-Record* 67, 111–8(1931) —Work is being done on the development of a soil rod which will enable the determination of the galvanic action of the soil, the specific resistance, the tendency to polarization and the potential difference between adjacent soils. Preliminary work indicates a close relationship between results obtained with such a rod and corrosion of test samples The rods at present have a copper electrode and a steel electrode suitably insulated The bottom, steel electrode is tapered to provide a driving tip LESLIE B BRAGG

**Modification of Ostwald's electric thermoregulator.** E BUTTERWORTH AND D A DERRETT-SMITH *J Sci. Instruments* 7, 233(1930) —Change in calibration due to allowing the instrument to cool is avoided by omitting the 2 side tubes of the standard form, sufficiently fine adjustment being obtainable by means of the screw in the terminal

head It is advisable to distil the toluene over Hg to insure complete removal of S
B C A

A laboratory thermostat for continuous operation. P. W Schenk. *Ber.* 64B, 368–70(1931) —A thermostat is described which will operate without special attention for a long period of time with an accuracy of 0 02° A Dewar tube is surrounded by a wooden box which contains the stirring motor, battery, relay, condenser and Hg switch A particular feature of the thermostat assembly is the inclosed Hg switch operated by a relay and making and breaking the current to two cylindrical heating bulbs in the thermostat The relay is actuated by a Hg-in-glass thermoregulator. A condenser of 1–2 mf is used across the regulator For temps below room temp a const. stream of water is passed through a Cu U-tube in the thermostat, and the same heating system is used to maintain the lower temp Allen S Smith

Simple universal thermostat for laboratory fermentations, refractometry and pycnometry. H Fink *Wochschr Brau* 47, 481–4(1930) —This app consists of a eudiometer with capillaries and containers for fermentation, a thermostat with heating elements, thermoregulator and stirrer, and an electrically driven shaking device and fittings to accommodate 20 pycnometers and 12 capsules mounted for reading by an immersion refractometer Six or 12 fermentation flasks can be used at once. These are provided with gas measuring fittings The bath remains const within 0.2° and is used within the range 15° to 40° S Józsa

Oven-temperature control and design of a bi-metal thermostat. W E Benton *Gas World* 94, 35–7(1931) —A math treatment of the fundamental principles of bi-metal thermostat design F. H Bergeim

A cooling unit for low-temperature thermostats. T. J. B Stier *Science* 73, 288–9(1931) —A Cu funnel is fed with cracked ice from an insulated hopper, with means for drawing off water as the ice melts The funnel is immersed in the thermostat to the proper level, found by trial, and will hold the app const to ±0 01° at room temps It costs about $1 00 Details are given J. H Moore

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Ag and its application to chemical plant (McDonald) 9. Colorimeters, spectrophotometers and nephelometers (Digaud) 7.

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Colorimeter John C Baker and Charles F. Wallace (to Wallace & Tiernan Products, Inc) U S 1,794,134, Feb 24

Immersion pyrometer for fused metals. Rudolf Hase Ger 514,682, May 11, 1929 Details of construction are described.

Optical absorption-pyrometer Kaiser-Wilhelm Institut für Eisenforschung e V (Gerhard Naeser, inventor) Ger 517,023, July 9, 1929

Thermometer Max F Moeller (to Moeller Instrument Co). U. S. 1,793,950, Feb 24

Thermometer connected with an indicator at a distance. Herman Schlaich U S 1,794,324, Feb 24 Structural features

Distance signalling thermometer suitable for use in stacks. D. G. Zeitlin. Brit. 338,267, Sept 14, 1929 Structural features

Thermometer or like device containing a gallium alloy. Sylvester Boyer (to General Elec Co) U S 1,793,303, Feb 17 Ga or alloy which may contain Ga, Sn and In is placed in a tube of material such as fused $SiO_2$ to which the alloy does not adhere

Viscometer Harry W. Kleiger (to Hercules Powder Co) U. S 1,793,807, Feb 24 X rays are utilized for observing the passage of a ball or the like through opaque liquids Cf *C A* 25, 3

Air filter Louis Klapp (to American Air Filter Co). U. S 1,794,115, Feb 24

Air filter. Albert Benteli-Hüssy. Swiss 142,423, Oct. 4, 1929 A labyrinthine passage for the air causes deposition of foreign bodies

Air filter for liquid-storage vessels. Karel Prillinger and Frantisek Prillinger. Swiss 142,109, Sept. 11, 1929.

Fabric air filter. C G Vokes. Brit. 337,966, Nov 1, 1929 Structural features

Oil filter. Charles W McKinley (to A C Spark Plug Co) U S 1,792,854, Feb 17.

Unactivated "prefiltering medium" suitable for treating oils, sugar solutions, etc. John J Nalgle U. S 1,794,862, March 3 A material of low decolorizing and deodorizing value, but which has a highly porous structure permitting a high rate of filtration, comprises carbonized lignin residues substantially free from all alk residues

**Filter cloths.** Victor Roeder Ger 517,260, Jan 18, 1929 Peripheral reenforcing means for perforations in the cloth is described

**Apparatus for filtering liquids under pressure.** J Hoffmann and T Kriebernigg Brit 337,848, Aug 14, 1929 Structural features

**Rotary, impeller agitating device and filter for treating liquids such as sugar solutions or oils.** John J Naugle U S 1,794,916, March 3 Structural features

**Magnetic separator.** Mitsuo Koizumi Ger 517,259, Apr 8, 1925 Corresponds to Brit 254,030

**Means for separating pneumatically conveyed materials from the conveying medium.** Wilhelm Knolle Ger 517,050, Jan 17, 1928

**Separator for oil and water, etc.** Ignaz Müller Ger 517,425, Apr 20, 1929 See Austrian 115,050 (*C A* 24, 2286) and 117,500 (*C A* 24, 3403)

**Apparatus for separating oil from compressed air.** Martin J Binkley (to Caloroil Burner Corp) U S 1,793,460, Feb 24 Structural features

**Settling apparatus suitable for the separation of solids from liquids and gases.** Walton C Graham, Horace S Rumsey and Ashur L Wetherbee (to Gilchrist & Co) U S 1,794,374, March 3 Structural features

**Spray-system washer for separating dust from gases.** David S Jacobus (to Babcock & Wilcox Co) U S 1,793,620, Feb 24 Structural features

**Röntgen-ray tubes.** W D Coolidge (to British Thomson-Houston Co, Ltd) Brit 338,430, Jan 16, 1929 Structural details of tubes which may have a Mo plate of sufficient thickness to assume a uniform temp and a surrounding focusing member of Ni or Mo

**Quartz rod (with a cone-shaped depression in its end) for use with ultra-violet lamps.** Cleon W Symonds. U. S 1,794,557, March 3

**Thermionic cathode.** Sandor Just (to General Elec Co) U S 1,794,298, Feb 24 A cathode is formed of a metal such as Mo having a m p above 1000° and an electron emissive material comprising a mixt of oxides including an alk earth oxide and a rare earth metal oxide, in which the latter is present to only about 0 1% the quantity of the former

**Electron-discharge apparatus.** Dudley A Mullaney (to General Elec. Co). U. S 1,794 315, Feb 24 A control electrode for a space current device has its surface mechanically roughened to decrease emission of secondary electrons from it

**Electron-discharge devices.** Établissements industriels de L C Grammont et de A. Grammont Brit 337,971, Dec 10, 1928 Electron emitting filaments (which may be formed of pure or oxidized W or of W coated with oxidized metal such as Fe, Ni or Cu and may if desired be wound with fine taping to retain the coating) are coated with alk earth metal oxide by depositing on the filament a single or double cyanide of the alk earth metal and decompg the cyanide to form the oxide after the filament is mounted in the electron, discharge device. Various details of procedure are described

**Electron-discharge devices.** H. C. Rentschler (to Westinghouse Lamp Co). Brit. 337,704, Feb 16, 1929 Oxidation of the surface of the anode may be effected by cooling in air after baking in H, and selective reduction of the oxides of Ni and Fe may then be effected by H at 800–1000° A small proportion of $H_2O$ vapor in the H prevents the formation of nitride or carbide of Cr due to the presence of any N or satd hydrocarbons in the gas used For further details see U S 1,760,525 (*C A* 24, 3405).

**Discharge device for compressed gases such as carbon dioxide.** Renee M. Lemoine U S 1,794,185, Feb. 24. Plugs of porous material such as tow impregnated with a liquid of low f. p. such as alc. are placed in expansion devices at the points which are most exposed to freezing U. S 1,794,186 relates to an app for atomizing paints, insecticides, etc, with $CO_2$

**Gas-analysis apparatus.** J G Daloz Brit 338,410, June 20, 1929 Various structural details are described of an app suitable for detn of fire damp The app may be attached to a *miner's lamp*

**Automatic gas-analysis apparatus.** C A Hartung Brit 337,862, Aug 21, 1929 Various details are described of app in which the gas to be tested, such as flue gas, is treated with another gas such as H and reaction effected as for the purpose of detg residual O in flue gases.

**Apparatus for determining and registering the density of gases and liquids.** Siemens & Halske A.-G. (Josef Krönert and Heinz Grüss, inventors) Ger. 517,364, Mar. 11, 1928. The detn depends on the velocity at which the gas or liquid flows through a narrow orifice.

**Apparatus for carrying out catalytic reactions between gases under high tempera-**

ture and pressure. MARIA CASALE-SACCHI Swiss 142,144, Apr 5, 1929. Details are given

Apparatus for the catalysis of gas. SOC ANON D'OUGRÉE MARIHAYE Swiss 141,303, Mar 4, 1929 The app is used for such catalytic reactions as the *oxidation of NH*$_3$ into oxides of N

Apparatus for maintaining a desired relation between the pressures of gas and air, etc. A C IONIDES Brit 337,955, Oct 28, 1929 Various structural details are described

Device for regulating the quantity and composition of gas mixtures such as those used for anesthesia. ANTON GRAMBERG (to I G Farbenind A -G ) U S 1,793,608, Feb 24 A device is described for operating needle valves controlling the supply of the gases

Apparatus for treating gases with liquid sprays for washing, saturating, cooling or other purposes J A REAVELL. Brit 337,507, Aug 22, 1929 Structural features

Gas washer, with rotary perforated washing drum. ZSCHOCKE-WERKE KAISERSLAUTERN A -G (Ernst Heilmann, inventor) Ger 517,352, Oct 26, 1929

Device for mixing liquids with added substances, for chemical reactions. EUGEN STEUER Ger 514,937, June 9, 1929

Centrifugal atomizer for liquids. AKTIESELSKABET NIRO Ger 514,714, July 18, 1926 The app comprises a rapidly rotating plate and is used for atomizing liquids preparatory to their reaction with gases

Centrifugal drum apparatus for clarifying liquids. H LIST Brit 337,628, Nov. 22, 1929 Structural features

Apparatus for clarifying aqueous liquids, etc, by gravity separation. FRITZ MIEDER. U S 1,792,919, Feb 17 Structural features

Apparatus for extractions with liquid solvents LE ROY C. TRESCOTT (to Contact Filtration Co ) U S 1,794,874, March 3 Various details of construction are described of an app for extn on the Soxhlet principle, such as extn of clay used in filtering oil An agitating device is mounted in the extn chamber

Valve for regulating the flow of liquids or liquefiable solids such as sulfur, wax, fat, pitch, etc. ARTHUR T PRENTICE (to Imperial Chemical Industries, Ltd ) U. S 1,793,747, Feb 24 Structural features

Noncorrodible container for liquids WILHELM BESCHETZNICK. Ger 514,588, Nov 27, 1929 The container is built up of sections coated with Pb, Cu, Al or other noncorrodible plates

Evaporator with steam-heated tubes suitable for concentrating liquids. FRANZ HOFMEISTER and HANS MELHARDT (to Chemische Fabriken J Bellak) U S 1,793,174, Feb 17 Structural features

Evaporating apparatus KARL FRIED Ger 517,176, Jan 8, 1928 The app. combines evapn in thin layers with multiple-effect vacuum evapn

Hollow-plate heating apparatus for evaporating liquids, etc. SOC. ANON POUR L'IND CHIM A BÂLE. Brit. 338,097, April 29, 1929 Structural features

Multistage steam drier. SCHMIDT SCHE HEISSDAMPF G M B H (Otto H Hartmann, inventor) Ger 514,883, Dec. 17, 1920

Centrifugal drier with a filter drum. I G FARBENIND A -G and FRITZ SANDER Ger 514,568, July 23, 1927 Addn to 401,162

Apparatus for drying steam. CHRISTIAN HÜLSMEYER Ger 517,402, May 10, 1928

Apparatus for drying sheet materials. COE MFG CO Brit 337,432, May 29, 1929 Structural features

Apparatus for drying materials by circulating air which is alternately heated and cooled. JOHAN G OLSSON and FRANS I E STENPORS U S 1,795,094, March 3. Structural features

Apparatus and procedure for spray desiccation of materials such as blood, milk or soap. FRED F PEASE (to F F Pease, Inc ) U S 1,794,978, March 3 Structural and mech details.

Sealing ring for rotating cylinder apparatus such as kilns and driers. BURNETT E GREEN (to Huron Industries, Inc.) U S 1,794,454, March 3

Rotary cooling drum (for cooling material discharged from rotary furnaces or kilns). H STEHMANN (to F Krupp Grusonwerk A -G ) Brit. 338,069, Jan 18, 1929

Atmospheric water spray cooling tower. CARL F. BRAUN (to C F Braun & Co ) U. S 1,794,394, March 3

Vapor-liquid contact column suitable for distillation, dephlegmation, absorption,

etc. CLAUDE B. SCHNEIBLE (to trustees of Joseph Schneible Trust). U. S. 1,794,986, March 3

Column-and-superposed-tray apparatus for removing carbon by washing from bubble towers used for oil distillation. GUY B BOGART (to Texas Co.). U. S 1,792,887, Feb 17 Structural features

Surface condenser suitable for use with steam. PAUL A BANCEL (to Ingersoll-Rand Co.) U S 1,794,135, Feb 24 Structural features.

Apparatus for aerating water with carbon dioxide. H ZWICKY Swiss 141,040, Sept. 24, 1929

Apparatus for proportionate mixing of chemicals with water or other fluids supplied through pipes. JAMES W PARKER, SABIN CROCKER and JAMES H WALKER. U. S 1,792,757, Feb 17 Structural features.

Condensing apparatus suitable for use with steam engines or turbines. RAYMOND P. MOORE (to Ingersoll-Rand Co.) U S 1,793,119, Feb 17 Structural features

Tiltable pan for receiving ammonium salts from saturators. FIRMA CARL STILL. Ger 517,476, July 7, 1928.

Lip-tilting crucible furnace. J H LUDLOW and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 338 013, Nov 25, 1929

Muffle furnace. ZAHN & Co G M B H Ger 514,502, May 31, 1927 A muffle furnace with a heat resisting hearth for the production of sulfate from NaCl and $H_2SO_4$ or bisulfate, is described

Horizontal or muffle furnace suitable for treating sand to remove its iron content. V. A. COLLINS. Brit 337,845, Aug 13, 1929 Structural features.

Annealing furnace. VEREINIGTE DRAHTWERKE A.-G (TRÉFILERIES RÉUNIES S A.). Swiss 138,657, May 10, 1929 Details of preheating and cooling are given.

*Chamber furnace with regenerative chamber for preheating air and gas.* C. *Otto* & Co. G M B H. Ger 507,912, Feb 28, 1929

Twin chamber furnace. C OTTO & Co G. M B H Ger 517,175, Mar. 5, 1927. Addn. to 511,515 (*C. A.* 25, 1127)

Regulator for inclined-grate furnace. FIRMA M. STREICHER. Ger 514,665, July 6, 1928.

*Traveling-grate furnace with compressed air admittance below the grate.* L. & C. STEINMÜLLER Ger 514,843, July 19, 1929

Oil-fired furnace. ERNST FELDHOFF (Erich W. Becker, inventor). Ger. 514,521, Dec. 7, 1928.

Gas-fired boiler with plate-like members. STREBELWERK G M B H Ger. 514,873, Apr 19, 1929

Gas-fired annular chamber kilns. LUDWIG RIEDHAMMER. Ger 517,334, Mar. 1, 1929 A method is described of attaining uniform temps. in the upper and lower parts of the combustion chambers.

Gas burner. CHARLES J. SCHIFFERLE (to Harry R. Struthers). U S 1,794,868-9, March 3

Gas burner. J W. BAKHUIZEN. Brit. 338,345, Nov 5, 1928

Safety pilot-jet system for gas burners. A. C. BECKER Brit. 338,122, April 13, 1929 Two pilot jets and a main burner and assocd devices are so arranged that in the event of one of the pilot jets being extinguished it is reignited from the other. Brit. 338,124 and Brit. 338,128 also relate to similar devices.

Furnace wall with parallel tubes for cooling. OSCAR NYGAARD U. S. 1,793,004, Feb 17.

Means for heating or intensively cooling hollow rolls or drums for working rubber, etc. PAUL TROESTER, MASCHINENFABRIK. Ger 517,361, July 9, 1930

Heat-exchange apparatus suitable for use as a condenser. GEORGE T. JACOCKS (to Alco Products, Inc.). U. S. 1,794,336, Feb 24 Structural features.

Heat-exchange apparatus suitable for heating air for combustion by hot gases. JEAN B. E. E. ARNOULT (to Établissements Ernest Arnoult). U. S. 1,794,573, March 3 Structural features

Apparatus for electric heating of liquids in receptacles by immersed electric resistance devices. W. WINSHIP. Brit. 337,762, May 3, 1929 Structural features.

Heating and cooking vessels. "SFINX" SPOJENÉ SMALTOVNY A TOVÁRNY NA KOVOVÉ ZBOŽÍ AKC. SPOL. Brit. 337,313, Dec 24, 1929 An inner vessel such as one of rustless steel is fitted within an outer sheath or jacket of metal of higher heat cond. such as Al or Cu Various structural details are described.

Apparatus suitable for heating chemicals in large kettles, etc. SIDNEY E. MEYERS (to National Aniline & Chemical Co.) U S. 1,792,918, Feb. 17. Various details are

described of a heating system by which a large kettle or the like is heated by hot fluids such as combustion gases supplied from an adjacent furnace

Apparatus for dispelling fog and mist with heated air. EDWARD C. READER U. S. 1,793,710, Feb. 24. App. is described suitable for use at aircraft landings, etc., which comprises an externally heated conduit through which air is forced which is then discharged as a forceful, voluminous blast into the fog or mist

Apparatus suitable for mixing measured portions of opaque substances with röntgenologists' solutions. GEORGE W. HOPKINS. U. S. 1,791,760, March 3. Structural features

Apparatus for "neutralizing" poisonous gases such as those from gasoline engines. DANIEL A. MACKINNON. U. S. 1,793,813, Feb. 24. Structural details are described of an app. suitable for treatment of the gases with catalytic material such as oxidized Cu

Apparatus for electrical conductivity tests on water in bore holes (to determine *character of surrounding rocks*). *Soc. de Prospection Electrique* (PROCEDES SCHLUMBERGER). Brit. 337,189, Oct. 26, 1928. Structural and elec. features.

Mercury-vapor boiler. WALTER E. TRENT (to Trent Process Corp.). U. S. 1,792,784, Feb. 17. The interior of the boiler is surfaced with a material such as Ag which is wetted by Hg

Apparatus for testing wearing of gears, etc., in various atmospheres. M. FINK. Brit. 337,511, Aug. 24, 1929. Wear is stated to be greater in gases contg. O than in inert gas such as $CO_2$

Apparatus (with superposed mixing chambers and agitating devices) for dissolving xanthates. RICHARD THURM and EUGENE SCHMIERER (to Baker Perkins Co.). U. S. 1,791,214, Feb. 24. Structural features

Apparatus for making amalgams, particularly for dental use. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Ger. 517,202, Mar. 27, 1928.

Apparatus for estimating the humidity of foundry sand, etc., by determining the electrical resistance. FRITZ FÖDT. Ger. 517,212, Dec. 23, 1928

Valve for operation under high temperatures and pressures. W. PFEIFFER and K. REISS. Brit. 337,838, April 18, 1929

Acetylene generators. PAUL WIDERKEHR. Swiss 142,961, July 22, 1929. App. for producing $C_2H_2$ from water and $CaC_2$ having a hollow vessel for regulating the $C_2H_2$ pressure, is described

Transport drum for carbide, etc. GUSTAV HILGER. Ger. 517,281, Nov. 10, 1929. Addn. to 489,305 (*C. A.* 24, 2017)

Gas-cock control device. FREDERICK A. GERICH and WALTER M. BERRY (to Hammer Bray Co.). U. S. 1,792,488, Feb. 17. Structural features

Automatic gas shut-off valve. LUTHER D. LOVEKIN (to Kitson Co.). U. S. 1,794,191, Feb. 24. Structural details of a device which shuts off gas flow when water in a tank reaches a certain temp. Cf. *C. A.* 24, 2335

Thermostatic valve. EDWARD S. HALSEY. U. S. 1,791,610, March 3. U. S. 1,791,611–12 *also relate to valves of the same general type.*

Thermostatic device suitable for control of electric circuits. JOSEPH W. MYERS. U. S. 1,793,954, Feb. 24. Structural features

Thermostatic device for gas ranges. ARTHUR STOCKSTROM and ISAAC V. BRUMBAUGH (to American Stove Co.). U. S. 1,794,329, Feb. 24

Thermostatic device suitable for humidity indicators, etc. ARTHUR F. KRICK (to National Dry Kiln Co.). U. S. 1,793,800, Feb. 24. Structural features

Thermostatic valve for hot-water systems, etc. WALTER B. CLIFFORD. U. S. 1,792,891, Feb. 17.

Thermostatic control device for burners such as those of water heaters. HOWARD I. PIATT (to Motor Wheel Corp.). U. S. 1,793,451, Feb. 17. Structural features

Thermostatic control device for hot water and oil heat-storage systems. C. F. HAMMOND *and* W. SHACKLETON. *Brit.* 337,425, July 31, 1929. Structural features

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Adolf Cluss. W. KLUGER. *Brauer- und Hopfenzeitung-Gambrinus* 58, 6–8 (1931), cf. *C. A.* 25, 1128.—Obituary. S. LAUFER

Arthur Amos Noyes. MILES S. SHERRILL. *Ind. Eng. Chem.* 23, 443–5(1931).—Biography with portrait G. G.

Hermann Reisenegger. H LAUBMANN *Chem.-Ztg* 55, 181(1931); *Z. angew. Chem.* 44, 213-6 —Obituary E. H.

To the memory of Karl Schirmacher. BRYK AND ZAHN *Z angew Chem* 44, 179-80(1931) —Obituary with portrait E. H

Alfred Stavenhagen. H WÖLBLING *Z angew Chem* 44, 178(1931) —Obituary with portrait E. H.

Edward William Voelcker. BERNARD DYER *Analyst* 56, 141-6(1931) —Obituary with portrait W T H

Nichols Medal award [to John Arthur Wilson]. The life of the medalist. CLARKE E DAVIS *Ind Eng Chem* 23, 435(1931) Scientific accomplishments of the medalist. ARTHUR W THOMAS *Ibid* 435-6 G G

The history of The Department of Chemistry of The Ohio State University. WM. MCPHERSON *J Chem Education* 8, 640-51(1931) E H

Chemistry in the vocational high schools of the middle west. MABLE SPENCER. *J Chem Education* 8, 712-6(1931) E H

The analytical distillation of gasoline. HAROLD J TORREY *J Chem Education* 8, 679-705(1931) —A lab exercise for students is described E H

The technic of micromanipulations. E A HAUSER *Rev gén colloïdes* 8, 358-61 (1930), cf *C A* 22, 1495, 4876 25, 1409 —A lecture A F

Reflections on statistical thermodynamics. J H CONLYN *Chaleur et ind* 9, 465-76, 527-31(1928), 10, 191-9(1929) 11, 31-8, 141-6, 197-205(1930), cf *C A* 23, 2350, 24, 2604, 4984 S L B LEHERTON

Simple reduction experiments. E H J MAGER *Z physik chem Unterricht* 44, 25-6(1931) —M describes several demonstration expts the reduction of boiling water with Zn dust, the reduction of CuO with (*a*) Fe dust, (*b*) wood charcoal in a porcelain crucible and (*c*) in a gas flame $CuCl_2$ can be reduced to CuCl by the following treatment Dissolve a small quantity of $CuCl_2$ in 3-4 cc conc'd HCl and place a wad of Cu wool in the soln Boil the whole vigorously until the soln becomes colorless Pour a portion into water and a white ppt of CuCl forms, cool the rest and shining crystals of CuCl appear F R SCHIERZ

Gas-volumetric experiments in student exercises. JOSEF KLIMA *Z physik. chem Unterricht* 43, 265-7(1930) —K describes a simple and inexpensive app for collecting gases which resembles the gas-collection part of the Victor Meyer mol.-wt app Two burets, one to serve as a leveling tube, are connected at their lower ends with rubber tubing The one in which the gas is to be collected is fitted with a rubber stopper carrying a T-tube One arm of the T tube is connected with a test tube or side-neck test tube which serves as a reaction chamber, the other arm is closed with a pinch clamp. This app. with slight modifications to suit individual cases can be used to det the H equiv of metals, the amt of O in HgO, and for the quant reduction of oxides (HgO, CuO) or the oxidation of Cu Diagrams and directions are given E R S

Evolution of hydrogen sulfide in the Bay of Krasnovodsk. D ZABRIEV *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1930, No 10, 58-63 —The role of microorganisms is described V KAITCHEVSKY

Preparation of pure mercury H VON STEINWEHR AND A SCHULZE *Z. Instrumentenk* 49, 566-7(1929) —Hg for use in phys app is repeatedly shaken with dil $HNO_3$ and then with water, fat is removed by means of petroleum or alc. The Hg is then filtered through a thin leather, previously freed from fat with petroleum, or a Haldenwanger filter tube It is then distd in a current of air in a water pump vacuum in an app without taps, and preserved in evacuated glass vessels B C A

Final report of I. M. M. representatives on the Sieves and Screen Committee of the British Engineering Standards Association. S J TRUSCOTT AND H I. SUTMAN *Bull Inst Mining Met* 311, 9 pp (1930) —The proposed fine testing sieves are based on a ratio of the fourth root of 2 between linear aperture measurements of consecutive sieves The American and proposed British sieves will be essentially identical as to aperture but not as to mesh because of the difference in American and British wire gage ALDEN H EMERY

A note on gravity separation. R. C EMMONS *Am Mineral* 15, 530(1930) — The unsatisfactory nature of gravity sepn by means of heavy solns on material in a fine state of division is best accounted for by adhesion, both of grain to grain and grains to air bubbles This can be eliminated by strong evacuation of the sepg vessel A few min is sufficient A rapid stratification results when the liquid is allowed to stand, not necessarily under vacuum A. M BRANT

The technical preparation of dvi-manganese. J. G F. DRUCE *Ind Chemist* 7, 75, 79(1931), cf *C A* 24, 2352 —The history of dvi-Mn (Re), at no 75, since its dis-

the principal dipole The moment of the *iso*-compd is the same as that of the normal if the branch in the chain is at least 2 C atoms away from the halogen, because only these 2 C atoms are affected by the principal dipole H W LEAHY

**Superstructure and magnetic susceptibility in the system: copper–gold.** H J. SEEMANN AND E VOGT *Ann Physik* [5], 2, 976–90(1929), cf *C A* 24, 5196.—The variation of diamagnetic susceptibility with concn was measured for the Au Cu mixed-crystal series Alloys of the compns $Cu_3Au$ and CuAu in certain circumstances exhibit superimposed structure lines consistent with a regular arrangement of the constituent atoms, *e g*, the corners of the elementary cube may be occupied by Au atoms and the face centers by Cu atoms The relation between susceptibility and the appearance of superstructure was detd for alloys of the compns $Cu_3Au$ and CuAu For the former an increase and for the latter a decrease in diamagnetic susceptibility accompany the production of regular at distribution in the lattice Control expts on alloys differing in compn from the whole no ratios indicated no difference in susceptibility for *quenched and slowly cooled specimens* No explanation is available for the difference in sign of the effect with $Cu_3Au$ and CuAu B C A

**Magnetic measurements on rhenium.** W H ALBRECHT AND E WEDEKIND *Naturwissenschaften* 19, 20–1(1931).—Samples of Re and of K perrhenate having less than 0 01% impurity in the form of Ca and U were measured Re gave at 18° a sp susceptibility $\chi = +0\,046 \times 10^{-6}$ ($\pm 0\,02$), the perrhenate is diamagnetic $\chi = -0\,13$ ($\pm 0\,05$) *The Re value does not lie between those of the neighboring elements* Os ($+0\,074 \times 10^{-6}$) and W ($+0\,33 \times 10^{-6}$) B J C VAN DER HOEVEN

**Relationships between the dielectric constant and the optical properties of substances having the sodium chloride lattice.** J ERRERA *Z Elektrochem* 36, 818–23 (1930).—The total polarization of the alkali metal halides increases with increase of at wt of the anion and the cation By using Spangenberg's values for the electronic polarization, the at polarization was calcd The proportion of the total dielec. const due to at vibrations is decreased as the at no of the anion is increased, and in the case of the bromides and iodides with increase of at no of the cation There is an irregular variation in the chlorides and fluorides The factor $p$ of the infra red term of the dispersion formula can be detd by comparing the characteristic infra red frequencies calcd. by the dispersion formula from the observed values of the dielec const. with those calcd. by Born by the theory of electrostatic cohesion The infra-red branch of the dispersion curve can also be calcd L L QUILL

**Action of nitric acid on benzoic acid in magnetic and in electrostatic fields.** R. H. CLARK AND R M ARCHIBALD *Trans Roy Soc Can* [3], 24, Sect 3, 121–4(1930); cf following abstr.—The action of $HNO_3$ on benzoic acid was carried out at 20° in a magnetic field of 23,000 gausses per $\pi/4$ sq cm The products of the reaction did not vary appreciably from those obtained outside the magnetic field J W SHIPLEY

**Addition of hydrogen bromide to allyl bromide in a magnetic and an electrostatic field.** R H CLARK AND K R GRAY. *Trans Roy Soc. Can* [3], 24, Sect 3, 111–4 (1930).—The effect of a magnetic field on the reaction of HBr and allyl bromide in glacial AcOH decreases the yield of trimethylene bromide. For propylene bromide $n_D^{20} = 1\,51904$ and for trimethylene bromide $n_D^{20} = 1\,52292$ J W SHIPLEY

**Further investigation of the two electromers of 2-pentene.** R H CLARK AND E G HALLONQUIST *Trans Roy Soc Can* [3], 24, Sect 3, 115–9(1930), cf preceding abstr.—The 2 electromers of 2 pentene were synthesized and some of their phys properties detd Neither a magnetic nor an electrostatic field had any effect upon the addn products obtained with HBr on the metastable 2 pentene Stable 2 pentene has the *following* consts: b p 35 8° (755 mm), $n_D^{20}$ 1 37845, f p —149°, metastable 2-pentene has b p 36 5°, $n_D^{20}$ 1 37960, f p —141° J W SHIPLEY

**Sound propagation in gas mixtures.** D. G BOURGIN *Phys Rev* [2], 34, 521–6 (1929).—Mainly math Previous results on a single gas and a mixt. of 2 gases (cf *Phil Mag* [VII], 7, 821–41(1929)) are simplified and extended to a mixt. of any no of gases B C A

**Calculations on the velocity of sound in nitrogen tetroxide.** FRANK VERHOEK AND FARRINGTON DANIELS. *J. Am. Chem Soc.* 53, 1186–7(1931).—By using dissocn data of $N_2O_4$ detd. by V. and D, the velocity of sound was calcd and compared with the velocities detd experimentally by Kistiakowsky and Richards (*C. A* 25, 864). The agreement is not much better than with the data of Bodenstein, used by K and R, but the deviation is nearly const and the calcd value is always less than the observed velocity, this may indicate a const. error, either in theory or expt C. J WEST

**The formation of beams in molecular streaming.** P. CLAUSING *Z Physik* 66,

471–6(1930), cf *C. A.* 24, 3403.—Formulas are given for the distribution of mols that stream through a short tube at const. pressure into an evacuated space. The mean free path of the mols is great compared with the size of the tube and diffuse scattering from the walls of the tube is assumed. In the case in which the length of the tube equals the diam., large deviations from the cosine law occur. G. M. M.

Viscosity, heat conduction and diffusion in gas mixtures. XI. The viscosities of $H_2$, $N_2$, CO, $C_2H_4$, $O_2$ and their binary mixtures. Max Trautz and Albert Melster. *Ann. Physik* [5], 7, 409–26(1930). cf *C. A.* 25, 10.—The viscosities of $H_2$, $N_2$, CO, $C_2H_4$, $O_2$ and their binary mixts were detd. over the temp. range 20° to 280° by measuring the rate of flow through a capillary tube. The results were well represented by the Sutherland formula, $\eta_1/\eta_2 = (T_1/T_2)^{3/2} \times [1 + (C/T_2)]/[1 + (C/T_1)]$ by using the following values for the const. $C$: $H_2$ 84.4, $N_2$ 103.0, CO 101.2, $O_2$ 126.6, $C_2H_4$ 241.4. The isotherms of $N_2$–CO, $N_2$–$O_2$ and CO–$O_2$ mixts. were practically straight lines. The relation between viscosity and mol. diam. in mixts. is discussed. XII. Viscosity of gases at high temperatures. Max Trautz and Robert Zink. *Ibid* 427–52.—The viscosities of air, $N_2$, $H_2$, $O_2$, $CO_2$, $SO_2$, $CH_4$, A, Ne and He were measured over the temp. range 20° to 830°. The viscosities of air, $N_2$, A, $O_2$, $CH_4$, $SO_2$ and $CO_2$, as well as of HCl and $Br_2$ are accurately represented by the Sutherland formula. The values of $C$ for the different gases are given. This formula fails for $H_2$, He and Ne below the crit. temps., but the viscosities of these gases are given by the formula $\eta = kT^n/[1 + (C/T)]$ where $n$ and $C$ have the following values: $H_2$, $n = 3/4$, $C = 0$; He, $n = 3/4$, $C = 2.5$; Ne, $n = 0.6$, $C = 20$. P. T. Newsome

Calculating viscosity and flash point in compounded oils. E. Kadmer. *Seifensieder Ztg.* 58, 22–3(1931).—See *C. A.* 25, 805. P. Fischer

Note on the equation of state explicit in the volume. George Scatchard. *Proc. Natl. Acad. Sci.* 16, 811–3(1930).—The Beattie-Bridgeman equation (*C. A.* 21, 3146) may be expressed in the form $V/n = (RT/p) + (\beta/RT) + [\gamma/(RT)^2 - \beta^2/(RT)^3]p + [\delta/(RT)^3 - 3\beta\gamma/(RT)^4 + 2\beta^3/(RT)^6]p^2$, in which $n$ is the no. of moles and the coeffs. $\beta$, $\gamma$, $\delta$ are functions of the temp. This equation reproduces the exptl. results for less perfect gases less satisfactorily than Beattie's original equation (*C. A.* 24, 1775). The equation is not accurate at high pressures. J. B. Austin

The specific heat of liquid biphenyl. Roy P. Newton, B. D. Kaufa and Thomas De Vries. *Ind. Eng. Chem.* 23, 35–7(1931).—*The sp. heat of liquid* $Ph_2$ up to 300° was detd. by 2 elec. heating methods and by a method of mixts. The 3 methods gave consistent results with an av. value for the sp. heat of $(0.388 + 0.00057t°) \pm 1\%$. F. H. Rathmann

The specific heat of biphenyl. H. O. Forrest, E. W. Brugmann and L. W. T. Cummings. *Ind. Eng. Chem.* 23, 37–9(1931).—The sp. heat of $Ph_2$ in small temp. intervals from 72° to 203° was detd. by the batch-calorimeter method and from 147.7° to 347° by the flow calorimeter. The sp. heat varies from 0.408 ± 2% at 77.6° to 0.672 ± 2% at 347°. The results differ from those of N., K. and De V. by from −5 to +12% (cf. preceding abstr.). P. H. Rathmann

The necessity of adopting a standard substance for boiling-point and vapor-tension measurements. W. Swietoslawski. *J. chim. phys.* 27, 496–502(1930), cf. following abstr.—After a discussion of work done by others in this field, it is recommended by the Comm. on Physical-Chemical Standards of the International Union of Chemistry that b. p. and vapor tension be detd. simultaneously with the b. p. and vapor tension of water, that a few other liquids be standardized and that $dp/dt$ be detd. G. M. P.

A comparative study of boiling points and vapor tensions of eight standard organic substances. Al. Zmaczynski. *J. chim. phys.* 27, 503–17(1930).—B. ps. and vapor pressures of 8 compds. were measured between 380 and 2000 mm. pressure. The b. ps. of the substances studied were compared with the b. p. of water by the formula $t_{subs.} = A + Bt_{H_2O} + Ct^2_{H_2O}$, and the coeffs. $A$, $B$ and $C$ were calcd. $dp/dt$ was calcd. The b. ps. detd. at 760 mm. were: EtBr, 38.386°; $CS_2$, 46.262°; $Me_2CO$, 56.131°; $CHCl_3$, 61.152°; $C_6H_6$, 80.122°; PhMe, 110.606°; PhCl, 131.687°; PhBr, 155.908°. Gerald M. Petty

The vapor pressure of pyridine. P. A. van der Meulen and Russell F. Mann. *J. Am. Chem. Soc.* 53, 451–3(1931).—The vapor pressure of pyridine was detd. by the isoteniscope method. Between −20° and +120° the pressure is given by the formula $\log p = 6.8827 - \frac{1281.3}{t + 205}$ where $p$ is expressed in mm. of Hg and $t$ in degrees C. P. T. Newsome

Systems of four immiscible liquid layers. E. Lester Smith. *Nature* 127, 91 (1931).—An example of the rarely observed phenomenon of 4 immiscible liquid

layers can be produced by using hexane 12 cc, $PhNH_2$ 7 cc, oleic acid 0.5 cc, alc 1.5 cc and 0.8 *N* NaOH 10 cc. The alc is not essential to the system but reduces the time required for sepn of the layers. An increase of temp. or of electrolyte renders miscible the hexane and $PhNH_2$ layers (first and third from the top), which then form the top layer. H. F. JOHNSTONE.

**Relation of the liquid to the crystalline state.** KEDARESWAR BANERJEE. *Nature* 127, 92-3(1931).—The origin of elastic heat waves in liquids is elec. and akin to that of lattice oscillations in crystals. From theory and from observations on x-ray diffraction, it is seen that there is a max. in the mol. arrangements in liquids corresponding to the structure of the substance in the crystal state. In a crystal the natural frequencies of a mol. that are responsible for the Raman effect are modified because of the surrounding mols., but on account of the regular arrangement all the mols. are affected in the same manner and the Raman lines are sharp. In a liquid, however, the regularity of arrangement is broken, and there is a broadening of the natural frequencies of the mols. H. F. JOHNSTONE.

**Loading of metals with gas at high pressure.** HANS JELLINEK. *Z. Physik* 66, 547-57(1930). After activation, Fe, Pd and Ag take up $H_2$ and $N_2$ under high pressures. The phenomenon is studied by means of measurements of the elec. cond. When the gas is taken up by the metal, the resistance increases and falls again when the pressure is removed and the gas is liberated. The resistance for Fe and $H_2$ increases 8.0% between 0 and 35 atm., but for Fe and $N_2$ it decreases 1.5% up to 15 atm. and then increases 17.3% from 15 to 30 atm. The increase in resistance and pressure range for other cases are: Pd-$H_2$, 4.1%, 0-20 atm.; Pd-$N_2$, 3.8%, 0-25 atm.; Ag-$H_2$, 11.1%, 0-35 atm. G. M. MURPHY.

**Measurements with the help of liquid helium. XII. Plasticity of metal crystals at low temperatures.** W. MEISSNER, M. POLANYI AND L. SCHMID. *Z. Physik* 66, 477-80 (1930); cf. *C. A.* 24, 3687.—The plastic deformation of Zn and Cd crystals on stretching was investigated over the temp. range 1.2-20° abs. The plasticity remains nearly const. A method for transporting and handling liquid He is described. G. M. M.

**Dependence of the dissociation temperature of solids on the size of crystal grains.** J. KRUSTINSONS. *Acta Univ. Latviensis Kim. Fakultat* 1, 273-7(in German 278) (1929); cf. *C. A.* 25, 417.—Red HgO was sepd. into 4 fractions by sieves and it is shown that the dissocn. temps. of the smallest and largest sizes differ by 6°. If the Thomson formula is assumed to hold, the calcd. surface tension at the gas-solid interface is 1110 dynes/cm. G. M. MURPHY.

**The conductivity of thin metal foils.** LADISLAUS TISZA. *Naturwissenschaften* 19, 486-7(1931).—*The limiting thickness of thin metal foils (by cathodic dispersion) at* which their resistance rises sharply (cf. Bartlett, *C. A.* 22, 2870; Perucca *Ann. Physik* 4, 252(1930); Braunbek, *C. A.* 24, 1557) can be derived from the free path of the cond. electrons as indicated by J. J. Thomson. It is assumed that the electrons are diffusely reflected by the surface and thereby lose their forward impulse. The resulting free path is $\lambda' = \lambda d/(d + \alpha)$, in which $\lambda$ is the free path in compact metal, $d$ the thickness of the film, $\alpha$ a const. of about $^1/_2$. The crit. limiting thickness is $d_c$ = about $\alpha\lambda$, which agrees with exptl. values (10$\mu\mu$ for Ag at room temp., $\lambda$ = 50$\mu\mu$, Sommerfeld). At low temps. with $d_c$ many times larger ($\lambda$ longer) the results should be more pronounced and characteristic. The present theory, however, does not account for Braunbek's result on Hg: *its $d_c$ value of 200-300$\mu$ at* —183° *is too high.* B. J. C. v. d. H.

**Polar properties of single crystals of ice.** J. M. ADAMS. *Proc. Roy. Soc.* (London) A128, 588-91(1930).—Photographs are reproduced of single microscopic ice crystals *grown under controlled conditions. A short right hexagonal* prism, with the height nearly equal to the diam. of the base, is a frequently occurring shape for these small crystals. A no. of specimens give evidence of crystallographic polarity by the appearance of a jut at one end only of the *c* axis when the crystal is brought into an atm. favorable to evapn. Two other types of disintegration, characterized resp. by juts at each end and in the middle of the *c* axis, are observed in crystals of the same external form. These 3 types are explained as being due to the 2 possible modes of twinning of a polar crystal on the basal plane. The conclusion that the *c* axis in ice is *a polar axis does* not necessarily contradict the conclusion reached by Barnes that the (0001) plane must be a plane of symmetry so far as the arrangement of O ions in the lattice is concerned (*C. A.* 24, 705). It is possible that the asymmetric location of H ions in a non polar O lattice confers the necessary polarity on the structure as a whole. B. C. A.

**Crystal structure of molybdenum trioxide.** NORA WOOSTER. *Nature* 127, 93 (1931).—Laue photographs of crystals of $MoO_3$ show orthorhombic symmetry. The cell size is $a$ = 3.97 ± 0.02 A. U., $b$ = 13.81 ± 0.05 A. U., $c$ = 3.67 ± 0.02 A. U. There

are 4 mols of $MoO_3$ per cell The space group is $O_h^{18}$. The crystals were thin plates parallel to (010) H. F. JOHNSTONE

The grating constant of quartz. O BERGQVIST *Z. Physik* 66, 494–8(1930).—The grating const of a rock crystal was measured in the 1st and 2nd orders with Cu $K_\alpha$ and Fe $K_\alpha$ The distance from slit to plate was 622.11 mm; the slit width, 0.02 mm The x ray tube operated at 35 kv and 5 milliamperes, the exposure time was from 20 min to 2 hrs No measurable plates were obtained in the 3rd order in 3 hrs From the values in the 1st order, the higher-order results were calcd. A correction curve to the wave length calcns is given for the anomalous dispersion of quartz The results are $d$ = 4246.02 X. U., $\log 2d$ = 3.9290120 G. M. MURPHY

Crystal structure of nickel oxides O. G. BENNETT, R. W. CAIRNS AND EMIL OTT *J. Am. Chem. Soc.* 53, 1179–80(1931).—$NiO_2$, prepd. by oxidation of $Ni(OH)_2$ with Cl in alk. soln. and heated at 285°, corresponds to the previously reported structure for NiO, as it is face centered cubic If the NiO is not heated above 110°, the compd. is cubic but the edge of the unit cube is 4.61 A. U., the d. is 4.8, as compared to 6.69 for ordinary NiO; the no. of mols. in the unit cell is calcd. as 4; consideration of the intensities of reflection excludes the face-centered cubic type There is evidence of further modifications C. J. WEST

The physical properties of rhenium. C. AGTE, H. ALTERTHUM, K. BECKER, G. HEYNE AND K. MOERS *Naturwissenschaften* 19, 108–9(1931).—Several properties of Re were detd. The crystal structure is hexagonal in close packing, consts. $a$ = 2.765 A. U., $c$ = 4.470 A. U., $c/a$ = 1.616, smallest distance 2.765 A. U., atomic radius 1.382 A. U. The m. p. is 3440° abs. (measured in drilled hole), the linear thermal expansion (x ray method) is $12.45 \times 10^{-6}$ along the hexagonal axis, $4.67 \times 10^{-6}$ perpendicular to it (8% accurate) The d. of a highly annealed rod is 20.9 (calcd. 21.4 for at. wt. 186.31 ± 0.02) The fracture strength of a Re wire grown in gas phase, 0.25 mm. diam., 0.03 mm. W core is 80.6 kg. per sq. mm., elongation 21%. The sp. elec. resistance at room temp. is $\rho$ = 0.21 × $10^{-4}$ ohm cm. (15% accurate), its temp. coeff. between 0° and 100° is $3.11 \times 10^{-3}$, between 0° and 2710°, $1.98 \times 10^{-3}$ The ratio of $\rho_{373}$ to $\rho_0$ is 6.31 The electron emission between 1900° and 2700° abs. gives for the Richardson equation $A$ = 200 amp. per sq. cm. and degree squared, $b$ = 50,500, corresponding to an exit energy of 5.1 v. B. J. C. VAN DER HOEVEN

Condition magnitudes for water in the range from 10° to 500° and from saturation pressure to 300 atmospheres M. TRAUTZ AND H. STEIER *Forschung Gebiete Ingenieurw.* 2, 45–51(1931).—A high pressure vessel (vol. 1410 cc. at 15° and 1 atm.) was fitted with a heating device, thermoelements and manometer, and placed in a container packed with insulating material An air space sepd. this container from the outer jacket The sp. vol. of water was measured in the range 10° to 370° and 150 to 300 atm. Below the crit. temp. the estd. accuracy was about ±0.2–0.4%, and at the crit. temp., ±2.4%. The change in heat content between 10° and 500°, over the range 150 to 300 atm., was measured with an estd. accuracy of ±3% From the present $PVT$ data, together with values interpolated between 150 atm. and satn. pressure by utilizing the International Skeleton Steam Tables, a series of values were calcd. for (1) $\mu C_p$, the product of the Joule-Thomson effect and the sp. heat, (2) $J$, the heat content, and (3) $C_p$, the sp. heat at const. pressure F. D. ROSSINI

Thermal properties of compressed liquid water. JOSEPH H. KEENAN *Mech. Eng.* 53, 127–31(1931).—Recent data of Keyes and Smith on compressed liquid sp. vol. measurements and of Osborne, Stimson and Fiock on satd. vapor measurements, have made possible a much more accurate calcn. of the feed pump work in power plant operation in the higher temp. and pressure ranges Calcns. are based on the more accurate const. entropy measurements as compared with the older and less accurate const. vol. method Temp.-entropy diagrams are given for ranges up to 700°F. A diagram is given showing a comparison between const. entropy feed pump work and const.-vol. feed pump work for abs. pressures from 0 to 400 kg./cm.². The differences are small, usually within 2% of the compression work A. L. KIMBLER

Some final values for the properties of saturated and superheated water. FREDERICK G. KEYES AND LEIGHTON B. SMITH *Mech. Eng.* 53, 132–5(1931).—Tabulations are given of all available data of the Mass. Inst. of Technology pertaining to the properties of water The tabulations include the following: vapor pressures between 100° and 374°, $dp/dt$ at satn. between 0° and 370°, sp. vols. of satd. steam between 100° and 370°, sp. vols. of water at satn. pressure between 100° and 374°, d. of water between 100° and 360°, vols. of liquid water under pressure and at different temps.; isometrics of superheated steam between 200° and 400°. The use of an alloy of 18Cr–8% Ni steel increased the accuracy of high temp. measurements A. L. KIMBLER

**Some additional volume data for superheated steam.** L. B Smith and F G. Keyes *Mech Eng* 53, 135-7(1931) —The temps at which steam has been measured are extended to 460° by the use of a stainless steel bomb Results are given in tables and diagrams A L Kibler

**The vapor pressure of chlorine monoxide.** Charles F Goodeve. *J. Chem. Soc* 1930, 2733-7 —The vapor pressures (from 288° abs to 173° abs ), the m p and the b p of ClO are detd The plot of log vapor pressures (mm ) against $1/T_{abs}$ is the straight line $\log_{10}p = -1373/T + 7.87$ From the vapor pressures the b. p. of ClO is 2.0°/760 mm , which is a better value than that of Goldschmidt (*C A*. 14, 29) From the slope of the line the latent heat of evapn ($L_v$) is 6200 cals /g -mol. The m p of ClO is detd from cooling curves as —116 ± 1° The value of Trouton's coeff indicates that little or no assocn of ClO takes place in the liquid state J Balozian

**The electrical conductivity of amorphous quartz.** Walter Gnann *Z Physik* 66, 430-52(1930), cf *C A* 24, 5197 —The surface cond of amorphous quartz cylinders of 1 cm diam and 1.2 cm length is measured as a function of humidity of the air, tension and time The cond is strongly dependent on humidity Up to 20% relative humidity, quartz is a better insulator than amber, but its cond increases more rapidly with humidity Immediately after tension is applied, the current is relatively large but drops after a few hrs to a const value The vol resistance is greater than $6 \times 10^{19}$ ohm cm. Similar measurements made on Bakelite C show that it is strongly hygroscopic. G M Murphy

**Blanc's alumina.** N Parravano *Mem accad Italia, Classe sci fis mat e nat* I, *Chim*. No. 1, 1-27(1930), cf *C A* 24, 4681 —Further study of Blanc's $Al_2O_3$ reveals powerful adsorbing properties at 25° it retains 32.5% $CCl_4$, 18.7% $C_6H_6$, 18.2% $CS_2$ and 17.9% $Me_2CO$ It is anisotropic a diffraction spectrum appears only after mol rearrangement, which occurs at 180° to 670°, depending on exptl conditions This change is accompanied by a crowding of the atoms in the space lattice, which is probably the source of the heat developed in the process X-ray analysis also shows that this second form passes into a third, corundum, above 950°, this reaction is also an exothermic one accompanied by further crowding of atoms in the lattice This opinion is strengthened by the fact that the corundum form, is not a catalyst because it will not dehydrate EtOH, while the other forms, whose atoms are further apart, have strong catalytic powers A summary of the previous work on this substance is included A W Contieri

***Gradual transition in crystalline sodium nitrate.*** F. C. Kracek and E Posnjak. *J Am Chem Soc*. 53, 1183-4(1931) —$NaNO_3$ exhibits a gradual transition which ends at approx. 275°; the properties of the crystals alter reproducibly over a range of temps. rather than suddenly at a definite transition pt The coeff of expansion is nearly const. to about 150°, then it gradually increases to a peak value near 275°, followed by a rapid decrease to a normal value beyond 280° The heat absorption on heating likewise gradually increases to a max at 275.5°, while on cooling the heat evolution begins at about 275° Other changes are noted C J West

**Calorimetric determinations of heats of adsorption. Adsorption of sulfur dioxide by wood charcoal.** A Magnus, H Gipperhain and H Veldt *Z physik Chem*, Abt A, 150, 285-94(1930) —The integral heats of adsorption of $SO_2$ by coconut charcoal were measured over a wide range of concn (0.05-68 mg of $SO_2$ per g of charcoal). With increase in the amt adsorbed there is a slow, regular fall of molar heat of adsorption Differential heats of adsorption were measured by allowing about 0.12 mg of gas per g of adsorbent to be adsorbed on the already more or less charged charcoal. A marked discrepancy appears between the curves for integral and differential heats of adsorption, and this is explained by the slow establishment of equil in the crevices on the surface of the adsorbent B C A.

**Adsorption influence, activity and solvation in salt solutions.** P P. Kosakevich and N A. Ismailov. *Z physik Chem*, Abt A, 150, 295-309(1930) —The adsorption by charcoal of PhOH in aq soln and of BzOH in MeOH or EtOH soln is increased by the presence of the chlorides or bromides of Li, Na or K. In aq soln the relative effects of the cations are in the order Na > Li > K and those of the anions Cl > Br. In MeOH the same order is observed for the anions, but this order is reversed in EtOH The salts raise the activity of the substance adsorbed, providing a means of calcg the relative activities of the latter from adsorption measurements On the assumption that the neutral salt effect is due to solvation, values are obtained from adsorption measurements in good agreement with those calcd. from the influence on soly. B. C. A.

HCHO breaks emulsions stabilized by proteins (4) Anhyd $Na_2SO_4$ $(NH_4)_2SO_4$, or $CaCl_2$ often salts out emulsifying agents (5) Filtration breaks emulsions stabilized by flocculent ppts W. G GAESSLER

**The dielectric constants of complex colloidal systems. Adsorption by micelles in solution. Dielectric origin of the adsorptive forces.** CHARLES MARIE AND NÉDA MARINESCO *J chim phys* 27, 455–70(1930), cf *C A* 21, 3806, 22, 4385.—Tables and graphs are given which show the variation of dielec const with concn of suspensions of C in water and in gelatin, of isoelec gelatin, of *l* leucine and C, and of glycine, gelatin and C The phenomenon of protection was sepd from the phenomenon of assocn in complex mixts Dielec analysis permits the arbitrary choice of a protective colloid, and a detn. of the quantity necessary to protect an unstable colloid GERALD M PETTY

**Formation of spirals by chemical precipitation.** R E LIESEGANG *Naturwissenschaften* 18, 645–6(1930).—The spiral structures found by Schikorr (*Ibid* 18, 376(1930)) are simply varieties of the ordinary Liesegang rings A photograph showing the occurrence of these spirals in $Ag_2CrO_4$ pptd in gelatin is reproduced B C A

**Study of E. Fischer's polypeptides with x-rays.** FRITZ V. LENEL *Naturwissenschaften* 19, 19(1931).—X-ray photographs were made of 4 Fischer prepns I *dl* leucyltetraglycylglycine, II *l* leucyloctaglycylglycine, III *l* leucyltriglycyl *l* leucyloctaglycylglycine and IV *l* leucyltriglycyl *l* leucyltriglycyl *l* leucyloctaglycylglycine "Mark" tubes of 0 8 mm diam., 10 to 20$\mu$ wall were used to contain the substances in a Debye-Scherrer camera of 117.7 mm diam., Cu *K* rays, 10 hrs exposure, 10 to 12 amps., 35 kv Rings at various angles were found In the last 3 prepns a recurring ring at $\vartheta = 10°36'$ indicates a crystallographic distance of 4 07 A U between polypeptide chains (4 65 and 5 20 for silk) For I a distance of 3 15 A U is found that is probably unrelated to the 3 5 A U of the av of glycylalanyl (K. H Meyer *C. A.* 23, 3721) A pos result of the study is that the polypeptides are cryst B J C VAN DER HOEVEN

**Solubility of salts in ethylene glycol and in its mixtures with water.** H M TRIMBLE *Ind Eng Chem* 23, 165–7(1931).—Tabular and graphical data are presented for the soly at 30° of KI, KBr, $CuSO_4$ 5 aq, $K_2SO_4$, NaCl and KCl in ethylene glycol, in water and in mixts of the 2 solvents The relative order of solubilities is much the same Metathetical reactions, and reactions in which one metal displaces another, took place readily in ethylene glycol solns GERALD M PETTY

**Influences acting upon solubility. VII The couples thiourea-antipyrine and caffeine-antipyrine** E OLIVERI-MANDALÀ AND L IRRERA *Gazz chim ital* 60, 872–7(1930), cf O–M, *C A* 21, 1395.—The cryoscopic measurements were carried out by the method of Bargellini (*C A* 14, 488) The expts show that (1) the solubilities of thiourea (I) and of caffeine (II) in water increase greatly with addn. of antipyrine (III), (2) the temp coeffs of soly and the thermal effect, *q*, calcd by the isochore formula of van't Hoff are not reliable criteria of the presence of mol complexes in water; and (3) the cryoscopic method and that based on soly coeffs at different temps often give different results The following data give the soly (mols. per l.) in water of I and of II at the temps shown I; 10°, 1 1176, 15°, 1 383, 20°, 1 544, 25°, 1 759. II, 15°, 0 058, 25°, 0 100, 35°, 0 167 The soly values and soly coeffs of the I-III and II-III solns are given in more extensive tables, which should be consulted for details C C DAVIS

**Critical solution temperatures of systems of sulfur dioxide and normal paraffins** W F SEYER AND E TODD *Ind Eng Chem* 23, 325–7(1931).—It was found in study of the systems of $SO_2$ and butane, hexane, octane, decane, dotriacontane, duodecane and tetradecane that the crit soln temp is a function of the mol wt of the hydrocarbon The amt of hydrocarbon sol in $SO_2$ at its b p is comparatively small D F BROWN

**Temperature of maximum density of aqueous solutions. Deviations from the law of Despretz.** NORA GREGG-WILSON AND ROBERT WRIGHT *J. Phys Chem* 35, 624–8 (1931), cf *C A* 13, 923.—Previous expts with dil solns supported the law of Despretz, but on investigating more concd solns deviations were found which seem to depend upon 3 factors, *viz*, lowering of the f p, increase in the coeff of expansion and the d of the soln In general with more concd solns the temp of max d is lower than the f p The law of Despretz holds only for dil solns H W LEAHY

**The role of chemical impurities in the fluctuation of heats of solution of monotropic salts.** K P MISHCHENKO *Z Elektrochem* 36, 777–82(1930).—In order to det. the source of the variations in the heat of soln of KCl (of the order of ±1 percent) very accurate measurements were made with an adiabatic calorimeter (cf *C A* 24, 4694) devised by L and M Other solid modifications of KCl were considered as a possible

source of the variations and for this reason certified samples of KCl from two sources were used after drying at 300°, after fusing, and with no previous treatment Excellent agreement at 25° of 6 detns, with the high —4200 cal and the low —4104 cal, gave an av value of —4196 cal as the integral heat of soln of KCl to KCl 200 $H_2O$ and indicated that other modifications were not the source of error A sample of KCl of analytical grade gave consistently low results—about —4175 cal but after one recrystn it gave —4184 cal This indicated the source of error and when addn of small amts of $CaSO_4$ to the certified samples gave correspondingly low results the proof seems conclusive ODEN E SHEPPARD

*Heats of dilution of uni- and multivalent strong electrolytes at great dilution.* E LANGE AND J MONHEIM *Z Elektrochem* 36, 772-7(1930).—The exptl integral heats of diln recently made available by Lange and collaborators (cf *C A* 22, 346, 24, 4694, 23, 1562 etc.) for 14 1-1 type, 2 2-2 type and 4 2-1 type salts are collected, plotted, and discussed in a more extended fashion (cf Lange and Meixner *C A* 24, 1018) With 1-1 type salts with same cations the initial exptl slopes, $A$, which correspond to $a''$ values (apparent ionic diameters) are larger the smaller the radius of the opposite ion This relation is valid for the 2-1 type salts investigated $A_{Mg(Cl)_2} > A_{Ca(Cl)_2} > A_{Sr(Cl)_2} > A_{Ba(Cl)_2}$ However the measurements available indicate the reverse condition in regard to the 2-2 type salts as far as is indicated by $CaSO_4$ and $MgSO_4$ Possibly this is due to the fact that Mg ion has a greater parameter due to the extent of hydration Possibly in all cases the temp change of the parameter is a factor individual for each ion This may also play a part in the explanation of neg slopes in heats-of-diln curves ODEN I SHEPPARD

**Rotation dispersion of optically active substances.** F KEPSER *Strahlentherap.* 34, 574-7(1929).—The circular dichroism and optical activity of various proteins were studied, the curve of the anomalous rotation dispersion of a 5% egg-albumin soln in presence of Cu sulfate is reproduced B C A.

**The theories of the Soret effect.** G S HARTLEY *Trans Faraday Soc* 27, Pt. I, 1-10(1931).—H reviews the kinetic theories of the Soret effect advanced by van't Hoff, Wereide, Porter and Chapman and points out the error common to all of them, viz., attributing to the solvent only the role of vehicle and carrier of the solute He obtains independent support for Eastman's theory by basing a treatment on the assumption that a gradient of osmotic pressure produces the same velocity of ion transfer as an elec field which gives rise to the same force per ion F R SCHIERZ

**Note on the use of acetamide as a solvent in cryoscopy.** E CHERBULIEZ AND G DE MANDROT *Helv Chim Acta* 14, 183-6(1931), cf *C A* 25, 2159.—Acetamide (I) was the only suitable solvent found for detg the mol wt of certain disintegration products of casein Previously detd (cf Brun and A Manuelli, *Gazz chim. ital* 35, 1418(1905)) values of the cryoscopic $K$ for I (3630 with urethan, 3330 with naphthalene and 3740 with biphenyl) disagreed so widely that new values were detd. with acetanilide, where $K = 4861$ at 0.897% concn., 4223 at 1.877% and 4177 at 2.520%, hippuric acid, where $K = 4543$ at 1.346% concn., 4240 at 2.418%, and diketopiperazine, where $K = 4885$ at 0.507% concn and 4790 at 0.986% The values of $K$ decrease with increase in concn but at the same mol concn of each solute the values check within 5% The detns were made with pure, dry I in Beckmann tubes in a paraffin bath (to avoid water vapor) placed in a const.-temp enclosure at 78° maintained by boiling AcOEt I kept in a desiccator does not melt at a const temp and in a week the m. p. drops several degrees, indicating 2 modifications of I. Despite these facts results agree well when values of $K$ are used depending on the concn, and the results are considered valuable in the work under consideration ODEN E SHEPPARD

Solvents. T. H. DURRANS. *J Oil & Colour Chem Assoc* 14, 65-80(1931).—The phys chemistry of solns with particular reference to *lacquer solvents* is discussed G G SWARD

**Studies on the porous-disk method of measuring osmotic pressure.** F T. MARTIN AND L. H SCHULTZ *J Phys Chem* 35, 638-48(1931).—The porous disk method of Frazer and Patrick (cf Townend, *C A*, 23, 752) for directly measuring osmotic pressure was modified and applied to dil solns of KCl with sufficient success to justify further work on it Errors in the results were traceable to unequal temps within the app and therefore suggest refinements in construction Distn was obtained at will in either direction with relation to the disk, which had not been possible in previous work H W. LEAHY

**Fractional precipitation. V. The influence of foreign substances in the crystal lattice.** OTTO RUFF. *Z anorg allgem Chem* 195, 60(1931).—Additional literature reference for a previous article (cf *C. A* 24, 2030). J. B. AUSTIN

Free energy of formation of thallium amalgams. CHARLES EDWIN TEETER, JR. *J Am Chem Soc* 53, 1180–1(1931) C. J WEST

The deposition series of metals in fused salts. GIOVANNI DEVOTO. *Atti III congresso naz chim pura applicata* 1930, 322–30.—From existing data, the free energy of formation at 700° and at the m. p. was calcd. for halides of the alkali metals, alk. earth metals and a few other metals such as *Mn*, *Cu*, *Co* and *Tl*. The potential relative to H at 700° was calcd. for a number of metals. J. B. AUSTIN

The diffusion of salt ions into aluminum. J. CIECHOCKI *Compt. rend.* 191, 841–2 (1930); cf. *C. A.* 23, 5099.—An Al tube, 2 mm. inside diam., and 4 mm. outside diam. was filled with NiCl₂, and drawn to 0.83 mm. outside diam. It was placed concentrically with a tube of Al in a larger glass tube, and the system was evacuated. At 600° and 80 v. a thermionic current was obtained, which rose to a max. of about $2.3 \times 10^{-7}$ amp. in 60 min., followed by a rapid decrease. No neg. emission was obtained. The thermionic current was due to an absorption of the salt by the metal. G. M. P.

The apparent dissociation constants of phenylalanine and of dihydroxyphenylalanine and the apparent free-energy and entropy change of certain amino acids due to ionization. SADAICHI MIYAMOTO AND CARL L. A. SCHMIDT *J. Biol. Chem.* 90, 165–78 (1931).—The apparent dissocn. consts. for *dl*-phenylalanine and *dl*-3,4-dihydroxyphenylalanine were detd. Values for the apparent standard free-energy change for the ionization of those naturally occurring amino acids for which apparent dissocn. consts. are available were calcd. Values for $\Delta S$, the apparent change in entropy of the system due to ionization, were calcd. for alanine, glycine, arginine, histidine, lysine, aspartic and glutamic acids and diiodotyrosine. Calcns. were made which show that no appreciable error results when concn. is used instead of activity in calcg. the primary dissocn. const. of aspartic acid and of glutamic acid. P. H. EMMETT

Electrolytic water as acid. R. SAXON *Chem. News* 142, 49–50(1931).—A method of prepg. H is described. H is liberated rapidly from pure water at a Cu anode with a potential of 200 v. Since the cathode becomes plated with Cu a Cu cathode is desirable also. No gas appears at the cathode. White CuOH is formed first; this turns through a light blue to a green hydroxide. Electrolytic reactions cannot be represented accurately by chem. equations. The reaction in question is explained by a rotation of the charged element H within $H_2O$ groups from the position $OHH^+$ to the position $^+HOH$ under the influence of the charges on the electrodes. The stage of the white hydroxide is formulated as $H)OHH^+OHH^+$ . $OHH^+$ (OHCu and the stage of green hydroxide as $HH)OHH^+OHH^+$ $OHH^+$(OHOH Cu, in which ) represents the pos. and ( the neg. electrode. ALLEN S. SMITH

Buffer solutions from secondary sodium phosphate and citric acid. K. H. SLOTTA AND W. FRANKE *Ber.* 64B, 452–4(1931).—Buffer solns. prepd. from these 2 salts have a range of $p_H$ 2.2 to 7.4. The values given for the various proportions differ considerably from previous reports. V. F. HARRINGTON

The "drop method" apparatus of Todt for the colorimetric determination of $p_H$ values. I. M. KOLTHOFF *Chem. Weekblad* 5, 78–9(1931).—The several shortcomings of this method are pointed out. Buffer solns. are recommended in order to minimize the chances for making errors. J. C. JURRJENS

The use of indicators with two color ranges for the photometric determination of the hydrogen-ion concentration. HANS LEISER *Biochem. Z.* 230, 285–9(1931).—The use of an indicator with a single color range is preferable to that with 2 color changes in detg. the $p_H$ by means of the step photometer. S. MORGULIS

The potential of the indi-indochloride electrode. HENRY TERREY AND HERBERT C. BAKER *J. Chem. Soc.* 1930, 2583–6.—The potential of the indi-indochloride electrode was measured, the cell arrangement being $\overline{Hg} \mid Hg_2Cl_2 + NaCl \mid NaCl + Na_2IrCl_6 + Na_3IrCl_6 \mid Ir$. The electrodes were of (*a*) indized Ir foil welded to Pt-Ir wire, or (*b*) indized glass, the $Na_3IrCl_6$ concns. being held const. at $0.984 \times 10^{-3}$ *N* and the $Na_2IrCl_6$ concns. being varied from 0.874 to $18.482 \times 10^{-3}$ *N*. The e. m. f. values vary according to $E = E_0 + RT/F \log_e s/o$, where, *s* and *o* are the concns. of $Na_3IrCl_6$ and $Na_2IrCl_6$, resp. The heat of oxidation of the indochloride was calcd. as 5600 cal./mol. It is found that the indo-indichlorides are correctly represented as being of the "ferro-ferri" type. J. BALOZIAN

The reduction potential of thymoquinhydrone. EINAR BIILMANN AND JYTTE MUUS. *Ber.* 64B, 310–4(1931).—The prepn. of pure thymoquinhydrone is described. Its potential was measured against quinhydrone. The values were not very const., increasing with time and temp. The e. m. f. against $H_2$ is at 18° 0.5927 ± 0.0005 v. and at 25°, 0.5806 ± 0.0005 v. V. F. HARRINGTON

**The behavior of the modifications and varieties of silica in a stream of chlorine in the presence of carbon.** E GRUNER AND J ELÖD *Z anorg allgem Chem.* 195, 269-87(1931) —The sequence of reactions is shown to be $SiO_2 + 2Cl_2 \longrightarrow SiCl_4 + O_2$, $2C + O_2 \longrightarrow 2CO$ *and not the more commonly* accepted $SiO_2 + C \longrightarrow Si + 2CO$, $Si + 2Cl_2 \longrightarrow SiCl_4$ The temps of formation of $SiCl_4$ from $SiO_2$, Cl and C are 740° from amorphous $SiO_2$, 1060° from tridymite, 1060° from cristobalite and 1220° from quartz For various naturally occurring varieties of $SiO_2$ the necessary temp. is 800-1100°, depending on the degree of aging The temp of formation of $SiCl_4$ can be used in the analysis of $SiO_2$ to det the amts of the various modifications present A P SACHS

**The influence of the silent discharge on sulfur vapor.** ROBERT SCHWARZ AND PAUL ROYPN *Z anorg allgem Chem* 196, 1-10(1931) —The behavior of S vapor at a temp *of 460° in a silent elec discharge was studied by a dilatometric method* A relative contraction was observed This is explained by postulating the formation of $S_2$ (thiozone) mols L J ROSENBAUM

**The existence of hyzone.** ROBERT SCHWARZ AND PAUL ROYPN *Z anorg allgem Chem* 196, 11-25(1931) —A silent elec discharge was passed through H at a pressure of 4 cm Hg and liquid air temp The decrease in pressure was measured at frequent time intervals From the amt of contraction observed and a calcn of the wall adsorption of H atoms, it is concluded that the effect is due only to the adsorption of H atoms and that there is no evidence of $H_3$ L J ROSENBAUM

**The hydrolysis of acetamide.** THOMAS W J TAYLOR *J Chem Soc 1930*, 2741-50 —The effect of acids (3 4, 5 *N* HCl, and 4, 5 *N* HBr and $H_2SO_4$) and bases (*N* NaOH and KOH) on the velocity of hydrolysis of acetamide (in 0 05 *N* soln ) at 25° is measured, together with the effect of 4 *N* and 5 *N* HCl at 40° and 41°, resp The salt effects are detd at 25° with 4 *N* HCl for *N* alkali (Li, Na, K) chloride, 4 *N* HBr for *N* alkali bromide solns , *N* NaOH for 2, 2 5 *N* NaCl, 2, 3 *N* NaBr, and with *N* KOH for 2 *N* KCl, KBr and KI Curves of the acid normality against the velocity coeffs at 25° and 50° indicate that for HCl the velocity coeff is max when the acid concn is 3 *N* A similar max is shown by HBr, but is not present with $H_2SO_4$ To explain these max it is assumed that with acetamide HCl and HBr form complexes ($2CH_3 CO NH_2$, HCl and $2CH_3 CO NH_2$, HBr, resp ), which do not hydrolyze, while $H_2SO_4$ does not form such a complex It is found that with 4 *N* HCl as catalyst, NaCl and KCl accelerate the hydrolysis, while LiCl fails to do so, with HBr, KBr accelerates the reaction, NaBr has no apparent effect, while LiBr represses it To explain this behavior of salts, the assumption is made that acetamide forms stable complexes with certain salts, which complexes do not hydrolyze The effect of any salt is the same in bases as in acids J. BALOZIAN

**Vapor-phase equilibrium of the simplest cis-trans isomers (dichloroethylene).** L LEBERT AND R. BÖLL *Z. physik Chem* , Abt. A, 152, 451-2(1931).—*The b ps of cis- and trans-*$C_2H_2Cl_2$ are 60 14 ± 0 04° and 47.48 ± 0 04°, resp (purity checked by dielec. precision measurements) An exact *b p curve of mixts of the 2 isomers* was detd Condensation of the vapor in equil at 300° yielded 63% of *cis* $C_2H_2Cl_2$, the thermodynamically more stable form FRANK URBAN

**The melting point in the tungsten-rhenium system.** KARL BECKER AND KURT MORRS *Metallwirtschaft* 9, 1063-6(1930) —The solidus line for the W-Re system was detd An intermetallic compd , $W_2Re_3$, m 3005° and with 2 eutectics one with 50 atomic % Re and m 2892°, the other with 67 atomic % Re and m 2822°, were found. C. H LORIG

**The modifications of silver iodide.** R BLOCH AND H MÖLLER *Z. physik Chem* , Abt A, 152, 245-68(1931) —By rontgenographic and microscopic examn of AgI prepd by various methods the phase diagram was constructed There are 3 modifications, cubic (< 135°), hexagonal (135-46°) and "hot" cubic (> 146°) Methods of prepg both cold forms are given V. F. HARRINGTON

**Phase equilibrium in binary systems with continuous mixed crystals.** E. KORDES *Z physik Chem* , Abt A, 152, 161-96(1931) —A simple empirical equation is given for the phase equil between crystals and liquid, between crystal modifications within continuous crystals and between the anisotropic liquid state and the isotropic. Previous data are used to prove the general applicability of the equation The value of this equation in geochemistry (the zone formation in plagioclase, the difference between isopolymorphism and boundary miscibility, etc ), is suggested V. F. H

**Phase-rule studies on metallic thiocyanates. I. The systems $Ba(CNS)_2$-NaCNS-$H_2O$ and $Ba(CNS)_2$-KCNS-$H_2O$ at 25°.** VINCENT J OCCLESHAW *J. Chem. Soc* 1931, 55-60 —The systems $Ba(CNS)_2$-Na(CNS)-$H_2O$ (I) and $Ba(CNS)_2$-KCNS-$H_2O$

(II) are investigated, and the solubilities of NaCNS, KCNS and $Ba(CNS)_2$ in $H_2O$ are detd at 25°. The ternary diagram of system I shows that no double salt exists at 25°. NaCNS $2H_2O$ is the stable solid phase at this temp. when NaCNS is in equil. with its satd. solns., its transition temp. being 30.3 ± 0.1° (detd. dilatometrically and thermometrically). In system II $3KCNS \cdot 2Ba(CNS)_2 \cdot 5H_2O$ exists over a wide area. It is prepd. by allowing a soln. contg. the correct proportions of the constituent salts to cryst. at 25°, freeing from mother liquor as much as possible by suction, and drying in air in cold weather. At 25° the solv. in g./100 g. is detd. as 58.78 for NaCNS, 70.89 for KCNS and 62.61 for $Ba(CNS)_2$. J. Balozian

**Physical constants of the system methane hydrogen.** F. A. Freeth and T. T. H. Verschoyle. *Proc. Roy. Soc.* (London) A130, 453-63(1931); cf. *C. A.* 25, 1422.—The pressure range of $CH_4$ isotherms was extended to 215 atm. The m.-p. curve was detd. The triple point was observed to be −182.40° at a pressure of 8.737 cm. The three phase curve and one isotherm at −182.5° of the system $CH_4$–$H_2$ were detd. P. J. Rosenbaum

**Kinetics of chlorine bleaches and hypochlorite solutions.** Joseph J. Weiss. *Z. Elektrochem.* 37, 20–5(1931); cf. *C. A.* 24, 5580.—The velocity of spontaneous decompn. of alk. hypochlorite solns. by the general reactions $3ClO^- \longrightarrow ClO_3^- + 2Cl^-$, $2ClO^- \longrightarrow 2Cl^- + 2O$, at const. H ion concn. is given by $\frac{d[ClO^-]}{dt} = \left\{k\frac{f_1^2}{f_2} + k_2^* f_{HOCl}^2 [H^+]\right\} [OCl^-]^2$, $\frac{1}{t}\left\{\frac{1}{[ClO^-]_t} - \frac{1}{[ClO^-]_0}\right\} = k_1\frac{f_1^2}{f_2} + k_2^* f_{HOCl}^2 [H^+] = k_{bim}$. Consideration of the Γ. Foerster tests (*Z. Elektrochem.* 23, 137(1917); cf. *C.* I. 11, 2865) and use of the Debye-Hückel theory gives $k_{bim}^F = 1.07 \times 10^{-4} \times 10^{0.704\sqrt{\mu}[OH^-]} \times \mu[OCl^-] + 1.2 \times 10^{-4}\frac{f_{HOCl}^2}{[OH^-]}$ at 25°, time in days and concn. in mol./l. Consideration of the Kauffmann tests (*C. A.* 19, 561) gives $k_{bim}^K = (5.1 \times 10^{-4} f_{HOCl}^2/[OH^-])$ in the same units. General kinetics of Cl bleaches, if HOCl or $Cl_2O$ is assumed as the bleaching principle, are set up, and the oxidation mechanism is discussed, with $p_H$ = const. $\frac{d[ClO^-]}{dt} = \left\{f(F) + k_2'\right\} f_{HOCl}^2 K_{HOCl}' [H^+][ClO^-]^2$, $\frac{1}{t}\left\{\frac{1}{[ClO^-]_t} - \frac{1}{[ClO^-]_0}\right\} = \left\{f(F) + k_2'\right\} f_{HOCl}^2 k_{HOCl}' [H^+] = k_{bim}'$. For homogeneous reactions $f(F)$ = const. $[R] + k_2'$ ($R$ is the reducing agent). This is compared with the Kauffmann phenolphthalein tests and confirmed. For heterogeneous reactions a form $f(F) = a_1[H^+]^n + a_2$ is discussed, which in general leads to a H ion concn. for extreme reaction velocity. There is discussed $n$ a reaction velocity and swelling being assumed for the special case of cellulose bleaching or oxidation, where $k_{bim}' = f_{HOCl}^2\left\{b_1\sqrt{[H^+]} + b_2[H^+]\right\}$. The Clibbens and Ridge tests (cf. *C. A.* 21, 2192) and theory are discussed for the cases $b_1 = 3.92 \times 10^4$, $b_2 = -4.0 \times 10^7$, $[H^+]^{n)}_{max} = 2.5 \times 10^{-7}$, and $b_1 = 10.4 \times 10^4$, $b_2 = -2.2 \times 10^8$, $[H^+]^{n)}_{max} = 0.6 \times 10^{-7}$ as H ion concns. of greatest fiber attack. A notable fact for useful application of practical bleaching of cellulose and textiles is that, from the general difference of the $n$ of the fiber and the $n$ of the color to be discharged, a H ion concn. or interval can be calcd. at which the color to be discharged is attacked rapidly, while the textile or fiber is practically unattacked, which is advantageous as regards bleach loss and textile strength. L. M. Symmes

**Influence of the triazo ion in the catalytic action of colloidal platinum on hydrogen peroxide.** Γ. Oliveri Mandalà. *Gazz. chim. ital.* 60, 878-82(1930); cf. *C. A.* 24, 1017.—Colloidal Pt was prepd. by the method of Bredig. Decompn. of $H_2O_2$ was followed by N detns. with an app. used previously for the catalytic decompn. of $HN_3$ (cf. *C. A.* 11, 1608). The molar concns. per l. of the $H_2O_2$, $NH_3$ and colloidal Pt were 0.0839, 0.012 and 0.00010, resp. The velocity of decompn. of $H_2O_2$ is reduced greatly by adding small quantities of $NH_3$, even traces of $NH_3$ reduce the velocity about 0.5. The velocity const., $K$, is not a linear function of the concn. of $NH_3$. The presence of $HN_3$ decreases $K$ about 25%. The temp. coeff., $K_{t+10}/K_t$ is 1.66 to 2. Conclusion: the catalytic decompn. of aq. $H_2O_2$ follows the logarithmic law $x = A(1-e^{-kt})$, and the temp. coeff. per 10 degrees is approx. 2, whether $NH_3$ is present or not. C. C. Davis

**Autoxidation of cyclohexene by oxygen.** N. D. Zelinskii and P. P. Borisov. *Ber.* 63B, 2302-5; *J. Russ. Phys.-Chem. Soc.* 62, 2051-4(1930).—The Lewis Langmuir

theory predicts the addn of O to an ethylenic linkage to yield a peroxide without the use of a catalyst Z and B allowed 20 g of cyclohexene to absorb O The rate of *absorption increased, decreased and became zero after 151 days* 3200 cc of O, corresponding to *one atom per molecule*, was absorbed The unchanged cyclohexene was removed by standing in a vacuum desiccator over $H_2SO_4$ for 3 months, when a tough, resinous, reddish yellow mass remained, which gave the peroxide test with guaiacol resin and ferrous salts, and analyzed for cyclohexene peroxide, $C_6H_{10}O_2$ F H RATHMANN

**Oxidation of seemingly autoxidizable leuco bases by molecular oxygen.** ALBERT REID *Ber* 63B, 1929 2(1930) —Thionine was reduced by phenylhydrazine to leucothionine and carefully purified by washing with alc, drying and subliming at 190–220° under 0 05 mm M p 185° 2 0 mg leucothionine in 2 cc of a molar buffer soln of $NH_4OAc$ and HOAc purified in quartz vessels ($p_H$ = 4 5), was shaken in a quartz vessel immersed in a thermostat at 20°, and the rate of absorption of O, noted I rom 0 0001 to 0 001 mg of Cu greatly increased the rate Replacement of the N of the air by CO greatly reduced the rate both with and without the presence of Cu Leuco methylene blue gave similar results *It is concluded that the oxidation of these leuco bases is not autoxidation but is catalyzed by traces of such metal ions as Cu, occurring as impurity in even the purest of lab reagents* I H RATHMANN

**The catalysis of the reactions between solids II The mechanism of the reaction *of catalytic stannate formation*** SETSURÔ TAMARU AND NOBORU ANDÔ *Z anorg allgem Chem* 195, 309 20(1931) cf *C A* 24, 774 —If $SnO_2$ is previously heated to 1150° the stannate formed from the mixt of $SnO_2$ and 7CaO without a catalyst at 900° is always small in amt and is independent of the method of prepn of the $SnO_2$ The reduction of $SnO_2$ by $H_2$ occurs in 2 stages and the further reduction of SnO is repressed by the presence of CaO A new method of *decompose cassiterite for analysis* is proposed, based on the formation of stannate by heating with lime in the absence of air A P SACHS

**The decomposition of carbon monoxide in the presence of iron and iron oxides.** P. RISCHBIETH *Z physik chem Unterricht* 44, 22-4(1931) —R describes 2 lecture expts to study the reaction (*a*) $CO \longrightarrow C + CO_2$ and the equil (*b*) $CO_2 + C \rightleftharpoons CO$ in the presence of Fe and its oxides The gases are passed over heated $Fe_2O_3$ in a glass tube Even after reduction of the oxide the content of $CO_2$ in the escaping gases (*a*) remains about const (*50%*) indicating the decompn of the CO in contact with Fe At 400–500° the equil (*b*) is about 50% $CO_2$ This catalytic reduction of CO may account for the occurrence of the finely divided C so often met with in the upper regions of the blast furnace E R SCHERZ

**The mechanism of iron catalysts in certain oxidations.** C V. SMYTHE *J Biol Chem* 90, 251-65(1931) —Ferrous iron present as the unionized pyrophosphate or metaphosphate is shown to oxidize rapidly with $O_2$ of the air regardless of the acidity of the soln, whereas $FeSO_4$ in similar slightly acid solns showed no appreciable oxidation This behavior, as well as the catalytic effect of ferrous and ferric iron in certain org oxidations, is explained in terms of the electronic structure of the compds P H E

**New methods of organic thermochemistry.** M REBEK *Arhiv Hem Farm* 4, 212 21(221 German)(1930) —A report on preliminary expts to det the energy content of org compds J. KUČERA

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## 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

**Masses of the electron, the proton and the universe.** A. S. EDDINGTON. *Proc. Cambridge Phil. Soc.* 27, 15–9(1931), cf. *C. A.* 24, 1277.—L.'s "Theory of 137" is developed further. The calcn. of the ratio of mass of the proton to the mass of the electron is given as 1849.6. The "packing fraction" is checked. The no. of protons in the universe is given as $7 \times 10^{78}$ or $14 \times 10^{78}$, depending on whether space is taken as elliptical or spherical. WILLIAM E. VAUGHAN

**The quantum theory of zero-point temperature.** G. BECK, H. BETHE AND W. RIPZLER. *Naturwissenschaften* 19, 39(1931).—At 0 abs. all internal motion of a crystal lattice has stopped. *All degrees of freedom are "frozen" with the exception of 1 per* electron for the Bohr orbits of the electrons. Every electron has (Eddington) $1/\alpha$ degrees of freedom if $\alpha$ is the Sommerfeld fine structure const. Likewise $1/\alpha$ degrees for every proton are present. Hence in order to reach abs. 0 $(2/\alpha)$ —1 degrees of freedom have to be subtracted from a substance per neutron present. If this is equated to 273°, a value of 137 is found for $1/\alpha$ which is considered to agree with a value obtained in a different way. B. J. C. VAN DER HOEVEN

**Quantum mechanics of electrons in crystal lattices.** R. DEL. KRONIG AND W. G. PENNEY. *Proc. Roy. Soc.* (London) A130, 499–513(1931).—Math. The mechanics of electrons in periodic fields of potential are calcd. for an integrable case. The results agree qualitatively with exptl. facts. E. J. ROSENBAUM

**Diamagnetism of the free electron.** C. G. DARWIN. *Proc. Cambridge Phil. Soc.* 27, 86–90(1931).—Math. D. shows that the susceptibility of a free electron gas is $2\mu_B^2/3kT$ per electron, where $\mu_B$ is the Bohr magneton. WILLIAM E. VAUGHAN

**X- and γ-radiation measurement and the new international *r* unit.** J. G. STEPHENS. *J. Cancer Research Comm. Univ. of Sydney* 1, 222–31(1930).—*Radiation is specified* clinically by detg. (*a*) the wave length, (*b*) the amt. of energy in the radiation and (*c*) the degree of polarization. The *r* unit, which measures the total ionic charge under certain conditions, is used to express energy in the radiation in terms of the ionization in air. It is suggested that the ionization in liquids such as hexane or light petroleum would be of advantage by reducing the size of app. and giving larger ionization currents. B. C. A.

**Direct measurement of intensity distribution in molecular beams.** J. B. TAYLOR. *Z. Physik* 57, 242–8(1929).—When an alkali metal atom strikes a glowing W wire, it parts with an electron and is reëmitted as a pos. ion. By measuring the no. of pos. ions emitted from such a wire in various positions in the path of a mol. beam the no. of alkali metal atoms striking the wire per sec. can be detd., and hence the energy distribution in different parts of the beam deduced, with an accuracy of 1 in $10^3$. B. C. A.

**The production of an intense beam of hydrogen positive ions.** LOUIS R. MAXWELL. *Rev. Sci. Instruments* 2, 129–40(1931).—*A method was designed for obtaining an in*tense beam of $H_3^+$ ions by diminishing the loss of the ions to the walls of the discharge chamber which occurs in the usual method. This is accomplished by placing the discharge chamber in a strong magnetic field in which the direction of the magnetic field is parallel to the direction of motion of the pos. ions. The app. is described. It is capable of producing a pos.-H ion beam corresponding to currents ranging up to 3 ma. in a region of pressure of $3.3 \times 10^{-4}$ mm. of Hg. ALLEN S. SMITH

**Photographic detection of the asymmetrical angular distribution of twice-reflected electrons.** E. RUPP. *Naturwissenschaften* 19, 109(1931).—Photographs were made of twice reflected electrons. An electron beam passed through a 0.3-mm. hole and was reflected at 45° on a Au surface. The reflected ray (also at 45°) passed through a 0.1-mm. hole (30 mm. from the point of reflection) with a thin Au foil behind it. The scattered ray is photographed on a plate 450 mm. from the foil. For electrons of 220 kv., diffraction rings were obtained with distinct asymmetry, the rings being weakest on the side away from the original direction of incidence of the electron beam. The asymmetry is not due to the structure of the Au. *An Al reflector and foil do not give* the same result. B. J. C. VAN DER HOEVEN

**Angular scattering of electrons in gases.** F. L. ARNOT. *Proc. Cambridge Phil. Soc.* 27, 73–6(1931); cf. *C. A.* 24, 1572.—A discussion is given of the error introduced

into expts on the angular scattering of electrons in gases by a potential at right angles to the electron beam Calcn shows that in the previously reported paper the error in all cases was less than 0°17′, which is less than the exptl error in the detn of the angles
WILLIAM E VAUGHAN

**Optical determination of the sphere of action of atoms for electrons.** L S ORNSTEIN AND A M VAN DOMMELEN *Proc Acad Sci Amsterdam* 33, 683–0(1930), cf *C A* 24, 1793, 2668 —The optical method previously described for the detn of the sphere of action of He atoms is limited to electronic energies above the excitation potential It is shown that it is possible to extend the measurements below that value with a mixt of He and Hg Further it is possible to simplify the method so that intensity measurement is not necessary and the density detn is sufficient for obtaining the value of the sphere of action
MARIE FARNSWORTH

**The cathode radiation of the sun.** H RUDOLPH *Naturwissenschaften* 19, 66 (1931) —From a theory on the daily variation of the earth's magnetism (*Gerl Beitr z Geophysik* 27, 378(1930)) it is concluded that the N 'dust shell" around the earth is negatively charged This necessitates a strongly neg corpuscular radiation from the sun and a potential of some $10^{11}$ v for this shell Several conclusions and results are discussed
B J C VAN DER HOEVEN

**Direct photography of ionization in insulating substances.** A GEMANT *Naturwissenschaften* 19, 109(1931) — Light-sensitive films in an elec field are blackened on reaching certain limits of potential This effect is attributed to ionization, it occurs in gases as well as in liquids and solids By using photographic paper (semiconductor) as an extension of the plate electrode the structure of insulating substances can be examd when present between the electrodes Blackening below the breakdown potential indicates porous structure of the material, ionization and consequent luminescence by either d c or a c can thus be studied directly It was found that for a no of substances only a c gives the glow to which the blackening is due
B J C VAN DER HOEVEN

**Photoelectric effect with lead and mercury at low temperatures.** J. C McLENNAN, R. G HUNTER AND J H McLEOD *Trans Roy. Soc Can* [3], 24, Sect 3, 3–23(1930) — Measurements of the photoelec current produced by films of Pb and of Hg when irradiated with ultra-violet light below 3000 A U were made down to temps below the transition point for supercond The object was to det whether the emission of electrons from a metal when suitably irradiated undergoes any abrupt modification if the temp of the metal irradiated is progressively lowered from a point a few degrees above its supercond transition point to one a few degrees below it The photoelec current from Pb and Hg in highly evacuated cells was measured at temps down to that of liquid $H_2$ At the temp of liquid air Pb showed a decrease in the current of about 2% from that of the satn value of the current at room temp and a decrease of about 16% at the temp of liquid $H_2$ Hg at liquid air temps showed large variation with the thickness of the Hg film Inability to reproduce films of exactly the same thickness made it impossible to draw any conclusions concerning the change in the photoelec current from Hg at the temps of liquid air and liquid $H_2$ The photoelec current from lead films at the temp of liquid He and in the superconducting state was slightly less than it was at a few degrees above its transition temp , 7.2°K No abrupt change took place in the photoelec emission of electrons from Pb as it was cooled down through its characteristic transition temp
J W SHIPLEY

**The action of adsorbed gas films on the photoelectric effect of salts (remark on "The action of Geiger counting chambers").** J. KLAPHECKE. *Naturwissenschaften* 19, 87(1931) —Water vapor promotes electron emission in a manner similar to that found in Geiger counters by Bosch and Klumb (*C. A* 25, 1434) in an investigation of the photoelectric effect of salts Salts heated *in vacuo* show no photoelectric effect (Werner, *C A* 23, 1295) Salts sublimed in air give a photoelectric current, which increases 10 fold after a short treatment with water vapor They do not exhibit the same activity as do the same salts with occluded water prepd from solns Results on gases other than $H_2O$ are inconclusive
B J C VAN DER HOEVEN

**Cathode sputtering at very low gas pressures.** A GÜNTHERSCHULZE AND K. MEYER *Z. Physik* 62, 607–18(1930) —The sputtering of Ag and Cu cathodes in He, Ne, A, H and N has been investigated at pressures so low (generally less than 0.01 mm , in the app described) that the sputtering is not dependent on the gas pressure The sputtering electrode, changes in the wt of which were noted by observing the motion of a spiral spring by which it was supported, was placed near a low-voltage arc consuming 3–5 amp at 50 v , it was maintained at a p d of 300–1200 v neg with respect to the anode of the arc The amt of sputtered metal increases with the p d applied

to the cathode, and the amt per unit ion current reaching the cathode increases in the order H Ne, N, A, at any given cathode potential No sputtering was observed in He up to the highest p d applied, 800 v The efficiency of the sputtering calcd as the ratio of heat of vaporization of the metal sputtered to the energy delivered by the ion current ranges from 0 3% in H to 1 3% in A Data have also been compiled relating to the amt of gas adsorbed per g of metal sputtered under various conditions of gas pressure and sputtering electrode potential, the values obtained are in the neighborhood of 0 4 mg in A, 1 0 mg in Ne, 0 7 mg in H and 1-6 mg in N B. C. A

*Observation of a particulate emission from the cooled metallic cathode of an electric arc.* Georges Laudet *Compt rend* 192, 202-3(1931) M. McMahon

*The dielectric constant and the conductivity of ionized gases.* Th V Jonescu and C Mihul. *Compt rend* 192, 343-5(1931).—The values of the cond and the dielec const of electronic gas as detd previously (*C A* 25, 1440) were about 30 times greater than the calcd values The present study indicates that this was due to the assocn of electrons with mols to a degree depending on the elec. conditions present in the tube used for the measurements The results suggest that the long transmission range of short elec. waves of between 10 and 40 m wave length might be due to a similar assocn of electrons with mols in the upper atm The reflecting power of such an ionized layer would be great for wave lengths between 10 and 40 m R H Lombard

*Method of measuring the number of ions in the free atmosphere.* Yo Itiwara *Physik Z* 32, 97-106(1931).—The usual type of ion-counting tube does not measure the total no of ions in the air as some are deflected away from the entrance by the elec field Measurements were made of the contour surfaces of equal potential around the end of the counting tube by means of a flame probe I. discusses and proposes corrections to apply to the data of Hess (*Sitzb Akad Wiss Wien, Abt IIa, 138, 109* (1929)) Reply V F Hess *Ibid* 106.—H disagrees with I. on several points T H Chilton

Experiments on the entanglement of atoms in a magnetocathodic or cathodic stream E Henriot, O Gochie and (Mlle) F Dony-Hénault *J phys radium* [7], 2, 1-11(1931).—Atoms of various substances (W, C, Pt, Na and S) may be entangled in a magnetocathodic or cathodic stream, probably as ions Once entangled in the electron stream they appear to form an integral part of it in that they are deformed by an elec or magnetic field in the same way and yield deposits of the particular element used of the same shape as the electronic stream alone They resist various attempts to sep them from the electronic stream However, they may be disengaged from the electronic stream at points of strong curvature of the latter and are obtained as pos ions This is brought about by applying an opposite and larger voltage between the plates than that of the electron flow The electron stream is then bent back to the plate through which it came after reaching a point of great electron density where the curvature of the stream reaches a max., whereas the atoms continue and are deposited on the opposite plate No satisfactory explanation of the attraction of the electron stream for the atoms is advanced but is thought possible that it is of an electrostatic character Oden E Sheppard

The anomalous scattering of $\alpha$-particles by light nuclei. Eugen Guth and Theodor Sexl *Z Physik* 66, 577-80(1930).—The theory and formulas for the exact calcn of anomalous scattering of $\alpha$ particles in a Gamov Gurney-Condon potential field are described. M. McMahon

A new method for the radioactive investigation of pulverized substances. W Sebesta *Z Physik* 66, 598-612(1930).—Because of its great sensitivity the $\alpha$ ray method is suited to quant measurement of radioactivity. In the method described a small quantity of pulverized normal material was mixed with the pulverized material to be investigated and the resulting change of gas cond produced in an $\alpha$ ray counter was measured Ionization took place in a semi spherical condenser with circular opening before which the brass dish holding the pulverized material was placed, a quadrant electrometer was used as measuring instrument. The standard material used was Ra Ba sulfate M McMahon

An investigation for accomplishing the decomposition of lead atoms. III. A Smits and H S Vening Meinesz *Proc Acad Sci Amsterdam* 33, 737-48(1930); cf *C A* 19, 3210, 21, 853 Marie Farnsworth

Artificial disintegration by $\alpha$-particles. J Chadwick, J E R Constable and E C. Pollard *Proc Roy Soc* (London) A130, 463-89(1931).—Atoms of B, N, Al, P, Na and P were bombarded by $\alpha$ particles from Po The protons emitted were recorded by an elec method with vacuum tube amplification It is assumed that the

protons and α particles are in definite energy levels within the nucleus Mass de have been calcd and checked against Aston's data (*C. A* 21, 3543). E. J

**Photoelectric absorption of γ-rays.** L H GRAY *Proc Cambridge Phil Soc* 103–12(1931) —*Consideration of the exptl data has lead G to the following equa* for the photoelec absorption coeff per electron (τ) of x rays and γ rays $\log_{10}\tau = 3 + 1.0\log_{10}\lambda + 0.180(\log_{10}\lambda)^2$ The curve is given WILLIAM F VAUGH

**Capture of electrons by α-particles.** H C WEBSTER *Proc Cambridge Soc* 27, 116–30(1931), cf *C A* 24, 5617 —The study of the capture by α par from Po of electrons emitted from a heated oxide covered filament was attem The ions were recorded with a modified Geiger counter The exptl set up is desc in detail Wholly neg results were obtained The disagreement with the wo *Davis and Barnes (C A 24, 1029) is discussed, no reconciliation is made* W E

**Study of the velocity of disintegration of polonium in various places.** L I VAVILENSKII *J phys radium* [7] 2, 12–9(1931), cf *C A* 24, 3143, 24, 3427 —T series of expts on the detn of the half period were made in the southern part of S R (42 places) in the region of Leningrad (18 places) and at Dietskoie Selo (3 pla The results vary from 135 5 to 141 1 days The time seems to depend on the where the detn was made L D ROBE

**The nature of the absorbable radiation accompanying the rays from polo** IRENE CURIE AND FREDERIC JOLIOT *J phys radium* [7], 2, 20–8(1931) —A detailed account is given of the work described in *C A* 24, 1792 O E

**Theory of the scattering of short x-rays by molecular hydrogen.** H. S W. MA *Proc Cambridge Phil Soc* 27, 77–85(1931), cf *C A* 25, 869 —Theoretical, o basis of wave mechanics M develops a theory which leads to the conclusion tha scattering of short x rays by mol H is similar to that for at H, although the varies with the angle of scattering There is no agreement with the one set of values available (cf Barrett, *C. A* 22, 1275, 3581) WILLIAM F. VAUGH

***Moseley diagram of the ionization voltages of the light atoms and ions.*** BRAUNBEK *Z Physik* 63, 20–9(1930) —The sq roots of the ionization voltage the elements and ions of the 1st 3 short periods (to K) are plotted against the a of the element as abscissa, and it is shown that each isoelectronic series (*e g*, Li, $B^{++}$, $C^{+++}$ . ) gives points lying on a straight line, the gradient of these lines const in each period The only point deviating appreciably is that corresp with $Cl^+$, and for this ion the ionization voltage of 22 2 v. is predicted instead provisionally accepted value of 18 32 v It is shown that this means that a relation exists between the screening nos and the atomic no *Z* in an isoelect series, although in the 1st period (H and He) the screening no is independent nuclear charge. It is shown that *s* decreases with increase in *Z* in an isoel series, contrasted with the x-ray terms, in which *s* increases with increase A slight concavity in the lines of the Moseley diagram points to a decrease with *Z* which is not exactly linear, the concavity being greatest in the 2nd perio not observable in the 1st period On this basis values for the ionization potent the ions $Li^+$, $Be^{++}$, $B^{+++}$, $C^{++++}$ are extrapolated from the known value of *s* for He, com *linearity being assumed These values agree to within 1% with the values calc* Hylleraas (*C. A* 24, 1285) by means of wave mechanics, which agree very ex with the unpublished measurements of Edlén and Ericson (cf *C A* 24, 1575). The tion of Hylleraas is shown to predict a slight decrease of *s* with increase in the a mentioned series B. C.

**Satellites of the $K\beta_1$ line of elements from iron to zinc.** SUEKICHI KA *Mem Coll Sci Kyoto Imp Univ*, Ser A, 13, 383–7(1930) —In the course of exp det the relative position of the absorption edge and the $K\beta_2$ line for the elements *I e to Zn several new satellites have been found on the short side of* $K\beta_1$ and $K\beta_2$, seem to correspond to $\beta''$ and $\beta'''$ observed by Druyvesteyn for elements of at no than that of Fe Wave length tables are presented. The application theories of Druyvesteyn and Beuthe as to the origin of these lines is discussed b definite conclusion is reached C. J HUMPHRI

**X-rays in the service of chemistry and industry in 1931.** GEORGE L C *J. Chem Education* 8, 625–39(1931) E

**Experimental study of the absorption formula of x-rays. II.** MATAKICHI I AND SUEKICHI KAWATA *Mem Coll Sci Kyoto Imp Univ*, Ser *A*, 13, 375–81(1 cf. *ibid* 10, 311(1927) —The relation of the true g -atomic absorption coeff , $\tau/\rho$ *A*, at no , *Z* and to the wave length has been studied for a no of elements by the meth scribed in the previous paper (*C A*. 22, 3096) From a study of the data thu tained it seems right to conclude that the fluorescent absorption of x-rays as a fun

of λ and $Z$ does not obey such a simple law as given by $\nu/\rho\ A = c\lambda^p Z^q$, in which $c$, $p$ and $q$ remain const., but that it must be connected by a more complex relation. Also, if it is to be expressed by the above formula, the constancy of $p$ and $q$ should hold only in a restricted region, and in the general case, they should depend somewhat on λ and $Z$.
C. J. Humphreys

**A new x-ray spectrograph for wave-length determinations in air.** S. Zeidenfeld. *Rev. Sci. Instruments* 2, 153-63(1931). E. H.

**The accuracy of interference measurements in the molecule with Röntgen and cathode rays.** L. Dewilogua. *Physik. Z.* 32, 114-7(1931).—From a consideration of the theoretical "form factor" curves for Röntgen rays and for electrons, it is shown that, in general, the former must give more exact values for the distance between atoms in a single mol.
T. H. Chilton

**Interferometer measurements in the infra-red region of xenon and iron.** J. C. McLennan and Florence M. Quinlan. *Trans. Roy. Soc. Can.* [3], 24, Sect. 3, 47-52 (1930).—An examn. of the infra red region of the spectra of Xe and Fe was made to det. whether suitable lines might be found as secondary standards of wave length. Difficulty was found in reproducing the Xe spectrum because of a change of the pressure of the gas as the discharge tube became older. This makes the gas unsuitable as a source of accurate standard wave lengths. A table contg. the wave lengths of the arc spectrum of Fe from λ6677.991 to 8688.637 A. U. is given.
J. W. Shipley

**Interpretation possibilities of the mercury hyperfine structures.** H. Schüler. *Naturwissenschaften* 18, 895(1930).—The Hg lines, in general, appear to consist of one strong component and several weaker components so grouped that their center of gravity coincides roughly with that of the main one. The ratio of the intensity sum of the weaker components to the total intensity has been measured for Hg arc lines 4047, 4078, 4916, 5461, 5769, 5791 A. U. and for Hg spark lines 6150 and 7944 A. U. With 2 exceptions the ratio is between 0.25 and 0.32. According to Aston the odd numbered isotopes constitute about 30% of the total so that the large hyperfine structure splitting of Hg lines may be ascribed principally to the odd numbered isotopes, $Hg_{199}$, $Hg_{201}$.
W. F. Meggers

**Photoelectric intensity measurements in the mercury spectrum. II.** L. S. Ornstein and J. F. Custers. *Proc. Acad. Sci. Amsterdam* 33, 809-13(1930).—In the first paper (cf. *C. A.* 24, 4458) it was stated that a characteristic relation of the line intensity $I$ as a function of the current $i$ exists at const. pressure, $p$, provided that the current is small and the pressure lies within a certain range. Further measurements show that $I/i$ increases with decreasing $i$ at all pressures, provided the current becomes sufficiently small.
W. F. Meggers

**Intensity measurements for the multiplet $z^5G - e^5F$.** W. A. M. Dekkers and A. A. Kruithof. *Z. Physik* 66, 491-3(1930).—Intensity measurements of 9 lines in the Ni spectrum forming the multiplet $z^5G - e^5F$ (4592.532 to 4900.97 A. U.) were made under a variety of conditions; they confirm the deviations from the sum rule reported by Ornstein and Bouma (*C. A.* 24, 5620).
W. F. Meggers

**Note on a phenomenon connected with the aurora.** A. C. Burton. *Can. J. Research* 4, 52-3(1931).—A description with photographs is given of a brilliant white beam of light stretching across the sky from east to west on the night of Aug. 21, 1930. Microscopic examn. of the photograph showed a fine structure not observed visually.
J. W. Shipley

**Excitation functions in the neon spectrum.** W. Hanle. *Z. Physik* 65, 512-6 (1930).—The intensities of various Ne lines as a function of the applied potentials which excite them are measured in the yellow and red, the potentials ranging from 20 to 100 v. Lines involving the same initial term are found to have the same excitation function. The marked dependence of intensity distribution in the spectrum upon gas pressure is ascribed to an effect of collisions.
W. F. Meggers

**Remark on our work "Intensity measurements in the copper arc."** L. S. Ornstein and D. Vermeulen. *Z. Physik* 66, 490(1930).—In the work referred to (*C. A.* 25, 249) the intensity ratio of the Cu doublet $1^2S - 2^2P$ was reported to deviate from the sum rule. Further measurements made with C electrodes contg. a trace of Cu so that the lines in question could be photographed with a long exposure led to the true value of the intensity ratio, viz., 1.2.
W. F. Meggers

**Absorption spectra of dissolved mercury.** H. Reichardt and K. F. Bonhoeffer. *Z. Elektrochem.* 36, 753(1930).—The soly. of Hg in water at temps. below 130° is too small for the absorption spectrum of the metal to be detected but at about 140° 2 absorption bands of about 20–30 A. U. width, due to the Hg atom, occur at 2600 and 2520 A. U. They are not derived by broadening and displacement of the normal lines

at 2650 and 2537 A. U., since in the solvents MeOH and $C_6H_{12}$, both of which contain dipoles, the bands occur at 2575 and 2530 A. U. and 2575 and 2545 A. U., resp.; they *may result from* division of the line at 2537 A. U. by the action of the elec. fields surrounding the solvent mols. H. C. A.

**Interpretation of band spectra I, IIa, IIb.** Robert S. Mulliken. *Rev. Modern Physics* 2, 506–8(1930), cf. *C. A.* 24, 2049. W. F. Meggers.

**Interpretation of band spectra. IIc. Empirical band types.** Robert S. Mulliken. *Rev. Modern Physics* 3, 89–155(1931). E. H.

**Some bands of the carbon molecule.** O. H. Dieke and W. Lochte-Holtgreven. *Z. Physik* 62, 767–91(1930).—Details are given for new bands resembling the Swan bands of $C_2$ (cf. *C. A.* 24, 2050). W. F. Meggers.

**Radiation and characteristics of molecules.** R. D. Kleeman. *Z. anorg. allgem. Chem.* 195, 161–72(1931).—A general discussion. William E. Vaughan.

**Structure and spectra of the molecules of hydrogen and helium.** W. Weizel. *Z. Elektrochem.* 36, 599–603(1930). cf. *C. A.* 24, 3160.—A description is given of the manner whereby the band spectra of the $H_2$ and $He_2$ mols. may be developed by consideration of the arrangement of the electrons and protons, and the phys. significance and method of detg. the quantum nos. of the individual electrons are indicated. The origins of the ortho- and para H spectra by sym. and asymmetric rotations are described. B. C. A.

**Energy levels of molecular oxygen.** J. C. McLennan, H. D. Smith and J. O. Wilhelm. *Trans. Roy. Soc. Can.* [3], 24, Sect. 3, 65–79(1930).—The absorption spectrum of $O_2$ was studied in the gaseous, liquid and solid phases to det. the origin and relation of the bands observed in its spectrum. Particular attention was paid to the bands in the spectrum of liquid $O_2$. Wave length tables and mol.-configuration diagrams are given. J. W. Shipley.

**The band spectrum of silver hydride.** Ernst Bengtsson. *Nature* 127, 11(1931).—An improved source has greatly extended the range of the known spectrum. This source is an elec. arc operating in H at reduced pressure and having a pos. electrode made of a Ag-Al alloy. Greatly increased intensity has been attained as well as the *elimination of the $N_2$ spectrum. The rotational structures of 14 bands belonging to* the $^1\Sigma \longrightarrow {}^1\Sigma$ system have been analyzed and arranged in a vibrational scheme. The vibrational levels of the lower electronic state appear to be represented by the *formula* $F''(v) = 1727.5v'' - 33.5v''^2 - 0.0091v''^3$. *The excited electronic state shows* irregularities of spacing in its rotational and vibrational levels which may be due to a perturbing electronic level. An approx. calcn. of the dissocn. energy in both states gives $D'' \sim 6300$ cm$^{-1}$, $D' \sim 19{,}000$ cm$^{-1}$. The isotope effect is *clearly shown* with high dispersion. C. J. Humphreys.

**Fluorescence of mercury vapor under atomic and molecular absorption.** Rayleigh. *Nature* 127, 10(1931).—The excitation of Hg vapor by radiation near the resonance line is due to both at. and mol. absorption. The at. absorption gives a type of fluorescence known as the core effect, since the radiation capable of this kind of absorption is limited to about 0.05 A. U. on either side of the resonance line. The intensity of this effect falls off very rapidly with penetration. The weaker fluorescence due to outlying radiation is called the wing effect, and is caused by mol. absorption. It is extinguished much less rapidly as the beam traverses the vessel. The reality of both effects has been confirmed by showing that a suitable addn. of H suppresses the core effect. C. J. Humphreys.

**The vibrational levels of the iodine chloride molecule.** W. E. Curtis and O. Darbyshire. *Trans. Faraday Soc.* 27, 77–87(1931), cf. *C. A.* 24, 1020.—Const.-pressure measurements of the spectrum were made at 17° and 207° to compare the intensities. All of the vibrational progressions increased appreciably, invalidating the *method for the detn. of vibrational levels. Some evidence indicated that the 2nd progression might remain const. and be identified with $v' = 1$.* Arthur Fleischer.

**Raman effects with liquid and gaseous nitrous oxide.** J. C. McLennan, H. D. Smith and J. O. Wilhelm. *Trans. Roy. Soc. Can.* [3], 24, Sect. 3, 197–205(1930).—The Raman effect was studied for liquid $N_2O$ as an example of a triat. mol. and the results were compared with those obtained by others. Tables and a discussion of the results are included. J. W. Shipley.

**Infra-red spectroscopy.** M. Czerny. *Z. Elektrochem.* 36, 615–8(1930).—A historical survey of the development of modern methods of infra red spectroscopy, with some exptl. details. B. C. A.

**Raman effect and its significance for the spectroscopic study of molecular structure.** A. Smekal. *Z. Elektrochem.* 36, 618–31(1930).—A survey of recent work. B. C. A.

Raman effect and chemical bonds in certain organic liquids. LESLIE E. HOWLETT. *Can J Research* 4, 79–91(1931).—Spectrograms were taken of ethylene glycol and 5 of its derivs, 4 nitriles and benzyl alc. on a specially constructed spectrograph designed to study the Raman effect. By assuming the simple harmonic oscillator theory an attempt was made to assoc. certain frequencies with definite bonds and structures. The theory was applied through an expression derived for the frequencies characteristic of the elastically bound masses vibrating in a straight line. The value of the stretching force of all single bonds is assumed to be the same. Double and triple bonds are taken as having a stretching force 2 and 3 times, resp., that of the single bond. Frequencies in the neighborhood of 300 mm $^{-1}$ are attributed to longitudinal vibrations between C and H. Lines near 160 mm $^{-1}$ indicate a double bonded C atom in the chain or ring. Lines near 225 mm $^{-1}$ are due to the C≡N triple bond. Lines between 50 mm $^{-1}$ and 150 mm $^{-1}$ are due to the longitudinal vibrating chain. Frequencies less than 50 mm $^{-1}$ are probably due to transverse vibrations of the chain, while some lines near 140 mm $^{-1}$ may be due to transverse vibrations of H. In the ethylene glycol compds. lines near 80 mm $^{-1}$ are assigned to the presence of O at the end of the chain. Lines near 72 mm $^{-1}$ and 65 mm $^{-1}$ are attributed to the longitudinal vibrations of Cl and lines near 42 mm $^{-1}$ and 30 mm $^{-1}$ are attributed to transverse vibrations of Cl. J. W. SHIPLEY

The influence of absorption of light on the rate of photochemical reactions. A. K. BHATTACHARYA AND N. R. DHAR. *Z anorg allgem Chem* 196, 26–32(1931); cf. *C. A.* 24, 553.—The relationship between absorption of light and reaction rate was obtained for the following photochem. reactions: $K_2C_2O_4$ with *I*, $FeSO_4$ with *I* and citric acid with $H_2CrO_4$. The exponent in the equation relating absorption of radiation to reaction rate can vary from a proper fraction to 2, it is independent of the relationship between the light and dark reaction. Tabulated data are given. E. J. ROSENBAUM

Photochemical dissociation of triatomic molecules. II. Potassium cyanide. DONALD S. VILLARS. *J Am Chem Soc* 53, 405–11(1931); cf. *C. A.* 24, 1034.—KCN vapor at 875° was found to absorb in 2 regions, the long wave length limits of which are approx. 2175 (5.7 v.) and 2900 (4.3 v.) A. U. The former region is interpreted as corresponding to the dissocn. into a normal atom and an excited one (K excitation 1.6 v., CN excitation, 1.8 v.), the latter corresponds to dissocn. into 2 normal atoms or radicals. This agrees with theoretical considerations. WILLIAM E. VAUGHAN

Photochemical studies. XII. Photochemical reaction between nitric oxide and mercury vapor. W. ALBERT NOYES, JR. *J Am Chem Soc* 53, 514–26(1931).—The reaction between NO and Hg in the full radiation of a quartz Hg lamp immersed in water has been studied from pressure decrease in the system. The reaction seems to lead to the formation of $NO_2$, which may react with Hg to give $N_2$. Both quartz and Corex glass cells were used, the pressure of the NO was initially approx. 0.1 mm. The rate in all cases was computable on the basis of a monomol. reaction rate equation. Initial pressures were varied over the range 0.1128 to 0.00338 mm. and the monomol. rate still applied. The value of $k_1$ decreases with high pressures of the order of 24 mm. Removal of Hg vapor practically stopped the reaction. Some studies on the quenching of the fluorescence of Hg by NO were made, 72% quenching at 2 mm. and 85% at 6 mm. A detailed theoretical discussion is given, various mechanisms are discussed. It is thought that a NO mol. in a high vibration state of the normal electron level is produced by collisions of the 2nd kind. WILLIAM E. VAUGHAN

The photosensitized decomposition of nitrogen trichloride and the induction period of the hydrogen-chlorine reaction. J. G. A. GRIFFITHS AND R. G. W. NORRISH. *Nature* 127, 14(1931).—The inhibiting effect of the addn. of small measured quantities of $NH_3$ on the induction period of the photochem. H Cl reaction is due to the formation of $NCl_3$, which undergoes photosensitized decompn. in the presence of excess Cl. Quantum-efficiency measurements indicate that the decompn. of $NCl_3$ proceeds by way of reaction chains of short length, the quantum efficiency falling to a lower limiting value of about 2 as the Cl pressure is increased. Gases such as He, A, N and O, when added to mixts. of $NCl_3$ and $Cl_2$ have sp. retarding effects on the decompn.; and, as the pressures are increased, depress the quantum efficiency toward the above limiting value. C. J. HUMPHREYS

The absorption of aqueous tartaric acid solutions. RENE LUCAS AND MARCEL SCHWOB. *Compt rend* 192, 225–7(1931).—The relative results of ultra violet absorbing powers of aq. tartaric acid solns. were detd. with the help of photoelec. cells, the photoelec. cell arrangement of Halban and Siedentopf (*C. A.* 16, 2078) being used. Contrary to previous observations, Beer's law was not verified. The variations are

particularly marked for 2536 A U, the sp absorption varying more than 200%. Dil. solns having greater absorbing power than concd solns M. McMahon

**Absorption spectrum of lignin derivatives in the ultra-violet.** Erik Hägglund and F W Klingstedt *Z physik Chem*, Abt A, 152, 293–312(1931); cf. *C. A.* 24, 1578.—The absorption spectra of the alkyllignins, the ligninsulfonic acids and the alkali lignins have been measured by the method of Victor Henri by means of the small Hilger quartz spectrograph The general similarity of the spectra of the different substances points to the fact that they have a common residue, there is, however, a distinct difference between the spectra of derivs of lignin from conifers and from deciduous trees. Selective absorption is relatively strong which indicates the existence of at least 1 aromatic ring in the fundamental substance of lignin W West

**Potassium chromate and potassium dichromate as light filters and the constitution of chromic acid from absorption measurements.** W V Bhagwat and N R Dhar. *J Indian Chem Soc* 7, 913–21(1930).—Detn of extinction coeffs shows that wave lengths shorter than 5150, 4950, 4950, 4600, 4300 and 4000 A U are completely absorbed by 1 cm of 5 5 (satd.), 2, 1, 0 1 0 01, and 0 001 *N* $K_2CrO_4$ solns., resp., wave lengths shorter than 5600, 5200, 4600 and 4000 A U are completely absorbed by 1 cm of 1 17 (satd.), 0 1, 0 01 and 0 001 *N* $K_2Cr_2O_7$ solns., resp The % transmission in the range 5600–6700 A U is greater with satd $K_2CrO_4$ than with satd $K_2Cr_2O_7$ soln In 0 001 *N* solns. $K_2CrO_4$ transmits light of wave lengths 5400–6700 A U better than $K_2CrO_4$ Neither $K_2CrO_4$ nor $K_2Cr_2O_7$ solns obey Beer's law In dil solns the absorption-concn curves for $K_2CrO_4$ and $K_2Cr_2O_7$ are strikingly similar Although concd solns of dichromate contain $Cr_2O_7^{--}$ and $HCr_2O_7^-$ ions, the dil solns contain mainly $CrO_4^{--}$ and $HCrO_4^-$ ions Oscar T Quimby

**The law of paramagnetic rotation of xenotime and its experimental verification.** Jean Becquerel, W J de Haas and H A Kramers. *Compt rend* 191, 839–41 (1930), cf. *C. A.* 24, 2047. Gerald M Petty

**Quantum theory of chemical kinetics. Unimolecular reactions.** S Roginskii and L. Rosenkevich *Z physik Chem*, Abt B, 10, 47–85(1930).—A unimol decompn or rearrangement can be viewed either as originating in an internal force field within the complicated mol., which causes the expulsion of a part of the mol in a manner analogous to the mechanism of γ-ray disintegration as pictured by Gramow and by Gurney and Condon, or as a rearrangement of its parts whereby new chem linkages are formed and simultaneously a part of the old linkages is disrupted with the consequent emission of part of the original mol This latter process has its analog in the Auger effect, as *e. g.*, in the excitation and simultaneous spontaneous ionization of a He atom. Both schemes lead to the correct expontential form of relation between velocity const. and temp; but it is argued that there is no exptl evidence for the kind of interaction between the mol and the emitted particle necessary in the first scheme The Auger process gives $k = e^{-A/kT} e^{\beta(Q-A)/\sqrt{A}}$, where $A$ is the energy of activation, $Q$ the heat of the reaction, and $\beta$ a factor depending only slightly on the nature of the mol This requires an exponential relation between the consts $A$ and $B$ of the Arrhenius equation $k = Be^{A/kT}$, which is shown to be experimentally satisfied The order of a reaction is detd. by the relative values of $Q$ and $A$; the conclusions are applied to known cases and used in predictions concerning reactions for which data are still wanting W. West

**Chemical combination and the line emission of solid bodies.** R Tomaschek *Z. Elektrochem* 36, 737–43(1930).—A survey of work on the spectrum of Sm in phosphors. Cf. *C. A.* 18, 3546; 19, 935; 22, 915 B C A

**The ionization of air during the oxidation of phosphorus.** J Tausz and H. Görlacher *Physik. Z.* 32, 91–7(1931).—Ionization measurements were carried out incidental to work on the oxidation of P in air and $O_2$, both pure and in the presence of poisons for the reaction (*C. A.* 24, 4476) When P was oxidized by air, the ionization increased with air velocity, temp., and P surface Pure $O_2$, when wet, showed no increase in ionization over air, but showed a progressive increase during drying Strongly poisoning substances such as isoprene and cyclohexane mixed in air caused considerable decreases in ionization depending on the concn. T. H. Chilton

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Physical and chemical action of ultra-violet rays on sublimed S (Fonzes-Diacon) 15. Behavior of water with change of temperature and with addition of electrolytes as studied by the Raman effect (Rao) 2. Determining Hg vapor in air (Ger. pat. 517,480) 7.

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## 4—ELECTROCHEMISTRY

COLIN G FINK

Recent progress in the use of the electric furnace in the steel industry. ALBERT LEVASSEUR *Arts & métiers* 1931, 54–60, *cf C A.* 24, 5236.—An address A P.-C

A modern electric steel plant. K VON KERPELY. *Giesserei-Ztg* 27, 101–2(1930).—A description of the new elec. steel plant (wire, cable, etc.), at Campia Turzii, Roumania CURTIS L. WILSON

Artificial atmospheres for electric furnaces and their application. A N OTIS *Iron Age* 126, 767–70, 844–8(1930).—Results of Cu brazing of steel parts, of annealing sheet steel, strip and lamination punchings for elec. generators and transformers indicate that there is a wider field of application A simple app has been developed for producing, from readily available materials, suitable gases rich in H at a fraction of the cost of $H_2$ produced by the usual methods N may be used as a diluent of H Where there is a demand for atomic H for welding, $NH_3$ may be dissociated by heat into a gas consisting of 75% H and 25% N The production of *electrolene* is described The H content prevents oxidation and the small $CH_4$ content prevents decarburization The content of the gas is controlled by the operating temp of the dissociator Several diagrams, tables and illustrations of different types of furnaces are included W H BOYNTON

Production of alloy steels in coreless induction furnaces. O DÖRRENBERG AND N BROGLIO *Stahl u Eisen* 50, 617–26(1930).—After a review of the development of the high frequency induction furnace and a discussion of the elec. principles on which it is constructed, an account is given of the installation and performance of one of these furnaces in a German steelworks The transformer efficiency is about 78–80%, and the current consumption for a 300-kg charge starting in the cold is 600 kw hr./ton to effect complete fusion and 730–790 kw hr./ton until casting is complete, the av. duration of melting is 90–100 min Curves showing the elec conditions during the melting of several charges are given, and the operation of the furnace is compared with that of a gas fired crucible furnace B C A

Tonnage melting by coreless induction. E F NORTHRUP *Iron Age* 127, 228–33 (1931).—The first of a series of articles on the theory, operation and uses of the high-frequency induction furnaces For power requirements of 50 kw. or less, the Hg gap type of oscillator is best in present practice For greater power, the motor or turbine driven generator giving frequency well within design and economic limits will best meet requirements Mechanically considered, the steel housing is lined everywhere on its inner surface with high-cond. sheet Cu about 1/4 in. thick. This lining prevents eddy currents from being induced in the steel housing The best results are obtained when using a "graded" coil without vacant spaces between turns G. T. M

Valve-operated coreless induction furnace for high-temperature research. FRANK ADCOCK *Trans Faraday Soc* 26, 544–60(1930).—A detailed description of the app. and circuit used is given, particular attention being paid to special features in design, safety appliances and the application of the furnace to metallurgical researches at high temps Two air-cooled silica valves, each capable of dissipating 2.5–3.0 kw. at the anode, are employed on the "push pull" or "back-to-back" principle The valve filaments are rated at 40 amps. and 17.2 v. and are supplied with a.c. by means of a transformer with a center tapped secondary. A combination of grid leak and condenser in conjunction with an accumulator bank maintaining a neg. potential of 36 v. is used to apply the correct grid bias to the oscillating valves Accurate regulation of the power supply is obtained by means of a condenser potential divider by means of which a definite fraction of the full oscillatory voltage in the furnace circuit is rectified and passed through a milliammeter used as an indicator. Frequencies of 50,000 and 1,000,000 cycles per sec. are used, special furnace construction (from the viewpoint of insulation between the turns of the inductor coil) being devised for the higher frequency Owing to the high frequencies employed the furnace is capable of heating efficiently

charges consisting of small metallic fragments "Bridging" (*i. e.*, the formation of a liquid pool by the lower portion of the charge while the upper portion remains as a relatively cool "bridge") of the charge on melting is not very pronounced at the 1 million cycles per sec. frequency Detailed descriptions (with drawings and photographs) of the component parts of the furnace set-up are given Observations on technic and applications of the furnace to the obtaining of high temp thermal curves, and to magnetic and resistivity investigations are also included EDWARD B SANIGAR

Refining of ferrochrome in coreless induction furnaces. C TAMA *Arch Eisenhüttenw* 4, 55–61(1930).—Production of Fe-Cr, decarbonization in coreless induction furnaces, suitable refractories for lining, and refining are considered The systems Fe–Cr, Fe–Cr–C, and Cr–C are discussed in the light of the recent investigations. A charge of 300 kg of Fe–Cr is usually melted in 70–100 min in a 50-cycle furnace or in 60–80 min in a 500-cycle furnace, and a charge of 30 kg takes only 40 min in a 10,000-cycle furnace The power consumed varies from 750 to 1850 kw according to the type of the furnace G T MOTOK

Chromium-plating of paper-mill rolls. R E CLEVELAND *Paper Mill* 54, No 4, 14–5(1931).—A brief discussion of the advantages of Cr plating paper mill rolls to increase their life by its hardness and resistance to corrosion A PAPINEAU COUTURE

Cathodic protection of metals in neutral solutions. U R EVANS. *Metals and Alloys* 2, 62–4(1931).—A table gives values for c. d. below which production fails for several steels and irons A J MONACK

Buffer action in nickel-plating solutions. K. PITSCHNER *Metal Ind* (N. Y.) 29, 119–20(1931).—The resistance to change in $p_H$ exhibited by a soln when it is subjected to gain or loss of acid or alkali varies greatly at different $p_H$ values Certain reagents, which are now common constituents in Ni plating solns., have the property of depressing the tendency toward large changes in $p_H$ The buffer effects of boric acid and of $NH_4Cl$ on Ni content were studied The extent of buffer action is evaluated by the Van Slyke method It is the differential ratio of the increment in g. equivs of strong acid or base added per l. of the soln to the resultant increment or change of $p_H$ The buffer effect is highest at the upper end of the $p_H$ range and least in the vicinity of $p_H$ 4.0—only 1/20–1/100 of the value at $p_H$ 6 In the usual plating range of $p_H$ 6–5, the buffer effect is more noticeable when alkali is added, while in the range around $p_H$ 2.5, the reverse is the case. The $NH_4Cl$ content of Ni solns is kept high enough so that the anode corrosion will keep the trend of $p_H$ toward the upper limit of the range Addns of acid only are necessary A brief discussion is included. Exptl. results are tabulated. W. H. BOYNTON

Studies in the electrodeposition of nickel. II. The effect of current density and temperature. J. B O'SULLIVAN. *Trans Faraday Soc* 26, 533–9(1930); *cf. C. A.* 24, 1801.—The influence of cathode c. d. and temp. on the appearance, structure and deposition potential of Ni deposited from buffered $NiSO_4$ solns. having various $p_H$ values has been studied The solns. used and the prepn. of the deposits were as reported in Part I of this work (*C. A.* 24, 1801). Deposits were obtained at 17° and 35° at c. ds. of 2, 5, 10 and 15 ma./sq. cm. Deposition potentials were measured against a satd. calomel half-cell, a capillary electrode tip in contact with the cathode surface being used. Tables showing the appearance of the deposits and tables of deposition potentials are given, as well as graphs of the deposition potentials against the logs of the c. ds. (giving straight lines) Tables of the deposition potentials at unit c. d. (obtained by extrapolation of the above graphs) and of the slopes of the above graphs are also given The varied surface structure of the Ni deposits is explained as due to variations in the throwing power (mainly dependent on the slope of the deposition potential-c. d. curve) of the solns. The slope of the deposition potential log c. d. curve and the deposition potential at unit c. d. were found to vary from one soln. to another. From this it is deduced that the constants of the Freundlich adsorption isotherm are functions of the $p_H$ of the soln. and of the nature of the buffering agent employed. III. Effect of small quantities of iron and aluminum. *Ibid* 540–3.—In Part I of this work it was shown that the structure of a Ni deposit varies according to the $p_H$ of the plating bath and the nature of the buffering agent employed, and it was suggested that this was due to the formation of some colloidal $Ni(OH)_2$ or basic salt in the cathode film and its co-pptn with the metallic Ni. The investigation has been extended by examg. the effect of adding to the plating bath small quantities of inorg. salts which would be likely to yield colloidal hydroxides at a lower $p_H$ than is required for $Ni(OH)_2$, *i. e.*, at a $p_H$ where $Ni(OH)_2$ would be exerting little influence. Fe (added as $FeSO_4$ or $FeCl_3$ soln.) and Al (as potash alum) were used for this purpose. Expts. were performed with solns. contg. 24 g. $NiSO_4.7H_2O$ and 1.56 g. NaCl per 100 cc., with a Fe

Fe or Al to Ni ratio of 1 1000 or 1 200 at $p_H$'s from 3.0 to 4.7, deposition being continued for 30 min. at a c. d. of 10 ma./sq. cm. It was found that small amts. of Fe salts had no appreciable effect on the electrodeposition of Ni, and it is suggested that this is due to the preferential deposition of Fe, whereby this metal is removed from the cathode film before it can form any colloidal compds. Al can accumulate in the cathode film until colloidal compds. are formed, and if this process proceeds far enough the structure of the deposit is altered, it becomes black or "burnt." The black deposits were found to contain appreciable amts. of Al (0.0006 g. in 0.65 g. deposit) whereas none could be detected in the white deposits (which were somewhat finer-grained than those from solns. contg. no Al) so that it is suggested that the change is due to the co-pptn. of colloidal $Al(OH)_3$ with the Ni. A discussion is given of the possible ways in which colloidal hydroxide—either as a film at the cathode or, with an amphoteric colloid, as a film some little distance from the cathode—could cause finer grained deposits. EDWARD B. SANIGAR

Electrodeposition of zinc on aluminum from sulfate solutions. H. C. COCKS. *Trans. Faraday Soc.* 26, 517–26(1930); cf. *C. A.* 24, 2058.—Measurements were made of the deposition potential of Zn from *N* $ZnSO_4$ solns. with first c. d. and secondly $p_H$ of the soln. as the only variable. Some static potentials were also detd. and observations made upon character of deposits, gas evolution and adhesion of bubbles. Expts. were done with buffered and with unbuffered solns. at c. ds. of 4.5, 9, 18 and 36 amp./sq. ft. at a temp. of 20°. Com. Al sheet (contg. 0.14% Si and 0.58% Fe), prepd. by sandblasting at 5–10 lb. pressure, was used as cathode. Potentials were measured by the capillary tip method. Tables are given for both buffered and unbuffered solns. showing the effect on the deposition potential and on the deposits, of various addition agents and of $p_H$. Graphs of the cathode potential against c. d. are also given. The potential measurements indicate that the addn. agents should increase the throwing power of an unbuffered $ZnSO_4$ soln. somewhat when its $p_H$ is 3–4. The order of merit of the addn. agents in giving smooth, fine-grained deposits was found to be gum arabic plus β-naphthol, gum arabic, β-naphthol, glucose, while a parallelism was found between the order of efficiency of the addn. agents in improving the deposits, increasing the change of deposition potential with c. d. and increasing the actual value of the polarization. The static potentials of Zn deposits and of sandblasted Zn sheet in both buffered and unbuffered solns. were found to vary with time and with $p_H$. For a given soln. the deposition potential became more neg. with decrease of $p_H$ at a fixed c. d., and more neg. with an increase of c. d. at a fixed $p_H$. These changes were barely detectable in the absence of addn. agents. Suggestions are given to explain these results. The deposits from the buffered and the unbuffered solns. were mostly dull white. The deposits improved with decrease of $p_H$ and increase of c. d. The addn. agents had marked effects on the deposits. Change of $p_H$ had a less marked effect on deposits from buffered than on those from unbuffered solns. Gas pits on the deposits usually increased with decrease of $p_H$ and increase of c. d. From agitated solns. there were generally no gas pits from solns. of $p_H$ 6 and only rarely from solns. of $p_H$ 5. A comparison of the $p_H$ values of the solns. employed obtained by the quinhydrone and by the colorimetric methods is given. Within the range of $p_H$ 3.0–6.0 the quinhydrone values were the lower (extreme deviations, 0.2 and 0.8 $p_H$). A soln. contg. *N* $ZnSO_4$, 0.25 *N* NaOAc and 1 g./l. of gum arabic, with or without 0.1 g./l. of β-naphthol, is suggested as likely to prove most suitable for Zn deposition on Al and its alloys. E. B. S.

Electrolytic zinc. CHARLES W. CUNO. *Chem. Markets* 28, 253–6(1931).—The advantages of the electrolytic over the smelter process are described. E. H.

Adhesion of electroplated coatings. W. BLUM. *Metals and Alloys* 2, 57–9(1931).—A review. A. J. MONACK

Electrodeposition of platinum, palladium and rhodium. W. KEITEL AND H. E. ZSCHIEGNER. *Trans. Electrochem. Soc.* 59 (preprint) 4 pp. (1931).—The chloride plating bath for Pt metals is not satisfactory because of its short life. A new bath was accordingly developed in which the Pt is present as the diamminonitrite. Good, bright adherent deposits are obtained. The throwing power is very good. A similar bath for Pd was likewise developed and has given very satisfactory results. C. G. F.

The limiting current density in the electrodeposition of noble metals. S. GLASSTONE. *Trans. Electrochem. Soc.* 59 (preprint) 8 pp. (1931).—The literature of electrochemistry does not appear to contain a simple equation permitting the calcn. of the max., or limiting, c. d. at which a metal can be deposited with 100% current efficiency. Such an equation is now developed on the assumption that the max. rate of deposition is equal to the max. rate at which the ions contg. the metal to be deposited can diffuse up to the cathode. The values calcd. in this manner are shown to be in good agreement

with those observed, although discrepancies may arise when there is a possibility of $H_2$ evolution C. G. F.

**Isothermal metallic cells.** O Scarpa. *Mem accad Italia, Classe sci fis. mat e nat* 1, *Chim* No 5, 28 pages(1930).—This study deals with the degree of freedom of ions in solid and liquid metals The motion of ions in metals diffusion in solid metals, also the e m f of contact of metals and thermodynamical calcn are considered in the first part of the paper This cell may consist of the following:

| | | | |
|---|---|---|---|
| Cu | Hg | Zn | Cu |
| Cu | Hg | Cd | Cu |
| Cu | Hg | Zn amalgam | Cu |
| Cu | Hg | Cd amalgam | Cu |

With Zn amalgam a satn point of $0.75 \times 10^{-6}$ v is reached at 19° with a concn of 5.5 atomic per cent of Zn G. T. Motok

**Theory of electrolytic diaphragm cell.** Francesco Giordani *Mem accad Italia Classe sci fis mat e nat* 1, *Chim* No 6, 75 pages(1930).—A mathematical study of electrolysis based on the expts carried out in a new type of electrolytic diaphragm cell for the production of caustic alkalies (developed by Giordani and Pomilio) This cell is set vertically with the graphite electrode in the center and the diaphragms on both sides of the electrode The formula for instantaneous discharge in the electrolytic diaphragm cell can be written (*A*) $R = 1 - \{n/[1 + (x_1/x_2)]\}$ and the ratio $x_1/x_2$ can be expressed as a function of the concn $C_1$ and $C_2$ of the chloride and the hydroxide dissociated at the cathode (*B*) $x_1/x_2 = Am(C_1/C_2)$ and (*C*) $C_1 = C_0 - BC_2$ *A* and *B* are functions of the initial concn $C_0$ and temp By substituting (*B*) and (*C*) in (*A*), there is obtained (*D*) $R = (1 + MC_2)/(1 + NC_2)$, where *M* and *N* are also functions of $C_0$ and temp. For higher values *M* is eliminated and (*E*) $R = 1/(1 + NC_2)$ results, the formula which was obtained by Guye G. T. Motok

**The electrochemical oxidation of ketones. I. A preliminary paper.** W. E. Bradt and Carl J Opp. *Trans Electrochem Soc* 59 (preprint) 8 pp (1931).—Acetone was oxidized at a Pt wire gauze anode at low anodic c ds The course of the oxidation was followed by the collection and the analysis of consecutive portions of the gaseous oxidation products *The effect of variation of the c. d on the compn of the anode* gas was investigated The anode gas from the oxidation of acetone normally contained $CO_2$, CO, $O_2$, unsatd hydrocarbons, $CH_4$ and $C_2H_6$. Analyses of the anode soln were made In every case, aldehydes, MeOH and pyruvic acid were absent. The anode soln normally contained formic acid, acetic acid, *mesityl oxide*, unchanged acetone and a tar. At higher c ds phorone was identified Efforts were made to show the disposition of all the acetone originally placed in the cell C. G. F.

**The alleged electrochemical sulfonation of an aromatic hydrocarbon.** Fr Fichter, H E Suenderhauf and A Goldach *Helv Chim Acta* 14, 249–53(1931).—An emulsion of PhMe, EtOH and concd $H_2SO_4$ was electrolyzed with an anode c. d of 0.19 amp./cm.$^2$ The acidic portion of the product was converted into Ba salts. $Ba(OAc)_2$ and $(EtOSO_2)_2Ba\ 2H_2O$ (I) were the only products isolated No $CO_2C_6H_4SO_2Ba$ was found, contrary to reports in the literature (Puls, *Chem Ztg* 25, 263(1901)). The electrolysis of a mixt of EtOH and $H_2SO_4$ yielded the same products free from resins produced by the oxidation of the PhMe On the other hand, a like operation on PhMe and $H_2SO_4$ yielded no acid The electrochem. oxidation of acetophenone. H. E. Suenderhauf *Ibid* 14, 253.—The electrolysis of PhAc emulsified with $H_2SO_4$ led to the formation of small yields of *maleic* and *fumaric acids*. Some phenolic compds. were also present among the products I. M. Levine

**Electrolytic reduction of 4-keto-3-phenyl-3,4-dihydroquinazoline.** H. Itoml. *Mem Coll Sci. Kyoto Imp Univ* 13A, 311–3(1930).—Electrolytic reduction of 4-keto-3 phenyl 3,4-dihydroquinazoline with a lead cathode and aq.-alc. $Na_2CO_3$ as the cathode soln at 25° gives *4 hydroxy-3-phenyl-1,2,3,4-tetrahydroquinazoline*, m. 170–1°, in 40% of the theoretical yield Both the above quinazolines are reduced to *3-phenyl-1,2,3,4 tetrahydroquinazoline*, m 118–9°, when the cathode consists of Cu coated with Pt black and reduction is carried out at 50–60°. B. C. A

**Electrolytic Peltier heats and their measurement by isothermal, adiabatic, differential calorimetry.** E Lange and J. Monheim. *Z physik. Chem., Abt A*, 150, 177–202 (1930).—The electrolytic Peltier heats at reversible electrodes are discussed in relation to other thermodynamical quantities characteristic of the electrolytic cell Earlier measurements are reviewed, and an isothermal, adiabatic, differential calorimetric method is described and has been applied to the Hg | $Hg_2^{++}$ electrode, using a Hg elec-

trode in $HgNO_3$ soln and the normal HgCl electrode The tabulated values show an increase in the pos direction with increasing metal ion concn, in agreement with theoretical prediction B C A

Method of mapping equipotential lines and its application to electrical precipitator problems A W Simon and L C Kron *Rev Sci Instruments* 1, 527–36(1930) B C A

Construction, operation and characteristics of photoelectric tubes. Lewis R Koller *J Illum Eng Soc* 25, 15–25(1931).—A discussion of the characteristics of the different types of photoelec. tubes showing what kind of tubes should be collected with their operating limits for the different services Metals of the alkali group are used in these tubes Compds of these metals change the sensitivities markedly. One of the most useful characteristics of the photoelec. cells is the relation between current and illumination. This is strictly linear over a wide range The photoelec. tube is sometimes called the "electric eye" Alone it is less sensitive than the human eye but with the aid of an amplifier it is 20 times as sensitive Several types of amplifier are discussed Where a great constancy in operation is required, vacuum tubes should be used Outstanding applications of the tubes are television, talking pictures smoke detectors, counters, bean sorters, light recorders, color analyzers, phys. photometers and innumerable control devices W H Boynton

Hydrogen-cooling for turbine-generators. M D Ross *Elec Eng* 50, 211–4 (1931).—Actual operating experiences with a 7500-kv amp unit are outlined Five advantages of $H_2$ as a cooling medium for rotating elec. machinery are (1) Windage losses are reduced to about 18% of their value in air. (2) For a given amt. of active material the rating of a generator with $H_2$ cooling is 25% greater (3) Corona has little effect on insulation in $H_2$ atm, increasing the life of the insulation (4) Fires in the generator are impossible, on account of absence of $O_2$ (5) Smaller gas coolers and less cooling water are required than with air cooling W. H. Boynton

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The relative merits of gas, oil and electricity for industrial purposes (Hopkinson) 13 Special refractories for electric furnace linings (Kukla) 19 Some new facts of a chemical nature in the field of corrosion investigations and in the protection of metallurgical products against corrosion (Cournot) 9 Corrosion of steel water pipes by stray electric currents (Rothe) 9 Electrochemical oxidation of paraffin (Atanasiu) 22. Au and Ag solutions (Brit pat 338,383) 18. Heat treatment of loaded electrical conductors (Brit pat 338,169) 9 Rubber battery boxes (Brit pat 338,114) 30.

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Billiter, Jean Électrométallurgie des solutions aqueuses. Translated from 2nd German ed by J Salauze and S Salauze Paris Dunod 324 pp I 84

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*Dry batteries.* Soc. anon Le Carbone Ger 514,966, Feb 16, 1924 The Zn and C electrodes are embedded in an electrolyte mixed with pectinizable colloid and powd C The example mentions a mixt. of $NH_4Cl$, arrowroot starch and powd. wood charcoal

Dry cell electric battery. H A Bumke Ges Brit 337,869, Aug 27, 1929 Mech features.

*Storage battery.* Soc. anon. des accumulateurs monoplaque Brit 337,375, Feb 5, 1929 Between each pair of neg plates there are placed two pos plates each having half the thickness of the neg plates, the pos plates being joined together and enclosing electrolyte which tends to remain at max. concn The electrolyte passes through the pos plates under the influence of hydrostatic and electro-osmotic pressures Alternatively, a single hollow pos plate contg an inert packing may be used

Galvanic batteries. Karl Kupka Ger 514,967, May 23, 1928 Details of arrangement of the electrodes in multicell batteries are given

Selenium cells. Firma Carl Zeiss Ger 514,911, Jan 8, 1929 Se cells contg two Pt electrodes mounted on glass or quartz and a channel contg Se are described

Selenium cell of the condenser type. "Selenophon" Licht und Tonbildgesellschaft m b H Ger 514,972, Feb 4, 1930 Details of arrangements are given

Light-sensitive selenium cells. Telefunken Ges für Drahtlose Telegraphie Brit 337,691, Feb. 13, 1929 A cell formed on polished glass comprises electrodes formed by graphite deposited from a colloidal suspension on portions previously etched the suspending medium being driven off by heating and the interstices coated with Se or Se and Te together

Electrodeposition of metals on rotating cathodes. S O Cowper Coles Brit.

338,173, May 16, 1929 In the deposition of metals such as Cu, Zn, Ni or Ag, a slowly rotating cathode is used which is supported on rollers above an arc-shaped anode and driven by rollers The anodes may either be formed of the metal to be deposited or of inert material such as Pb, C or ferro-Si and the electrolyte may contain the compd of the metal to be deposited either in soln or in suspension Deposition may be effected directly from ore App is described

**Forming acoustic diaphragms of thin metal such as nickel by electrodeposition.** ALBERTIS HEWITT (to Victor Talking Machine Co) U S 1,793,483, Feb 24 Various details of app and procedure are described

**Nickel-coated articles.** FRANK V KNAUSS (to Madsenell Corp) U S 1,793,936, Feb 24 A Ni surfaced article such as a spring steel bar is treated as anode in a $H_2SO_4$ bath and a fresh Ni coating is then electrodeposited on the treated Ni surface A firmly adherent coating is formed which takes a good polish

**Electroplating ferrous metal articles with zinc.** SIDNEY H DAVIS, CARL O ANDERSON, RUDOLPH J STENGL, WM N SMITH and HERBERT R HANLEY (to Century Zinc Co) U S 1,795,081, March 3 Articles are first provided with a thin coating of Zn by electrodeposition from a $ZnSO_4$ soln of suitable acidity with a current of suitable d, the articles are then transferred to a second bath of $ZnSO_4$ soln of relatively higher acidity and the plating is continued with a current of higher d, and the c d is finally lowered and the plating further continued to produce a coating of the desired thickness

**Electroplating zinc on iron or steel** SIDNEY H DAVIS, CARL O ANDERSON, WM N SMITH and HERBERT R HANLEY (to Century Zinc Co) U S 1,795,079, March 3 A thin initial coating is formed on an article by current from an insol anode in a bath comprising a $ZnSO_4$ soln of relatively low acidity by using a d c of relatively high c d, and further plating is effected with a current of lower d in a bath of higher acidity with further use of an insol anode U S 1,795,080 relates to plating with Zn after preliminary deposit of a thin coating of spongy Pb from an alk Pb-bearing soln by current of low d. from an insol anode and brushing to remove some of the Pb and cause penetration of the ferrous metal by the remaining Pb

**Electroplating apparatus suitable for continuous operation** CHRISTIAN H JORDING (to John W. Brown Mfg Co) U S 1,793,551, Feb 24 Structural features.

**Anode container for electroplating apparatus.** THOMAS G MELISH U S 1,792,998, Feb 17 Structural features

**Apparatus for electroplating successive portions of a large area such as the interior of oil stills, etc.** KEVIE W SCHWARTZ (to United Chromium, Inc.) U S. 1,794,487, March 3 Various structural details are described including means for moving the anode to different positions for use.

**Apparatus for electroplating articles such as in the manufacture of "copper-clad" roofing.** CHARLES E YATES (to Anaconda Sales Co) U S 1,794,748, March 3 Structural features

**Plating interior surfaces of metallic vessels.** EDWARD O DUNKLEY (to Standard Oil Co of Calif) U S 1,793,069, Feb 17 Various details of app and procedure are described for operations such as plating the interior of large metal vessels with Cr

**Continuous process for chromium-plating metal wires or strips.** BYRON V. MCBRIDE (to Westinghouse Elec. & Mfg Co) U S 1,794,973, March 3 The wire or strip is drawn downward through a Cr-plating soln in such a manner that all portions are substantially equidistant from the anode and exposed directly to the voltaic action of the bath, and then drawn upward through the soln in such a manner that all portions are again substantially equidistant from the anode and exposed directly to the voltaic action of the bath App is described

**Selectively chromium-plating portions of surfaces such as those of reflectors.** VICTOR L. SODERBERG U S 1,794,929, March 3 Portions of the surface which are to remain unplated are covered with nitrocellulose lacquer preliminarily to the plating operation

**Electrolytic cell.** I. G FARBENIND A G (Georg Pfleiderer, inventor) Ger. 514,741, Nov. 2, 1926 Addn to 471,925 (*C A* 23, 2376) In a bipolar cell, especially for the decompn. of water (as described in 471,925), a portion of the electrolyte is passed continuously through an outside circulatory system to regulate the temp and concn. The app is described

**Electrolytic cell.** SOCIÉTÉ D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIMIQUES. Ger. 514,501, Oct 25, 1928. The cell has a middle partition and porous containers between the partition and the electrodes, the containers being raised from the bottom of the cell to permit free flow of the electrolyte.

**Construction for maintaining a constant electrolyte level in electrolytic cells.** CARL ROTH (to I G Farbenind A -G) *U S 1,793,130, Feb 17.*

**Electrolytic production of compounds containing active oxygen.** JOHANNES ECKELL (to I G Farbenind A G) U S 1,792,633, Feb 17. See Brit 313,124 (*C A* 24, 792)

**Metal hydroxides by electrolysis.** R S CARRERAS Brit 338 178, July 9, 1929 Hydroxides of Zn, Cu, Sb and other metals (other than Bi hydroxide and white lead) are obtained by use of an anode of the metal the hydroxide of which is to be formed, in a dil soln of an electrolyte such as $NaClO_3$ or $KClO_3$ satd with $CO_2$ (the electrolyte being continuously withdrawn from the cell without removal of the pptd hydroxide and returned after resatn with $CO_2$) Various details of app and procedure are described

**Apparatus for electrolyzing fused alkali metal halides.** DEUTSCHE GOLD- UND SILBER SCHEIDEANSTALT VORM ROESSLER Ger 517,256, May 15, 1924

***Apparatus for preparation of light metals by electrolysis of their fused halogen salts.*** SOC ANON POUR L'IND CHIM A BÂLE Swiss 142 518, Aug 23, 1929

**Formation of gang by the decomposition of electrolytic solutions within the rock layers.** SIEMENS-BAUUNION G M B H, KOMM -GES (Michael Muller, inventor). Ger 514 818, Jan 17, 1929 Rocks not contg a natural electrolyte are impregnated with $Na_2SiO_3$ so that $SiO_2$ is freed on electrolysis The process can be used for petrifaction.

**Aluminum production.** COMPAGNIE DE PRODUITS CHIMIQUES ET ELECTROMÉTALLURGIQUES ALAIS, FROGES ET CAMARGUE Brit 338,084, March 15, 1929 A mixt of $AlF_3$ and Na or K carbonate or hydroxide is used instead of cryolite as a flux in the electrolytic reduction of alumina Various details, proportions, etc, are given

**Protective layers of lead peroxide.** SIEMENS & HALSKE A -G (Walter Birett and Johannes Fischer, inventors) Ger 514,621, Oct. 23, 1927 Anode conductors are given a protective coating of $PbO_2$ by electrolysis in an alk soln of a Pb compd contg also such O-contg org compds as aldehydes, ketones, ales or their derivs Examples mention baths contg NaOH, hydroquinone and PbO, or NaOH, acetone, AcH and PbO, or NaOH, fruit sugar and PbO

**Bleaching shellac.** OLGA MYLO NÉE ROSENHAGEN Ger 517,096, May 12, 1929 A soln of shellac is treated with a soln of a suitable salt, *e g*, NaCl, and the mixt. is electrolyzed with stirring and cooling Preferably, the electrolysis is begun with a weak current, which is afterward strengthened An automatically operating app *is* described

**Treating hydrocarbons in an electric arc.** I G FARBENIND A G (Otto Eisenhut, inventor) Ger 514,592, Dec. 15, 1925 App for subjecting satd hydrocarbons, *e g*, $CH_4$, to the elec. arc to produce unsatd hydrocarbons, *e g*, $C_2H_2$, is described Cf *C A*. 24, 1586

**Acetylene and hydrogen production in the electric arc.** OTTO EISENHUT (to I G Farbenind A G). U S 1,794,004, Feb 24 See Fr 674,459 (*C A* 24, 2385).

**Electric furnace.** DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRIE Ger 514, 575, May 7, 1926 Details of the electrodes are given

**Electric induction furnace.** EDWIN F. NORTHRUP (to Ajax Electrothermic Corp) U. S 1,795,136, March 3 Elec features

**Electric induction furnaces** SIEMENS-SCHUCKERTWERKE A -G (Rudolf G Berthold, inventor) Ger 517,348, July 17, 1926 Details of the current feed are described

**Electric resistance furnace.** HERBERT J MCCAULEY. U S 1,794,310, Feb 24 Structural features

**Electric arc furnace for alloying or refining metals** EMILIEN BORNAND and HANS A SCHLAEPFER Ger 517,285, Mar 1, 1928

**Electric annealing furnace.** AKT GES BROWN, BOVERI & CIE Swiss 142,004, Sept. 17, 1929

**Electric furnace *for smelting metals.*** EMIL F RUSS *U S 1,793,137, Feb 17. Structural features*

**Electric-furnace reduction of alumina.** VEREINIGTE ALUMINIUMWERKE A -G Brit 337,995, Nov 27, 1928 A furnace is continuously charged automatically in accord with the quantity of alumina which is reduced to metal in the bath, the charging hopper being mounted on a hollow anode and discharge from it being controlled by a current indicating device.

***Closed tiltable electric furnace suitable for iron and steel production*** EMIL G T. GUSTAFSSON and BENGT I NOREN (to Hampus G E Cornelius) U S 1,794,455, March 3 Structural features

**Melting finely divided dry materials such as iron oxide in an electric induction furnace.** LOWIN F NORTHRUP (to Ajax Electrothermic Corp) U S 1,794,863, March 3 Lumps of cond material such as pure iron which are large enough to be separately heated by induction in passing an a c about the charge are mixed with the charge

***Producing carbide-forming metals such as titanium, vanadium, chromium, iron or manganese.*** TURE R HAGLUND U S 1,794,401, March 3 Ores such as oxides of the metals named are fused in an elec furnace together with added reducing agent including lumps of material contg bauxite, a basic refractory oxide of lower m p than the ore, such as CaO, and carbonaceous reducing material A cement may be produced as a by product

**Electric furnace with carbide resistances** R C BENNER and G J EASTER (to Carborundum Co and C I Hawke) Brit 338,131, Dec 7, 1928 Various structural details are described of furnaces which may have resistances of Si carbide or B carbide surrounded by a body of granular carbon such as crushed petroleum coke.

**Electromagnetic stirring device for furnaces for the electrolysis of fused aluminum salts.** HANS THOMA Ger 514,919, Dec 4, 1928

**Device for electrically heating and for spraying molten metals for coating surfaces.** WM S RICE and CHARLES M SAEGER, JR U S 1,792,551, Feb 17 Structural features

**Electrode mounting for electric furnaces or electrolytic cells** A FRANCHINI (to P Girod) Brit 338,371, Aug 27, 1929 Structural features

**Lattice cathodes.** RAGUHN ANHALTER METALLOCHEMIE M B H Ger 514,716, June 24, 1926 Lattice cathodes for the electrolysis of alkali chlorides are described

**Coating cathodes with alkaline earth metal oxides.** FRITZ TÖDT Ger 514 606, Apr 8, 1928 The glowing cathode is coated with alk earth metal oxides, especially BaO, by electrolysis in an aq bath of alk earth metal salt contg $CO_3$ ions and heating *the carbonate deposit so formed to glowing*

**Cathode for rotary flame arcs.** GEORGES GAUTIER, LEON LE BOZLE and RAYMOND DUBOIS U. S 1,793,605, Feb 21 A cathode comprises a hollow annular ring in which a cooling fluid flows continuously and a winding immersed in the fluid which is supplied with elec. current and has its axis the same as that of the ring

**Glowing cathodes.** SIEMUM A -G Swiss 142,281, Aug 6, 1929 Glowing cathodes are made with a core of non readily fusible metals This is heated with one or more alkali metals in the absence of O to form a surface alloy, which is then oxidized to complete the cathode

***Incandescent cathode for electric discharge tubes.*** ANTON E VAN ARKEL and JOHANNES BRUINES (to N -V Philips' Gloeilampenfabrieken) U S 1,794,810, March 3 Cathodes are formed with a metallic core such as Ni, W, Mo or Pt and a surface consisting of a nitride of at least one of the elements Ti, Zr and Hf

**Luminous electrical discharge tube and associated cooling device.** JACQUES RISLER (to Risler Corp of America) U S 1,793,720, Feb 24 Structural features

**Electric gas-cleaners.** METALLGES A -G (Heinrich B Rüder, inventor). Ger. 517,261, July 18 1929 Means is described for keeping the high tension insulators dry by supplying radiant heat

***Electric gas-cleaners.*** METALLGES A G (Kurt von Eberhard, inventor). Ger. 517,262, Oct 5, 1929 Details of the discharge electrode and its mountings are described

**Electric gas-cleaning apparatus with parallel-plate precipitating electrodes.** METALLGES A -G (Jakobus R Gies, inventor) Ger 517,067, June 8, 1928

***Hammer device for gas-cleaning electrode.*** SIEMENS SCHUCKERTWERKE A -G (Alexander Kaufmann, inventor) Ger 517,263, June 26, 1928

**Electric gas-purification plant** METALLGESELLSCHAFT A -G Ger 514,587, Dec. 9, 1928 Addn to 511,643 (*C A* 25, 1169) Details of cleaning the electrodes by shaking

***Electric gas-purification plant.*** SIEMENS SCHUCKERTWERKE A -G (Richard Heinrich, inventor) Ger 514,650, July 31, 1927 Details of the pptg electrodes are given

**Chamber for the electric purification of gas.** SIEMENS-SCHUCKERTWERKE A -G. (Richard Heinrich, inventor) Ger 514,820, Mar 10, 1926 The pptg surfaces are formed of tin plates

**Apparatus for electrical precipitation.** CARL W. J. HEDBERG and HARRY A WINTERMUTE (to Research Corp). U. S 1,794,074, Feb 24 Structural features

**Apparatus for electrical precipitation of suspended particles from gases.** LODGE-COTTRELL, LTD, and L LODGE Brit 337,642, Nov 29, 1929 Structural features

***Apparatus for electrical precipitation of suspended particles from gases.*** ME-

positive induced dichroism is obtained on development *The polarized initial exposure* with the $CrO_3$ treatment had changed the sensitive film to a photochem polarizer The effect is a support for the micelle theory of latent image and was *predictable from it.* It is expected that the same Albert reversal could also be obtained with highly sensitive, coarse grained emulsions B J C. VAN DER HORVEN

**Determination of the general and color sensitivity of negative materials.** C. EMMERMANN *Schweiz Photo Ztg* 32, 220–2, 224–9(1930) —*The principles* and the application of the methods of Scheiner, of Eder-Hecht and of Hurter and Driffield are discussed for the detn of the *general and color sensitivity of neg materials* H D RUSSELL

**Optical sensitizing of silver halide by colloidal silver.** S E. SHEPPARD *J. Franklin Inst* 210, 587–607(1930) —*Various theories* on the optical sensitizing of Ag halides are discussed It is suggested that optical sensitizing by colloidal Ag (Becquerel effect) is primarily due to sensitized photoelec. emission by Ag amicrons and ultramicrons Sensitized photoelec emission of composite metal films is considered as due to minute Volta condenser fields Self fields as origins of sensitized photoelec. effects are considered in relation to the Becquerel and Weigert effects with Ag halides E P WIGHTMAN

**Alteration of orthochromatism by pinakryptol.** K. HAIDRICH *Photofreund* 11, 50–2(1931) —Sensitometric tests were made on a series of plates The same exposure was given each plate One plate was desensitized with a normal pinakryptol bath before development A rodinal developer (1 20) was used The normal plate was developed for 5 min and the desensitized plate for 6 min in total darkness With the Gevaert SSS plate a loss of 5° Scheiner resulted, with Gevaert Super-Press 8° Scheiner; with Agfa Isochrome 9° Scheiner and with Agfa Allocyanine plates 15° Scheiner It was also found that desensitizing affected the color sensitiveness of an emulsion as follows

Agfa Isochrome plates

| Blue | green | yellow |
|---|---|---|
| 3° S | 3° S | 3° S loss in speed |

Gevaert Super-Press plate

| Blue | green | yellow |
|---|---|---|
| 6° S | 8° S | 8° S loss in speed |

Gevaert SSS plate

| Blue | green | yellow |
|---|---|---|
| 1° S. | 4° S | 3° S loss in speed |

Allocyanine plate

| Blue | green | yellow | red |
|---|---|---|---|
| 14° S | 11° S. | 16° S. | 16° S |
| loss in speed | | increase in speed | |

A. K. WITTMER

**Desensitizing** NEUGEBAUER *Photofreund* 10, 360–3(1930) —Sensitometric tests were made to det loss of speed by the use of a desensitizer (pinakryptol green as a preliminary bath) A desensitized plate compared with untreated plate showed a loss of speed when both were given equal development If the developing time is doubled, an increase of speed is obtained which approaches but does not usually equal that of the untreated If a desensitizer is used two to three times the normal exposure should be given A K. WITTMER

**Desensitizing.** H DÜRR *Photofreund* 10, 441–3(1930); cf Neugebauer (*preceding abstract*) —*D* directs attention to several publications by O Mente, A. Hubl, K Jacobsohn, M L Dundon, J I Crabtree and B H Carroll on desensitizing All authors claim *no loss of speed* if a plate or film is developed a little longer than an ordinary plate which is not given a desensitizing treatment A K. WITTMER

**Desensitizing.** LÜPPO CRAMER. *Photofreund* 11, 7–9(1931) —*Exception is taken* to the view of Neugebauer (2nd preceding abstract) that the use of desensitizers results in a loss of speed. L C cites some of his own papers *in support of his statements* A K. WITTMER

**Desensitizing.** NEUGEBAUER *Photofreund* 11, 27(1931) —In reply to Lüppo-Cramer (preceding abstract) N. states that the newer emulsions may act differently with a desensitizer from emulsions made in 1920–1925 A K. WITTMER

**Chromium and sulfur intensification of negatives and prints.** H D POWER *Camera Craft* 38, 73(1931) —The method consists in bleaching the negatives or prints *in a soln of* 2% $K_2Cr_2O_7$ plus 1 5% strong HCl and substituting a freshly prepd 2% soln of $Na_2S$ for the developer The use of a bisulfite soln is mentioned to discharge the color *of the dichromate to give satisfactory results* G W WILHELM

**Some properties of fine-grain developers for motion picture films.** H C Carleton and J I Crabtree *Trans Soc Motion Picture Eng* 13, 408-44 (1929) — Graininess can be lessened by (1) increasing the sulfite (2) decreasing the rate of development and (3) increasing the degree of development Borax developers do not give aerial fog, but also do not produce images with less graininess Tables showing the effect of compn, agitation, aging and exhaustion and time fog curves are given A N H

**Borax developer characteristics** H Moyar and D R White *Trans Soc Motion Picture Eng* 13, 445-62 (1929) A sulfite concn of 75 g per l gives grain free images with high speed The effect of borax is due to its alky Metol rather than hydroquinone does the developing Hydroquinone tends to increase fog Renewing a borax developing bath brings back the development rate but not the detail giving power which has been lost through bromide accumulation Ann Nicholson Hird

**Neutral and acid amidol developer** C Zimmermann *Phot Chronik* 37, 139-40 (1930) Acid amidol is a somewhat slower developer than neutral amidol Emulsion speed is not affected Acid amidol also produces more fog Halation is more noticeable with the acid amidol A M Robinson

**Warm tone developing, selenium and sulfur toning** C Zimmermann *Phot Chronik* 38, 10, 15-7 (1931) The use of pyrocatechol glycine hydroquinone and eikonogen without sulfite as warm tone developers is briefly discussed Se and S toning are also briefly described A M Robinson

**"Uvatypie" and its paper prints in natural colors** K Wolter *Camera (Luzern)* 9, 185-90 (1931) Three color sepn negatives are made in a repeating back camera A print is made from each of these on dichromated gelatin film by exposure through the support A wash off relief is then produced on each film The reliefs are dyed in the three complementary colors and a three color imbibition print is made upon gelatin coated paper This imbibition process remedies the poor shadow quality and variation in successive prints characteristic of other imbibition processes This end is achieved by rinsing the dyed reliefs in distd water before making the prints and by employing dye solns of the correct degree of dispersity Diffusion of the dye in the printing paper is prevented by incorporating casein into the gelatin M W S.

**Positive material for motion pictures in color.** R Landau *Kinotechnik* 13, 12-5 (1931) A hypothetical color printing process is described in which 3 fine grained photographic emulsions are to be made, each of a uniform grain size differing from the other two When developed in the same developer, each emulsion is to give a colloidal Ag deposit of one of the 3 complementary printing colors The emulsions are to be coated in superposition upon a common film support The top and bottom emulsions are not to be color sensitized, while the middle one is to be orthochromatic or panchromatic All are to be impregnated with a yellow screening dye The lowest is to give a red Ag deposit, the middle one a yellow deposit and the top one a blue deposit The film is exposed 3 times, each time through one of the three color sepn negatives to the green filter neg, through the support, with blue light, to the red filter neg, from the emulsion side, with blue light, to the blue filter neg, with yellow light The film is then to be developed to obtain a pos in 3 colors Instead of making the emulsions of 3 grain sizes, they may be of one grain size, and the developer, preferably contg a Ag halide solvent, may be altered in compn as it penetrates the successive emulsions M W Seymour

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Photographic detection of the asymmetrical angular distribution of twice reflected electrons (Rüss) 3. Direct photography of ionization in insulating substances (Germant) 3. Method for preparing photographs of Petri dish cultures by direct contact printing on photographic paper (Buchmotz, Lewis) 11C.

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Newens, Frank R.· **The Technique of Colour Photography.** London Blackie and Son, Ltd 101 pp. 4s 6d, net.

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**Photographic emulsions.** S E Sheppard and P P Wightman (to Kodak, Ltd). Brit. 317,121, Feb 25, 1929 Stability of emulsions is improved and any tendency to fog is corrected by adding small proportions of compds such as saccharin, diacetamide, phthalimide, pyrrole derivs such as succinimide and ring compds such as those contg the pyrazolone, pyrazole, pyrazolidone or v triazole ring C C A, 24, 3720

**Photosensitive material.** H D. Murray, D A Spencer and Colour Photographs (British & Foreign), Ltd Brit 317,918, Aug 21, 1929 A water impermeable cellulose ester such as a nitrocellulose or cellulose acetate compn, or fibrous

material such as paper or fabric coated or impregnated with such an ester, has its surface rendered water permeable by superficial de-esterification and is then impregnated with a light-sensitive salt such as a compd. of Ag, Cr or Fe or a diazo compd. Various details of treatment are described.

*Apparatus for developing photographic materials* such as sensitive paper by a developing gas such as ammonia. ADOLPH LANGSNER (to Eugene Dietzgen Co.). U. S. 1,794,909, March 3. Structural features.

Bromide printing. OTTO TREICHEL. Ger. 495,920, Sept. 26, 1928. Bromide prints without spots or wrinkles are produced by having at most 1.8% alkali and at least 1.8% $Na_2SO_3$ in the $KHSO_3$ and citric acid developer. A suitable developer contains metol, hydroquinone, $Na_2SO_3$, $Na_2CO_3$, $KHSO_3$, citric acid and KBr.

Blue prints. KALLE & Co. A.-G. (Maximilian P. Schmidt and Rudolf Zahn, inventors). Ger. 517,159, July 24, 1926. A compd. (other than a dye) showing strong absorption in the ultra violet, *e. g.*, Na 6-phenyl 2-aminopseudoazimmobenzene-3,4'-disulfonate, is added to inks or crayons for making drawings from which blue prints are to be prepd. Clearer reproduction results.

Screen for use in photoengraving. JOHN W. IVERS (one half to Joseph Deutsch). U. S. 1,794,693, March 3. In forming a patterned, irregularly reticulated, hardened colloid screen for photoengraving, a dichromated colloid layer is exposed to actinic rays at predetd. areas and again exposed to light in its entirety, and swelling is then effected by development with suitable colloid-swelling liquids, followed by washing and drying.

Photomechanical printing surfaces. EUSTACE B. ETHRIDGE (one half to John A. Haeseler). U. S. 1,793,070, Feb. 17. For producing a substantially grainless printing surface from a latent Ag image in a colloidal material, capable of being printed from as in collotype printing, the exposed plate or film carrying the latent image is developed with a developer such as a dil. amidol soln. which reacts upon all the light affected Ag salt in the colloid proportionately to the amount of light to which the Ag salt has been exposed, but the action of which is so feeble as to produce an extremely faint and tenuous image lacking d. and depth which will be composed of very minute quantities of reduced Ag held in suspension in the colloid, and the colloid is chem. hardened in the presence of the Ag (suitably by the action of an aq. soln. formed from $CuSO_4$, KBr, $K_2Cr_2O_7$ and chromic acid).

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The atomic weight of iodine. The analysis of iodine pentoxide. GREGORY P. BAXTER AND ALBERT Q. BUTLER. *J. Am. Chem. Soc.* 53, 968–77(1931).—$I_2O_5$ produced by dehydration of $HIO_3$ contains less I (and more O) than corresponds to the theoretical formula. $I_2O_5$ of normal compn. is difficult, if not impossible, to prep. Conclusions based upon its actual compn. are not sufficiently reliable for work of high precision, as attested by the at. wt. obtained, 126.905. B. A. SOULE

Principles of the structure of boron-hydrogen compounds. Addendum. E. WIBERG. *Z. anorg. allgem. Chem.* 195, 258(1931).—Because of an abbreviation of ms. (cf. *C. A.* 25, 1751) omission was made from the table of properties of $B_2H_6$ and $C_2H_4$ that the statement regarding addn. of Na to the ethylenic bond relates to derivs. of ethylene and that the assumption of addn. of hydrogen halides, halogens and compds. of the type HOX to $B_2H_6$ relates to a previous hypothesis on boron hydride substitutions elaborated by W. A. P. SACHS

The chemistry and metallurgy of beryllium. G. MALCOLM DYSON. *Chem. Age* (London) 24, 228–30(1931).—A review. E. H.

The separation of beryllium and aluminum oxides. A. TRAVERS AND SCHOUTEDEN. *Compt. rend.* 192, 285–7(1931).—Methods available are based on these facts: (1) BeO dissolves in a soln. of $NH_4HCO_3$ while $Al_2O_3$ does not. (2) Solubilities in alk. solns. are different. (3) Solubilities in a boiling soln. of $NaHCO_3$ are different. (4) A basic acetate of Be is sol. in $CHCl_3$. (5) Al is pptd. by 8-hydroxyquinoline. T. and S. offer the following methods. (1) The bisulfites are evapd. to dryness on a steam bath and extd. Al forms an insol. oxide but Be does not. (2) $Be(HSO_3)_2$ ppts. in boiling soln. in the presence of traces of $H_2SO_4$ but redissolves on cooling, while $Al(HSO_3)_3$ does not. (3) Be forms a complex with $NaHSO_3$ which is completely decomposed by boiling and Be does not form compds. with Al at *p*H 4. An extensive bibliography is given. A. L. T.

Polytherms of ternary systems which in addition to water contain an alkaline sul-

fate and manganous sulfate. III. A. BENRATH. *Z anorg allgem Chem.* 195, 247–54 (1931), cf *C. A* 24, 3159.—The polytherms are detd for the systems $MnSO_4$–$Tl_2SO_4$–$H_2O$, $MnSO_4$–$(NH_4)_2SO_4$–$H_2O$, $MnSO_4$–$Rb_2SO_4$–$H_2O$. The solid phases present are $MnSO_4.Tl_2SO_4.6$ aq, $2MnSO_4.Tl_2SO_4$, $Tl_2SO_4$ and corresponding salts of $NH_4$ and Rb, in addn to the mono-, penta- and heptahydrate of $MnSO_4$ in each system. The temp range was 0–100°. K does not form the double salt $MnSO_4.K_2SO_4.6$ aq, while with Cs the salt $2MnSO_4.Cs_2SO_4$ is lacking. H STOERTZ

Ternary systems. IX. Sodium iodate, sodium nitrate and water. ARTHUR E HILL AND JOHN E DONOVAN. *J Am Chem Soc* 53, 934–41(1931), cf *C A* 23, 4616.—The soly of $NaIO_3$ in water is given for temps from 5° to 50°. Isotherms in the ternary system $NaIO_3$–$NaNO_3$–$H_2O$ are given at 5°, 25° and 50°. The stable hydrates are $NaIO_3.5H_2O$ below 20° and $NaIO_3.H_2O$ above this temp. In the ternary system, the double salt, $2NaIO_3.3NaNO_3.15H_2O$, appears below 9.8°. X. Magnesium iodate, magnesium nitrate and water. ARTHUR E HILL AND SAMUEL MOSKOWITZ. *Ibid* 941–6.—The soly of $MgIO_3$ in water is given from the eutectic (−0.36°) to +90°. In addn to the deca- and tetrahydrates, previously known, the anhydrous form is shown to exist in contact with water above 57.5°. Isotherms in the ternary system $Mg(IO_3)_2$–$Mg(NO_3)_2$–$H_2O$ are given at 5°, 25° and 50°. No double salts are found in this temp. range. B E TIFFANY

Behavior of sodium sulfate crystals toward cold ethyl alcohol and methanol. M A RAKUZIN. *Z Krist* 73, 115–6(1930).—Treatment with 95% EtOH affords a powder consisting of thenardite, with MeOH dehydration, but not powder formation, occurs. B C A

*The chlorides of sulfur.* T M LOWRY. *Z Electrochem* 36, 733–4(1930), cf *C A* 24, 4441.—Dielec consts for mixts of $S_2Cl_2$ and $Cl_2$ in the solid state show the presence of $SCl_4$. F-p curves indicate the sepn of solid $S_2Cl_4$, $SCl_2$ and $SCl_4$. Surface tension, d, light absorption and parachors show the liquid mixts behave as a ternary system $S_2Cl_2$–$SCl_2$–$Cl_2$. O M SMITH

Sulfur fluoride. KĀRLIS ŠTRENKS. *Acta Univ Latviensis Kim Fakultat Serija* 1, 233–60 (in German 261–2)(1930).—The interaction of AgF and S yields $Ag_2S$ and $S_2F_2$, a colorless gas with an odor similar to that of $SO_2$ or $S_2Cl_2$, it fumes in air and is very toxic to the organism, it is decomposed by water, yielding S, $H_2SO_3$ and HF, it attacks glass, even at low temps., and yields S, $SiF_4$, $SOF_2$ and $SO_2$, its formula has been proved by analysis and density detn. It attacks quartz, and consequently the physical constants reported by Fischer and Jaeneckner (*C A* 23, 5014) are incorrect, it does not corrode Sn, steel, Fe or Pt. A. L HENNE

The decomposition of hypobromous acid. FRIEDRICH POLLAK AND ETELKA DOKTOR. *Z anorg allgem Chem* 196, 89–112(1931).—HBrO is best prepd by treating concd $AgNO_3$ soln with pure $Br_2$, followed by vacuum distn. A concn greater than 0.3 *M* will be unattainable because of the decompn of HBrO. Prepns of HBrO always contain its decompn products, $HBrO_3$ and $Br_2$, which fact has not always been considered in previous work. If HBrO is prepd from $AgNO_3$ it contains $HNO_3$ which comes over during the distn. This $HNO_3$ can be detd analytically only by the nitrometer method. The nitrometer method of Klemenc and Hayek (*C A* 21, 3285), which is especially suitable for a small quantity, was modified for use in the presence of the Br compd present in the prepn. Inexplicable irregularities in the distn and the decompn of HBrO make it almost impossible to prep a soln of definite concn. This decompn is greatest during the first part of the distn. The decompn of HBrO proceeds by 2 simultaneous, independent reactions (I) $5HBrO \longrightarrow HBrO_3 + 2H_2O + 2Br_2$ and (II) $4HBrO \longrightarrow O_2 + 2H_2O + 2Br_2$. In the dark, at 15°, reaction (I) predominates. H ions were not observed to influence it. Bubbling of $N_2$ through the soln did not affect it. $HBrO_3$ may be involved transiently in the decompn, but it did not appear in measurable concn. R. H LOMBARD

Composition of the deposit forming on zinc immersed in copper sulfate solution. L A GALECKI AND J. TOMASZEWSKI. *Roczniki Chem* 10, 437–68(in German 468–71) (1930), cf following abstr.—The coherence of the deposit forming on zinc rods immersed in $CuSO_4$ soln increases with stirring and with the concn and decreases with the acidity of the solns; at the same time the color of the deposit becomes lighter. The deposit contains two constituents. (a) a metallic, flexible, red, yellow or white coating, possessing either a dull or a polished surface, and (b) a dark brown to black powdery or flocculent ppt. The former consists of metallic Cu and Zn in various proportions, probably both as a mixt. and as alloys, while the latter contains oxides of the two metals, as well as basic sulfates and the free metals. B C A

Composition of the deposit forming on zinc immersed in copper sulfate solution. II.

A Galecki and J Tomaszewski *Roczniki Chem* 10, 601–27 (in German 628 9)(1930), cf preceding abstr —With the increase of temp the content of Cu in the ppt decreases and the content of Zn increases The neg balance of the reaction is greater the higher the temp Temps. at which the expt was performed (18–50°) had no noticeable influence on the appearance and color of the ppt The addn of $ZnSO_4$ to the reaction system lowers the percentage of Zn in the ppt by an amt proportional to a certain extent to the amt of $ZnSO_4$ added The neg balance of the reaction increases with added $ZnSO_4$ In a quiet electrolyte the addn of $ZnSO_4$ has in general no noticeable influence on the external form and consistency of the ppts in a stirred soln addn of $ZnSO_4$ causes the formation of more fragile ppts A considerable portion of Zn is most probably in the form of basic compds which dissolve in NaOH In general, the ppt varies greatly in form and compn with varying conditions. J Krčéra

**The non-existence of the subiodides of bismuth, $BiI_2$ and $Bi_4I_5$.** V. Caglioti *Gazz chim ital* 60, 933 5(1930) For a long time there has been evidence both for and against the existence of Bi iodides lower than $BiI_3$ (*cf Pogg Ann* 107, 601(1859), Guthmann and Herz *Z anal Chem* 56, 422(1908) Marino and Becarelli, *C A* 7, 1457) and it was therefore of interest to exam $BiI_2$ and the reputed compds, $BiI_2$ and $Bi_4I_5$, by x rays $BiI_2$ and $Bi_4I_5$ were prepd with the app used by Marino and Becarelli (*loc cit*) for studying the system Bi I The powder method was used in the x ray examn, and the roentgenographs are reproduced No evidence of the existence of any compd other than $BiI_3$ was obtained A mixt of $BiI_3$ and Bi in proportions corresponding to $BiI_2$ showed no interference lines of Bi so that the substance which was supposed to be $BiI_2$ is probably a mixt of $BiI_3$ and Bi A mixt of $BiI_3$ and Bi in proportions corresponding to $Bi_4I_5$ showed the lines of $BiI_3$ and Bi This obscuring of the lines of one substance in a mixt. is being studied further, and it has already been found that Cu contg 7% of Co-Si does not show the interference lines of the Co-Si C. C. Davis

**Silicic acids. II.** W Dilthey and W Nagels *J. prakt Chem* 129, 178–88 (1931) cf *C A* 23, 1585 —The earlier expts were repeated with various solvents and at lower temps The $H_2O$ content of the silicic acids obtained depends on the temp and is not much influenced by the proportion of the $Ph_3COH$ in the reaction At −18° to −20° and with 4 5 mols. of $Ph_3COH$ a product with a $H_2O$ content of 27% is obtained when using $CHCl_3$ as a solvent This compares with the product obtained with Et O at 35° The 27% is too high to assume the presence of the meta acid With $CCl_4$ at −15° to −18° a product with 20% $H_2O$ is obtained This value is too low for the meta acid No ortho acid could be obtained The soly of the silicic acids, detd by dialysis, was not over 6% and decreased with age The splitting off of $H_2O$ is probably not intra but inter mol F Schotte

**The existence of violet tungsten oxide, $W_4O_{11}$.** E Tarjan *Naturwissenschaften* 19, 160 7(1931) — Expts in $H_2$–$H_2O$ mixts between 700° and 1000° on W oxides did not confirm the existence of $W_2O_5$ (blue), in agreement with the results of Reinders and Vervloet (*C A* 18, 349) Inside the range of existence of this compd (Chaudron, *C A* 14, 2451) a violet product was obtained of compn $W_4O_{11}$ (oxidation value 1 76 to 1 84%), i e between $WO_3$ and $W_2O_5$ Above $W_4O_{11}$ blue reduction products are formed at low $H_2$ concns. with oxidation values of a few tenths of a percent; below $W_4O_{11}$ no blue products could be obtained, further reduction gave $WO_2$ and W $W_4O_{11}$ can be prepd from $WO_3$ as well as from $WO_2$ at 15 to 30% $H_2$ at 900° In CO-$CO_2$ mixts $W_4O_{11}$ can be made inside the alleged $W_2O_5$ limits from either side (900°, 25% $CO_2$) (cf van Liempt, *C A* 16, 1530) $W_4O_{11}$ crystallizes in red violet needles with a metallic luster it has a triclinic lattice different from that of $WO_2$ and $WO_3$ Ignition of a pressed mixt. of $3WO_3 + 1WO_2$ in an inert atm gives the violet oxide in a manner similar to the prepn method of W bronzes. The relationship with these bronzes is furthermore evident from the chem resistivity and the metallic cond ($\rho = 2 \cdot 10^{-4}$ ohm cm for a pressed sample, sintered at 1200°) Leiser (*C A* 2, 760) has described the electrolytic prepn of $W_4O_{11}$, earlier erroneous data on the W oxides are partly due to retarded reduction processes and hence apparent equilibria B J C v d H

**The preparation of complex bromine derivatives of quinquevalent tungsten.** H Paulsen & Beck *Z anorg allgem Chem* 196, 85–8(1931), cf Collenberg *C A* 12, 2501 —The following complex bromotungstites were prepd by methods which in principle consisted in treating the complex K, $NH_4$ or Na oxalotungstites with concd HBr, segg excess oxalate and bromide and treating with a soln of the bromide of the metal or base in HBr *Dirubidium pentabromotungstite*, $Rb_2(WOBr_5)$, bright, olive-brown crystals *dicesium pentabromotungstite*, $Cs_2(WOBr_5)$, greenish yellow powder of microscopic octahedra *monopyridine tetrabromotungstite* $(C_5H_5NH)(WOBr_4)$, brownish green

powder of square platelets *diammonium pentabromotungstite*, $(NH_4)_2(WOBr_5)$, olive-green octahedra, decompd on drying, *monoletraethylammonium aquotetrabromotungstite*, $[(C_2H_5)_4N](WOBr_4 H_2O)$, bright green powder of cryst scales The 3 series of salts, $Me^I_2(WOBr_5)$, $Me^I(WOBr_4 H_2O)$ and $Me^I(WOBr_4)$, are analogous to the previously known chlorotungstites and have the same cryst form as the latter, although their color is more toward brownish yellow The bromotungstites are less sol in concd HBr than are the corresponding chlorotungstites in concd HCl The color of the bromotungstite soln is green that of the chlorotungstite soln is blue Treatment of Na oxalotungstite with concd HF gives a violet-colored soln The bromotungstites are more susceptible to hydrolytic decompn than are the chlorotungstites, but they may be preserved in dry $CO_2$ R H Lombard

**Sulfur derivatives of perrhenic acid.** Willi Feit *Z angew Chem* 44, 65–6 (1931) —$H_2S$ is passed into a satd soln of $KReO_4$ The soln becomes yellow in color at first, but after a day's flow of gas becomes deep brown, almost opaque When no further change is observed the $H_2S$ is removed by boiling, and the soln is carefully concd by evapn at 35° When only about 1/4 the original volume remains, small brown crystals sep which appear to be $KReO_4$ contg a small quantity of thio salt On further concn the crystals sepg become even darker and are accompanied also by a dark brown ppt. which is probably a sulfide of Re The soln is finally dried without further sepn of crystals to a dark brown mass which is easily sol in $H_2O$ and contains 14–15% S It is a mixt of $KReO_3S$, $KReO_2S_2$, $KReOS_3$, $KReS_4$ A soln of this residue is treated with N/20 $Tl_2SO_4$ and the dark brown ppt. is filtered, washed and dried at 35° Analysis gave the compn $TlReS_4$ The filtrate from this still contained Re and S, and on further treatment with $Tl_2SO_4$ yielded a bright yellow cryst. ppt of $TlReO_3S$ A soln of this salt on treatment with HCl gave a fugitive red color followed by sepn. of S, showing that free $HReO_3S$ is unstable H Stoertz

**The hypophosphites of cesium and rubidium.** L Hackspill and J Weiss *Compt rend* 192, 425–6(1931) —The hypophosphites of Cs and Rb $(PO H_2M)$ are similar to those of the other alkalies Their density and their affinity for $H_2O$ increase with their at wt. and their decompn with heat is similar Amy LeVesconte

**Study of the absorption spectra of various series of rare earth double nitrates.** Denis W Pearce and J Allen Harris *Trans Roy Soc Can* [3], 24, Sect 3, 145-51(1930) —A study was made of the various double nitrates of the rare earth elements to ascertain if it was possible that some might be more efficient than others in effecing a sepn of these elements, particularly of Il from Nd and Sa From a study of the relative intensities of the most characteristic absorption band of each element it would appear that (1) The double $NH_4$ nitrates afford the most efficient sepn of La and Pr from Nd (2) The double Mg and double Co nitrates are of the same efficiency in their relative sepns, no definite sepn being possible by these salts The ease of crystn renders them useful for preliminary sepn of the more basic members (3) The double Mn nitrates are to be recommended as a means for sepg Sa and Nd (4) The double Cu nitrates appear to effect a reversal of soly from the usual serial order of the double nitrates *i e*, according to at. wts (5) Pb appears to produce little effect on the sepn of the more basic members of the Ce group Indications are afforded that $Pb(NO_3)_2$ may be helpful in the sepn of Il J W Shipley

**Observations on the complex cyanides of nickel, copper and chromium.** W. Gluud and W Riese *Ber ges Kohlentechnik* 3, 452 9(1931) —In strongly ammoniacal solns, $K_4Fe(CN)_6$ decomposes as follows under the influence of $AgNO_3$ First one mol of $NH_3$ is taken up $K_4Fe(CN)_6 + NH_3 \longrightarrow KCN + K_3[Fe(CN)_5NH_3]$ The $AgNO_3$ removes the cyanide and takes the reaction to the right in steps as follows $K_3[Fe(CN)_5NH_3] + NH_3 \longrightarrow KCN + K_2[Fe(CN)_4(NH_3)_2]$, $K[Fe(CN)_3(NH_3)_3]$, $[Fe(CN)_2(NH_3)_4]$ and finally $Fe(CN)_2$ are formed Similar reactions occur with Ni salts, $K_2[Ni(CN)_4]$ being converted into $K[Ni(CN)_3NH_3]$, $[Ni(CN)_2(NH_3)_2]$ and finally also into $[Ni(NH_3)_2CN](CN)$ and $[Ni(NH_3)_4](CN)_2$ Similar results are obtained with Cu and Cr compds With $(NH_4)_2S_x$ these complex cyanides lead to the formation of thiocyanates, the Ni salts furnishing typical reactions If the formation of $[Ni(NH_3)_4](CN)_2$ is assumed, this reacts with $(NH_4)_2S_x$ to form NiS and $NH_4CNS$. The corresponding Cu and Cr salts are formed somewhat less readily The presence of concd $NH_4OH$ suppresses any considerable thiocyanate formation Varied reactions are given with $FeSO_4$, the Ni salts giving a ppt. of $Fe[Ni(CN)_4]$, no Fe whatever replacing Ni in the anion With Cu salts, however, ferrocyanides are produced and also the following compd, $KFe[Cu(CN)_4]$ With the complex Cr cyanide the reaction is as follows in alkaline soln: $K_3[Cr(CN)_6] + 3KOH \longrightarrow Cr(OH)_3 + 6KCN$ The excess of KCN then forms a ferrocyanide with the ferrous salt. H. Stoertz

Phase rule studies on metallic thiocyanates (OCCLESHAW) 2.

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## 7—ANALYTICAL CHEMISTRY

W T HALL

*Quantitative emission spectrum analysis in any percentage without calibration curve* G SCHEIBE AND O SCHNETTLER *Naturwissenschaften* 19, 134(1931).—Certain phases of a method previously described (*C A* 24, 5622) have been checked by the use of a Pt absorption wedge The results are briefly discussed B J C. v D H

*Physical methods in the chemical laboratory. XVII. A method for increasing the accuracy in quantitative emission spectral analysis and its testing.* G SCHEIBE, C F LINSTRÖM AND O SCHNETTLER *Z angew Chem* 44, 145–51(1931), cf *C A* 25, 1440 —The photographic plate, with respect to its applicability for spectrographic analyses, was studied, with particular attention to the dependence upon the wave lengths With the aid of a thermoelec photometer, which is suitable for technical purposes, the behavior of the intensity of the lines was carefully studied, and as a result of this study a procedure was developed which will serve for the spectrographic detn of varying quantities of substances with an accuracy of about 3% W T H

*Colorimeters, spectrophotometers and nephelometers.* C. DIGAUD *Ann chim anal chim appl* 13, 1–5, 33–54, 65–72(1931) —This is an account of the marked advances that have been made in the field of analytical chemistry, particularly with respect to applying the principles of modern phys chemistry A discussion of the theory underlying all processes ending with visual observation begins with an explanation of the anatomy of the eye, then turns to photoelec cells, thermoelec couples, thermoelec piles and photographic plates and finally compares the sensitiveness of the eye with that of the photoelec cell and of the photographic plate. The app and its use are described in detail W T H

*Nephelometric titrations. II. Standard-solution end-point.* CLYDE R. JOHNSON *J Phys Chem* 35, 830–5(1931) —It has been pointed out (*C. A* 25, 1178) that there is a possible error in the equal-opalescence end point in nephelometric detns. To avoid this possible error it is proposed to work to a different end point called the "standard soln end point" For this 2 sets of standard solns. are necessary In the titration of $Cl^-$ with $AgNO_3$, *e g*, the necessary quantity of $AgNO_3$, to within a few tenths of a *mg*, is added, and then both $Cl^-$ and Ag are detd nephelometrically in the supernatant soln by use of solns satd with AgCl ppt as standards W T. H

*The stability of standard arsenious acid solutions. IV.* TANANAEV. *Ukrainskii Khem Zhurnal* 5, Sci Pt., 217–26(1930) —(1) Standardized arsenious acid loses the strength of its titer through oxidation to arsenic acid The oxidation rate is directly proportional to the alky of the soln A 0 1 *N* soln of $As_2O_3$ in 1 *N* NaOH suffers a daily loss in titer equaling approx 0 176% of $As_2O_3$ (2) Weakly alk. solns ($p_H$ = 7–9) remain unchanged for 1 5 years (3) $NaHCO_3$ free from $Na_2CO_3$ is most suitable and can be prepd by passing $CO_2$ through the soln (4) Solns of $As_2O_3$ prepd from the pure chem remain sterile and do not form $AsH_3$ B S LEVINE

*Systematic qualitative analysis with small quantities of cations.* A. SCHEINKMANN *Z anal Chem* 83, 176–88(1931) —Instead of starting with 1 g or more of material, only 0 1–0 15 g of sample is taken, and the reagents are added in drops, an unnecessary excess being avoided The first group of AgCl, $PbCl_2$ and $Hg_2Cl_2$ is treated with a little 5% $KNO_3$ soln., in which $PbCl_2$ is more sol than in water, but is otherwise analyzed in the conventional manner For pptg the second group, a satd soln of $H_2S$ is used, which is prepd daily but which is much more convenient to use than the gas itself The sulfide ppt is treated with KOH soln to dissolve the sulfides of As, Sb, Sn and Hg From this soln HgS is pptd by $NH_4Cl$, and the sulfides of As, Sb and Sn by AcOH, after which this subgroup is analyzed conventionally The sulfides of Group II which are insol in KOH soln are dissolved in HCl and $H_2O_2$ and treated with $NH_4OH$, after which the procedure is normal In Group III, the NiS and CoS left undissolved by dil HCl are dissolved by treatment with AcOH and $H_2O_2$, which is decidedly advantageous In testing for Al, both the morin and alizarin tests are used For Zn the resorcinol and ferrocyanide tests are used, and for Mn the green fusion test and the treatment with $PbO_2$ and $HNO_3$ are prescribed The filtrate from this

Fe-Al group is evapd to dryness after making acid with HCl and ignited with oxalic acid, whereby insol $BaCO_3$, $SrCO_3$, $CaCO_3$ and MgO are formed together with water-sol alkali carbonates. In this way the baneful effects of excess $NH_4$ salts are overcome. These are the principal ways in which the procedure differs from that ordinarily used Several lab devices are shown which will be found useful W T H

Mercurimetric studies. O Tomíček and O Procke *Collection Czechoslov Chem Comm* 3, 116-25(1931).—Votoček found that $Na_2Fe(CN)_5(NO)\ 2H_2O$ could be used as indicator in titrating $Cl^-$ and $Br^-$ but not $I^-$ with $Hg(NO_3)_2$. With respect to the solv of the Hg nitroprussiate and the extent of its ionization, but little data are available It would seem probable that the molar solv is not greater than $2 \times 10^{-4}$ and that its soly product is below $10^{-9}$ The physicochem studies here described lead to the same conclusion that the molar solv is below $5 \times 10^{-4}$ Other observations made will be given a practical application in a subsequent paper W T H

Dimethyl-*p*-phenylenediamine hydrochloride for the determination of small quantities of chlorine. Knut Aleftman *Finska Kemist-samfunde's Medd* 36, 109-12 (1927).—The reagent gives with Cl the same shade of red color as methyl red (dimethylaminoazobenzene-o-carboxylic acid) shows in acid soln The water to be tested is treated with the reagent and the resulting color is compared with those of known solns. of methyl red In testing drinking water 0.01 mg Cl can be detd J Ryselin

Indirect estimation of silicon in 48 to 52 percent ferrosilicons. G T Dougherty *Ind Eng Chem, Anal Ed* 3, 158-9(1931).—The direct detn of Si in Fe-Si requires 1.5-2 days. To avoid car demurrage, an indirect method has been worked out requiring but 0.5 day and which depends upon carefully treating the sample with HF and $H_2SO_4$ in a Pt or palau crucible and weighing the residue after evapn and ignition W T H.

Lithium chloroplatinate and the separation of potassium from sodium and lithium by the unmodified, original, Fresenius method. G Frederick Smith and A C. Siegd *J Am Chem Soc* 53, 947-57(1931).—$Li_2PtCl_4\ 6H_2O$, prepd from $Li_2CO_3$ and $H_2PtCl_6$, and twice recrystd, can be used to advantage for pptg $K_2PtCl_6$ The ppt. then has the normal compn, which is not true when $H_2PtCl_6$ is used as precipitant Moreover, the ppt is stable at 200-260°, whereas the ppt. produced with $H_2PtCl_6$ decomposes above 160° For washing the $K_2PtCl_6$ ppt, 80% LiOH is recommended The errors due to the use of $H_2PtCl_6$ are due to decompn of the reagent, which does not take place when recrystd $Li_2PtCl_6$ is used W. T. H.

Quantitative determination of calcium, magnesium and phosphorus in feedstuffs and cattle excreta. Improved technic. H P. Morris, J W Nelson and L. S. Palmer *Ind. Eng Chem, Anal Ed* 3, 104-7(1931).—Detailed directions are given for fusing the ash with soda, extg the melt with HCl and water and detg Ca, Mg and P in the soln To avoid the necessity of removing all $SiO_2$, the $CaC_2O_4$ ppt. is titrated rather than weighed The value of the method is shown by exptl data. W. T. H

The selenious acid method for the determination of zirconium. Stephen G. Simpson and Walter C. Schumb *J Am Chem Soc* 53, 921-33(1931).—For decompg Zr minerals, the Muehlberg method of fusing with $Na_2O_2$ and C is recommended, the fusion being made a second time with any residue which is insol in acid After the fusion, ext. the melt with water and reject the soln of sol Na salts. Dissolve the residue in HCl, filter if necessary and evap the soln to fumes with 25 cc. of 18 *N* $H_2SO_4$. Cool, dil. and filter off $SiO_2$. Make the filtrate ammoniacal, filter and wash slightly. Promptly dissolve the ppt, which contains $ZrO_2$, in 15 cc. of 12 *N* HCl, add 20 cc. of HOH, heat nearly to boiling, dil to 500 cc., again boil and add 20 cc of 10% $H_2S_2O_3$ soln When the liquid is clear, filter off the ppt. of $4ZrO_2\ 3SeO_2\ 18H_2O$, and after very slight washing, dissolve it in 15 cc. of 12 *N* HCl. Add 20 cc. of 3% $H_2O_2$ to reduce any quadrivalent Ce, dil to 500 cc. and again ppt with $H_2SeO_3$ Digest the 2 filters used for the Zr ppts. with 40 cc. of hot 10% oxalic acid and add the soln to the main ppt. contg Zr Dil to 200 cc., heat to boiling and add 12 cc. of 6 *N* HCl. After it has stood at least 10 hrs., filter and wash the ppt. with 2.5% oxalic acid dissolved in 0.24 *N* HCl. To the filtrate contg the Zr add 30 cc. of 18 *N* $H_2SO_4$ and evap till all the $C_2O_4^{--}$ has been destroyed, as shown by no more evolution of CO and $CO_2$ Filter off any Se ppt. and make the filtrate ammoniacal Filter off the $Zr(OH)_4$ ppt., and after a little washing dissolve it in 15 cc. of 12 *N* HCl, add 20 cc. of 3% $H_2O_2$, dil to 500 cc., add 20 cc. of 10% $H_2SeO_3$ soln, filter, ignite the basic Zr selenite over the blast lamp and weigh as $ZrO_2$. W. T. H.

Separation of calcium and magnesium by the molybdate method. R. C. Wiley

*Ind. Eng. Chem., Anal. Ed.* 3, 127–9(1931).—$CaMoO_4$ is insol. in water, whereas $MgMoO_4$ is quite sol. Quantities of Ca ranging from 20 to 50 mg. can be sepd. from 12–70 mg. of Mg by treating the soln. (0.05 *N* in Ca, 0.075 *N* in Mg, or less) at the boiling temp. with a slightly ammoniacal soln. of $NH_4$ molybdate (about 0.4 *N*), added dropwise. The pptn. of the Ca is complete if boiling is continued till the supernatant liquid is clear. The ppt. can be weighed as $CaMoO_4$ after drying at 120° for 30 min. The Mg can be detd. as $MgNH_4PO_4$ in the filtrate. W. T. H.

Potentiometric determination of iridium. Sho-Chow Woo and Don M. Yost. *J. Am. Chem. Soc.* 53, 854–8(1931). cf. *C. A.* 25, 1725.—The iodometric method, in which quadrivalent Ir is reduced to the bivalent Ir by means of $I^-$ in 0.1–0.2 *N* HCl and the liberated $I_2$ is titrated with $Na_2S_2O_3$, gives good results if benzene is used to show the end point. Good results are also obtained by direct titration with $TiCl_3$. The potentiometric end point is clear in 75 cc. of 0.1–0.2 *N* HCl if 2–3 g. of NaCl is added and the $TiCl_3$ is added slowly toward the last. Directions are given for prepg. chloroiridic and chloroiridous acids. W. T. H.

Method for the separation and gravimetric determination of osmium. Raleigh Gilchrist. *Bur. Standards J. Research* 6, 421–49(1931).—Os, when present as chloride or bromide, can be pptd. completely as hydrated $OsO_2$ from boiling solns. of *p*$_H$ 1.5–6.3. The presence of alkali chloride or sulfate does no harm. The marked tendency to spatter when the oxide is heated can be overcome by impregnating the ppt. with $NH_4Cl$. Os, when reduced in $H_2$ and cooled to room temp. in $CO_2$, remains unattacked by air for a long time. Os, when present as bromosmate or alkali osmate, can be volatilized completely as $OsO_4$ by boiling in 10% $HNO_3$. When present as chlorosmate, it cannot be eliminated easily in this way, but from concd. $H_2SO_4$ near its b. p. the $OsO_4$ can be distd. off from the latter compd. but less readily from the former compds. By a mixt. of $H_2SO_4$ and $HNO_3$ it is possible to effect complete volatilization from either type of compd. No $RuO_4$ is volatilized from 40% $HNO_3$ or from concd. $H_2SO_4$ alone, but from concd. $H_2SO_4$ contg. $HNO_3$ or from concd. $HNO_3$ alone $RuO_4$ is gradually volatilized. A soln. of 6 *N* HCl satd. with $SO_2$ is a suitable reagent for receiving the distd. $OsO_4$. It is necessary, however, to evap. repeatedly with concd. HCl to decompose the Os sulfite compd. completely. The thiourea test for the detection of Os can be made sensitive to 0.02 mg. of Os in 100 ml. of soln. In the app. recommended for the detn. of Os, all connections are of ground glass. The 700 ml. distg. flask carries a tap funnel in the neck, a glass tube extending to the bottom of the flask for the entrance of the gas, and a gas exit tube leading to a conical flask, contg. 170 ml. of 6 *N* HCl which has been satd. with $SO_2$. In this first receiver practically all of the $OsO_4$ is condensed, but for the sake of safety there are 2 other flasks provided, each contg. 50 ml. of the $SO_2$-HCl soln. Between the first and second flasks, a small tap funnel is fused into the gas line, through which addnl. HCl $SO_2$ can be introduced if necessary. It was found necessary to keep the stopcock of this funnel greased, but otherwise no lubricant is advisable. To the soln. in the distg. flask, dil. if necessary with 100 ml. of water, add 40 ml. of 7.5 *N* $HNO_3$ and flush out the funnel with 10 ml. of water. Pass a slow current of air through the app. and heat the soln. to boiling. Distil for 1 hr. This should be sufficient to remove Os from alkali osmate or bromosmate, but 7–8 hrs. are necessary if chlorosmate is present. In this case it is better to distil from concd. $H_2SO_4$ or if Ru is absent, from concd. $H_2SO_4$ to which a little concd. $HNO_3$ has been added. Unite the several portions of HCl-$SO_2$ and evap. on the water bath in an etched beaker. Digest the residue with 10 ml. of concd. HCl for 15 min. and evap. a second time. Repeat the digestion and evapn. 3 times more. Take up the final residue in 100 ml. of water and heat to boiling. Add $NaHCO_3$ soln. until a ppt. appears and suddenly coagulates. Add bromophenol blue indicator and enough more $NaHCO_3$ soln. to impart a faint, bluish color to the soln. Boil 5–6 min., filter through a Munroe crucible and wash the ppt. with hot 1% $NH_4Cl$. Cover the washed ppt. with solid $NH_4Cl$, add a few drops of the wash liquid, and apply suction to get the $NH_4Cl$ into the ppt. Wipe off the coating of $NH_4Cl$ that comes through the crucible, cover with a Rose crucible lid of quartz and heat in $H_2$. At the end heat strongly for 10 min. and allow to cool in $H_2$, finally replacing with $CO_2$. Weigh as metallic Os. W. T. H.

New method for reduction of tin and antimony prior to titration. B. S. Evans. *Analyst* 56, 171–7(1931).—A soln. of 5 g. $NaH_2PO_2.H_2O$ in 6 *N* HCl, added to about 100 ml. of 6 *N* HCl contg. 0.002–0.05 g. of Sn and 1 cc. of satd. $HgCl_2$ as catalyst, will reduce all $Sn^{++++}$ to $Sn^{++}$ if boiled 15 min. in an atm. of $CO_2$. Then, by dilg. with 2.5 times as much of a boiled and cooled soln. of 10 g. citric acid, 0.4 g. KI and some starch, the Sn can be detd. by titration with standard $I_2$. Particular pains were taken to avoid all contact with air. The reduction of Sb to the terrivalent condition takes

place with 5 min boiling and without the use of any catalyst. Fe, Cu and As must be removed The results obtained were excellent. W T. H.

Determination of lead as chromate in presence of perchloric acid. D. J. Brown, Joseph A Moss and John B Williams. *Ind Eng Chem., Anal Ed* 3, 134–5(1931) — $PbCrO_4$ is less sol in dil. $HClO_4$ solns. than it is in dil HCl or dil $HNO_3$ Directions are given for carrying out the gravimetric and volumetric detn of Pb as $PbCrO_4$, after first removing HCl and $HNO_3$ by evapn with $HClO_4$, and 24 results obtained with a 0 5 g sample of a certain ore contg 82 04% Pb showed 81 55–82 04% W. T H

Photoelectric microanalysis. Mototarô Matsui and Tôkiti Noda. *J Soc. Chem Ind Japan* 33, Suppl binding 517–8(1930) —Cu in Cu $NH_3$ soln can be detd by measuring with a photoelec cell the amt. of light transmitted through such a soln The light source was an incandescent lamp The thickness of the Cu-$NH_3$ soln. was 12 cm If $I$ is the current from the photo-elec cell when the Cu-$NH_3$ soln is in the light path, and $I_0$ the current when $H_2O$ is substituted for Cu $NH_3$ soln., a quant relation exists between $I_0$-$I$ or $log(I_0 I)$ The photoelec current was reduced 73 5% when a 0 00063 $N$ Cu-$NH_3$ soln was substituted in the cell by $H_2O$ An accuracy of about 5% was possible The photoelec cell used was of the A-filled Cs type. The tension was 80 v in series with a 5 megohm protector E M Symmes

Detection of cadmium. J Stanton Pierce and W T Forsee *Ind Eng. Chem., Anal Ed* 3, 188–9(1931) —Instead of using KCN or Fe powder before testing for Cd in the usual qual scheme, it is recommended to boil the neutral or slightly acid soln for 3–5 min with 1–5 g of fine Ni powder which serves to reduce the Cu. Then, after filtering, a soln is obtained which can be tested for Cd by adding AcOH and $H_2S$. W. T H.

*Detection of zinc and cadmium by the cyanide method.* N. A. Tananaev and N. S. Fedulov *Ukrainskii Khem Zhurnal* 5, Sci Pt., 213–6(1930) —To a soln of the substance add a considerable excess of $NH_4OH$, heat and filter. If Mn is present add $H_2O_2$ and filter. To the filtrate add a soln. of KCN until the colors due to Ni, Co and Cu disappear. Add $Na_2S$ and heat. Wash the ppt. 3 or 4 times with water. A white ppt. which completely dissolves in an excess of KCN indicates the presence of $ZnS_2$ alone If the ppt is yellow, CdS is present alone or in conjunction with ZnS To establish this fact add an excess of KCN and acidify the soln with AcOH. A white ppt. or turbidity indicates the presence of ZnS There is some incomplete exptl. evidence to show that the method works in the presence of Pb and Sb when the $NH_4OH$ added is not too strong B S Levine

Qualitative tests for zinc, copper and silver. A. Sergeev. *Ukrainskii Khem. Zhurnal* 5, Sci Pt., 227–9(German abstract 230)(1930) —Add a few drops of concd. NaOH and some pulverized Al to the soln., and stir with a glass rod. A change in color and a swelling of the Al particles indicate the presence of Zn To a neutral or slightly ammoniated soln of the substance add some Hg Formation of gray or silvery needle-like crystals indicates the presence of Ag Heat the end of a narrow glass test tube and apply to a drop of the soln to be tested Heat the end of the tube for about 2 min. in the lower part of a Bunsen flame A copper-orange filament is formed if Cu is present. B S Levine

Pyrognostic assaying of platinum and palladium. Herculano Calmon. *Rev. brasil. chim* 1, 84–5(1929) —C describes his method for the detection of Pd and Pt, which is based on the incandescence that is observed in the ashes of the filter paper or in asbestos threads that have been impregnated with the salt to be investigated, heated to a red heat and put in the flame of illuminating gas, alc. vapors or a mixt. of EtOH and sulfuric ether Working on a metallic web is recommended The reaction is very sensitive. John M Ladino

New method for the titration of iron according to J. Knopp. Otto Rothe and Acebo Pio Sobrinho *Rev brasil chim* 1, 129–49(1929) —For detg $Fe^{++}$, the following conclusions are drawn The use of diphenylamine indicator with dichromate is superior to the use of permanganate The metals of the second group must be removed with $H_2S$, especially As and Sb Min quantities of Cu cause no error Colloidal silica or other metals such as Hg and Sn need not be removed Colloidal Pt caused by fusion of the oxide in a Pt crucible is harmful, making the use of permanganate necessary. A Ag crucible is to be preferred Care must be taken not to reduce any AgCl, the reduction of which takes place quite readily John M Ladino

Determination of aluminum oxide in aluminum and its alloys. A M. Shandorov *Tsvetnye Metallui* 1930, 672–9, *Chimie & industrie* 25, 37(1931) —S verified the accuracy of the Cl gas method, using a gas heated, transparent quartz tube so as to follow the reaction, which is strongly exothermic and requires careful regulation of the

heating and Cl feed It is essential that the Cl be free from $O_2$ and water After the chlorination the boat is ignited at 1000° to burn the C The analysis requires about 1 hr S found 0.07-0.10% $Al_2O_3$ in com Al and 0.07-0.21% in duralumin

A PAPINEAU COUTURE

**Analysis of metal containing copper. I. Analysis of copper. II** ARAI, C. UYETSUKI AND S TACHIBANA *Repts Imp Ind Research Inst., Osaka, Japan* 11, No 15 (1930) The procedure for the electrolytic detn of Cu is given F. I NAKAMURA

**Supplement to the new iodometric method for determining vanadium in alloy steels and in ferro-vanadium.** W WERZ *Z anal Chem* 83, 161-4(1931); *cf. C. A.* 25, 31 For the decompn of excess $(NH_4)_2S_2O_8$ 15 min. is inadequate, but 30-35 min should suffice The reaction between Fe$^{+++}$ and I is so slow in the presence of $H_3PO_4$ that as much as 3 g Fe liberates $I_2$ corresponding to not more than 0.2 cc. of 0.05 *N* $Na_2S_2O_3$ when 0.2-0.3 g of KI is added, with 1-2 g of KI about twice as much $I_2$ is liberated When oxalic acid is present, more $I_2$ is set free With highly alloyed steels this effect is less, and by keeping the concn of the $H_3PO_4$ soln low, the interference of Mn is lessened and the addn of oxalic acid is unnecessary There is, on the other hand no danger of any Cr being oxidized by the persulfate when Ag ions are absent. When the Cr is high in an alloy steel, the Cr carbide should not be removed until after the oxidation with $HNO_3$ If this carbide is not removed, it will tend to reduce vanadate later in the analysis The persulfate should not be added until the nitrous fumes have all been boiled off from the soln. The procedure as modified is as follows Dissolve 1.3 g of steel in a 500-cc. Erlenmeyer flask in 25 cc of $H_3PO_4$ (*d* 1.70) and 200 cc of water (10-15 min.) Oxidize with concd $HNO_3$ and add 5 cc in excess Boil a few min to remove nitrous fumes Filter off any undissolved carbide Add 10 cc. of 5% $(NH_4)_2S_2O_8$ soln and boil 35 min Add 25 cc. more of $H_3PO_4$, cool to room temp., add 2-10 cc. of 0.2 *N* KI soln., shake well and after 5 min titrate with 0.05 *N* $Na_2S_2O_3$ in a vol of about 200 cc W. T. H

**Use of microanalysis in the streak test [for precious-metal alloys].** R. STREBINGER AND H HOLZER *Mikrochemie* [N. S.], 2, 264-70(1930).—The streak test is made on a roughened depression in a microscope slide When the alloy is chiefly Ag, the streak is dissolved in $HNO_3$ on the slide, and the Ag is pptd as chloride and removed by centrifuging The filtrate is evapd to dryness, the residue dissolved in water, and 1 drop of K mercurithiocyanate soln is added, green crystals indicate the presence of Cu and brown crystals the presence of Cd For the examn of a Au streak it is dissolved in aqua regia the metals are pptd as sulphides by passing $H_2S$ through the soln from a capillary tube, and the ppt. is collected in a microcentrifuge, washed, digested with $(NH_4)_2S$ to remove the Au, and dissolved in $HNO_3$ Min drops of the soln are tested for Pb by addn of AcOK and $KNO_2$ (triple K Pb Cu nitrite pptd.) for Bi with K sulfate (double sulfate pptd.), for Pd with dimethylglyoxime in AcOH, for Ni with the same reagent and $NH_4$, for Co, Zn and Fe with $NH_4$ mercurithiocyanate, and for Al with alizarinsulfonic acid Pt streaks may be similarly tested for the presence of Cu, Pd and Ag, Au is detected by the purple of the Cassius test B C. A

**Titrimetric determination of small quantities of ammonia, with particular attention to water analysis.** S KÜHNEL HAGEN *Z. anal Chem* 83, 164-75(1931).—An app is shown which is suitable for the detn. of free $NH_3$ in water One of the principal advantages lies in the avoidance of rubber stoppers and rubber connectors and in the use of a quartz condenser tube The $NH_3$ is caught in a measured vol of $^1/_{100}$ *N* HCl and the excess titrated with NaOH of the same concn. against an indicator of a 0.01% soln. of methyl red and 0.04% soln. of bromothymol blue in 96% alc. For the detn of albuminoid $NH_3$ it is recommended to heat with $H_2SO_4$ 0.1 g graphite, 0.75 g $HgSO_4$, 1.00 g $CuSO_4 \cdot 5H_2O$ and some $K_2SO_4$, and finally to add $Na_2S$ and NaOH and distil By the app and method described, 0.1-0.3 mg of $NH_3$ can be detd with an accuracy of about 5% W T H

**Indirect determination of magnesium carbonate in the presence of calcium carbonate.** G A PAVCHENKO *Ukrainskii Khem Zhurnal* 5, Sci Pt., 187-95(1930).—Dissolve a weighed sample in an excess of standard acid and titrate the excess Now add an excess of standard oxalic acid and titrate the excess of the oxalic acid with $KMnO_4$. B S LEVINE

**The estimation of sodium carbonate in sodium bicarbonate.** A. K. BANKO. *Ukrainskii Khem Zhurnal* 5, Sci Pt., 197-206(1930).—When the % of soda in the bicarbonate exceeds 3-4%, it can be detd by titration against phenolphthalein, if a pure soln of $NaHCO_3$ and an equal amt. of the indicator are used as a control, or by the method of Simpson with a mixt. of 6 parts of bromophenol blue and 1 part of cresol red

as indicator If the $Na_2CO_3$ content is below 3%, a colorimetric detn is better
B S Levine

**The oxalate method for the analysis of potassium thiocyanate using the borax titer.** N A Tananaev and N A Lazarkevich *Ukrainskii Khem Zhurnal* 5, Sci. Pt., 209–12(1930) —By means of the oxalate method, convert KCNS into $K_2CO_3$ and titrate the latter with acid soln standardized against borax B S Levine

**Determination of phosgene.** J C Olsen, George E Ferguson, Victor J Sabetta and Leopold Scheflan *Ind Eng Chem, Anal Ed* 3, 189–91(1931) —Four methods for detg $COCl_2$ have been studied (1) absorption in alc. soln of *NaOH and subsequent titration of chloride or of excess NaOH*, (2) absorption in ammoniacal $AgNO_3$ soln and weighing of the AgCl formed after neutralizing with $HNO_3$, or titration of excess Ag, (3) absorption in a satd soln of aniline and weighing of the resulting diphenylurea, (4) passing of the $COCl_2$ through a 2% soln of NaI in acetone and titration of the liberated $I_2$ Methods (3) and (4) were found reliable in studying decompn products of $CCl_4$ mixts and in samples of $COCl_2$ contg other Cl compds
W T H

**The separation of phosphoric acid as bismuth phosphate in quantitative analysis.** A Kešāns *Acta Univ Latviensis Kim Fakult Serija* 1, No 4–5, Fasc 2 Burtnieca (in German 121–6)(in Lettish 65–121(1929)) —At room temp., a satd soln of $BiPO_4$ in *0.25 N $HNO_3$* contained *0.6* mg of $P_2O_5$ in *100* cc. *A 0.5 N $HNO_3$ soln under the* same conditions dissolves 2.4 mg of $P_2O_5$. In the presence of the halogen or sulfate ions, the soly increases, because a portion of the $BiPO_4$ becomes basic BiOX or $Bi_4O(OH)_2SO_4$. This difficulty can be overcome by using solid $BiONO_3$ as the precipitant. The sepn is so complete that only 0.1 mg of $P_2O_5$ in 100 cc of the soln remains The main pptn is carried out in a *2 N* or *5 N $HNO_3$* (either hot or cold) by adding the solid $BiONO_3$ and diluting to a strength of 0.5 *N* The mixt. is warmed for 6–8 hrs on a water bath and allowed to cool until the next day This insures greater pptn The cations Ca and Sr should not be present in amts greater than 70 mg /100 cc. of diluted soln, and the other cations, Na, K, Mg, Ba, Zn, Mn, Co, Ni and Fe, in concn greater than 100 mg /100 cc. of soln. Russell C. Erb

**A new method for the optical determination of atmospheric ozone.** Andre I. Dunjowski *Compt rend* 191, 859–61(1930) —*By use of a galvanometer sensitive* to $10^{-9}$ amp., with photographic registration, the distribution curve of solar energy was recorded between 4860 and 12 000 A U on several days from August to December, 1929 In interpreting the results it is necessary to consider at some definite wave length the intensity, *I*, the mass of air traversed, *M*, and the atm. d., $\Delta$ colog $I = \text{colog } I_0 + m\Delta$ The *ozone is detd in 4 min., and 10–15 detns should be made* at one time, as atm changes during a series of measurements were the principal source of error The work was done at Montpelier The value of *e* varied from 0.20 to 0.36 cm.
Gerald M Petty

**New method for determining carbon monoxide by combustion with oxygen in the *presence of a new catalyzer of two substances.*** Albert Schmidt *Z. angew. Chem.* 44, 152–5(1931) —$I_2O_5$ is commonly used for the oxidation of CO but is not very stable at the necessary temp., it tends to retain the liberated $I_2$, and but 1 mol. of $I_2$ is formed by the action of 5CO. Combustion of CO to $CO_2$, by passing the dry gas over CuO at 300–400°, is always more or less incomplete without a catalyst, but if 1–2 mm quartz *grains are moistened with $Cu(NO_3)_2$ and then ignited, a layer of fine CuO on $SiO_2$ is* obtained which converts CO to $CO_2$ very efficiently The $SiO_2$ tends to adsorb CO, *the CuO* adsorbs $O_2$ and the catalyzer does not retain the $CO_2$ formed, which can be absorbed in $Ba(OH)_2$ soln. An app is shown which is suitable for detg CO and in which the reaction tube is heated electrically At the end of the process the excess $Ba(OH)_2$ *is titrated*
W. T H.

**Determination of hydrochloric acid in the presence of hydrobromic and hydriodic acids.** G. G Longinescu and Th. I Pirtea *Bul chim soc. romînă stiinte* 31, No. 4/6, 77–87(1930); cf. *C A* 25, 894 —The method described depends upon first pptg with $AgNO_3$ in dil. $HNO_3$ and weighing the ppt. This gives the wt. of AgCl *together with AgBr and AgI* In a second portion of the same size, the ppt. is kept as far as possible in the beaker and washed by decantation to remove all excess Ag The ppt. is then heated with 50 cc of 7–8% $NH_3$ soln and treated with a soln of KBr or HBr, whereby any chloride of Ag is converted into AgBr. This ppt. is also weighed Finally, when all 3 halides are present, a similar treatment is given to the ppt. except *that KI is added after the treatment with $NH_3$ soln.* In this case, the total halide content is detd as AgI. The purpose of the $NH_3$ treatment is to dissolve all the AgCl

and part of the AgBr, whereby the KBr or KI soln becomes more effective in accomplishing the desired conversion W. T. H

**Microdetermination of the calcium ion.** Mousseron *Bull. soc. chim. biol* 12, 1014(1930) cf *C. A* 25, 1458.—Ca is ppted as the salt $K_2CaNa(NO_2)_5$ from which N is reduced to $NH_3$ and detd by titration The amt of Ca can then be calcd Fe, Mg, Al etc cause less interference in this method than in the tungstate method. From 0.3 to 1.0 mg Ca can be detd C. G. King

**A new reagent for fluorides.** Camillo Pertusi *Atti III congresso naz. chim pura applicata* 1930, 573-5.—The reagent consists of a soln of benzidine acetate prepd. from 1.84 g benzidine a little concd HOAc and distd $H_2O$ to make up to 500 cc., and a 0.02 *N* Hg succinimide soln mixed in equal parts. The reaction is quite evident with a drop of 0.05 *N* alkali fluoride or 0.00004 g of HF The compn. of the ppt in a complex mol of 2 mols of $HF.H_2NC_6H_4C_6H_4NH_2.HF$ and 1 mol of $HgF_2$ F. M. S.

**Detection of bromides by the drop method.** A. V. Pavlinova *Ukrainskii Khem Zhurnal* 5, Sci. Pt., 231(German abstract 232)(1930).—*The method is based on* the fact that pernitric acid formed by the interaction of $H_2O_2$ and $HNO_2$ liberates Br from bromides The Br gives a pink color with eosin or fluorescein The reaction is sensitive to 1:12,500 Chlorides do not interfere with the reaction Iodides do, but they can be removed with $Na_2S_2O_3$. B. S. Levine

**Conductometric titration of sulfate and barium.** I. M. Kolthoff and Toshiru Kameda *Ind. Eng. Chem., Anal. Ed.* 3, 129-33(1931).—In the conductometric titration of $ZnSO_4$ with $BaCl_2$ the end point is very poor unless about 30% of alc. is added In all cases, however, the titration curve bends before the equivalence point is reached Similar results were obtained in titrating sulfates of K, Na and Li with $BaCl_2$ as well in the reverse titration of $BaCl_2$ with alkali sulfate solns. The end points are reproducible, however, to within about 1% of the Ba or $SO_4$ content, so that the conductometric method will be useful in the analysis of very dil solns. The errors are smallest with $Li_2SO_4$. The cond of the soln in the presence of $BaSO_4$ ppt. is greater than when the ppt. is removed, possibly because of the charge residing on the $BaSO_4$ in suspension and because of its influence on the cell const. W. T. H

**Determination of nitrite and sulfite in the presence of one another in salt mixtures and in meat products.** E. Szabó *Z. Untersuch. Lebensm.* 60, 389-95(1930).—The salt is dissolved in a little $H_2O$, $Na_2CO_3$ is added and the sulfite ppted by a cold soln of $Pb(OAc)_2$. The mixt. is dild to a known vol., filtered and an aq portion taken for the colorimetric detn of the nitrite by means of *m*-phenylenediamine The ppt is washed with cold $H_2O$, suspended in cold boiled $H_2O$ and the $SO_2$ detd by acidification and distn in a stream of $CO_2$. Or, the sample may be dissolved in a dil. soln of $NaHCO_3$ and the $SO_2$ detd by the addn of a slight excess of 0.1 *N* I soln. with back-titration with $Na_2S_2O_3$. The air is then removed by a stream of $CO_2$ and the soln acidified with 1 cc of 0.1 *N* $H_2SO_4$, and after 1 min without disturbance, the free I is titrated with $Na_2S_2O_3$. The stream of $CO_2$ serves to mix the 2 solns. KI should be added in the second titration only if the amt of nitrite is in great excess. A max error of approx. ±1 mg for both detns was found in solns of mixts contg 65-100 mg of $Na_2SO_3$ and 25-100 mg of $NaNO_2$. Meat samples are extd with $NaHCO_3$ and the ext. should be free from substances which may interfere with the iodometric titration C. R. Fellers

**The determination of the sulfite ion in the presence of the thiosulfate ion with the aid of fuchsin.** V. E. Malinovskii *Ukrainskii Khem Zhurnal* 5, Sci. Pt., 181-6 (1930).—Dissolve 0.34 g fuchsin in 1 l. of water contg 1 g of $H_2SO_4$ and heat slightly on a water bath Make a satd aq soln of the substance and dil. 10 times, add 1 drop of 1% phenolphthalein indicator and if the soln is alk., carefully neutralize with 0.1 *N* AcOH To 10-15 cc of the neutralized soln add a few drops of the fuchsin reagent Decolorization within the first few min is a certain indication of the presence of the $SO_3^{--}$ ion Under the conditions outlined the presence in the soln. of the $S_2O_3^{--}$ ion does not interfere with the reaction B. S. Levine

**Determination of ammonium salts by the formaldehyde method** Ermenegildo Sorrentino *Atti III congresso naz. chim. pura applicata* 552-6(1930).—Five cc. of neutral 40% $CH_2O$ and a few drops of phenolphthalein are added to 20-5 cc of the $NH_4$ salt soln., and the mixt. is titrated with 0.2 *N* $Ba(OH)_2$ until a color persists. Results agree well with the theory Urea, dicyandiamide and guanidine do not interfere E. M. Symmes

**The simultaneous test for thiocyanate and ferrocyanide anions by the drop method.** A. V. Pavlinova and T. N. Bakh *Ukrainskii Khem. Zhurnal* 5, Sci. Pt., 233(German abstract 234)(1930).—Place a drop of $FeCl_3$ on a piece of filter paper, follow by a drop

of $H_2SO_4$ and finally by a drop of the soln to be tested In the presence of both anions a central blue spot of Prussian blue is formed surrounded by a red ring formed by the $Fe(CNS)_3$ B S LEVINE

**The effect of the nature of the paper upon the sensitiveness of the drop method.** A V PAVLINOVA AND T N BAKH *Ukrainskii Khem Zhurnal* 5, Sci Pt 235(German abstract 236)(1930) —Ash free paper enables one to detect the presence of $K_4Fe(CN)_6$ in $N/8445$ soln while on ordinary paper the test is sensitive only to $N/5000$ soln. B S LEVINE

**Poisoning by mercury oxycyanide.** A SARTORI *Chem -Ztg* 54, 813–4(1930) — An analysis of the viscera, performed 3 months after death failed to detect the presence of HCN, but showed Hg A L HENNE

**Absolute determination of nitrogen in organic compounds. Pregl's micro-method.** OTTO R TRAUTZ AND JOSEPH B NIEDERL *Ind Eng Chem , Anal Ed* 3, 151–2(1931) —The accuracy of the micro Dumas method for detg N can be increased by using measured vols of $CO_2$ and of CuO, applying empirical corrections for air and absorption errors allowing for adhesion to the walls and taking into consideration the vapor pressure of the KOH soln over which the $N_2$ is measured Detailed directions are given for carrying out an analysis with a few mg of sample Thus in one analysis of toluamide the value 10.33% N was obtained, which is correct within 4 parts in 1000 although the observed vol of $N_2$ obtained was only 0.321 cc and the calcd corrections were 0.012 cc W T H

**A micro-method for the determination of carboxyl groups in organic acids.** SHUNJI TSURUMI AND YASABURO SASAKI *Science Repts Tôkohu Imp Univ* , 1st Ser , 19, 681–8(1930) —*The carboxyl group in org acids is detd within an error of 1% on 2–5-mg* samples by a procedure based on that described by Hunter and Edwards (*C A.* 7, 2189). The app consists of a train, a decompn vessel, an air chamber and a micro-buret (Flaschentrager, *C A* 19, 3230) in series The train contains the usual elements for producing pure $H_2S$ The decompn vessel (55 mm × 14 mm diam ) has an inlet tube reaching the bottom, an outlet tube at the top and a side arm A curved spatula, which may be rotated, is introduced through a stopper in the side arm The air chamber is water jacketed and has 2 2.5-cc bulbs and a 5-cc bulb in series Capillary tubing and stopcocks are used throughout Charge the decompn vessel with 1 cc of carbonate-free NaOH and weigh the sample on a 7-mm watch glass and support it on the spatula Sat the NaOH with $H_2S$ from the train and shake to remove excess Bring the system to atm pressure and connect it to the buret Spill the sample by turning the spatula, shake the decompn vessel till no more gas is evolved and measure the displaced air over water in the buret. A. F. SHEPARD

**Analysis of mixtures of hydrogen, methane and ethane.** OSWALD J. WALKER AND SOORYA NARAYAN SHUKLA *J. Chem Soc* 1931, 368–70 —A Töpler pump is connected *by means of a 3-way cock to a U-tube which can be cooled by immersion in a bath* of liquid air for the removal of the $C_2H_4$, it is also connected to bulbs contg "oxidized" Pd sponge for the removal of $H_2$ The procedure consists, therefore, in condensing the $C_2H_4$ and measuring the contraction, adsorbing the $H_2$ by Pd and detg the $CH_4$ by difference or by explosion W. T. H

**Detection of glycerol.** M TRONCOSO SERANTES *Rev centro estudiantes farm. bioquim* 18, 221–3(1929) —Denigès' method (*C A* 22, 136) and Sanchez' procedure are modified by the use of $BaO_2$ instead of $PbO_2$ or $MnO_2$, as oxidizing agent B C A.

**Reactions of glycerol and calcium glycerophosphate.** LAD EKKERT. *Pharm. Zentralhalle* 72, 85–6(1931) —Various color tests are discussed in connection with the detection of glycerol, notably that involving the use of codeine and concd $H_2SO_4$ It appears unnecessary first to oxidize the glycerol to glyceraldehyde or dihydroxy-acetone, since by simply putting a layer of concd $H_2SO_4$ beneath an aq soln of glycerol and codeine a blue or violet color develops An aq soln of Ca glycerophosphate shows like behavior W. O. E

**Detection of isopropyl alcohol in brandy, spirits, tinctures, cosmetics and liniments by means of piperonal.** G. REIF. *Z. Untersuch Lebensm* 60, 243–54(1930); *cf C. A.* 23, 5542 —Twenty five brandies 40 cosmetics, 124 liniments and various samples of spirits, tinctures, etc , were examd by the following improved technic Ten cc. of the sample is distd on the water bath into a small cylinder immersed in ice water until no more alc is evolved, 0.3 cc of the distillate is shaken with 0.7 cc of a mixt. of 80 cc. of abs alc and 20 cc of $H_2O$, and a soln of 0.1 g of $NH_2OH$ HCl in 3 cc of water is added. The mixt is shaken for 3 min at room temp , 0.4 g of absorbent charcoal is added and the mixt. is shaken and filtered through a small dry paper into a 100-cc. round-bottomed flask. Five cc of a freshly prepd soln of 0.5 g of piperonal in 100 cc of abs. alc. is added,

followed by the slow addn of 20 cc of $H_2SO_4$, sp gr 1 84 The mixt. is shaken and placed on the water bath for 5 min in a large test tube, a red color indicates the presence of isopropyl alc., and a green brown color its absence If 30 cc. of 30% AcOH is added, a stable rose-red color is a pos reaction, a brown color indicates the presence of a small quantity of the alc., a colorless soln or weak red tinge stable for a min. and turning yellow gray or colorless shows a definite reaction The sensitiveness of the reaction is 1 2% for most substances but is delicate to 0 1% with liniments In the latter, $CH_2O$ if present, must be removed before distn by heating the sample with 5 cc. of NaOH soln, sp gr 1 125, under a reflux condenser for 1 hr Contns of acetone less than 20% have no harmful effect on the reaction C. R Fellers

**Colorimetric determination of the tyrosine and tryptophan contents of various crude protein concentrates.** Wm D McFarlane and Hugh L. Fulmer. *Biochem J* 24, 1601 10(1930).—The detns were based on the method developed by Folin and Ciocalteu (*C A* 21, 3210) The tyrosine (ty) and tryptophan (tr) contents in one series of expts were as follows

| | Ty % | Tr % |
|---|---|---|
| Caseinogen | 7 59 | 1 54 |
| Buttermilk powder | 6 36 | 1 25 |
| Meat meal | 3 02 | 0 95 |
| Tankage | 2 42 | 0 88 |
| Cod liver meal | | 0 77 |
| Fish meal | 2 92 | 1 38 |

Benjamin Harrow

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The separation of Be and Al oxides (Travers, Schnoutka) 6 Technic of extracting liquids that form emulsions (Weinberger) 2 Apparatus for electrical tests to identify various materials (U S pat. 1,793 970) 4

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Jolyaux Alcide Leçons de chimie analytique. Paris Hermann et Cie 350 pp F 60

Merck E Prufung der chemischen Reagentien auf Reinheit. 4th ed. Darmstadt Merck 401 pp

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**Determining monatomic substances in gases, particularly mercury vapor in air.** Siemens & Halske A G (Otto Krenzien, inventor) Ger 517,480, Sept 13, 1928 The method depends on the detn of the intensity of the resonance effect produced when a beam of light, the spectrum of which includes a "resonance line" of the spectrum of the element to be estimated, is directed through the gas in which the element is to be detd and then into a vessel also contg the vapor of the element

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## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T WHERRY AND J F SCHAIRER

**The formation of calcite crystals by slow precipitation of calcium salts in water by ammonia.** J Henrion *Ann soc geol Belg* 53, B40–1(1929).—A flask of tap-water connected by an overhead glass tube to a flask of concd $NH_4$ pptd calcite, identified petrographically on 4 months' standing R H Ewell

**The precipitation of calcium carbonate in dilute solutions.** F. Corin *Ann soc geol Belg* 53, B64–6(1930).—Referring to Henrion's paper (preceding abstr.), C. states the *present status of the subject, and cites the work of several earlier investigators* R H Ewell

**The deposit of cerite in Kystym district.** V. Zilberminтz. *Trans Inst Econ Mineral* (Moscow) No 44, 41–2, *cf C A* 24, 4243.—Assocd with parisite there has been found another mineral, differing in all its properties but closely connected genetically It contains about 19% $SiO_2$, 11% CaO and 64% Ce, La and "Di" oxides. It approaches cerite in optical properties and compn but is purer than Swedish cerite. H C. Parisit

**Radioactive mineral found in Japan.** Satoyasu Idmori, Jun Yoshimura and Shin Hata *Sci Papers Inst Phys Chem Research* (Tokyo) 15, No 285, 83–8(1931).—A radioactive mineral has been found in the Bijozan Range, in black prismatic crystals about 6–7 mm long, with a resinous luster and a hardness of 5 5 The powder and the streak are brown It is easily decomposed by HCl, leaving a white flocculent residue

It is a new species belonging to the epidote group, and the name *nagatelite* is suggested Its radioactivity is thought to be due to a small quantity of Th. An intensively radioactive mineral was found in a biotite crystal It gave a qual test for U. Laterite and lateric clays were also found. Analyses of some of the minerals are given.
L D ROBERTS

**A variety of uranotile from Chinkolobwe (Katanga).** J THOREAU *Ann soc. geol Belg* 53, B60–4(1930) —A sample of pitchblende was encrusted with a thin layer of yellow radiating needles with black opaque inclusions, weakly dichroic, with parallel extinction, + elongation, $n_g = 1.703$, $n_p = 1.632$ The d is greater than 3.3 Analysis gave volatile matter ($H_2O$) 15.4 insol matter ($SiO_2$) 6.8, $UO_3$ 73.1, CaO 7.4% This corresponds roughly to $SiO_2 2UO_3 CaO 6H_2O$ The mineral dissolves in cold concd HCl with evolution of a gas, and if heated the black inclusions also dissolve The black mineral may be uraninite There is also another yellow, fibrous mineral on the pitchblende with somewhat different properties ($n_g$ less than 1.676), which may be another variety of uranotile
R H EWELL

**Sorption of gas by minerals. II. Laumontite.** JITSUSABURO SAMESHIMA *Bull. Chem Soc Japan* 5, 303–10(1930) —Laumontite ($CaAl_2Si_4O_{12} 4H_2O$) sorbs $NH_3$, but not $CO_2$ The sorption data are tabulated and presented in curves The dryness of the mineral has an important influence $NH_3$ combines chemically with the dehydrated mineral
ALBERT L HENNE

**The presence of apatite in the Upper Cambrian rocks of Neuville. Note on the optical study of weakly birefringent minerals.** F CORIN. *Ann soc geol Belg* 53, B66–8(1930) —After considerable difficulty, C identified apatite as an accessory constituent of these rocks The birefringence is only 0.0015 R H EWELL

**Contribution to the mineralogy of the coal fields.** M. BELLIERE *Ann soc geol Belg* 53, B125–39(1930) —The mode of occurrence in various coal mining regions of Belgium is described for the following minerals S, sal ammonite, ankerite, quartz, pholerite, pyrite, chalcopyrite, sphalerite, galena, calcite, dolomite, gypsum and aragonite. *Crystallographic data and chem analyses are given*
R H EWELL

**Petrographical description of the Sadon mine.** E A KUZNETZOV *Trans Inst. Econ Mineral* (Moscow) No 46, 3–53(1930) —The aplite veins are adapted to a transverse system of cracks, which are parallel to a more recent thrust The same direction was followed by keratophyres at a later period After a long period of rest accompanied by the destruction of granite and deposition upon it of sedimentary rocks, new movements produced new cleavages, along which flowed the overlying keratophyres Then, after another period of relative rest, a new fracture occurred in the same region, where granite, porphyry and sedimentary formations were caught by the movement and ground up Simultaneously ore-bearing solns rose from their original depth reservoir The granite was crystd under the influence of its own gas phase Apparently the hydrothermal solns were rather hot at first. Later they cooled and the main manifestation of their force is to be seen in silication, sericitization, chloritization and carbonatization of adjacent rocks
H. C. PARISH

**Mineralogy of the Sadon ore vein.** E. E ZAKHAROV. *Trans Inst Econ Mineral* (Moscow) No 46, 54–152(in English) 153–4(1930) —The Sadon deposit of Pb-Zn ore showed galena, sphalerite, pyrite, chalcopyrite, pyrrhotite, arsenopyrite and molybdenite, of the gang minerals quartz, carbonates, chlorite, muscovite and a mineral of the gummite series A series of the minerals smithsonite, cerussite, malachite, azurite, gypsum and Pb oxide has also been discovered Z. notes breccia structures, imbricated and banded structures, a thick network of ore-bearing veinlets, a thick ore inclusion and structureless formations
H. C PARISH

***Magnesite: its application in assaying.*** *R. J. B KETHEL. J. Chem Met Mining Soc. S Africa* 31, 172–5(1931), cf *C. A* 24, 5256 —Discussion ALDEN H EMERY

**Asbestos deposits in the Union.** A. L. HALL. *S. African Mining Eng. J.* 41, II, 423–4(1930), 487–8(1931) —The Union of South Africa contains asbestos deposits of very considerable extent It is the leading crocidolite producer The following fiber varieties occur in the Union amosite, crocidolite, chrysotile, anthophyllite, tremolite The occurrences of each are described ALDEN H EMERY

**Petrology of chrysotile asbestos deposits of the Krasno-Uralsky asbestos mine in the Ural Mountains.** V. V. ARSHINOV AND B YA MERENKOV. *Trans Inst. Econ Mineral* (Moscow) No 45, 1–83(1930) —The asbestos is graded according to fiber length as follows: grade I about 16 mm , grade II, 12 mm , III, 8.5 mm ; IV, 4 to 2 mm ; VI, 2 to 0.5 mm It is believed that the serpentines of this region have been derived from saxonites under the simple influence of water Other basic rocks encountered in small quantities are schlieren of pyroxenite, a mono-mineral rock formed by diopside.

The serpentinization of saxonites is developed along the fissures as ribbons of serpentine. As this process goes on, the grain size diminishes until the whole rock is altered into serpentine. The characteristic types of asbestos ribboning are represented by the following varieties: (1) bordered asbestos, (2) fine asbestos veinlets branching, (3) fine asbestos parallel sets. A believes all of these rocks to be products of the differentiation of diorite intrusive bodies. The absence of granite pegmatite dikes is characteristic for the asbestos deposits of the Krasno-Uralsky mine. H. C. Parish

**A new deposit of plastic clay.** L. Nys. *Ann. soc. geol. Belg.* 53, B77–8(1930).—The deposit is at Grosses Pierres. Analysis gives: $SiO_2$ 73.08, $Al_2O_3$ 19.97, $Fe_2O_3$ 1.78, CaO 0.10, MgO 0.06, loss on heating 4.30%. There are inclusions of yellow sand and small amts. of andalusite, zircon, magnetite and tourmaline. R. H. Ewell

**Studies on the moisture adsorbed by the Kanbara clay.** Hajime Isobe. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 14, 229–74(1930)(in English).—In certain deposits of Kanbara clay the upper layers are acid, the middle layer is neutral and the lower alk. Neutral clay can be prepd. from either the acid or the alk. clay by washing with distd. water. Acid and alk. clays show different vapor pressure curves, but the curves of the natural neutral clay, clay artificially neutralized with acids or alkalies and clay made neutral by washing with distd. water, have practically the same characteristics at the same temp. The water adsorbed by special capillary action ranges from 20 to 35%, while that due to true adsorption of the surface of the clay is about 2 to 18%. On the basis of x ray studies the formula $\{Al(Si_2O_5SiO_3)_3\}^{Al}_{H_4}MgH_2O$ is advanced for the clay. K. D. Jacob

**The translucent and opaque diamonds of the Bushmaie deposits.** Edmond Polinard. *Ann. soc. geol. Belg., Publ. rel. au Congo Belge* 52, C179–218(1929); **The transparent diamonds of the Bushmaie deposits.** *Ibid.* 53, C1–45(1930).—Complete and detailed crystallographic data are given. R. H. Ewell

**The igneous rocks of the Helle (Haute Fagnes).** Paul. Ronchesne. *Ann. soc. geol. Belg.* 54, B35–43(1930).—Petrographic analysis shows these rocks, formerly classed as granites, to be quartziferous diorites because they contain about 30% of anorthite in the plagioclase and a small amount of orthoclase. Analysis gives: $SiO_2$ 70.06, $Al_2O_3$ 14.86, $Fe_2O_3$ 1.64, FeO 0.63, FeS, 1.28, MnO 0.06, CaO 3.45, MgO 1.02, $K_2O$ 2.06, $Na_2O$ 4.83%. Accessory minerals include biotite, chlorite, magnetite, epidote, apatite, zircon, sericite, kaolinite and sulfides. R. H. Ewell

**The plagioclases of the igneous rocks of the Helle.** P. Michot. *Ann. soc. geol. Belg.* 54, B44–8(1930).—cf. preceding abstr.—M. discusses the mutual soly. of orthoclase, albite and anorthite to explain the absence of separate crystals of orthoclase, when its presence is shown by chem. analysis. The zoning of the plagioclases is explained by the effect of irregularly varying pressures on the temp.-compn. diagram of the system. R. H. Ewell

**The pegmatites of the sodalitic syenite of the Island Rouma (archipelago of Los, French Guinea). Description of a new mineral (serandite) found there.** A. Lacroix. *Compt. rend.* 192, 189–94(1931).—The island is very rich in feldspathoid syenite. Mineral constituents of the pegmatites are described, and mineralogical characteristics of normal syenite are compared with those of the pegmatites. The new mineral called serandite is described in detail and chemical analysis given: $SiO_2$ 48.72, $Al_2O_3$ 0.29, $Fe_2O_3$ 0.03, FeO 1.33, MnO 28.99, MgO 0.06, CaO 10.42, $Na_2O$ 7.38, $K_2O$ 0.26, $H_2O+$ 2.67, $H_2O-$ 0.11%, corresponding to $SiO_2$ (MnO, CaO) ($Na_2O$, $K_2O$) $H_2O$. A somewhat similar manganese bearing pectolite from Magnet Cove, Ark., is discussed, but the Mn is in smaller quantities, and d. and optical properties are different from those of the new mineral. Alice W. Epperson

**The alkaline rocks of the southern part of Kystym district, Ural.** E. A. Kuznetzov. *Trans. Inst. Econ. Mineral.* (Moscow) No. 48, 1–89(1930).—This area is formed of granite gneisses, syenites and miascites. In the granite gneisses are bands of amphibolites, quartzites and garnet mica gneisses. Analyses of the miascites are given. On the mountain Sobachy all the miascite bands are edged by alk. syenites forming the reaction zones of miascite and granite gneisses. The western dikes of miascites are more or less sharply sepd. from the country rocks, the latter being altered into syenite gneisses with aegirite augite and biotite. As against the Eastern band the miascites become fine grained in contact and at some places contain considerable porphyritic inclusions and albite or elaeolite up to 5 cm. In other respects all miascites are similar. H. C. Parish

**Mariupolite and its related rocks.** J. Morozewicz. *Prace Polsk. Inst. Geol.* 2,

217-350(1929). *Tschermak's Mineral. Petrog Mitt* 40, 335-436(1930).—Mariupolite, from Ukraine, is an extreme member of the nepheline-syenite series It consists of albite, nepheline and aegirine, with sometimes lepidomelane, sodalite or cancrinite, and accessory magnetite, beckelite and pyrochlore The order of intrusion of this and the assocd rocks was that of increasing bacisity

| | | Mean d | Mean $SiO_2$ (mol.-%) |
|---|---|---|---|
| 1 | Upper biotite granite | 2 632 | 80 0 |
| 2 | Diallage and amphibole-granite | 2 678 | 74 4 |
| 3 | Alkali syenites | 2 699 | 70 5 |
| 4 | Mariupolites | 2 712 | 63 9 |
| 5 | Foyaites | 2 718 | 60 6 |
| 6 | Wehrlite | 3 359 | 46 2 |

Many chem analyses are given of these rocks and their constituent minerals, and the relations are discussed in detail B. C. A.

**Origin of certain Pre-Cambrian amphibolites in Agder (Southern Norway).** Tom F. W. Barth. *Norsk Geol Tids* 11, 219-31(1930).—Pre Cambrian amphibolites found in Agder have the same 3 modes of origin as those found by Adams (*Compt rend Congr Géol Int Stockholm* 1910, 536-72) for amphibolites from Haliburton and Bancroft areas (*Memoir* 6, *Can Geol Survey*, 1910) Comparative compns are shown A para-amphibolite formed by metamorphic action of granitic magma or "ichor" on impure calcareous sediment embedded in the magma is described A map of a small area of Pre Cambrian rocks in which amphibolites originated by alteration of limestones by the action of granitic "ichor" is shown The same mechanism produced an amphibolite which formed a basic schlieren in the anorthosite on the eastern slope of Mt Poke-moonshine in the Adirondacks Detailed data on different amphibolites are presented Actinolitic hornblende occurs in Norwegian amphibolites formed by alteration of pure limestones, other types contain common hornblende A theory of formation is discussed E. M. Symmes

***Structure and form of fresh-water limestones.*** E. Rozenšteins *Acta Univ. Latviensis Kim. Fakultat Serija* 1, Fas 1 Burtnica, (in German 13-21) (in Lettish 25-7(1929)).—The compact limestones consist of microcryst (0.01-0.2 mm.) or meso-cryst (0.25-0.07 mm.) calcite aggregates in rosette or druse forms The medium compact limestones are of crypto- and pelitomorphous aggregates (0.003-0.005 mm.) and often the interspaces are filled with secondary crystals Around thin plant fibers there forms a strong crust which tends to form in layers The gypsum content may range from 1.21 to 4.12% and may be found in limestones deposited from gypsum free water, on account of the oxidation of pyrite Silica was as high as 13.02% A. N. H.

**Structure of weather-resisting rocks.** A. L. W. E. van der Veen. *1st Communications New Intern Assoc for Testing of Materials B*, 10-2(1930).—Fossilization (cementation) of a sediment is made by solns circulating in its interstices The microscope reveals the mineralogical compn of the sediment and the nature of its cement *The chem analysis of a weather resisting rock may suggest that something is wrong* within, whereas the microscope reveals that the dangerous atoms are locked up in most resisting minerals The relation between genesis and weather resistance of some sandstones and marbles is described E. J. C.

**Mineralogical study of the soil of the Vercelli district.** E. Repossi *Atti accad. sci. Torino Classe sci. fis., mat. e naturali* 64, 335-58(1929). B. C. A.

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*The ceramic industry of Ontario* (Montgomery) 19. *Au—its geographic distribution* and geological occurrence (Bell) 9. Phase equilibrium in binary systems with continuous mixed crystals (Kordes) 2. Gravity separation (Emmons) 2. The geochemistry of the Ti group (von Hevesy) 2.

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## 9—METALLURGY AND METALLOGRAPHY

D. J. Demorest, H. W. Gillett and Richard Rimbach

**Present status of the dressing of bituminous copper ores.** A. Götte. *Metall u. Erz* 28, 73-5(1931).—The most notable deposits of bituminous Cu ores in Germany are at Niedermansberg and Mansfeld A discussion of dressing methods used for these ores is given The bituminous content in no way interferes with the flotation processes. H. Stoertz

**Investigation of ore dressing machines with the help of yield calculations.** W. Lueken and L. Krapber *Metall u. Erz* 28, 49-55(1931).—A study of operating conditions at the "Ant" mine in Siegerland by comparison of the yields obtained from a dust settling machine and a Hercules hearth. The particle range is 22-2.5 mm. for the first machine and 2.5-0 for the second. H. Stoertz

**Effect of particle size on flotation.** A. M. Gaudin, John O. Gross and H. B. Henderson *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 414, 3-23(1931).—A study is made to det. what effect particle size has on floatability. One method of study was on the samples of the final products of several mills and in the other mixts. of pure minerals were ground to different degrees of fineness and floated. In both cases the products were sized and analyzed. Conclusions: The results obtained by the 2 methods are in agreement. The usual notion about the relative ease of flotation of very fine particles does not agree with the facts. There is a time sequence of flotation with regard to size, the medium coarse particles floating first. No successful method of floating extremely fine pulps has been found. Recovery is optimum in a well-defined size range. Selection is optimum in another well defined range. The bulk of the pulp is in the range of 100–800 mesh. Thirteen figures and 5 tables are shown. Data from lab. and practice agree closely. W. H. Boynton

**Experimental flotation of oxidized silver ores.** H. S. Gieser *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 401, 9 pp. (1931).—Because of the other uses the no. of org. S compds. available for flotation is limited. Benzyl mercaptan and benzyl sulfide and disulfide show interesting results. Thioureas leave high tailings. When the diethylphenyl and di-*o*-tolyl thioureas are used the froth is white and barren. Mercaptobenzothiazole is of some value with a number of oxidized precious metal ores. Thioacetanilide gives fair results, while thiobenzanilide is better. Reagent soly. is an important factor in flotation. H. C. Parish

**Flotation of minor gold in large-scale copper concentrators.** E. S. Leaver and J. A. Woolf *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 410, 32 pp. (1931).—CaO is an active depressant for free Au during flotation if the alky. of the soln. circuit is $p_H = 10$ or above. A reaction of $p_H$ 7.5 to 10 is best. In the flotation of base metal ores contg. Au as a by-product careful regulation of CaO, avoiding excess, will increase Au recovery. If pyrite in the ore is crushed fine enough to free the Au, most of the pyrite may be depressed by low CaO alky. in the flotation circuit and a high percentage of the Au floated with the Cu sulfides. Ores with a low ratio of pyrite to CuS and contg. under $1 in free Au per ton gave, by control of the flotation circuit assuring low alky., 25% Cu concentrates contg. more than 90% of the Cu and more than 80% of the Au. Ores high in pyrite and lean in Cu sulfides and Au as a nominal by-product, offer low grade concentrates unless the percentage of Au recovery is sacrificed. In the flotation of oxidized base-metal ores in which a sulfidizing reagent is used, $Na_2S$ gives a much higher Au recovery than CaS or Ca polysulfide. Ca salts depress Au. H. C. Parish

**Investigation on the influence of the iron content of zinc blendes on their floatability.** Ludwig Kraeber *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* 12, 343–52 (1930).—Flotation tests were made on blendes in a mechanically agitated cell and in a pneumatic cell. It was found that each sample of blende gave a definite $p_H$ to the water regardless of whether the water was originally slightly alk. or acid, the value being lower for blendes of high Fe content. The max. recovery was obtained with a $p_H$ between 6 and 7, and it appeared that the optimum $p_H$ was lower for high Fe content. Very small quantities of CuS speeded up the rate of recovery. The quantities of KCN and $ZnSO_4$ necessary to hold down the Fe differed widely for different ores but bore no simple relation to the Fe content. Conclusion: The presence of foreign materials as well as the pretreatment is of more significance than the Fe content in affecting flotability. H. C. Dubs

**Quinquennial review of the mineral production of India for the years 1924 to 1928.** *Records Geol. Survey India* 64(1930).—Gold. G. Dep. Cotter *Ibid.* 92–106.—Indian Au occurs both in veins and as alluvial deposits. Individual deposits are described. Production has fallen steadily since 1915. Lead. G. Vernon Hobson *Ibid.* 154–66.—Near Bawdwin ore bearing solns. have ascended through crushed rhyolitic tuffs, flows and breccias metasomatically replacing materials in the tuff and leaving sulfides. The ore is an intimate mixt. of Ag bearing galena and sphalerite and in many places also chalcopyrite. Production for 1924–28 averaged about 60,000 tons of Pb and 5¾ million oz. Ag. Manganese. L. L. Fermor *Ibid.* 172–233.—Indian Mn occurs chiefly in metamorphosed manganiferous sediments contg. spessartite and rhodonite. Typical ores contain braunite and psilomelane. Ores are also found in assocn. with cryst. limestone contg. piedmontite. Other minerals found are holland-

ite, vredenburgite, sitaparite and rarely pyrolusite The high grade ores contain Mn 48–54, Fe 4–8 and $SiO_2$ 6–9% World production, analyses of ores, manuf. of ferromanganese in India, various economic considerations, etc, are discussed India is the world's leading producer Silver. G Vernon Hobson *Ibid* 293–8—No ores are mined primarily for Ag in India. Over 99% of the production is a by-product from Pb, the remainder from Au The government Ag refinery is described in detail Tin. J Coggin Brown *Ibid* 298–303—Almost all India's Sn production comes from Burma cassiterite, the occurrence of which is described in the section on tungsten Tungsten. J Coggin Brown *Ibid* 303–10—Wolfram and cassiterite occur in quartz veins closely assocd with a biotite boss-granite intruded into a series of slates, shales, argillites and agglomerates with greatly subordinate quartzites, limestones and conglomerates The veins fill fissures The mineral associates of wolfram are not the same in different deposits. The various assocd minerals are beryl, tourmaline, mica, fluorite, molybdenite, pyrrhotite, galena, sphalerite, arsenopyrite, Bi, bismuthinite and topaz The vein formation appears to be a direct sequence of processes of *differentiation influenced by local conditions* Zinc. G Vernon Hobson *Ibid* 310–2—Sphalerite occurs with galena at the Bawdwin mine The industry is growing

Alden H Emery

***The composition of Finnish ores.*** Gust A. Aartovaara *Yhtyneen Teknillisen Koelaitoksen* (Reprint) 10, 1–9(1927)—Analyses are given of sulfide and oxide ores.

J Ryselin

***The use of Greek nickel ores in Germany.*** E. Reitler *Metall u. Erz* 20, 273–4 (1930)—Before the war the German nickel works used New Caledonian ore and some American oxide. Attempts have been made to use Greek nickel ores from the Laurion Mountains. The compn of these ores is, on the dry ore *NiO* 6.62, *CoO* 0.15, $Fe_2O_3$ 40.01, $SiO_2$ 28.86, $Al_2O_3$ 14.64, $As_2O_3$ 0.04% and minor quantities of CuO, CaO, MgO and $Cr_2O_3$ The smelting of these ores is complicated by the presence of so much alumina, which give very viscous slags. It is very doubtful if these ores can be successfully used

R S Dean

**Iron ore on Canyon Creek, Fort Apache Indian Reservation, Arizona.** Ernest F Burchard. U. S. Geol Survey, *Bull* 821-C, 51–75(1931) E. H.

**Rationalization of the fusion of lead minerals.** N. C. Kyriacou. *Génie Civil* 98, 184–9(1931)—Insufficient prepn of the mixing bed and imperfect combustion raise the consumption of coke The metal should be dense, free of S, in the form of the silicate, perfectly clinkerized and free of dust. The most suitable size of granule is 20 mm in diam A rotary furnace for preliminary roasting feeds its charge directly to the shaft furnace. The use of a water jacket and of a forehearth reduces Pb losses.

Ann Nicholson Hird

**Treatment of low-grade gold ores at West Rand (South Africa).** Jean Fulot. *Génie Civil* 98, 153–8(1931)—Modern equipment has raised the Au recovered by the cyanide process from 49.78 to 61.93%. The Au in the tailings is lowered from 0.316 to 0.256 pennyweight per ton Ann Nicholson Hird

**Origin of flour gold in black sands.** A. E. Kellogg. *Mining J* (Arizona) 14, 3–4, 49–50(1931)—Flour Au may float over riffles, adhere to black sand or magnetic Fe or refuse to amalgamate Flour Au may have been originally minutely dispersed through rocks, run into soln with quartz in vein fissures, wrapped up within or chemically combined with other Au ores or may have been formed by attrition by waves An example of such grinding is in the very ancient Siskiyou Island. No reliable means of recovering flour Au is known E. M Simmes

**Gold—its geographical distribution and geological occurrence.** J Mackintosh Bell. *Canadian Mining J.* 52, 246–51(1931)—An address is given which covers the world's gold fields It seems probable that the annual production of Au will decrease 20–25% during the next decade. W. H. Boynton

**Mining and mill in the Vermont copper district.** C. S. Anderson. *Eng. Mining J.* 131, 208–10(1931)—Mining of the cupriferous pyrrhotite deposits of Vermont is outlined The Cu content varies between 0.5 and 20% with an av. of about 3%. A flowsheet is shown for the Elizabeth-Foster-Cleveland mill of the National Copper Corp W. H. Boynton

**Milling methods and costs at the Spring Hill concentrator of the Montana Mines Corporation, Helena, Montana.** L. A. Grant. Bur. Mines, *Information Circ.* 6411, 8 pp (1931)—The ore, Au (10–15% native) assocd with pyrite, arsenopyrite and Bi, occurs disseminated through diorite along a limestone contact. Barren pyrrhotite, the most plentiful sulfide, floats with the Au-bearing sulfides. Costs per ton of ore concd for 1929–30 were crushing and conveying $0.102, grinding $0.290, flotation

$0.258, tailings disposal $0.052, $H_2O$ $0.012, repairs $0.233 and total $1.007.
ALDEN H. EMERY

**Milling methods and costs at the lead-zinc concentrator of the Treadwell Yukon Company, Limited, at Tybo, Nevada.** W. H. BLACKBURN. Bur. Mines, *Information Circ.* 6430, 14 pp. (1931).—The ores are complex and contain Pb, Zn, Fe, Ag and Au. Most of the Ag is associated with galena. Sphalerite and pyrite are also argentiferous. Pb concentrates average 90.43 oz. Ag per ton, 62.75% Pb and 3.50% Zn. Zn concentrates average 13.65 oz. Ag per ton, 2.71% Pb and 46.57% Zn. Costs for March, 1930, were in cents per ton of ore treated: sorting 1.8, crushing 7.9, grinding and classification 44.5, flotation 50.2, filtering 2.1, general 21.7 and total $1.282. Pb recovery is 74%, Zn 70%, Ag 75%. Detailed metallurgical data are given. ALDEN H. EMERY

**The absorption of gold in tube mills.** H. A. WHITE. *J. Chem. Met. Mining Soc. S. Africa* 31, 161-71(1930).—Though concn. upon the surfaces of pebbles and tube linings is a real effect, it does not account for more than a minor portion of the total Au locked up in the tube. The remainder is held in the numerous joints in the linings, *between the lining and the shell and in other crevices.* ALDEN H. EMERY

**Amalgamation practice at Porcupine United Gold Mines, Ltd., Timmins, Ontario.** RONALD A. VARY. Bur. Mines, *Information Circ.* 6433, 5 pp. (1931).—The ore consists of quartz with fine stringers of mineralized basaltic schist, or of banded quartz schist, or of stringers of quartz in schist, accompanied by pyrite and often contg. visible Au. It is amalgamated in a 25-ton pilot mill. Costs per ton of ore treated are: *crushing* $0.384, *grinding* $0.771, *classifying, screening, conveying and refining* $0.626, miscellaneous $0.070 and total $1.851. ALDEN H. EMERY

**Historical evolution of Lower Harz smelting methods.** ROSENHAINER. *Metall u. Erz* 28, 75-85(1931). H. STOERTZ

**The rationalization of zinc smelting in horizontal retorts.** H. BEERMANN. *Metallbörse* 20, 2385-6, 2441-2(1930).—The slowness of the reaction is due to the inability to carry it on at a very *high temp. since the reaction zone proceeds inward concentrically* from the retort walls and consequently the Zn reduction reaction is going on at a gradually decreasing temp. and hence rate. From these considerations B. concludes that a small quantity of some gas which would not interfere with condensation could be profitably introduced into the retort to equalize the temp. somewhat. No test has been made of the idea. R. S. DEAN

***The reaction between magnetite and ferrous sulfide. II.*** F. S. WARTMAN AND G. L. OLDRIGHT. Bur. Mines, *Rept. of Investigations* 3072, 10 pp. (1931); cf. *C. A.* 23, 1374.—$SiO_2$ and MgO accelerate, whereas CaO, $Al_2O_3$ and $Cu_2S$ hinder, the reduction of magnetite by FeS. Orthoclase, anorthite, albite and kaolin also accelerate the reaction. ALDEN H. EMERY

**Nickel slagging in copper refining with the formation of ferrites.** W. STAHL. *Metall u. Erz* 28, 55-6(1931).—In the presence of Fe it is comparatively easy to remove Ni from Cu by slagging it out as ferrites ($NiFe_2O_4$ and $NiFeO_4$). The residual Cu still has a Ni content of 0.10-0.15% which cannot be removed in this manner. H. S.

**Suggested improvements in fire refining of copper.** H. H. ALEXANDER. *Eng. Mining J.* 131, 226-9(1931).—An outline is given of methods incorporated in U. S. Patents 1,687,277(*C. A.* 22, 4450), 1,756,967 (*C. A.* 24, 3207) and 1,776,826 (*C. A.* 24, 5711). *Means of removing impurities by oxidation, the deoxidation of Cu and improved melting practice as tried out in the lab. and in furnaces of com. size are pointed out.* Melting and refining simultaneously result in low initial cost of equipment, lower slag production, few repairs, low operating cost and a better product. W. H. BOYNTON

**The zinc industry in Belgium.** V. FIRKET. *Bull. soc. belg. ing. ind.* 10, 799-844 (1930). E. H.

**Photoelectric control for soaking-pit covers.** R. M. BAYLE. *Elec. World* 97, 409 (1931). C. G. F.

**Fluorspar in the open-hearth slag.** H. L. GEIGER. *Blast Furnace Steel Plant* 19, 412-4(1931).—A survey of the work of prominent metallurgists to help to make clear the much discussed function of fluorspar in the thinning of slag. Basic open hearth tapping slags do *not contain F. F is probably lost as volatile $SiF_4$, and a little as* a volatile F-S compd. (In the basic elec. process very little F is lost, however, very little $SiO_2$ is present.) The action of fluorspar is probably to decrease the $SiO_2$ in the slag by the formation and loss of $SiF_4$. In order to establish equil. FeO and $Fe_2O_3$ from the bath replace the lost $SiO_2$. It is generally agreed that these metallic oxides increase fluidity. If this analysis is correct, then Fe oxide is the actual thinning agent. A. W. HOLMES

**The economic situation of non-ferrous metallurgy.** LÉON GUILLET. *Génie Civil* 98, 81–5(1931).—International statistics are given on the production, export and import of Cu, Pb, Zn, Sn, Sb, Ni, Al, Hg, Ag, Pt and Au from 1870 to 1928. A. N. H.

**X-rays in the foundry trade.** R. BERTHOLD. *Giesserei-Ztg.* 26, 642–4(1929).—The economic value of the use of x rays in the foundry is discussed with particular reference to light metal castings. MALCOLM DOLE

**X-ray technic in the foundry.** WALTER B. BARTELS. *Giesserei-Ztg.* 26, 632–4 (1929).—A discussion of the technic, costs and profits of the use of x rays in the foundry. MALCOLM DOLE

**Rosin in core oil.** WERNER G. SMITH. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 839–41(1930).—The compn. of core oils and their use in the foundry are discussed. During baking of the core much of the core oil is lost by volatilization, leaving a porous but strong material which is free from gas producing substances. Rosin imparts tensile strength to the oil film and prevents excessive absorption of the oil by sands contg. loam. The medium grades of rosin are commonly used for this purpose. S. suggests improvements in the packaging and shipping of rosin. H. K. SALZBERG

**The influence of colloidal ferric hydroxide upon the properties of molding sand.** ETUJI TAKAHASI. *Kinzoku No-Kenkyu* (*J. for Study of Metals*) 7, 552–62(1930).—A difficulty connected with synthetic molding sands consists in the lack of durability that is, fine clayey substance is liable to sep. from the sand. In a study of the action of electrolytes and $Fe(OH)_3$ sol upon clay substance in molding sand, T. found that the addn. of colloidal $Fe(OH)_3$ increases either the plasticity or the gas permeability according to ramming conditions. The increase in gas permeability seems to be due to the coagulation of clayey particles. It prevents the separation of bonding substance from the sand. Various applications of colloidal $Fe(OH)_3$ for making synthetic sands were also studied. M. KURODA

**Influence of siliceous matters upon the reduction of magnetic sands.** KEIZO IWASE AND MASAJI FUKUSHIMA. *Kinzoku No Kenkyu* (*J. for Study of Metals*) 7, 524–34(1930).—The influence of siliceous matter such as tailings, sea sand, pptd. silica and alumina upon the rate of reduction of magnetic sands has been detd. at temps. between 900° and 1150°. At lower temps. their influence is small because no sintering occurs but at higher temps. the semi reduced product FeO from the hematite in the tailings and other substances combine with silica forming semi fused substances and retard considerably the rate of reduction. M. KURODA

**The manufacture and properties of malleable castings.** J. K. SMITHSON. *Foundry Trade J.* 44, 110–12(1931).—A description. H. C. PARISH

**New methods of producing quality gray cast iron, hard cast iron and tempered cast iron in cupola furnaces.** LAMLA. *Giesserei-Ztg.* 27, 621–3(1930).—A general discussion. H. C. DUUS

**Low-carbon, malleable cast iron from cupola furnaces.** W. VALENTIN. *Giesserei-Ztg.* 27, 617–22(1930).—A general discussion. H. C. DUUS

***Advantages of fine-grained iron over coarse-grained iron for the production of high-grade castings.*** R. SCHMITT. *Z. ges. Giessereipraxis* 51, 25–8(1930); *Chimie & industrie* 25, 81(1931).—By the use of fine-grained iron instead of hematite iron, castings with identical C, Si, Mn, P and S contents but of finer grain were obtained, the tensile strength increased from 23 to 26 kg. per sq. mm., the Brinel hardness was unchanged, and the mech. properties of the castings were improved in spite of an increase in the graphitic C content. The effects of the size of the grains were evaluated quantitatively, and variations in the mech. properties resulting from the metallographic tests confirmed the following mechanism. When fine-grained iron is used, the small graphite lamellas are completely dissolved in the iron; this results in a state of high dispersion of the graphite in the castings, which in turn produces a fine grained structure on cooling. If coarse-grained iron is used, the graphite lamellas are not uniformly distributed, this leads to irregularities in structure on cooling. A. PAPINEAU-COUTURE

***Sulfur in cast iron.*** H. H. EBERT. *Zentral Europ. Giesserei-Ztg.* 3, 3–4(1930).—Methods of desulfurization are discussed. B. C. A.

**Cast chromium steels in wider use.** H. D. PHILLIPS. *Steel* 88, No. 2, 39–43 (1931).—A discussion of production processes, properties and uses of chromium steels. LESLIE B. BRAGG

**Overcoming certain operating troubles in making open-hearth steel.** T. N. ARMSTRONG. *Iron Age* 127, 864–7(1931).—The advantages incident to the use of burnt lime instead of raw limestone in basic open hearth steel charges are discussed, as well as the methods of overcoming a no. of common troubles encountered in open-hearth

operation, particularly those connected with the use of Southern grades of pig Fe. DOWNS SCHAAF

**The system, iron-carbon.** EUGÈNE L. DUPUY *Rev mital* 27, 686–92(1930).—A review H. S. v. KLOOSTER

**Manufacture of ferro-silicon.** ROY P HUDSON *Blast Furnace Steel Plant* 19, 399–401(1931) —The chief district for producing ferro-Si is Jackson County, Ohio Originally, lean ores of the district were used, but these have been supplanted by Lake Superior ores The blast furnace can produce metal contg 18% Si, but most grades average 6–15% Si Ferro-Si is notably low in S on account of the high temp of formation and large vol of slag produced Bituminous coal is used in admixt. with coke to decrease the fuel cost. Because of the high temp required to reduce a large quantity of silica to Si, the heat should be coned in a small area, therefore, the boshes and hearths are always smaller In the manuf of high Si iron the evidence indicates that when alumina is lower than 17% it acts as an acid and above this it acts as a base But as it rarely exceeds that amt., alumina is always considered an acid A W HOLMES

**Open-hearth combustion.** W P. CHANDLER, JR. *Proc. Eng Soc. West Penn* 46, 241–63(1930) —See *C. A* 24, 5205 H. C. DUUS

**Gas and stock flow in the blast furnace.** S P. KINNEY. *Blast Furnace Steel Plant* 19, 407–11(1931) —See *C A* 24, 808. A. W. HOLMES

**Recent advances in metallography.** I. L HAUGHTON. *1st Communications New Intern Assoc for Testing of Materials A*, 316–9(1930) —A review of the advances in the methods of thermal and microscopic analysis of alloys, and in the use of phys property measurements as an aid to the study of constitution Attention is also directed to some of the other principal problems such as age hardening, modification and the problems raised by allotropic modification, intermetallic compds , etc E J C

**Bearing of present-day knowledge of plastic deformation on the testing of metals.** G SACHS *1st Communications New Intern Assoc for Testing of Materials A*, 309–15 (1930) —In the testing of metals and other cryst. materials it will in the future be necessary to bear in mind the results of modern investigations on the following points (1) The properties of a material may be different in different directions (2) The values of the elastic consts may be seriously affected by previous treatment and by the methods of measurement (3) The elastic limit and the yield point are easily affected by previous cold working (4) The previous history of a material can subsequently be detd from the distribution of internal stresses within it (5) In the calcn of structural parts it is necessary to take account of the new knowledge concerning the liability to deformation under normal and shear stresses (6) The behavior of materials when subjected to technological processes can be calcd on the basis of their properties as detd by testing methods and can be checked by specially designed methods of testing A bibliography is included E J C

**Materials at high temperatures. General properties, limiting creep stress and limit of proportionality.** R. G BATSON *1st Communications New Intern Assoc for Testing of Materials A*, 74–9(1930) —The general behavior of steels at high temps under short time tensile tests and the effect of prolonged loading in producing creep or flow and intercryst. failure are discussed Limiting creep stresses are described and the values obtained for them are compared with results from limit of proportionality detns and time yield tests as defined by Hatfield (*C A* 23, 4429) The safe stresses to be used for design purposes are stated E J C

**Materials at high temperatures.** A. POMP. *1st Communications New Intern Assoc for Testing of Materials A*, 80–4(1930) —Tensile strength at high temps is materially affected by the rate of testing The time effect, however, is materially less in the detn of the yield point or the 0.2% limit Published results generally indicate that the yield point at high temps , for particular classes of material, bears a definite ratio to the tensile strength at room temp In place of the lengthy tests under prolonged loading, Pomp and Dahmen propose an abridged method of testing which in the course of 1 or 2 working days permits of an approx detn of the so-called limiting creep stress This is regarded as being attained when the rate of extension in the 3rd and 6th hrs. after applying the load does not exceed 0.001% A bibliography is given. E J C

**Behavior of metals at high temperatures.** H. STÄGER. *1st Communications New Intern Assoc for Testing of Materials A*, 89–96(1930) —Tests to det the limiting creep stress were made at 400°, 500° and 600° on steel castings of widely varying compns. and on a no of alloy steels Rapid high-temp tests afforded no indication of the value of the limiting creep stress. For the design and construction of machine parts intended to work at high temps only the actual creep stress can be employed. An exact defi-

nition of this stress can only be arrived at as the result of further investigation It was found that it is not the steels contg large amts of alloying elements which give the best strength results at high temps, but rather those in which the alloying elements have been added in the most suitable amts for the purpose of strengthening the material lying in the crystal boundaries E J C

**Materials at high temperatures. Special alloys of iron, nickel and chromium.** ROBERT HADFIELD *1st Communications New Intern Assoc for Testing of Materials A*, 104–10(1930) —A review of the development of heat resisting alloys and their use in the improvement of furnace efficiencies as metallic recuperators, conveyors for the mech operation of furnaces exhaust valves for internal-combustion engines, steam turbine blading and steam fittings Of these alloys, the Fe Ni Cr type are probably the most useful and important Most of the practical alloys of this type fall into 3 groups, 1 contg from, say, 18–25% of Cr, with 7–10% of Ni, the Fe content amounting to 65–70% The second range is higher in Ni its percentage being in this case from 20 to 40, the Cr amounting to 10–15% and Fe 50–60% The third group includes alloys contg about 65% of Ni, 12% of Cr and 25% of Fe Other elements in smaller percentages are added in many instances E. J C

**The micromechanical study of metals.** P A WELIKOV, N P SHCHAPOV AND W. P LORENZ *1st Communications New Intern Assoc for Testing of Materials A*, 328–38(1930) —The micromech method used by the Inst Sci Exptl des Transports, *Moscow, for studying the mechanism of plastic deformations occurring in the materials* employed in means of transport, comprises a combination of the micrographic investigation of the deformations with mech tests on specimens of small dimensions, the 2 being carried out simultaneously on the same test piece Tests were carried out on compressive and tensile strength, and in the latter case test specimens both with and without a notch were used The following materials were investigated mild steel used in bridge construction, steel for rails fine-grained Cr and Ni steels The rept describes the development of permanent deformations observed E J C

**Nonmetallic inclusions in metals.** G P COMSTOCK *1st Communications New Intern Assoc for Testing of Materials A*, 348–54(1930) —The causes, effects, identification and elimination of nonmetallic inclusions in steel and nonferrous alloys are discussed briefly Illustrations of the most common type of inclusions are presented, as well as Wohrman's scheme for their identification by metallographic means Proper polishing of specimens is important. The various types should be considered separately, since the causes of their existence in metals, and the means for their elimination, are different for the different types The effects of their presence are usually, but not always, undesirable, and the prevention of segregation is of more general importance than the elimination of inclusions E J. C.

**Physical and chemical properties of the light metals. Prescription for the mechanical testing of aluminum alloys.** A VON ZEERLEDER. *1st Communications New Intern. Assoc for Testing of Materials A*, 257–72(1930) —The phys consts of Al and Mg are given and their alloys described The standard specifications for tests on casting and forging Al alloys are stated, as they are recommended by the Swiss section of the New Intern Assoc for the Testing of Materials and by the European Al producers They concern the detn of tensile strength, elongation, limit of elasticity, upper yield point, modulus of elasticity, Brinell hardness, resilience, bending capability, casting property and contraction for casting alloys and construction for forging alloys F J C.

**Notched-bar impact test—standard test piece.** M. MOSER *1st Communications New Intern Assoc for Testing of Materials A*, 222–4(1930) —The Charpy test piece is not altogether satisfactory Both producers and users of materials are looking for a new test piece on the following lines (1) The specimen must be small so as to enable each part to be tested without unreasonable expense. (2) The shape must be such that the various mech conditions of the material are widely differentiated at room temp (3) The range of application must be as wide as possible so that auxiliary test pieces are only necessary in exceptional cases. (4) It must be easy to make, the tools commonly available in a workshop are used Various proposals are illustrated The German standard notched bar test specimen, the principal features of which are already fixed, corresponds closely to the test specimens used in other countries E J. C.

**Notched-bar impact tests—standard test piece.** R. PAWLIKA AND M. SCHMIDT. *1st Communications New Intern Assoc for Testing of Materials A*, 217–21(1930) —No simple proportionality exists between notched bar test specimens of various forms, and the test results are influenced by the temp, shape of the specimen and by the speed of the test *For plain and alloy steels, distinction must be made between high and low values for the impact toughness, the development of these, with reference to the*

the 3rd and 6th hr In alteration of Pomp and Dahmen's previous suggestions the creep limit of straight C steels is defined as that max load at which the velocity of extension does not exceed 0.0001% between the 5th and 10th hr G G Neuendorff

**Prospects hopeful on metals for 1000 1500°F.** H W Spring *Elec World* **97**, 459 61(1931) Greater demands are being made for steel to withstand high temps. under high-pressure conditions Above the strain hardening or so called equi cohesion temp there is no such thing as "creep limit," creep constantly going on, but more rapidly with higher temps and increased stresses Large grain sized material has greater resistance to creep than the same material with reduced grain size Fatigue of over-stressed metal is much more important at lower temps than at high operating temps Boiler shells headers piping etc have a certain flexibility, but valve seats require new and more serviceable materials than the common C steels Brass, Monel metal, Ni and Ni alloys stainless steels and some harder alloys are used, depending upon the service desired A proper valve seat should be noncorrosive, have a proper coeff of expansion, have forging or casting quality machinability, density and smooth texture, proper strength and ductility hardness to withstand scratching, nongalling or seizing quality and be reasonable in cost "Alloy" is being used for the purpose.
W H Boynton

**Advances in microscopy.** F F Lucas. *1st Communications New Intern Assoc. for Testing of Materials* A, 361 5(1930) cf C 1 23, 73 Specifications are given for new metallographic equipment expected to yield satisfactory results at very high magnifications (5000–7500 diams) Developments in progress in the field of ultra violet metallography are discussed New optical glasses of ultra violet transmitting characteristics are needed and the possibilities are reviewed briefly The advances to be expected in metallography, especially with respect to the phenomena involved in the hardening of steel and the nature of the constituents, martensite and troostite, are discussed
R J. C.

**Progress of microscopy.** H Wrighton. *1st Communications New Intern Assoc. for Testing of Materials* A, 368 8(1930) —Progress in metallurgical microscopy in Great Britain since 1920 is described An outline is given of the work of the Roy. Microscopical Soc in the interests of technical microscopy, of new developments in app, and of advances in microscopical and photomicrographic technic Reference is made to the work in progress at the Imp Coll of Sci, where the technic of ultra-violet light microscopy is being developed
R. J C.

**Strengthening by reversals of stress.** W Schwinning and R. Strobel. *Z. Metallkunde* **22**, 102 4(1930) —Conclusion of a previously published article (*C. A.* **25**, 1107). This article gives an account of the changes in structure (slip lines, grain boundaries, etc) and the effect of heating (recrystn) upon the structural changes observed
Robert F Mehl

**Theory of solution of metals. II.** M Straumanis *Z physik Chem*, Abt. A, **153**, 107–11(1931); cf *C. A.* **24**, 4088 —Polemical with Thiel (*C. A.* **25**, 673)
Oscar T. Quimby

**Note on the preceding contribution [on theory of solution of metals].** A. Thiel. *Z. physik Chem*, Abt A, **153**, 112(1931) —Polemical with Straumanis (cf. preceding abstr).
Oscar T. Quimby

**Thermal analysis and dilatometry.** H Scott. *1st Communications New Intern. Assoc for Testing of Materials* A, 339 41(1930) —The salient features of methods for revealing physicochem changes in metals at high temps have been critically examd, thermal analysis, dilatometry, resistance testing and magnetic testing alone are considered Thermal analysis alone is well adapted to the detection of solid to liquid phase changes Its chief shortcomings are inability to follow changes at a const. temp and to measure quantitatively a sp phys property The other test methods are complementary to thermal analysis in these respects Dilatometry has the distinction of revealing under favorable conditions all types of discontinuous changes in solid metals. Elec resistance measurements are particularly adapted to the detn of changes in solid solv Magnetization tests are superior for the detn of phase relations in certain steels and permit the identification of sp magnetic compds in steel There are several types of equipment available for each test method Of those for thermal analysis, the Rosenhain furnace with the inverse rate method is the most flexible one. An autographic device for plotting such curves has been developed The fully automatic dilatometer of Chevenard is very convenient for detecting physicochem changes and furnishes fair values of expansivity as well Elec. resistance and magnetization tests have unique applications, but require further development to become generally acceptable lab tools.
R. J. C.

**Heat treatment of aircraft parts.** HORACE C KNERR *Proc Am Soc. Testing Materials* 30, Pt II, 154-70(1930) —A general discussion The properties of various SAE steels under different heat treatments are tabulated For Cr Mo aircraft steel 4130X, *Knerr advocates 1575–1625°F for normalizing or quenching*, and 1275–1375°F, air or 1375-1425°F furnace, for annealing On oil quenching, and tempering at 680-1100 F yield points from 180,000 to 110,000 lb /sq in are obtained Types of furnace equipment for various heat treatment operations are discussed H W G

**Heat treatment of carburized parts.** H M MCQUAID *Iron and Steel of Canada* 14, 22-4(1931) —A considerable amt of steel, which at the present time is being given the costly double treatment subsequent to carburizing, might quite sucessfully be quenched directly from the carburizing box The 3 methods of single-quenching carburized work are discussed, and the types of steel suitable for use when these methods *are employed are described A statement is given of the proper procedure to follow* in establishing the proper heat treatment of a carburized part based on the assumption that the analysis selected has been chosen as the result of a careful study of the stresses and service to be met with in use O W. FELLOWS

**Heat treating pipe-line couplings.** C B PHILLIPS. *Steel* 87, No 26 43-5(1930) — The plant of the Dresser Mfg Co at Bradford, Pa., is described LESLIE B BRAGG

**Red shortness** FRANZ HATLANEK *Arch Eisenhüttenw* 4, 207-14(1930) —In addn to red shortness due to oxides, brittleness is also due to other causes at high temps., among them the action of gases and the presence of Mn Brittleness produced by O at relatively low temps can be prevented by the presence of C, Mn, Si and Al Blue shortness is caused by oxidic inclusions, is produced earlier than red shortness, and is more difficult to overcome. H. STOERTZ

**The measurement of the true specific heat of solid and liquid metals at high temperatures** H SEEKAMP *Z anorg allgem Chem* 195, 345-65(1931).—S describes a process for the measurement of the true sp heat in which a W spiral *is employed as* the source of energy Complete details of the method of supporting the spiral within the sample of metal to be investigated are given Four diagrams are given which describe the app used and the elec equipment employed in connection with the expts Particulars are given of the results of expts on Cu, Al and Mg, the true sp heats of which were measured in the solid state Curves are given, showing the relationship between S's results and those of previous workers in this field The application of this method to the investigation of liquid metals is described In this case, the W spiral is protected by means of a porcelain sleeve Measurements of the true sp heats *of solid and of liquid Tl were made from the range 18° to 500°. It is shown* that Tl undergoes a transformation at the point of 226.7°, the heat of transformation amounting to 98 cal /g -atom O W. FELLOWS

**Standardization of methods for testing the fatigue resistance of metals.** K LAUTE *1st Communications New Intern Assoc for Testing of Materials A*, 111-8(1930) — The alternating stress resistance of a material is detd by the endurance limit under a standardized system of dynamic loading Its value is dependent on the 2 factors of fatigue and work hardening Abridged methods of testing fail because work hardening is not completed even after a million reversals of loading The various methods of stressing, either by steadily changing loading or by alternating impact, and the various types of stress, such as bending, torsion or alternating tension and compression cannot be regarded as interchangeable The fatigue range varies with the chem compn of the material It is diminished by occasional over loading and depends very much on the smoothness of the surface of the test piece Much less important are the effects of mech or thermal *treatment prior to testing, while the variations of temp during* the test itself and the frequency of alternation have no effect The influence of the actual dimensions of the test piece is probably negligible The great importance of the character of the surface in itself constitutes a very serious obstacle to standardization of the test. Further, the difficulty of ascertaining and keeping to a definite max *of loading in practical* use makes the application of the fatigue limit for practical purposes somewhat illusory F J C

**Fatigue of single crystals of pure metals.** H J GOUGH *1st Communications New Intern Assoc for Testing of Materials A*, 133-44(1930), cf *C A* 23, 2402 —The characteristics of deformation, under fatigue stresses, of single crystals conforming to each of 3 crystallographic forms, *i e*, face-centered cubic (Al), body-centered cubic ($\alpha$ Fe) and close packed hexagonal (Zn), are summarized It is shown that the criterion of plastic deformation is, in every case, the max value (max resolved shear stress) of the shear stress component on the slip plane along one of the slip directions contained by the slip plane. The direction of slip is always parallel to the "principle line" of

atoms (that having a greater no of atoms per unit distance than any other line of atoms in the lattice) In the face centered and close packed hexagonal systems, the slip plane is the plane of max at d α Fe deforms by a process of duplex slip on planes of high at d I atigue cracks are initiated in the region of max resolved shear stress, not affected, apparently, by normal stress considerations The propagation of the crack is, however, largely assisted by tensile normal stress the direction of propagation is often detd by max , not max resolved, shear stress Reference is also made to certain theoretical deductions arising from the expts A bibliography is included E J C

**The effect of surface condition on fatigue test results.** C H M JENKINS *1st Communications New Intern Assoc for Testing of Materials A*, 145–8(1930) —*An attempt* has been made to translate fatigue tests to the service conditions of such machine parts as springs, shafts with keyways, etc The effects on the test results of such factors as the form of section, the surface finish and abnormalities in compn and micro-structure are discussed The accelerating influence of chem corrosion is marked, and perhaps phys abrasion of the surface may also weaken the material Although the general tendency of imperfect surface conditions is to reduce the value of the fatigue strength, there appears to be a slightly increased resistance to fatigue in the case of certain sur face hardened materials A bibliography is given E J C

**Fatigue. I. Relation of the fatigue limit to the elastic limit and other mechanical properties. II. Effect of surface condition on fatigue test results.** P LUDWIK. *1st Communications New Intern Assoc for Testing of Materials A*, 119–32(1930). E J C.

**Fatigue studies of telephone cable sheath alloys.** J R TOWNSEND AND C. H GREENALL. *Proc Am Soc Testing Materials* 30, Pt II, 395–405(1930) —In the study of fatigue properties of cable sheath alloys, a preliminary survey is made by use of a const. deflection method on a flat cantilever specimen at a single deflection, under which pure Pb fails in 0.3 to 1.3 million cycles and a 1% Sb alloy in 1 8 to 2 6 Alloys of refined Pb with 0 04% Ca ran for 13 million as a min up to 169 million unbroken *Very small quantities of Sn or Sb injure the Ca-Pb alloy on the test and it is stated that* it will detect the effect of 0 001% As, which is not shown by tensile test Actual endurance tests are made on a cantilever type rotating beam machine Refined Pb, unalloyed, shows a 50 million cycle endurance limit at 215 lb /sq in The same with 1% Sb shows 45 and with 0 04% Ca 850 lb /sq in S-N curves are given Static flow tests show an elongation in 3000 hrs at 920 lb./sq in of 0 02" in 2" for the Ca alloy and 0 10" for the 1% Sb alloy. For metallographic and other data on these alloys, see Schumacher and Bouton (*C A* 24, 2409) H. W GILLETT

**Constancy of the work done to cause fracture as an explanation of fracture by fatigue and other loads.** K. LJUNGBERG *1st Communications New Intern Assoc for Testing of Materials A*, 149–54(1930) E J. C.

**Relations between the changes in physical properties by cold working and mixed crystal formation.** CURT AGTE AND KARL BECKER *Physik Z* 32, 65–80(1931).— *Cold working and the introduction of impurities cause similar changes in many of the* phys properties of metals A review is given of data on W showing these changes Bibliography includes 75 references T H CHILTON

**The theory of recrystallization.** J A M VAN LIEMPT *Z anorg allgem Chem.* 195, 366–86(1931) —Having assumed (1) that in the solid state only those atoms can change places, which possess an energy equal to, or greater than, a given value $E = ar_0^3$, where $r_0$ is the min amplitude required to cause a change of place, and (2) that amplitudes in excess of $r_0$ are impossible, and having accepted Lindemann's assumption that at the m p of a solid the amplitude of vibration of the atoms is approx. equal to the mean distance of the atoms apart, van L develops a general diffusion formula applicable to single crystals, from which, if the distance between the atoms of the metal in which diffusion occurs, the characteristic vibration frequency, and the m p of the diffusing metal, and the temp at which diffusion occurs are known, a value for the *diffusion* const. at the above temp can be obtained Hence, the relationship between the diffusion const. and the temp. of the metals can be calcd A relationship between the diffusion consts. of deformed and undeformed metals is then evolved, and the fact that the rate of diffusion of a deformed metal in an undeformed metal is greater than that of the undeformed metal is explained. Modifications necessary to apply the theory to polycryst materials are discussed. van L. then derives general formulas for the relationships between temps. of annealing and the times required to effect complete softening at these temps , and between the m ps and the temps. of recrystn. of the metals. Tables showing the relationship between observed and calcd. values are given

The phenomena of recrystn in solid solns and of recrystn in general are discussed.
O W. Ellis

**The aeration theory of Evans.** E Herzog and G Chaudron *Korrosion Metallschutz* 7, 1(1931).—*A reply* is made to objections by Maass and Liebrich (*C. A.* 24, 3744, 5705) against conclusions drawn from 'drop' expts. Details of these expts. are given, which uphold the conclusions of the authors and the aeration theory by Evans. E Maas and F Liebrich *Ibid* 2-3.—The unetched spot in the center of a drop observed by Herzog and Chaudron (above) after adding to this drop a NaCl soln contg 1% $H_2O_2$ is assumed by the authors not to be due to a different aeration, but to be due to disturbances of convection currents caused by the introduction of the capillary pipet. It is important whether the pipet only touches the surface of the drop, or whether it penetrates beneath it. In the first case, the soln introduced will not go down to the center of the drop, as assumed, but will, provided its d is approx the same as that of the drop, diffuse slowly throughout the drop. In the second case, a disturbance of the convection currents takes place, which will cause the appearance of an unetched or only slightly etched spot in the centre, regardless of whether the soln contains $H_2O_2$ or not. A similar unetched spot can also be obtained if, in place of a pipet, a thin glass rod with a plane polished end is immersed for only 5 or 10 min. into the drop. This cathodic spot formed in the center remains unetched even after the removal of the glass rod.
Leopold Pessel

**Investigation on the behavior of metal toward cleaning and disinfecting materials.** M. I. Schulz. *Molkerei Ztg.* (*Hildesheim*) 44, 1439–41, 1461–3, 1495–1501, 1515–6, 1557–60(1930).—Metal sheets of 100 sq. cm. surface are immersed for 24 to 48 hrs. at 45° to 50° in a soln. of the material. Change in the metal, loss in wt., tempering color, surface and pore corrosion are detd. The results are placed in a table so that the proper material can be detd. for each metal. There are no cleaning solns. which do not attack metal, but some are worse than others. The protection given by the addn. of water glass and chromate is studied. The addn. of chromate to the soln. is limited by the cost. The amt. of water glass to add to solns. of a no. of com. cleansers is given.
George R. Greenbank

**Metallurgy of the modern die set.** John H. Hruska *Iron Age* 127, 702–5 (1931).—Castings for die sets are made almost exclusively from semi-steel or a special grade of gray cast Fe. The heat treatment of die set castings is described. Increased temp. decreases hardness, prolonged heating enlarges graphite flakes of matrix and decreases transverse strength. Leader pins and bushings are made of pearlitic Mn steels. Box carburizing is desirable in long leader pins and bushings. The rotary furnace has certain outstanding features so far as quick production and low cost are concerned. Drawing may be done in rotary furnaces, salt pots or oil tanks with accurate temp. regulation. Results of analyses are tabulated.
V. S. Polansky

**Atomic hydrogen occluded in iron nitride.** Shun ichi Satoh *Bull. Chem. Soc. Japan* 5, 291–303(1930).—The presence of at. H in Fe nitride is confirmed. The evidences are the liberation of H when Fe nitride is heated above 430° and decomposes slowly, the measurement of the single potential of Fe nitride in the normal $FeSO_4$ soln., the oxidation of at. H by O in the water in which Fe nitride is immersed, the transformation of K ferricyanide. Nitriding changes compact Fe into porous Fe. Light does not produce any marked photochem. effect upon the single potential of Fe nitride.
Albert L. Henne

**Nickel in aviation.** General Grard. *Acier spéciaux* 5, 566–73(1930).—The properties of many steels are given.
A. J. Monack

**Discontinuous changes in length accompanying the Barkhausen effect in nickel.** C. W. Heaps and A. B. Bryan *Phys. Rev.* 36, 320–32(1930).
Bernard Lewis

**Silver and its application to chemical plant.** Donald McDonald *Soc. Chem. Ind., Chem. Eng. Group Feb.* 13, 1931, 12 pp.; *Chemistry & Industry* 50, 168–78 (1931).—The properties of Ag are reviewed with regard to its use in the construction of chem. equipment. The economic history, occurrence and metallurgy of Ag are discussed at length. The phys. and chem. properties reported in the literature are critically reviewed with some addnl. observations. The power of absorbing O by Ag in the molten state has been studied in detail. The more important alloys of Ag and their applications are mentioned. The properties of Ag which make it attractive for the chem. plant are its freedom from oxidation, resistance to acids, high thermal and elec. conductivities, and excellent mech. characteristics. Various uses in the industries are mentioned. The high salvage value of Ag app. makes its use as a construction material more attractive.
Allen S. Smith

**The resistance of chromium-plated plug gages to wear.** HARRY K. HERSCHMAN. *Bur. Standards J Research* 6, 295–304(1931) R. RIMBACH

**The structure and the mechanical properties of pearlite.** N T. BELYAEV. *Rev métal* 27, 680–5(1930) —B indicates the possibility of using the interlamellar distance in pearlite as a measure for the mech properties of eutectoid steels (cf *C A* 23, 5454). H S v KLOOSTER

**The effect of certain elements upon the segregation of cementite and its relation to the modification process.** J H ANDREW *Roy Tech Coll Met Club J* (Glasgow) 1929–30, No 7, 16–7 —Speculation upon the relation between the effect of 0.25% Mo in a 3% Ni steel, or of 0 60% Mn in a 0 22% C steel, in which the Mo or Mn is said to hinder free movement of carbides, preventing them from coalescing and thus producing a fine sorbite, and that of Na in the modification of Al-Si alloys H W G

**Thermochemical data on iron.** W A ROTH, H UMBACH AND P CHALL. *Arch. Eisenhüttenw* 4, 87–93(1930), cf *C A* 24, 2039 —The authors used azeotropic 20% HCl soln at temps in the neighborhood of 100° as a solvent for various Fe compds and detd the following heat effects, calcd at 19° $Fe + 0.5O = FeO + 64.2$ Cal., $FeO + Fe_2O_3 = Fe_3O_4 + 7.0$ Cal., $2FeO + SiO_2$ (quartz) $= Fe_2SiO_4 + 8.1$ Cal and $Fe_2O_3 + 3Cl_2 = 2FeCl_3$ (cryst.) $+ 1.5O_2 + 7.4$ Cal H S v KLOOSTER

**Alterations in the properties of hematite pig iron cast from the first melting.** E. PIWOWARSKY *Stahl u Eisen* 50, 966–8(1930) —The alterations which take place in the mech properties of pig Fe during tapping from the blast furnace into an acid mixer from which finished castings are poured have been detd The compn. and properties of samples cast in sand and in chill molds directly from the blast furance during the charging of the mixer and during the emptying of the mixer are tabulated, the variations over a period of 7 days being shown Sand castings have the better properties when taken directly from the blast furnace, but chill castings are superior to sand castings poured from the mixer In both cases an appreciable improvement in properties takes place during the passage of the metal through the mixer B C A

**Cast iron.** E. PIWOWARSKY *1st Communications New Intern Assoc. for Testing of Materials A*, 5–9(1930) —The special properties of cast Fe (lack of quasi isotropy and influence of graphite inclusions) have for a long time made it difficult to introduce standardized methods of testing The absence of reliable inter relationships between the mech. and phys properties necessitates furthermore a large number of sep. investigations to det. the quality The following measurements are now made (1) *The static properties*—(a) Tensile strength Tensile tests are provided for. The fact that cast Fe is scarcely ever subjected to pure tension in practice makes this test of little value, but it is easy to carry out and to evaluate, (b) bending strength. The deflections must be given for as many loads as possible, in any case for the max load at fracture; (c) the Brinell hardness, (d) compression strength, with simultaneous recording of the stress strain diagram and the load at which cracks begin to appear; (e) shearing strength. The test for shearing strength does not give any simple relation between shearing and tensile strength (2) *The dynamic properties*—The detn of the fatigue limits will continue to be of value until smaller foundries are able to procure rotating type fatigue testing machines (3) *The elec and magnetic properties.*—Experiences in testing Fe and steel may be applied (4) *The machinability*—The hardness boring test of Keep, Loewe or Kessner is widely used Nevertheless the test on turning time to det. the cutting speed seems to be the only suitable one The Brinell hardness for cast Fe bears no fixed relation either to the machinability or to the resistance to wear. (5) *The volumetric stability*—This test still lacks any degree of uniformity. (6) *The sp. vol*—This test is best carried out with the method of buoyancy Measurement of the perviousness to gases appears to be of less importance (7) *The ability to fill molds*—Rapid and practically useful results are given only by pouring tests. The tendency to porosity and to the formation of blow-holes is shown by Cook's K-test. E. J. C.

**Cast iron—methods of testing.** E DÜBI *1st Communications New Intern. Assoc. for Testing of Materials A*, 10–24(1930) —A separately cast test piece of 50 mm diam. gives results which agree very closely with those obtained from test pieces of 30 and 50 mm. diam machined from the main casting Small test pieces taken according to the French specification from the main casting give valuable criteria of the nature and uniformity of the internal structure of the casting itself As regards the strength of the material, however, these small test pieces do not give any more accurate indications than specially cast test pieces having a diam corresponding as nearly as possible to the thickness of the wall of the casting under investigation. The strength properties of casting apparently can only be detd. conclusively from tests on the casting itself. E J. C.

**High-duty cast iron.** GEBRÜDER SULZER *1st Communications New Intern Assoc for Testing of Materials A*, 49–63(1930).—The methods of producing high grade cast Fe are discussed with particular reference to the effect of a considerable reduction of C content on the properties of the Fe. As the C content diminishes, bending strength, tensile strength and resistance to impact increase, while in general the deflection remains unchanged. The shrinkage and the tendency to form cavities, however, increase, as do the general difficulties of foundry technic. The pearlitic ground mass of high-grade cast Fe has in the cast condition, a tensile strength of approx. 70 kg per sq mm. By means of alloying addns., so long as the structure remains pearlitic, the Brinell hardness of cast Fe is increased while the other strength properties are not materially changed. Carbide forming elements such as Cr, W, Mo and V increase the resistance to abrasion and to thermal effects, but reduce the machinability. E J C

**The results of investigations on the growth of cast iron.** FRANZ ROLL. *Die Giesserei* 17, 905–8(1930).—The views of various investigators on the influence of the compn. and other factors on the growth of cast Fe are tabulated. J BALOZIAN

**Cast-iron testing in Great Britain.** J G PEARCE. *1st Communications New Intern Assoc for Testing of Materials A*, 1–4(1930).—A specification which has the approval of the founding industry was issued in 1928 by the Brit. Eng. Standards Assoc. While it covers only 2 qualities of Fe for general engineering castings, the testing procedure is applicable to all types and qualities. The features of this specification are as follows. The size of the test bar varies with the thickness of the casting, 3 sizes being used at present. The test bars are cylindrical and may be cast away from the casting. Both tensile and transverse tests are covered and no chem. analysis is demanded. The majority of engineering castings will be covered by the intermediate size of bar 1.2" in diam. which is virtually the standard bar used on the Continent and in America. The adoption of this basis for testing has stimulated a considerable amt. of investigation on the relations between mech. properties, but it is believed that at the present stage of development no other mech. tests can be usefully employed in general specifications. E J C

**Heat- and acid-resisting cast irons with high chromium and carbon contents.** EMANUEL VALENTA. *Iron and Steel Inst. (London) Carnegie Scholarship Mem.* 19, 79–165(1930).—Three series of Cr-Fe C alloys were studied. (I) without added elements, (II) with addns. of Si and (III) with addns. of Al. (I) In this series the C content varied from 0.15 to 3.6%, while the amt. of Cr was between 4.7 and 36.9%. The Si content was 0.4% for low Cr and 0.8% for high Cr percentages. It was found that above 16% Cr the resistance to scaling is perfect. Beyond 35% Cr the heat resistance does not increase further. The proportion of primary double carbides increases with the C content. These carbides form long, heat resistant needles which destroy the homogeneity and strength of the castings. Hence the hypereutectic alloys are of no technical importance. Below 0.5% C the alloys are more expensive and must be produced in an elec. furnace. Test bars, both prismatic and cylindrical, were prepd. for chem., metallographic, dilatometric, thermal and mech. examn. Brinell hardness detns. were made after casting, annealing and air cooling for various thicknesses and different rates of cooling. Graphs are presented showing lines of equal hardness depending on the Cr and C contents. For machinability, if a hardness of 350 is assumed to be the limit, it is necessary to keep the C content below 1.6 or 2% in alloys contg. 25 or 35% Cr, resp., in annealed specimens. For high resistance to wear and abrasion a Cr/C ratio of 10/1 may be used with advantage. The useful alloys in the Fe–Cr–C system are those contg. 1.8–2% C which may be divided in 3 zones (*a*) alloys in which the pure δ-crystal predominates, strongly corrosion resistant, suitable for forging and without hardening ability, (*b*) alloys showing both γ- and δ-crystals with reduced corrosion resistance and lower malleability and (*c*) alloys of pure γ-crystals with materially reduced resistance to corrosion, recommended for service at high temps. (II) The examn. of alloys contg. Si in amts. varying from 0.5 to 4.3% with Cr ranging from 20 to 35% showed that the eutectic valley is displaced to lower C percentages. Hence the range of useful hypoeutectic alloys is much lower. Addn. of 1% Si displaces the eutectic line to lower C content by about 0.3% C. The corrosion resistance is greater than for those alloys contg. no Si. With constant Cr content the effect of varying amts. of Si (0.5–2.3%) is to raise the temp. of entrance into the γ-phase. For 1% Si the rise is about 80°. The effect is less for lower C content where the eutectoid temp. rises rapidly. Hence the lower the C and the higher the Cr percentage, the smaller is the amt. of Si required to suppress the hardening of alloys cooled from 1000°. For high C alloys as much as 4% Si might be required to prevent air hardening, but the product would be brittle and unmachinable. (III) Alloys with Al as addnl.

element contained 1 1–2 0% C, 10 3–29 8% Cr and 0 6 2 4% Al. Even a low percentage (0 5%) of Al was in most cases sufficient to suppress entirely the self-hardening properties The effect of Al on the raising of the critical points and upon the structure was about twice that of Si Air cooling gave alloys with low hardness shock resistance and good malleability The location of the eutectic line was not materially altered by adding 1–1 5% Al, hence the range of useful high C alloys is greater than that for Si alloys The alloys studied are classified on the basis of the dilatometric curves obtained Numerous tables, charts and photomicrographs are given A suitable reagent for etching these alloys consisted of a cold ale soln of 5% picric acid, 2 5% HCl and 2% FeCl. H S v Klooster

**Nickel-vanadium and nickel-molybdenum cast irons. II.** Jean Challansonnet. *Rev Metal* 27, 654–71(1930), cf C A 25, 1197.—The dilatometric and microscopic study of a synthetic cast iron contg 3 7% C showed that the presence of 0 25 and 0 5% Mo either alone or with 1 and 2% Ni, resp, does not affect the Curie point of $Fe_3C$ Addns of 0 25 and 0 5% Mo raise the Ac point 25° to 725° and in alloys with 1 and 2% Ni the added Mo raises the Ac point from 660° and 665° to 725° On cooling the Ar point is lowered and the effect is cumulative when both Mo and Ni are present Reheating of the cast alloys brings about graphitization in the specimens contg 1% Ni and 0 25% Mo (at 1000°), 2% Ni and 0 25% Mo (at 1050°) and 2% Ni + 0 5% Mo (at 1070°) The microstructure of all 6 alloys when fast cooled showed no graphite Mo refines the pearlitic constituent and produces small bright spots, possibly complex Fe-Mo carbides which diminish in size in the presence of Ni The com cast irons were the same as those used previously for prepg Ni V cast irons and distinguished as A, B and C, resp In each group 6 alloys were studied contg approx 1% Ni + 0 25% Mo, 1% Ni + 0 5% Mo, 2% Ni + 0 25% Mo, 2% Ni + 0 5% Mo, 0 25% Mo and 0 5% Mo All alloys as obtained after casting contained both graphite and cementite Mo favors somewhat the cementite formation at low C contents (2 5%) but the graphitizing effect of Ni is only slightly changed by Mo Dilatometric curves show sudden expansions on heating at temps. below the Ar point for all alloys contg Ni This expansion, due to graphitization, is absent in alloys contg only Mo addns when heated to 1000°. A study of the effect of the rate of cooling on the microstructure indicated that no complex carbides were produced in the com. cast irons but that Mo, like Ni, increases the hardness of the pearlitic matrix With a C content as high as 3 5% C, Mo does not noticeably increase the percentage of combined C. Contrary to the effect of V on rapidly cooled cast irons contg Ni, Mo does not prevent a martensitic quench Tables, graphs and photomicrographs accompany the article No definite conclusions could be derived from the data obtained H. S van Klooster

**Non-metallic inclusions in iron and steel.** A Baikov *1st Communications New Intern. Assoc. for Testing of Materials* 1, 355–62(1930).—The non metallic inclusions in cast metal are generally present in only very small proportions (tenths or hundredths of 1%), and usually consist of S and O compds The sulfurous inclusions are solid solns, and the O compds are fused matter resembling a slag If this view of the nature of inclusions is correct, then the way in which they are distributed is detd. by the circumstance that the complete constitutional diagram of the system cast metal + material of the nonmetallic inclusions exhibits the phenomena of limited soly in the liquid state and forms 2 liquid layers *Nonmetallic inclusions with a m p lower* than that of the metal are of a totally different character In this case the inclusions are in the form of drops and retain their spherical shape while surrounded by the solidified metal The third type of nonmetallic inclusions is observed in metals with low Mn content, considerable quantities of S and low C content In this case practically the whole of the S forms Fe sulfide With excess metal, the nonmetallic inclusions solidify at the end of the crystg process, forming a skin of eutectic alloy around the grains of the segregated metal R. J. C.

**Report of research committee on yield point of structural steel.** W O M. Withey, *et al Proc. Am Soc Testing Materials* 30, Pt I, 133–58(1930).—In a coöperative study, the yield point of specimens cut from structural shapes of 10 different sizes and shapes, ranging from ⅜" plate to 20" girder beam and made from steel of 0 14 to 0 29% C, 0 37 to 0 73% Mn, was found to range from 29,000 to 39,000 lb /sq. in depending on variations in rolling and cooling conditions, on finishing temp, on size of section and position of the specimen in the section The ratio of yield point by drop of beam to tensile strength ranged from 0 50 to 0 65, hence it cannot be estd. with sufficient accuracy from the tensile values There was considerable discrepancy between mill tests and the more carefully conducted coöperative tests A single specimen will not adequately represent the av. properties of heavy girder beams and H-column shapes

and 3 specimens from intermediate flange, root and web should be taken. If only one is taken, it should come from the intermediate flange. The most representative single specimen is from an intermediate location in plates and angles and from the center of the web in channels and I-beams. H. W. GILLETT

**Mechanical properties of British steels.** W. E. DALBY. *Proc. Inst. Civil Eng.* (London) 227, 25–61(1928).—Slipping stresses are calcd. from (1) the non load-to-break diagram, (2) the elastic diagram, (3) the push-pull diagram, and (4) the torque-twist diagram to indicate the stress at which slip begins for Bessemer acid steel, open hearth basic, open hearth acid (0.52% C), open hearth acid (0.62% C) and Ni-Cr steels. Elastic twist changes gradually to plastic twist, the change being more marked in Bessemer steel. The elastic diagrams are similar but limits of proportionality vary greatly. ANN NICHOLSON HIRD

**The macroexamination of steel.** Metallographic methods used at the Watertown Arsenal. M. G. YATSEVITCH. *Army Ordnance* 11, 297–305(1931).—Prepn. methods are discussed and objects of tests, etc., are considered. Examples are given. Three tables on quantity of reagents, etching times, etc., are given. The interpretation of the picture revealed on the surface of the metal is discussed. M. F. BEBAR

**Selection and heat treatment of ball- and roller-bearing steels.** ERNEST F. DAVIS. *Fuels & Furnaces* 9, 153–62 1931).—Ball steels contain 1% C and 0.75–1.65% Cr, depending upon ball diam. Smaller sizes have lower Cr contents. Failures of balls in service result from surface defects, surface decarbonization, excessive carbide segregation, and the commoner defects such as inclusions and center segregation. Steels for races are the high-C-Cr steel and the carburized grades such as the Ni-Mo, and the 3.5% Ni. Most widely used steel for carburized races is SAE 4615. Roll steels are the high-C-Cr steel, spring steel of modified SAE 4150 analysis and the carburized grades. Analyses are given of the various steels and methods of heat treatment are outlined. R. RINGACH

**The strength of steels at high temperatures.** H. A. DICKIE. *Roy. Tech. Coll. Met. Club J.* (Glasgow) 1929-30, No. 7, 32–7.—A brief general discussion. H. W. G.

**Effect of rate of cooling on the structure and constitution of steel.** J. M. ROBERTSON. *Safety in Mines Research Board Paper* No. 59, 57 pp. (1930).—The effect of variation in the rate of cooling steel cannot be accounted for by the supposition that an increased cooling rate produces in turn sorbite, troostite and martensite, as many other different forms of structure are evident between these states. It is suggested that the constitution of steel should always be considered in terms of the quantity of α-solid soln., γ-solid soln. and cementite present and their relation with one another. Four series of structures may be obtained by different methods of cooling. The first includes all structures consisting of ferrite and pearlite or the latter alone. Again, continuous rapid cooling which suppresses the Ar1 and lowers the Ar2 point produces the series of quenched steels, the structure of which may be varied considerably. When cooled so that the Ar1 point is suppressed and the rate then retarded so that the Ar2 change takes place at const. temp., a 3rd series results, and a 4th is similar except that the steel is withdrawn before the change is complete, the final change being effected by atm. cooling. The general arrangement of all ferrite-pearlite structures is detd. by the manner in which ferrite develops from austenite, but the structure of the grains of pearlite is detd. by simultaneously formed ferrite and cementite. The only structures which temper in a different manner are those which contain a considerable quantity of α-solid soln., since, during reheating, decomps. of this α-phase occurs by the gradual sepn. of C as the temp. is raised and not by a sudden ppta. of fine C with subsequent coalescence to form larger globules. B. C. A.

**Effect of the state of the cementite on the heat sensitivity, the tendency to core-hardening and formation of hardness fractures in carbon steels.** S. STENBERG. *Stahl u. Eisen* 50, 1164–6(1930).—The effect of various heat treatments on the microstructure and mech. properties of steels with 0.8 and 1.2% C has been investigated. The hypoeutectoidal steel after annealing at 900° and slow cooling becomes hard and tough after hardening at 725° and quenching, hardening at 750–800° produces a more coarsely crystalline structure, and the metal becomes brittle with a tendency to develop hair-cracks. The hypereutectoidal steel requires very slow cooling after annealing at 950° and a hardening temp. of 800–50° to produce a tough structure. Lamellar cementite causes brittleness and hair-cracks to develop on hardening, whereas granular cementite or troostite imparts a high degree of toughness to steel. B. C. A.

**Temper hardening of steel containing copper.** H. BUCHHOLTZ AND W. KÖSTER. *Stahl u. Eisen* 50, 687–93(1930).—The solid solv. of Cu in α-Fe is 0.4% at 0–600° and then increases according to the equation, $\log x = -4125/T + 4.22$, to 3.4% at the

eutectoid temp., 810°. On cooling a Cu steel from the γ-solid soln range, supersatd. solid solns of Cu in α-Fe, having a structure resembling that of martensite, may be obtained; these supersatd solns., as well as those contg 0.6–3.4% Cu quenched at 600–800°, undergo age hardening on tempering at 450–600°, but the sepn of the excess Cu in a highly dispersed condition and the subsequent coagulation of the particles take place very slowly. When the steel contains both Cu and C in supersatd solid solns., both elements sep. in a disperse form on aging at high temps., the 2 reactions taking place independently of one another. Thus on tempering a quenched steel with 0.05% C and 2% Cu at gradually increasing temps., the hardness rises sharply from 160 to 210 at 20° during 3 days, then to 220 at 100° because of sepn. of excess C, the hardness then falls rapidly to 150 at 300°, because of coagulation of the cementite, and rises again to 205 at 500–550° because of pptn. of the Cu. The properties of temper-hardened forgings of steel with 0.8% Cu and 0.4% Cr resemble those of a Cr-Ni steel with a tensile strength of 70 kg./sq. mm., both steels are characterized by the regularity of their mech. properties throughout large cross sections and by their stability on prolonged storage after tempering. B. C. A.

**The malleability of rolled soft steel and a new method for its improvement.** Joseph Vietórisz. *Iron and Steel Inst. (London) Carnegie Scholarship Mem.* 19, 167–213 (1930).—Tensile tests and microscopical investigations were performed on a com. open hearth mild steel contg. C 0.05, Mn 0.29, P 0.02 and S 0.035%. Specimens obtained from the same billet (heated to 1350° and rolled in 8 passes at 1200°) were rolled at temps. ranging from 1280° down to 20°. Test pieces were then taken both in the direction of rolling and across. The following quantities were detd. for various degrees of deformation: yield point, traction hardness, uniform and total elongation, tenacity, stress in contracted section of fracture, malleability, reduction in area, tensile strength and no. of grains in a given field of vision. The changes in properties were recorded in graphs as a function of the rolling temp. The main results are summarized as follows. Between 700° and 850° all mech. properties have very low values, this range may be taken as the dividing line between hot- and cold rolling. Uniform and total elongation are at their max. value on rolling at 900° and reach a min. at 300°. Rolling between 200° and 400° gives a fairly const. max. value for yield point, traction hardness and tensile strength. At const. temp. these quantities, as a rule, increase when the degree of deformation increases. The tenacity curve shows a rise at 850°, falls rapidly between 850° and 750°, then rises again at 700° and drops to its lowest value at 300°. The grain no. increases rapidly with decrease in rolling temp. to 850°, but below 700° no appreciable change in grain no. is found. After rolling between 200° and 550° a special etching method with the aid of Fry's reagent brings out characteristic slip figures at angles of 45° to the direction of compression parallel to the direction of rolling and in the form of horizontal lines across the direction of rolling. Rolling at room temp. produces merely slipbands, serrated crystal boundaries and broken crystals. It is suggested that recrystn. of specimens rolled between 200° and 400° will produce the finest structures and the best mech. properties. This tentative conclusion is contrary to the customary practice of recrystallizing material rolled at room temp.

H. S. v. Klooster

**Carburization and decarburization of carbon steels.** Takejiro Murakami and Harujiro Sekiguchi. *Tetsu-to-Hagané (J. Iron and Steel Inst. Japan)* 16, 1015–40(1930).—C steels with 0.29, 0.70, 1.02 and 1.29% C were treated at 800°, 900° and 1000° with different kinds of carburizing agents. With pure C powder, decarburization was already noticed at 800° in steels whose C content was higher than 0.3, especially when the packing was insufficient. Carbonate salts prevent this effect, though slight decarburization was found at initial stages. Carburizing speeds can be accelerated by the addn. of $BaCO_3$ till the amt. of the salt reaches 40%; the addn. of $NaCO_3$ to this mixt. promotes the tendency. When the carburizing temp. exceeds 900° fine particles of C adhere to the steel surface. It is easy to carburize up to the $A_{cm}$ point, but the carburizing speed drops suddenly above this. Small quantities of moisture in C are preferable for carburization, and the size of C powder has no effect on the speed. M. Kuroda

**The effect of carbon on the transformation points and hardness of 12% chromium steels.** Takejiro Murakami and Yoshiro Fujii. *Kinzoku-No-Kenkyu (J. for Study of Metals)* 7, 505–23(1930).—By measurements of the thermal dilatation and the magnetization of 8 specimens contg. about 12% Cr with const. and varying C contents of less than 2.04% during heating and cooling under different conditions, the change of transformation points of these specimens was studied. The effect of C on the $A_1$, $A_2$ and $A_3$ points in slow heating and cooling from 900° and 1100° with different ve-

locities was carefully observed, and the results were shown in curves The Brinell hardness of specimens cooled under the same varying conditions as above, or quenched in oil from 900°, 1000°, 1100° and 1200°, *or quenched and tempered* at several temps. was measured From the results, the change of hardness with the C content and with the several heat treatments was plotted in several curves and discussed in detail The *microstructure of these specimens* and its change under several heat treatments were also described M. KURODA

**Manganese steel.** HEINRICH KREUTZ VON SCHEELE *Giesserei-Ztg* 27, 98–100 (1930) —A review of the prepn of high Mn steel castings CURTIS L. WILSON

**List of alloys.** WM CAMPBELL. *Proc Am Soc Testing Materials* 30, Pt I, 336–97(1930) —Campbell's list of non ferrous alloys, which has been so useful for reference, has been brought up to date, and greatly enlarged There are about 8000 compns listed The phys properties of the standard and widely used alloys are given from the Am Soc for Testing Materials specifications and other sources H. W. GILLETT

*Comparison tests on light metal piston alloys.* M. v. SCHWARZ *Z. Metallkunde* 22, 417–9(1930) —An app is described for detg the performance of a piston in service. Data obtained with it are used to compare Al alloys and cast Fe used in piston manuf ROBERT F. MEHL

**Measurements on the superconductivity of alloys.** J C. MCLENNAN, J F. ALLEN AND J O WILHELM *Trans Roy Soc Can.* [3], 24, Sect 3, 53–64(1930), cf. McLennan and Quinlan, *C A* 25, 2050 —The supercond transition points of a no of alloys contg Sb, As and Sb were measured to compare the effect produced with that of metals from other groups Most metals when alloyed with superconductors do not affect the supercond appreciably Au apparently lowers the supercond transition point of some metals while with one exception the metals of the Bi group elevate the transition temp of the metal with which they are alloyed Tables giving the transition temp for the alloys examd are included J W. SHIPLEY

**Methods of mechanical testing of light aluminum alloys used in automobile and aircraft construction.** S S NEKRYTI. *1st Communications New Intern Assoc for Testing of Materials A*, 277–92(1930) —Investigations were carried out to det. the methods of testing which best show the influence of the following factors heat treatment, the addition of other metals (Mg, Fe) to the alloy, and methods of casting Tensile strength, compression strength, elongation and the results of a bending test with a single blow are not affected by these factors On the other hand, the following tests are sufficiently sensitive to enable the mech properties to be estd and to det the influence of the factors under investigation bending strength, limit of proportionality under compression, limit of endurance (fatigue test), rupture under repeated blows, alternating tensile and compressive stresses by repeated blows and shortening under compression. A definite relation exists between the results of these tests and the elements of construction The best method for detg the resistance to corrosion is the soly test for 15 min in a 10% soln of HCl There is a relation between the results of this test and those of the fatigue tests No difference is observable between the mech properties of specimens cut from the main casting and those of specimens cast separately Al alloys can be hardened even if they contain no Mg The addn of Mg up to 0 6% and of Fe up to 1 0% increases considerably the hardness and the strength after hardening Like all other metals, Al alloys have a safe limit of fatigue stress. E. J C

**The notch toughness of a few aluminum alloys especially at low temperatures.** W A GÜLDNER *Z Metallkunde* 22, 412–6(1930) —Conclusion of a previously published article (cf *C A* 24, 5009) The influence of velocity of test, of the width of the test piece, and of the depth of the notch, all at —190° were studied. The relations between these conditions is expressed mathematically and graphically, and discussed at length with comparison to Fe alloys ROBERT F. MEHL

**Aluminum alloys containing nickel.** W. C. DEVEREUX. *Brass World* 27, 31–5 (1931) —The manuf and applications of "Y" and "RR" alloys are outlined "Y" metal contains 4% Cu, 2% Ni, 1 5% Mg, balance Al; "RR" contains 1.3–2 25% Cu, 1 3% Ni, 0 1–1 6% Mg, 0 1–0 8% Ti, 0 5–2 2% Si, balance Al The manuf of Cu hardener, Ni hardener and Cu-Ni hardener is also outlined. Applications of "Y" and "RR" alloys include aero and automobile engineering, cylinder heads and pistons, connecting rods, propellers, crank cases, bus frames, etc W H. BOYNTON

**The advantages of titanium additions to aluminum.** H. RÖHRIG *Metallwirtschaft* 10, No 6, 105–11(1931) —It is difficult to alloy Ti with Al on account of the high m p of Ti The best method is to add $TiO_2$ to the Al ore and reduce the 2 together electrolytically Ti added to Al in small quantities forms either $TiAl_4$ or $TiAl_3$, a

brittle compd Pure Al has a very coarse grained structure. By alloying with small quantities of Ti, 0 01 to 0 03%, the grain size is reduced considerably This is illustrated by macrographs Sheet Al, 1 mm thick, contg 0 01–0 19% Ti, was annealed at 500°, stretched cold 2, 5 and 10% and then annealed at 600° The samples were etched in HCl-HF to show the recrystn structure With the higher Ti contents the grain size was smaller, but the difference was less noticeable with the 10% cold-worked samples With Ti free Al recrystn begins at 300°, with 0 19% Ti at 350° The influence of these small quantities of Ti on the tensile strength and ductility is slight The tensile strength of the samples contg Ti which were hard rolled, and those which were annealed at 350°, was slightly higher and the ductility lower For those annealed at 450° and 500° the reverse was the case Corrosion tests were made by immersing samples for 1 hr at 20° in 4 parts $HNO_3$, 4 parts $H_2O$ and 1 part HCl The loss in weight increased in the following order annealed at 500° (least), annealed at 450°, at 400°, at 350°, hard rolled (most) Samples contg Ti lost less weight than those without Ti Those which were annealed during the hard rolling process lost more weight than those not annealed C E MACPARLANE

**Study of iron-aluminum-carbon alloys.** O v KEIL AND O JUNGWIRTH *Arch Eisenhüttenw* 4, 221–4(1930) —The most suitable melting methods for the production of Fe-Al C alloys are detd Up to 14% Al, the eutectic temp rises from 1145° to 1300° and then slowly falls again With 1% Al, the eutectic point is reduced by about 0 16% C. The greatest formation of graphite lies between 3 and 20% Al, between 12 and 18% Al the melt when chilled is white With increasing Al content 2 new constituents are formed Phase I, which is low in C, microscopically homogeneous but easily sol in acid; and Phase II, probably an Al-Fe carbide with great stability against acid attack H STOERTZ

**Electrical conductivity of some bismuth alloys at low temperatures.** J C. MCLENNAN, J F. ALLEN AND J O WILHELM *Trans Roy Soc Can.* [3] 24, Sect 3, 25–35(1930) —A no of alloys contg Bi were prepd and their super-conducting transition temps detd with an accuracy of about 0 1°K. The transition temps found were 58% Bi and 42% Pb 8 8°K., Rose's metal ($Bi_4SnPb$) 8 5°K., Newton's metal (Bi 50, Sn 19, Pb 31%) 8 5°K., Wood's metal (Sn 12 5, Cd 12 5, Pb 25, Bi 50%) 8.2°K., $Bi_4Tl_3$ 6 4°K., Pb 83 and 17% Sb 6 6°K. The presence of Bi in an alloy tends to raise the superconducting temp while the presence of Sb sometimes raises and sometimes lowers the superconducting point. The Pb-Bi alloy has a superconducting point 1 6°K. higher than any other previously obtained Attention is drawn to the inadequacy of all the theories of elec. cond in metals in that they do not account for the phenomenon of superconductivity A suggestion is made that superconductivity may be due in part, at least, to the directive action of magnetic forces within the atom J W SHIPLEY

**Constitution of the cadmium-rich alloys of the system cadmium-silver.** P. J. DURRANT. *J. Inst Metals*, Advance Copy, No 549, 15 pp (1931) —Alloys contg up to 40% Ag were studied microscopically and by means of heating and cooling curves There are 3 peritectic lines, and 3 solid solns in this area. The solid soly of Ag in Cd is 6 0% at 343°, and 5 2% at 250°. The second solid soln includes 18–33 5% Ag, the third more than 36% Ag Also in *Metal Ind* (London) 38, 403–6, 415(1931) J L GREGG

**Copper alloy systems with an α-phase having variable limits and their use for the hardening of copper.** M. G CORSON. *Rev mét* 27, 83–101, 133–53, 194–213, 265–81 (1930) —An account is given of the investigations leading up to the development of the so-called "Corson alloys" which have been the subject of numerous patents in recent years The alloys consist of Cu with small percentages of Cr, Co, Si, or silicides of Ni, Co, Fe or Cr, all of which constituents have a higher solid soly at high temps. than at the ordinary temp Between 20° and 1000° the solid soly of Cr in Cu varies from 0 05 to 0 8%, of Co from 0 35 to 3 4%, of $Co_2Si$ from 0.3 to 3 3%, of $Ni_2Si$ from 0 7 to 8.2%, of Fe from 0.2 to 3 8% and of Si from 2 8 to 7.5% Alloys contg silicides are best hardened by quenching from 800° to 1000° and aging at 250–450°, these alloys should contain a slight excess of the 2nd metal over that required to form its silicide so as to insure max. hardening on aging without the serious fall in elec. cond , which is produced by the retention of Si in solid soln Photomicrographs of numerous alloys of this type are reproduced, and the effect of heat treatment on the mech and elec. properties and on the structure is illustrated by graphs and photographs B C. A

**X-ray investigation of copper-arsenic alloys.** NOBUYUKI KATOH *Z. Krist.* 76, 228–34(1930)(in English) —See *C. A* 25, 272 L S RAMSDELL

**Investigation of the effects of impurities on copper. VII. The effect of antimony**

on copper VIII. The combined effect of antimony and arsenic on copper. S L Archbutt and W E Prytherch *J Inst Metals*, Advance copy, No 546, 33 pp (1931); cf *C A* 24, 2705.—Alloys contg less than 0.02% O were investigated. Those contg up to 0.47% Sb rolled hot, while one with 0.85% Sb was hot short. Annealed ingots contg up to 0.85% Sb could be cold rolled. All alloys contg 0.47% or less Sb could be rolled into thin sheet. Sb increases the strength without appreciably affecting the ductility. The endurance limit of the annealed 0.47 Sb alloy was 7.8 tons/sq in. as compared with 5 or 6 tons/sq in. for pure Cu. The softening temp. is raised by Sb, its effect being greater than that of As. The limit of soly. of Sb in solid Cu was detd. microscopically as approx. 10%. The addn. of As to alloys contg. Sb had only a slight effect on the properties. All of the alloys had high impact strengths. J. L. G.

The equilibrium diagram of copper-tin alloys. Matsujiro Hamasumi and Seiji Nishigori *Kinzoku No Kenkyu (J. for Study of Metals)* 7, 535–51 (1930).—There are many structures of Cu-Sn alloys (especially those contg. 10–40% Sn) that are hardly explainable by any of the existing diagrams. The latest diagram is probably that of Raper. H and N prepd. bar specimens of 15 cm. length and 5 mm. diam. in spite of their glass like brittleness and measured the change of elec. resistance and the thermal dilatation on heating. *Thermal analyses and microscopical examns. on the quenched* specimens were made, and the equil. of the system in the solid state was detd. There are 2 intermetallic compds., namely, $\delta$ and $\eta$ in this region, corresponding to the chem. formulas $Cu_3Sn_2$ and $Cu_4Sn$. The compd. $\delta$ formerly considered to have the formula $Cu_4Sn$, is proved to be $Cu_3Sn_2$, as pointed out by Westgren. The compound $\eta$ undergoes a *transformation at 675° to the solid soln.* $\gamma$. *This transformation* accompanies an expansion of 0.56% of its linear dimension, which is twice as great as that of $\gamma$ iron to $\alpha$ iron. There are 3 eutectoid transformations at 510°, 570° and 630°, corresponding to the equil. $\alpha + \delta \rightleftharpoons \beta$, $\delta + \eta \rightleftharpoons \epsilon$ and $\beta + \eta \rightleftharpoons \gamma$, and 2 peritectic transformations at 580° and 625°, corresponding to the equil. $\delta \rightleftharpoons \beta + \epsilon$ and $\epsilon \rightleftharpoons \beta + \eta$. The transformation of $\delta$ and $\eta$ into $\epsilon$ accompanies a linear expansion of 0.25%, which is nearly equal to the expansion of $\gamma$ iron into $\alpha$-iron. The typical dilatation, temp. and resistance temp. curves of the samples are shown. The change of the direction of the curves on heating exactly coincides with the equil. diagram given. The existence of the new phase $\epsilon$ is also clearly proved by the microscopic examn. of the quenched specimens. M. Kuroda

X-ray examination of the lattice structure of the $\epsilon$ phase of the copper–tin system. J. O. Lindb. *Ann. Physik* [5], 8, 124–8 (1931).—An alloy with exactly 25 at. % Sn was prepd. from pure materials, melted in a H atm. and carefully homogenized. After powdering in an agate mortar it was heated in an evacuated glass tube for 40 hrs. at 400° and then subjected to the x-ray examn. with an angle range of 25–75°. Extra lines, not formerly observed, were found, which could not be identified as lines of the hexagonal lattice with only 2 atoms in the elementary range. These lines were found to be surprisingly strong by choosing an 0.2 mm. camera opening and an exposure of 17 hrs. Being dissolved into their $\alpha$ doubles, they could be measured very well. The indices of all the lines observed could be detd. These extra lines found indicate a *regular distribution of the 2 kinds of atoms in the lattice, which is in agreement* with the low elec. resistance of $Cu_3Sn$. It was not possible to find a simple at. arrangement, with hexagonal symmetry, which would explain all the lines observed. The lattice appears to be very complicated. Leopold Pessel

Alloys of iron, nickel and chromium. M. A. Grossman *1st Communications New Intern. Assoc. for Testing of Materials A*, 97–103 (1930).—A review of the properties and uses of these alloys. Fe-Ni alloys are used with various proportions of Ni to give high elec. resistance, low thermal expansion, high permeability and to form permalloy (78% Ni). Fe-Cr alloys are used for their stainless properties and stiffness at high temps. Ni-Cr alloys (80–90% Ni, 20–10% Cr) give high elec. resistance combined with resistance to oxidation and are therefore used for elec. heating elements. Fe-Cr-Ni *alloys* are rustless, readily worked and have a high creep stress. Alloy steels may contain from 0.5 to 4% Cr, giving great hardness, or from 0.5 to 5% Ni to give toughness. Ni and Cr may also be combined with other alloying elements. E. J. C.

Tensile properties of alloy steels at elevated temperatures as determined by the "short-time" method. William Kahlbaum, R. L. Dowdell and W. A. Tucker *Bur. Standards J. Research* 6, 199–218 (1931).—*The materials tested were a plain carbon* steel and commercial alloys of Cr, V and Fe with and without addns. of W, Si or Al, also Cr-W, Ni-Mo and several austenitic steels with and without W. Metallographic study revealed very little intercryst. weakness and no marked or significant change in structure resulting from the high temp. tests. The addn. of W increases the "structural

stability" of the austenitic alloys Hardness was detd as a further indication of tempering which might have occurred during the heating A comparison of short-time" test and "flow test" for pearlitic and austenitic steel is included. R. R

Mechanical and physical properties of magnesium alloys. S L Archibutt. *1st Communications New Intern Assoc for Testing of Materials A*, 251–6(1930)—A review of the results of the investigations carried out during recent years on Mg and its alloys. Important progress has been made in regard to purity of the metal and foundry technic, but intensive research is necessary regarding heat treatment and modification processes Al, Zn and Cu are the chief alloying elements at present in com use, and curves are given showing the tensile strength and ductility of binary alloys of Mg with these metals as well as with Ni Four tables are also included showing the results of numerous tests carried out by various bodies on Mg alloys E J C.

Compression diagrams and temperature-hardness curves of some lead-tin-antimony alloys. Eduard Hertel and Arthur Demmer *Metallwirtschaft* 10, No 7, 125–6(1931)—Compression stress strain diagrams were prepd for 12 Pb-Sn-Sb alloys, *with samples 20 mm diam and 25 mm high the load was applied at the rate of* 0 01 mm per sec. These results and Brinell hardness tests are shown in the tabulation. In 10 x ray examns, the existence of a tetragonal Sn rich, a trigonal Sb-rich and a cubic constituent was found and the absence of any definite Sn-Sb compds was proved

| No | Compn Sn | Pb | Sb | Cu | Ni | Mg | P | Load kg/sq mm at Compression 0 2% | 0 4% | 0 9% | 1 8% | 3 6% | Brinell hardness at 20° | 100° | Ratio 0 4%/0 2% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100 | | | | | | | 2 51 | 2 94 | 3 40 | 3 7 | 4 03 | 12 8 | 5 | 1 17 |
| | | 100 | | | | | | 2 07 | 2 58 | 3 08 | 3 39 | 3 69 | 6 1 | 3 8 | 1 24 |
| | | | 100 | | | | | 5 31 | 8 64 | 12 54 | Broke | | 49 0 | 34 5 | 1 06 |
| | | | | 100 | | | | | | | | | 63 0 | 57 0 | . |
| I | 50 | 50 | | | | | | 2 57 | 4 09 | 4 77 | 5 20 | 5 49 | 14 5 | 6 8 | 1 59 |
| II | 48 | 48 | 4 | | | | | 3 42 | 4 59 | 5 56 | 5 81 | 5 86 | 18 6 | 8 0 | 1 34 |
| III | 44 | 44 | 12 | | | | | 4 26 | | 7 00 | 7 47 | 7 77 | 24 9 | 9 5 | |
| IV | 42 | 42 | 16 | | | | | 4 36 | 6 04 | 7 95 | 8 51 | 8 84 | 28 4 | 13 0 | 1 36 |
| V | 40 | 40 | 20 | | | | | 4 87 | 6 53 | 8 86 | 9 75 | 10 19 | 30 0 | 13 5 | 1 33 |
| VI | 40 | 40 | 15 | 5 | | | | 5 11 | 7 33 | 9 89 | 10 45 | 10 87 | 43 0 | 22 8 | 1 43 |
| VII | 40 | 45 | 10 | 5 | | | | 4 44 | 6 87 | 9 39 | 9 98 | 10 23 | 30 4 | 12 4 | 1 54 |
| VIII | 40 | 40 | 15 | 3 | 2 | | | 4 78 | 7 10 | 9 89 | 10 40 | 10 67 | 29 7 | 15 9 | 1 48 |
| IX | 40 | 40 | 12 | 3 | 5 | | | 2 55 | 3 10 | 5 17 | 6 71 | 6 87 | 31 2 | 17 2 | 1 21 |
| X | 40 | 40 | 9 | 3 | 8 | | | . | | | | . | 34 5 | 17 8 | |
| XI | 40 | 40 | 15 | 3 | | 2 | | 4 97 | 6 20 | 8 12 | 8 86 | 9 30 | . . | .... | 1 24 |
| XII | 42 | 42 | 10 | 2 | | 2 | 2 | 4 40 | 6 16 | 7 21 | 8 01 | 8 62 | .... | . ..., | 1 40 |

C. E Macfarlane

Silver-cadmium alloys. E R. Trews. *Deut. Goldschmiede-Ztg* 33, 56–8(1930). B. C. A.

Alloys of zinc and manganese. N. Parravano and V Montoro. *Mem. accad Italia, Classe sci fis. mat e nat* 1, Chim. No 4, 19 pp—*A study of the binary alloy* Zn-Mn by the x ray method. Alloys studied contained up to 23.3% Mn. In these alloys 3 different phases were detd. (1) a solid soln of Mn in Zn, the η phase, with hexagonal lattice that is similar to that of Zn, having up to 0 98% Mn, (2) an ε phase with hexagonal lattice different from that of Zn. This corresponds to the compd. $MnZn_7$, which contains 16 atoms ($2MnZn_7$), (3) a γ phase, with body-centered cubic *lattice, corresponding to the compd* $MnZn_3$ *and having 48 atoms* ($12MnZn_3$) per unit lattice. G T. Motok

The influence of third metals upon the constitution of the brasses. III. The effect of tin. O Bauer and M Hansen *Z. Metallkunde* 22, 405–11(1930).—Continuation of previously published articles (cf *C A* 25, 1302). The exptl. methods are described and the results expressed in diagrams representing sections of the ternary system The results are summarized in a partial ternary three-dimensional diagram. Robert F Mehl

Influence of the degree of rolling on the properties of α-brass. N. Davidenkov and V. Bugakov. *Metallwirtschaft* 10, 1–6(1931)—α-Brass (62 95% Cu, 37 03% Zn) was rolled to thicknesses corresponding to reductions varying from 0 to 80%. The tensile strength, elastic limit, elongation, Brinell hardness, the solv in $HNO_3$ and the micro- and x ray structure in the rolled condition were investigated. Between 20 and 30% reduction there is a crit. region where all curves of properties plotted against % reduction show discontinuities. On annealing at 200° the change in proper-

ties becomes continuous, showing that the discontinuities are caused by internal stresses C H LORIG

**Deep-etch test of brass.** W F GRAHAM AND L A MEISSE *Trans & Bull Am Foundrymen's Assoc* 2, 810-25(1931).—Deep etching of brass with a soln of $HNO_3$ (1.42 sp gr.) and 10% by vol of HCl (1.18 sp gr.) clearly brings out areas of discontinuity of the structure caused by sonims, crystal boundaries or dendrites C. H. L.

**Some properties of silicon "Al-bronzes."** L. J BRICH *J Inst Metals*, Advance copy, No 547, 18 pp (1931).—The effect of Si on the mech properties of Cu base alloys contg 5 7½ and 10% Al was detd The alloys were tested as cast, as cast and annealed by heating to 800° followed by air cooling, as quenched in oil from 800° or 600° and a few as forged Si contents were as high as 4.5% With 5% Al the addn of up to 2% Si improves the properties Further increase of Si increases the strength but lowers the ductility rapidly An annealed 5% Al, 3.5% Si alloy has the properties of a 10% Al alloy The addn of up to 4% Si to the 7½% Si alloy progressively increases the strength and decreases ductility With more than 3% Si the ductility is so low as to render the alloy useless The addn of even 1% Si to the 10% Al alloy produces a very low ductility A microscopic study of the alloys is included Also in *Engineering* 131, 498-500(1931) J L. GREGG

**Repairing pewter.** A EYLES *Brass World* 27, 27-8(1931).—The handling of pewter in the old days is outlined and practical notes are given for the reconditioning of old pewter vessels In repairing old pewter vessels, dents must be removed and all surfaces must be perfectly clean A good solder consists of Bi 50, Sn 25 and Pb 25%. Fluxes are rosin, Gallipoli oil, olive oil and a mixt of rosin and olive oil W. H B

**A sand-cast test bar for specification purposes for aluminum alloy castings.** S L. ARCHBUTT *1st Communications New Intern Assoc for Testing of Materials A*, 273-6 (1930).—Investigation into the use of a sand-cast bar prepd in sand molds of special and simple type, with Y-alloy of widely varying gas content, is described. Density, machining and tensile tests on bars so prepd are compared with corresponding values obtained from chill-cast bars of similar dimensions. The presence or absence of gas is clearly indicated in the results from the sand-cast bars, while relatively little effect is seen in the tests on chill-cast bars L. J C.

**Magnesium alloy castings.** C PLAYER *Metal Ind* (London) 38, 7-10, 31-2 (1931).—A review is given of the properties and foundry practice The application of a special flux Elrasal which is to prevent the contamination of the metal is described, as well as the use of powd S in the core material, to obtain clean castings. L. P

**The mechanical work of cutting and dressing rough castings.** M KURREIN *Z Metallkunde* 22, 382-6(1930).—A discussion is given of the evaluation of the mech. work performed, and its relation to design, by chisels, milling cutters, saws, grinding wheels and sand blast The article is too detailed to permit adequate abstracting ROBERT F. MEHL

**Some notes on a "burned-on" casting.** L. W. BOLTON *Bull Brit Cast Iron Research Assoc* 1931, No 31, 342-3.—Bureau Report No 68 describes physical and microscopic tests of a gray iron casting 1.5 in thick, which had an almost circular hole about 3 in in diam filled in by burning on new metal R RIMBACH

**Some new facts of a chemical nature in the field of corrosion investigations and in the protection of metallurgical products against corrosion.** JEAN COURNOT. *Bull soc chim* 47, 802-25(1930).—A review is given Among the protective processes mentioned, the electroplating of Ni, Cd, Cr and parkerizing are discussed in greater detail LEPOLD PESSEL

**Two years' progress in corrosion resistance.** JOHN A MATHEWS. *Paper Trade J* 92, No 10, 57-8(1931).—A brief review is given of some of the causes of failures of 18-8 alloys, particularly in the sulfite industry The latest metallurgical theories are given relative to C pptn., and the need for proper heat treatment of metals is stressed, as well as the chem. compn of the alloys Means of preventing metal embrittlement is indicated A PAPINEAU COUTURE

**The resistance of electrodeposits to corrosion, with special reference to cadmium and zinc.** W S PATTERSON *Metal Ind* (London) 36, 527-9, 579-82, 632(1930).—Of the 3 different types of corrosion of electrodeposits only the 1st is discussed the corrosion of the coating metal considered as a continuous envelope sealing completely the metal it is protecting The effects of impurities and of porosity of deposits upon corrosion were studied under a variety of conditions Electrodeposited and hot-galvanized Zn are compared Cd is regarded as an excellent coating for indoor work or for mild conditions of exposure, but for outdoor work where rain and atm pollution

play an important part Cd fails and Zn is the more satisfactory and durable
W H Boynton

**Corrosion resistance of light alloys** H. Sutton *1st Communications New Intern Assoc for Testing of Materials A*, 304–8(1930) —A review of the more important work of British investigators E J C

**The corrosion of aluminum casting alloys.** R. Sterner Rainer *Z Metallkunde* 22, 357–61(1930) —The sensitivity of Al casting alloys toward corrosion is dependent upon the compn and upon the corrosive agent Contrary to the usual opinion that the corrosion of Al alloys cannot be improved by addns, it has been shown that all those substances which are effective in sepg Fe and Si are effective in improving the corrosion resistance It is not certain that a protective coating forms on Al alloys inhibiting further action, though the effect of small addns of Sb and Bi furnish some support for such a belief Other addns decrease the corrosion resistance, especially Cu The application of special alloys to special conditions is discussed R F M

**Corrosion resistance of aluminum and its alloys.** M Bosshard *1st Communications New Intern Assoc for Testing of Materials A*, 293–303(1930) —The great resistance which Al offers to the action of air, water and aq salt solns is due to the formation of a skin of oxide Corrosion must be divided into 2 classes according to the way in which it occurs (1) general corrosion, soly, (2) local corrosion, formation of holes General corrosion occurs only under the action of corrosive agents which dissolve the oxide On the other hand, corrosive agents causing local corrosion have at first no oxide dissolving qualities *The ability to dissolve the inert surface layer locally is a secondary effect of electrochem action The effect of impurities* (Fe, Si, Cu, Mg, Zn and Mn) on the corrosion of Al is also discussed E J C

**Studies of corrosion in aluminum and aluminum alloys under the microscope.** H Röhrig. *Z Metallkunde* 22, 362–4(1930), cf *C A* 24, 1835 —From microscopic studies reported R. concludes (1) that deliberate or accidental inclusions are more noble to corrosive attack than the Al matrix, (2) that pores or voids offer assistance to the progress of corrosion, (3) that according to the nature of the attacking substance corrosion may proceed intergranularly or along strings of inclusions, or it may proceed concentrically from the starting point without regard for structure—the first is typified by the attack of sea water or sea water accelerated by $H_2O_2$ the second by boiling phenol or dil $H_2SO_4$ The purer the Al the fewer are the inclusions from which attack might start. Corrosion resistance may also be improved by heat treatment.
Robert F Mehl

**Corrosion of early Chinese bronzes.** Wm F Collins *J Inst Metals*, Advance copy, No 548, 25 pp (1931) —The probable mechanism of the formation of patina on early Chinese bronze is discussed in light of the corrosion studies made in England and the mechanism of mineral formation S was probably not a factor in the corrosion of the Chinese bronzes The ancient Chinese bronzes are unique in contg appreciable quantities of Pb The analyses of a large no of these bronzes are given The data also include the probable period of origin J L Gregg

**Corrosion of steel water pipes by stray electric currents.** Otto Rothe. *Rev brasil chim* 2, 249–54(1930) —After a period of 1–2 years, pipes showed holes which from appearances and the presence of $FeCl_2$ at places not yet perforated made the deduction reasonable that the damage was caused by continuous elec current R tested pipes at various points of the city and found that they were positively charged in relation to the soil around them, the p d from the voltage of the trolley car power lines had a max. of 10 v. It was possible to reproduce in the lab funnel-shaped holes full of $FeCl_2$, similar to the ones in the city water pipes. The perforations occur where the asphalt protection is damaged and the elec current is permitted to pass A diagram is given John M Ladino

**Experiments with coal-fired pot-annealing furnaces.** H Stäbler *Stahl u Eisen* 50, 381–91(1930) —An attempt has been made to elucidate some questions regarding annealing time, fuel consumption, choice of pot, etc, arising from an analysis of the details of operation of annealing furnaces in a no of works The max and min. temps. within the heating stock, in a semi gas-fired furnace capable of accommodating 5 pots, have been detd as a function of the time The annealing time, *i. e*, the time required for the min. temp within the material to reach the arbitrarily chosen value of 700°, is a linear function of the wt. of the charge ($W$) and is given by the equation $T = T_0 + KW$, where $T_0$ is the time required for the inner wall of the empty pot to reach 700°. The temp difference, $t_{max} - t_{min}$, when $t_{min} = 700°$, increases linearly with the wt of the charge until the latter reaches about 1500 kg, when it passes through a max. and thereafter decreases By suitably regulating the heating conditions, the char-

acteristic temp curves ($t_{max.}$ and $t_{min.}$ as functions of the time) can be varied to correspond with any desired heat treatment of the material. The calcn. of the efficiency of the plant from the annealing time is discussed and illustrated by 1 or 2 examples.
B. C. A.

Press welding of iron. Hans Esser *Arch. Eisenhüttenw.* 4, 199–206(1930).—E. dets. the relationship between the press weldability of pure Fe or Fe-C alloys and temp welding pressure, surface properties and grain size. Three dimensional diagrams are given, in which tensile strength is plotted against temp and C content of press-welded Fe-C alloys. With pure Fe, the strength of the welded surface increases with temp. The smaller the grain size the more suitable is the material for welding, and at higher temps. the welding ability increases markedly with welding pressure. With increasing C content in pure Fe-C alloys, the temp. range suitable for press welding becomes lower.
H. Stoertz

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The chemistry and metallurgy of Be (Dyson) 6. Sidelights on Cu as applied to brewing (Stewardson) 16. The melting point in the W–Re system (Becker, Moers) 2. Superstructure and magnetic susceptibility in the system Cu–Au (Seemann, Vogt) 2. Au and Ag solutions (Brit. pat. 338,383) 18. Clarifying suspensions [of ores] (Ger. pat. 517,055) 13. Apparatus for estimating the humidity of foundry sand (Ger. pat. 517,212) 1. Crystals of metals (U. S. pat. 1,793,672) 18.

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French, Herbert J. The Quenching of Steels. Cleveland: Am. Soc. for Steel Treating. 177 pp.

Münzer, Georg. Das Platin: Gewinnung, Handel, Verwendung. Leipzig: W. Diebener G. m. b. H. 136 pp. M. 6.75.

Suhr, Jean: L'alméleé. Paris: Revue de l'aluminum et de ses applications. 11 pp.

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Recovering ore values on an adhesive surface. Roger Luckenbach. U. S. 1,792,544, Feb. 17. Candle tar with an oil thinner such as crude petroleum is used in sepg. ore constituents such as Au, Ag, Pt or other metals. Na silicate may be added to assist in sepn. of gang.

Apparatus for amalgamation of metal constituents in ores. Edgar W. Myers. U. S. 1,794,090, Feb. 24. Structural features.

*Reducing iron from iron oxide ores.* Wm. W. Percy. U. S. 1,792,507, Feb. 17. Preheated ore is charged into a reducing chamber and subjected to the reducing action of gases comprising CO and H, and after the gases have passed from the reducing chamber a portion of them is withdrawn. The temp. of the remaining gases is maintained, and they are caused to pass downward through a bed of incandescent C in a bottom-blown gas regenerator exterior to the reducing chamber and thence return into the bottom of the reduction zone at a temp. at which complete reduction of the Fe oxide will take place. App. is described.

Working up lead ores and waste. Metallgesellschaft A.-G. Ger. 514,679, April 29, 1927. Pb ores and waste contg. Pb, such as flue dust, are worked up in a completely rotatable cylinder furnace in which metals such as Zn, Cd and As are volatilized as oxides. The Pb is obtained, without the addn. of C, by the thermal reduction of $PbSO_4$ and PbS with production of $SO_2$ and $SO_3$. App. is described.

Working up ores containing zinc, lead and copper. Albert F. Meyerhofer. Ger. 514,537, Dec. 24, 1924. A wet process for working up these ores consists in sepg. the Zn and Pb as sol. fluosilicates, leaving the Cu. The Zn and Pb fluosilicates are sepd. by fractional crystn. and worked up to obtain the metal with regeneration of HF. The Cu remains mostly as CuS and is worked up in the usual way. The detailed steps of the sepn. of the $ZnSiF_6$ and $PbSiF_6$ are given.

Treating zinciferous ores. A. Folliet and N. Sainderichin. Brit. 337,636, Oct. 19, 1929. Volatile metals in Zn bearing ores contg. S are extd. by blowing air in 2 stages onto a thin traveling layer of the ore, first onto ore alone for desulfurization and then onto the hot roasted product together with reducing C. App. is described. Cf. *C. A.* 24, 4499.

Tin from ores, etc. Soc. d'Électro-Chimie, d'Électro-Métallurgie et des Aciéries Électriques d'Ugine. Brit. 338,149, June 22, 1929. See Fr. 692,640 (*C. A.* 25, 1481).

Separating and refining metals. Hirsch, Kupfer- und Messingwerke, A.-G. (Cyrano Tama, inventor). Ger. 514,612, Aug. 31, 1928. Metals and metallic compds.

of differing m p are sepd by placing them near the perforated bend of a tube and heating to the various fusing temps. of the metals or compds. by elec. induction.

**Metal granules from molten metal.** Hartstoff-Metall A. G. Ger. 514,623, Dec. 6, 1928. Details of app. for atomizing the molten metal are described.

**Floating metal powders.** John R. Cain (to Richardson Co.). U. S. 1,794,883, March 3. A dry powd. metal such as Fe is treated with a volatile oily liquid such as benzene, and after the liquid is evapd. the powder is deposited on an aq. soln. of a metal salt such as a Cu salt soln., the metal of which will be replaced by the metal of the powder, and the resulting powder is consolidated into a foil on the surface of the soln. The product thus formed is suitable for integrating into foils by the action of an elec. current.

**Treating impure lead containing copper and arsenic.** John B. Schuettenhelm (to Bunker Hill & Sullivan Mining & Concentrating Co.). U. S. 1,794,047, March 3. For recovering Cu and As in the form of dross from hot impure lead to purify the lead, the initial dross is skimmed off from a molten mass of the material and the material of the molten mass is caused to continuously circulate (as by the action of a propeller submerged in the bath, in a described app.) downwardly from and then upwardly to the surface of the bath. A charge of $NH_4Cl$ is introduced into the circulating molten mass to sep. the Cu and As from the Pb so that the first two will rise by upward currents and gravity to the surface. The dross is skimmed off to recover the Cu and As from it while the mass is quiescent, the treatment with $NH_4Cl$ and circulation of the material is repeated, and the temp. of the mass is gradually reduced as the process proceeds to freeze the Cu and As and facilitate their isolation by reason of their relatively higher m. ps. as compared with Pb, so that the dross will gradually become drier as the process proceeds.

**Separation of gases such as sulfur dioxide from smelter fumes by adsorption under pressure.** Rudolph L. Hasche and Wm. H. Dargan (to American Smelting & Refining Co.). U. S. 1,791,377, March 3. An adsorbent material such as silica gel may be used and during "desorbing" sufficient heat is suppl'd to the material to balance the latent heat of vaporization of the gas and to maintain the temp. of the material substantially constant, so that the process is carried out substantially isothermally.

**Ladle for melting metals (suitable for use in dental work).** K. Bryner. Brit. 338,063, Jan. 14, 1929. Structural features of a double walled ladle the jacket of which may be filled with glycerol or other suitable liquid.

**Molding sand mixture for use in casting iron, steel, brass, etc.** Roy Cross (to Silica Products Co.). U. S. 1,793,011, March 3. Inert material such as sand and clay is mixed with about 2.5–5% of bentonite treated to increase its jelling power (suitably by conjoint use of MgO, Ca aluminate, Ca silicate portland cement or blast-furnace slag).

**Binder for mold materials such as sand.** Monroe S. Clawson. U. S. 1,794,888, March 3. Sawdust, resin and paraffin oil are used together.

**Coating molds such as those for casting automobile engine pistons, etc.** Nelson J. Quinn (to Metal Castings Holding Corp.). U. S. 1,794,536, March 3. Various mech. details are described for applying a liquid contg. refractory material such as MgO to matrix surfaces from a nozzle first placed close to the surface to build up a relatively thick coating rapidly and then held at a greater distance from the surface to produce a surface coating which has the desired degree of porosity.

**Ingot mold.** Edward R. Williams (to Vulcan Mold and Iron Co.). U. S. 1,795,065, March 3. Ingot molds are made of cupola cast iron which contains less than 0.05% S and has a high resistance to cracking through sudden expansion.

**Hot top for ingot molds.** Wm. H. Ramsen (to Valley Mould & Iron Corp.). U. S. 1,792,868, Feb. 17.

**Hot top for ingot molds.** Niklas P. Feiler (to Insulated Top Co.). U. S. 1,794,840, March 3.

**Composite ingots.** W. Albarts and F. Stein. Brit. 338,092, Aug. 28, 1929. In casting ingots suitable for rolling into "Vignoles" rails, etc., the partition for sepg. the molten metals forming the ingot is made of practically pure iron and may be perforated or woven.

**Ingots for producing non-porous articles such as rock drill pistons, etc.** Louis G. Firth (to Firth-Sterling Steel Co.). U. S. 1,792,381, Feb. 17. Metal such as steel is cast into an ingot having a body portion and flanges extending from the latter, the flanges are longitudinally sepd. from the body portion, and products such as pistons, valve seats or valves are formed from the flanges.

Apparatus for die-casting metal articles FRANZ F MANTEI (to Friedrich J. Haas) U S 1,793,110, Feb 17. Structural features.

Casting metals. HARRY ALBERT SCHWARTZ. Ger 514,875, Mar. 4, 1924 App for casting metals with cooling by a circulating liquid is described

Casting slab ingots from deoxidized steel. EMIL GATHMANN U. S. 1,793,314, Feb 17 App and various details for controlling solidification are described.

Casting blooms of aluminum. ELMER P McCLURE (to Aluminum Products Co.) U S 1,792,545, Feb 17 Mech features.

Casting aluminum alloy pistons, etc. FRITZ FEHRENBACH. U. S. 1,792,580, Feb 17 Al is melted and Si is added in an amt. about 18% or somewhat more of the metal mixt., and to this mixt are added particles of hard material such as Ag Cu, B, Be, Zr Mg Ti V, Mn Mo or Cr to approx. 5% of the ultimate metal mixt. The molten mass is poured into a vertical mold and chilled, so that the hard metal particles are distributed over the surface of the casting

Aluminum castings. THEODOR LAIBLE. Swiss 143 081, May 11, 1929 In making Al castings, NaCl, KCl, $K_2SO_4$, wood-charcoal dust, $Na_2B_4O_7$ $10H_2O$ and cryolite are added to the molten metal. These addns. prevent oxidation of the Al, adsorption of N, H or $CO_2$ and remove Fe, Si, etc., as scum

Casting copper alloys. ARTHUR KIRCHHOF Ger 513,738, April 16, 1924. Thick castings of Cu alloys are produced by adding CuO to the molten metal just before casting in the proportions of 1 to 2 parts CuO to 50 parts of metal

Casting "stainless steel" or similar alloys. W. E MARTIN and J A. BERLYN Brit. 337,413, July 29, 1929 Structural details are described of sand molds which may be combined with chills and wire reënforcing in their walls.

Alloys of tungsten or molybdenum carbides. FRIED KRUPP A.-G (Hermann Voigtländer and Otto Kaufels, inventors) Ger 514,728, May 3, 1928. See Brit. 310,876 (*C A* 24, 584)

Ore-roasting muffled-retort furnace. HOWARD S BAILEY and RAY A. BENNETT (Bailey to Bennett) U S 1,792,476, Feb 17

Calcine-dust seal for ore-roasting furnaces. BENJAMIN G CALL (to American Smelting and Refining Co) U S 1,793,274, Feb 17. Structural features.

Blast-furnace tuyère. E POHL, A WAGNER and GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G Brit 338 130, May 10, 1929

*Tuyère for blast furnaces.* HOLMES B GRONINGER. *U S. 1,793,849, Feb 24.*

Drying air for furnace blasts. G MALIOTH Brit 338,244, Aug 28, 1929 See Ger 515,216 (*C A* 25, 1480)

Multi-trough hearth furnace for distilling metals such as zinc, mercury and cadmium. E M S. INDUSTRIAL PROCESSES, LTD., R. A STOKES and E G L. ROBERTS. Brit. 337,471, Aug 3, 1929 Structural features.

Metallurgical furnace suitable for annealing, etc. JOSEPH HARRINGTON (to Joseph Harrington Co) U S 1,792,638, Feb 17 Structural features.

Furnace suitable for continuous heating of metal sheet bars, slabs, billets, etc. FRANK J WINDER (to Allegheny Steel Co) U. S. 1,793 037, Feb 17.

Furnace for heating metal billets and sheets. A. SMALLWOOD and J FALLON. Brit 337,302, June 25, 1929 Structural features

Furnace for heat treatment of small articles in baskets or other containers. FRANK T. COPE (to Electric Furnace Co) U S 1,794,151, Feb 24.

Heating salt baths for heat treatment of metals. ARTHUR E BELLIS. U. S 1,792,674, Feb 17 A low voltage a. c. is continuously passed directly through the bath material between an electrode immersed in the bath and the metal wall of the pot or container

Heat treatment and quenching procedure for differential tempering of car wheels. JAMES C DAVIS U S 1,794 445, March 3

Heat treatment of loaded electrical conductors. V E LEGG (to Electrical Research Products, Inc) Brit. 338 169 Nov 24, 1928. In making Cu conductors loaded with magnetic material, with heat treatment, the Cu is first heated to about 1000° in the presence of a reducing agent such as charcoal (in a closed vessel in a resistance furnace) and afterward the loading material is applied, followed by further heat treatment and annealing App is described

Apparatus for conveying materials such as metal bars or sheets through heat-treating furnaces. LEONARD LARSON (to Republic Steel Corp.) U S 1,793,940, Feb 24. Structural features.

Apparatus for annealing arched metal sheets. WM E WATKINS (to Copper Plate Sheet & Tube Co) U S 1,794,659, March 3 Structural features

*Iron.* WALTER G. CLARK. U. S 1,792,967, Feb 17 For producing a substantially C free metal, iron is melted and heated air is blown through it until about 75% of the Fe is converted into oxide, the residual air is displaced with N and heated H is then blown through the mass until the oxide is reduced to metal and until the C content of the metal is reduced to the desired limit.

Cast iron. EDWARD R. WILLIAMS (to Vulcan Mold and Iron Co.) U. S. 1,793,268, Feb 17 For making cast iron with a pearlitic structure, a charge of low Si and C contents is melted, the S content is reduced to below 0.05%, the molten metal is poured into a mold which is at room temp. and the casting is cooled normally without application of external heat.

Cast iron. MEEHANITE METAL CORP. Brit. 337,844, Aug. 13, 1929. Iron which has been produced by methods such as are described in Brit. 210,118 (*C. A.* 18, 1640), Brit. 292,164 (*C. A.* 23, 1382) and Brit. 312,126 (*C. A.* 24, 819) is heat treated by maintaining the casting at a temp. above the $Ac_1$ point (about 800°) for over 12 hrs. and then cooling (the first stage of cooling—as from about 900° to about 540°—being at a rate not exceeding about 10° per hr.)

Iron and iron alloys. T. D. YENSEN and N. A. ZIEGLER (to Associated Electrical Industries, Ltd.) Brit. 338,409, Jan. 18, 1929. For obtaining iron or alloys of Fe with Ni or Si, substantially free from C and O, there is added to the material such a quantity of either C or O that these elements are present in substantially equal atomic proportions and the material is melted while simultaneously removing the products of combustion as they are formed (as by evacuation or passing an inert gas through the furnace). C may be added as such and O may be added as free O, air or an Fe oxide or oxide of an alloying ingredient. The product may be allowed to solidify in a vacuum and cooled slowly from 900–1200° to normal temp. (with previous hot working if desired).

Heat treatment of iron and steel sheets. HERBERT M. COX and CARY M. SMITH (to Republic Steel Corp.) U. S. 1,792,573, Feb. 17. The sheets are heated to a temp. near the lower crit. point of the metal and maintained at this temp. for a time varying from 1/2–6 min. then heated to a temp. above the upper crit. point of the metal, maintained at such temp. for 2–6 min., then cooled rapidly to a temp. below the lower crit. point of the metal, maintained at such temp. for 2 min. or less, reheated to a temp. near the lower crit. point of the metal, maintained at this temp. for 2–8 min. and then permitted to cool to atm. temp. This treatment gives the metal good drawing and stamping properties.

Protecting iron and steel from corrosion. A. FOLLIET and N. SAINDERICHIN. Brit. 337,562, Oct. 10, 1929. Articles of iron or steel are heated to 850–1050° in a mixt. comprising finely granulated Al free from Cu or Zn (the $Al_2O_3$ present as impurity not exceeding 6%), an inert material of high thermal cond. such as SiC free from graphite (this material constituting 40–60% of the volume of the mixt.), and 2–5% of one or more chlorides of non-ferrous metals alloyable with Fe, such as Cr, Ni or Mn. Double chlorides may be used and $NH_4Cl$ 1.0–2.5% may also be added. A layer of an alloy of Fe, Al and the metal of the chloride used is formed on the articles.

Protecting iron and steel from corrosion. A. FOLLIET and N. SAINDERICHIN. Brit. 337,635, Nov. 28, 1929. A protective surface alloy is formed on iron or steel articles by embedding them in a mixt. of Al or Al-Mg alloy, oxides or oxidized ores of metals to be alloyed with the iron or steel (such as ilmenite, calcined pyrolusite, calcined garnierite or roasted nickeliferous pyrites, chrome Fe ore or wolframite), and 2–10% of one or more chlorides of the same metals. By heating in mixts. of this kind surface alloys are formed such as chrome-Ni steel, Ti-Mn steel or the like. Cf. *C. A.* 24, 4254.

Open-hearth steel. ALEXANDER L. FEILD (to Republic Steel Corp.). U. S. 1,794,068, Feb. 24. A melted charge is refined in the presence of a slag in which a substantially constant percentage of Fe oxide is maintained by necessary tests and adjustments.

Open-hearth steel. GLENN E. HILLIARD. U. S. 1,793,442, Feb. 17. A molten bath of carbonized metal in the furnace is maintained in mobile condition and a strongly oxidizing flame is passed over the bath to effect oxidation of impurities. Finely divided scrap is introduced at such a rate of speed and in such volume that it is heated "nearly to molten condition" while approaching the surface of the bath but is not excessively oxidized by the flame.

Hardening steel by nitridation. F. KRUPP A.-G. Brit. 337,404, May 25, 1928. Nitridized articles of high resistance to stresses produced by high pressure or impact are made from steel free from Al and contg. Cr 1–20, C 0.25–3.0, W 0.5–3.0% and up to a total of 3% of Si, Mn, V and Mo (not more than 1% of any one of these). A

temp of about 500° and a time of about 70 hrs is suitable for the nitridation Cf. *C A* 24, 818.

Treating steel scrap in open-hearth furnaces. GLENN E HILLIARD U. S. 1,793,441, Feb 17 Fine metal scrap is introduced into open hearth furnaces in the form of a free falling stream of such volume and at such rate that the occluded air will be consumed by the furnace gases while the scrap is moving into charged position.

Stainless steel. POLDIHÜTTE A.-G Ger 514,944, Sept. 2, 1923 An acid- and rust proof steel contains Ni 20–25, C 0.2–0.8, Cr 9–27 and not more than 0.5% Mn or Si Cf *C A* 25, 1792

Alloys resistant to corrosion at high temperatures. R A HADFIELD Brit. 337,893, Sept 11, 1929 *An alloy suitable for elec. furnace resistors* contains Fe together with Cr 24–35 W 3–5 and Al 3–7%, the proportions of C, Mn and Si being low (suitably about 0.6, 0.3 and 0.6%, resp.)

Aluminum alloys. ALUMINIUM INDUSTRIE A.-G Brit. 337,922, Oct. 12, 1928. Elongation and bending and rolling capability of sheets, bands, wires, etc., of Al alloys of high tensile strength is improved by plating them with an Al alloy of lower tensile strength but of high elongation and good bending and rolling capability such as one contg Mn 1–4, Mg 0.5–6% and up to 1% Sb, or one contg Mn 0.5–2, Mg 0.3–1 and Si 0.5–2%, or up to 2% of Pb Various details of manuf are given.

Aluminum alloys. BIRMINGHAM ALUMINIUM CASTING (1903) CO., LTD., and P PRITCHARD Brit 337,558, Oct 9, 1929 Alloys comprising Al 94.5–96, Mg 3.5–5.0 and Mn 0.5% are made by melting Al and Mg and adding a melted Al Mn alloy.

Aluminum alloys. ALUMINIUM INDUSTRIE-A.-G Swiss 142,629, Sept. 23, 1929 An alloy suitable for vehicle buffers contains Al, with Mg 0.3–1, Si 0.5–2, Mn 0.5–2 and Cu 3.5–5%

Copper alloys. HANS KANZ. Swiss 141,610, Feb 1, 1929 An alloy for grinding contains Zn 15–50%, up to 8% Sn, and Cu, with addn of any of the metals Al, Fe, Mn, Ni, Sb, Pb or Si. *The example mentions an alloy contg* Cu 62, Sn 4, Zn 30, Pb 2.5 and Ni 1.5% Cf *C A* 25, 908

Copper alloys containing also silicon, nickel, iron and zinc. EUGEN VADERS. U S 1,792,944, Feb 17 Casting alloys suitable for tools are formed mainly of Cu together with Si 1–4 Ni 1–5 Fe 4–6 and Zn 8–20% Cf *C A* 24, 4503

Iron alloys WILLOUGHBY S SMITH, HENRY J GARNETT and JOHN A HOLDEN Ger 512,727, April 29, 1928 An alloy of high permeability for use in elec. circuits contains 4–10% Cr 1–4% Al 0.05% C and the rest Fe

Iron alloys. VEREINIGTE STAHLWERKE A.-G Brit. 338,071, Jan. 30, 1929 In the manuf of Fe alloys, the rusting tendency of the alloy is detd rapidly by first testing in the normal way the power of the material to withstand vibration stresses, and then ascertaining the power of the material to withstand vibration stresses while exposed to the corrosive action of water or moist air during the vibration test (the method being based on the fact that the rusting of steel proceeds in the same proportion as the resistance to fatigue stresses is reduced in the corrosion fatigue test)

"Rustless" iron alloys FREDERICK M BECKET and JAMES H CRITCHETT (to Electro Metallurgical Co) U S 1,793,153, Feb 17 In prepg a low-C alloy of Fe and Cr of "rustless" character, *the metal bath is side-blown with a blast* contg 50% or more free O to effect oxidation of constituents of the bath including C and a minor proportion only of the Cr and the temp of the bath is raised to and maintained above 1600° solely by *the exothermic reactions induced by the blowing operation, and* the blowing is continued until the C content of the bath is reduced to 0.2% or less

Iron-chromium alloys SKODA WORKS, PLZEN Brit. 337,767, April 18, 1929 Fe-Cr *alloys contg* Cr 20–40 and C 0.2–3% contain also Ti 1–15 (preferably 1–5) and up to 15% of Al (preferably 5% or less)

Spongy metals. HENNING G FLODIN. U S 1,792,532, Feb 17. See Fr 662,960 (*C. A* 24, 330)

Steel alloys containing chromium. F KRUPP A G Brit. 337,349, June 26, 1929 Austenitic Cr steel or Cr Ni steel alloys contain also such a proportion of V or Ti or both as to enter into stable combination with the C dissolved by the austenitic basic mass and retain the alloy in austenitic form even when it is heated to 500–800°. The quantity of Ti or V is preferably at least twice that of the C.

Alloy steels. W. MATHESIUS and H MATHESIUS Brit 337,715, March 16, 1929 In making Ti steel, previously decarburized and deoxidized liquid steel is passed from a ladle through a discharge brick in the bottom into a second ladle contg pulverized or briquetted Ti thermic mixt.

Alloy steels. R. SERGESON. Brit 338,315, Oct. 18, 1929 Alloy steel articles

which have been nitrided at about 400–560° for about 5–100 hrs. are reheated to between 590° and the lower crit. point of the core material (preferably about 650°) to decrease the brittleness and increase the toughness of the case. An example is given of the treatment as applied to a steel contg. C 0.32, Mn 0.56, Si 0.18, Cr 1.43, Mo 0.18 and Al 1.3%.

Alloy steels. J. T. Whiteley (to I. W. Heyman and S. L. Zavon, trading as Multi-Steel Co.). Brit. 337,919, Jan. 24, 1929. Alloys are formed contg. C 0.2–0.5% together with Mo 0.4–0.75, Cr 0.1–0.3, Si 0.2–0.5, Mn 0.5–1.0, Zr 0.5–1.5, Ti 0.1–0.3, Cu 0.5–0.9 and Ni 0.1–0.35%, and may be hardened by heating to about 925–950° and quenching.

Magnesium alloys. I. G. Farbenind. A.-G. (*Adolf Beck* and *Hugo Dibelka*, inventors). Ger. 517,102, July 26, 1928. Addn. to 493,827 (*C. A.* 24, 2713). The method for rendering the surface of Mg alloys non-corrosive, described in 493,827, is modified by moistening the surface with dichromate soln. and drying, before carrying out the dichromate and $HNO_3$ treatment.

Magnesium alloy suitable for pistons of internal-combustion engines. Walther Schmidt (to I. G. Farbenind. A. G.). U. S. 1,793,023, Feb. 17. Mg is alloyed with other metals such as Cu 15, Al 2 and Si 3%.

Strengthening magnesium and its alloys. I. G. Farbenind. A.-G. Brit. 337,706, March 11, 1929. The strength, especially the compression yield point, of Mg and its alloys is improved by hot working (suitably at 200–500°).

Silver alloys. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Ger. 514,772, Apr. 7, 1925. Alloys of Ag, Cu and Ag, Cu, Cd are improved by heating to glowing to a temp. just below that at which fusion commences and quenching. The process may be repeated with cold mech. working between the processes. In an example, a Cu, Ag alloy is heated to 730° and cooled in water.

Tungsten-carbide alloys. Joseph T. Terry. U. S. 1,792,943, Feb. 17. For controlling the C content of a W carbide alloy to prevent the formation of graphitic carbon, CaO is added to W and the mixt. is fused in a carbon crucible.

Steam and vacuum treatment system for drying spools of water-quenched wire. Charles B. Carr (to Western Elec. Co.). U. S. 1,793,275, Feb. 17. App. and various details of steam and vacuum treatments are described.

Pickling metals with acid solutions. Vanderveer Voorhees (to Standard Oil Oil Co. of Ind.). U. S. 1,793,146, Feb. 17. An acid soln. such as a 5–10% soln. of $H_2SO_4$, for use in pickling metals such as iron or steel, is prepd. with an addn. of org. substances recovered from sludge derived from a cracked petroleum distillate sol. in dil. $H_2SO_4$ but free from sludge substances sol. only in strong $H_2SO_4$. These substances serve to inhibit corrosion of the metal.

Pickling bath for steel plates, wire, etc. Edwin C. Wright (to National Tube Co.). U. S. 1,792,958, Feb. 17. A 5% $H_2SO_4$ soln. is used with an addn. of about 0.05% of a sulfonated product of coal tar distillates b. 270–350° (other than anthracene oil), which serves as an inhibitor.

Purifying acid waste liquors such as those from pickling steel. John T. Travers (to Ohio Sanitary Engineering Corp.). U. S. 1,793,342, Feb. 17. Acid waste liquors contg. Fe salts are treated with a mixt. of lime and a solid waste product recovered from an alkali plant, the latter being in a quantity about 4 times that of the lime.

Case-hardening (nitriding) metal articles. John J. Egan (to Electro Metallurgical Co.). U. S. 1,793,309, Feb. 17. Articles such as iron alloys are heated in the presence of a nitriding agent such as $NH_3$ and at least one of the N oxides.

*Local case-hardening of metals.* Aubert & Duval Frères. Ger. 517,077, Nov. 18, 1927. The parts to be protected from nitridation are coated with a salt or a salt mixt., or with a glaze, enamel or the like, *e. g.*, with KCl or with a mixt. of $BaCl_2$ 2, KCl 1.5, $CaCl_2$ 1 and NaCl 1.25 parts, or with a mixt. of PbO 7, sand 2 and borax 1 part. The parts to be protected may be painted with water glass and the powd. salt, etc., then applied.

Sealing metals to insulating materials such as glass. N.-V. Philips' Gloeilampenfabrieken. Brit. 337,491, Aug. 12, 1929. In forming vacuum tubes, etc., comprising metal members such as rings or disks sealed to glass or the like, the metal at the point of union consists of an alloy preferably contg. 50–90% Fe together with one or more of the elements W, Mo, Ta, Cb, Co or Si, the coeff. of expansion of the metal being about the same as that of the insulating material with which it is to be united. Substances such as Cr, Al or Mg (preferably less than 5%) which form a coherent oxide film also may be added. Various structural details of manuf., etc., are described.

Apparatus for spraying metallic materials. Theo E. Bridger. Swiss 141,331,

Mar 21 1929 The metal is finely divided, centrifuged and subjected to an intermittent elec. current in an atm of indifferent gas. Cf *C. A* 24, 51.

**Coating articles with vaporized or atomized metals, etc.** KURT RICHTER. Ger 517,419 Dec 8, 1928. Low pressure vaporization or cathodic atomization of the coating materials is effected in a flattened vessel having a relatively small vapor space through which a gas stream is led at a high velocity. Back-diffusion of the coating material is thus diminished

**Protective coatings on metals.** A ARENT Brit. 338,221, Aug 20, 1929 Metals such as iron or steel are provided with a protective coating or surface layer by treatment with a soln of a chloride of As Sb or Bi in a substantially non aq solvent such as $C_6H_6$ kerosene acetone AmOAc, EtOAc or their mixts, or with the vapor of such a soln if a volatile chloride is used The material may be preliminarily coated with Zn if desired and a surface thus prepd is suitable for further coating with paint, etc.

**Coating and coloring aluminum alloys.** A. PACZ. Brit. 338,204, Aug 16, 1929 A colored protective coating is formed by treatment with a soln. contg chromates or dichromates or both in quantity not exceeding 0.17% by wt. calcd. as $CrO_3$ and a comparatively large quantity of an alk. substance such as not less than 1.5% of $Na_2CO_3$. Various colors are produced depending on the compn. of the Al alloys, which may contain Si, Zn, Mn, Sb, Mo Cu, Ag, Sn or W, small quantities of metal salts may be added to modify the coloring

**Coating iron or steel sheets, etc., with metals such as zinc-aluminum alloy.** AMERICAN ROLLING MILL Co Brit. 337,399, July 29, 1929 The metal to be coated is passed successively through a flux, a bath of molten Pb and a bath of molten Zn-Al alloy contg 3–20% Al App and various details of operation are described. Cf *C. A* 25, 909

**Apparatus (with squeezing rolls) for coating metal sheets with materials such as tin.** EDMUND W SHINN and ROBERT H. SCOTT U. S. 1,794,093, Feb. 24. Structural features.

**Determining the thickness of metal coatings such as tin and chromium.** WESLEY A. RICHARDS and PAUL H KRAMER. U S. 1,792,606, Feb 17. The coating is liberated by a stripping acid such as 37% HCl so that the salt of the coating will be in reduced condition The reduced salt is measured by means of I soln. and starch as an indicator in the reaction reagent.

**Cement mixture suitable for uniting metals.** WM. R. CHAPIN. U. S. 1,793,156, Feb 17 Silico-Mn 65 and powd. borax glass 1–10 are used with fine steel filings to make up about 100 parts total U S 1,793,157 specifies silico-Mn 40, powd. Cu 25, powd. borax glass 1–10 and fine steel filings to make a total of about 100 parts. Cf *C. A* 24, 5281

**Uniting iron with other materials such as tin or nickel.** WM H. SMITH. U S. 1,793,757, Feb 24 In forming alloys of Fe, finely divided iron such as "sponge iron" is assocd with the other alloy elements such as Sn or Ni while still comparatively cold, and the assocd materials are pressed into the general desired form so that they hold together by adhesion They are then heated to a temp somewhat below the m. p of the iron to partly fuse the mass, heated up to alloying temp., and then subjected to pressure to effect final alloying and shaping

**Hard metal composition for cutting tools and dies.** FLOYD C. KELLEY (to General Elec. Co) U S 1,794,300, Feb 24 A powd. mixt. consisting largely of W but contg appreciable quantities of C and Co is treated with a small percentage of an alkyd resin and moistened with a solvent such as acetone. The material is pressed, heated sufficiently to vaporize the solvent and resin, further heated to sintering temp and subjected to pressing while highly heated.

**Use of tungsten carbide for making hard tough metal products.** SAMUEL L. HOYT (to General Elec. Co) U S. 1,794,229, Feb 24 Powd W carbide is mixed with a cementing metal such as Co and the mixt. is pressed into the desired form to make tool bits or other articles, sintered into a hard mass and then subjected to pressure while subjected to a sintering temp Cf *C. A* 24, 5016

**Apparatus for flexing metal wire or strips such as iron or steel while immersed in a liquid such as sulfuric acid to remove surface impurities.** FRANK M. DORSEY (to Madsenell Corp) U S. 1,793,914, Feb 24

**Filaments of material such as metals.** GEORGE F TAYLOR (to Baker & Co.) U S 1,793,529, Feb 24 Material such as a metal of low or high m. p. sheathed with borax, glass or quartz is drawn into a cored filament while heated to render it sufficiently fluent and the cored filament is solidified close enough to the heated substance so that the substance will flow to the point of solidifying App is described.

**Indented metal foil** Aluminiumwerke A.-G., Rorschach Brit 337,710, May 24, 1929 Metal foils with deep indentations are formed by passing smooth foil through goffering rollers together with paper which is subsequently burned away in an annealing process (suitably at 300–550°)

**Metal bearings.** Henry L. Barton (to General Motors Research Corp.). U. S. 1,702,565, Feb 17 Powd. bearing metal such as finely comminuted Babbitt alloy is placed in a bearing back and subjected to pressure to cause it to unite with the back in good heat conducting relation

**Magnetic material comprising nickel, chromium, cobalt and iron.** Gustaf W. Elmen (to Bell Telephone Laboratories Inc.) U. S. 1,702,483, Feb 17. A material comprising Ni 10–80 and Co 5–80, Fe between 0 and 50% of the entire Ni-Fe-Co content and Cr up to 12% is heat treated to give it good magnetic properties with small magnetizing forces, and is suitable for use in making loading coils of signaling systems, etc. Cf. *C. A.* 25, 678

**Metal for use in spark-plug manufacture.** A. A. Postnikoff and P. P. Zverkidze Brit. 337,889, Sept. 7, 1929 The metal surfaces exposed to the combustion gases are coated with Cr or a Cr alloy to a thickness of 0.0001–0.00025 in.

**Cutting elements for paper-making engines** Clarence W. Noble (to Noble and Wood Machine Co.) U. S. 1,702,516, Feb 17 The side portions of cutting edges are formed of relatively hard metal such as Cr and the central portions of softer metal such as steel

**Welding electrode.** John O. Ritter (to Westinghouse Elec. & Mfg. Co.) U. S. 1,701,983, March 3 Welding electrodes formed of an alloy of Fe 65–45%, minor impurities and Ni 35–55% produce welded joints substantially free from residual stresses by deposition at a temp. near or below its low annealing temp. Various details of temps. for working with varying compns. of alloy are described

**Arc electrodes for welding.** J. H. Aitchison, H. Bull and L. Johnson Brit. 337,589, Oct. 25, 1929 Billets are formed of one or more metals of an alloy to be welded (such as Cr steel for welding "stainless steel") and are provided with one or more longitudinal cores or coverings of the other metal or metals of the alloy to be welded (such as Ni), and the composite billet is worked into composite electrodes by rolling, forging or drawing Various details and modifications of manuf. and compns. for electrodes are given

**Electrode for metal deposition by the electric arc process.** Arthur P. Strohmenger (to Quasi Arc, Inc.) U. S. 1,701,012, Feb 21 An electrode is formed with a flux-forming covering and a ferrous core contg. a quantity of Mn dependent on its diam. and varying inversely as the diam. from 2.25% to 4.0% for cross sections of electrode cores from 0.012 to 0.005 sq. in. This proportion of Mn avoids a brittle zone in the deposit. Cf. *C. A.* 24, 52

## 10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

**The determination of the empirical formula of a hydrocarbon.** Edward W. Washburn. *Bur. Standards J. Research* 5, 867–90(1930).—The precision aspects are discussed of the problem of detg. the mol. wts. and H content of a hydrocarbon, and of combining the results so as to obtain the empirical formula. "A detn. of the Br (or other) addn. no. may, in some instances, be substituted for the mol.-wt. detn. or for the *combustion analysis, or may be utilized to decrease the accuracy which would otherwise be required in either or both of these detns.*" *By following the lab. procedure outlined* it should be possible to det. the empirical formula of any pure hydrocarbon contg. not more than 100 C atoms. R. E. Schaad

**Formation of carbon tetrachloride from the elements.** Alfred Stock, Hermann Lux and Werner Wustrow. *Z. anorg. allgem. Chem.* 195, 149–57(1931).—Specially prepd. C made from filter paper and well outgassed was used. This prepn. was placed in a quartz tube in a furnace at either 400° or 500° (only 2 temps. were studied) and measured amts. of $Cl_2$ were admitted, the contents of the tube were analyzed at various periods. $CCl_4$, HCl and traces of $CO_2$ were found. Heating periods were for as long as 90 hrs. Activation of the C was attempted. The effect of HCl on the reaction vessel was also studied; in 70 hrs. 3.7 cc. HCl was quantitatively converted into $H_2O$. $Cl_2$ had practically no effect on the glass. *William H. Vaughan*

**Pentane.** C. R. Noller. *Org. Syntheses* XI, 81–6(1931).—Details are given for

the prepn of $C_8H_{18}$ from $Me(CH_2)_4CHBrMe$ through the Grignard reaction; yield, 50–3%. C J West

Carotene. III. Hydrogenation and optical properties of carotene and its hydrogenated derivatives. James H C Smith *J Biol Chem* 90, 597–605(1931), cf *C A* 24, 3794.—By reduction of carotene (I) in $Et_2O$ with Al-Hg, filtering and drying *in vacuo*, *dihydrocarotene*, $C_{40}H_{58}$, was obtained as a noncrystallizable orange compd., $[\alpha]_D^{18}$ 419° ($Et_2O$), 380° (EtOH). I had $[\alpha]_D^{18}$ −63° = 17% ($CS_2$). The degree of hydrogenation by Adams' catalyst varied with the amt of catalyst. With 5.2 g I in cyclohexane and 0.126 g catalyst, 9 mols $H_2$ was absorbed to give a colorless oil, $C_{40}H_{74}$, *octadecahydrocarotene* (II), $[\alpha]_D^{14}$ 7.56° ($CS_2$), $d_4^{29.2}$ 0.8828, $d_4^{15}$ 0.8524, $n_D^t$ 1.4962 − 0.000367 *t*, $M_D$ 180.3 (calcd for straight chain 178.2). With 0.85 g I and 1.84 g catalyst, 10.23 mols $H_2$ was absorbed to give a clear viscous oil, $C_{40}H_{76}$, *eicosahydrocarotene* (III), $b_{0.005}$ 206°, $[\alpha]_D^{20}$ 0.337°, $n_D^{24.2}$ 1.4821, $d_4^{24.2}$ 0.8748, $M_D$ 181.42 (calcd for straight chain 180.32). From the low mol. exaltations of II and III the presence of the cyclopropane rings is deduced. The steady decrease in rotation on hydrogenation shows that the 2 linkages hardest to sat. are those producing asymmetry. The 2 bonds reducible by Al-Hg are probably attached to rings (Kuhn and Winterstein, *C. A.* 23, 4682). A structure of 9 conjugated double bonds, conjugated further with 2 cyclopropane rings, is assigned to I, this agrees with the formula of Karrer, *et al* (*C A* 25, 519). K. V. Thimann

A method for the preparation of substituted acetylenic hydrocarbons. René Truchet *Compt rend* 191, 854–6(1930).—Methylacetylenes are satisfactorily prepd by treating a Na acetylide with $Me_2SO_4$, $PhSO_2Me$ or $p$-$MeC_6H_4SO_2Me$. The reaction with aromatic $SO_2H$ acids appears to be perfectly general, 45–60% yields resulting from treating RC:CNa with various sulfonic esters for 3 hrs. at 80°, decompg with $H_2O$, extg with Et$_2$O, drying over $CaCl_2$, distg *in vacuo* and redistg at atm. pressure. $C_5H_{11}$-C:CNa (I) plus $p$-$MeC_6H_4SO_2Et$ (II) gave 45% of *3 nonine*, b 155–7°, $d_{15}$ 0.763, $n_{20}$ 1.429, M R 41.9 (calcd 41.77). $C_6H_{13}C$:CNa with II gave *3-decine* (47% yield), b 175–6°, $d_{21}$ 0.765, $n_{21}$ 1.433, M R 46.6 (calcd 46.4). I with $p$-$MeC_6H_4SO_2Bu$ gave *5 hendecine* (60% yield), b 195–6°, $d_{20}$ 0.785, $n_{20}$ 1.437, M R. 52.0 (calcd 51.1). I with $PhSO_2C_5H_7$ gave *amylallylacetylene*, $b_{13}$ 74.5–5.5°, $d_{20}$ 0.788, $n_{18}$ 1.445, M R. 46.2 (calcd 46). By-products of these reactions may be ethers produced by heating the sulfonic esters, alcs. from sapon. of the esters or 1-chloroacetylenic hydrocarbons resulting from the presence of small quantities of sulfonyl chloride. These chloroacetylenes are especially hard to remove so care should be taken to use esters contg. none of the chloride. C H P.

Preparation of chlorinated acetylene derivatives. Stephan Langguth *Chimie & industrie* 25, 225(1931).—Directions are given for the prepn of $SbCl_5$, $SbCl_3$, $C_2H_2Cl_4$, $C_2H_3Cl_3$, $CCl_2$:CHCl and $(PhNH)_2C$:CHNHPh. A. Papineau Couture

The higher alcohols of the paraffin series and their technical significance. Schrauth *Chem Ztg* 55, 3, 17–8(1931).—The higher alcs. are now available, made by reduction of the corresponding acids. Various uses are indicated, chiefly as the sulfuric and sulfonic acid derivs. in *medicine* and as *emulsifying agents*, as esters in *perfumery* and as *waxes*. T. H. Chilton

Some $\alpha,\alpha$-dichloro and $\alpha,\alpha$-diethoxy tertiary alcohols and the hydroxy aldehydes derived from them. A Avy *Bull soc chim* [4], 49, 12–8(1931).—The general problem of prepg. $\alpha$ HO aldehydes of the type $R_2C(OH)CHO$ (I) from $R_2C(OH)CHCl_2$ (II) and $R_2C(OH)CH(OEt)_2$ (III) was investigated. Type II compds. were prepd. by treating $Cl_2CHCO_2Et$ (IV) with the suitable organomagnesium bromide since the bromides gave better yields than the iodides used heretofore. IV was obtained in 90% yield by boiling for 6 hrs. 100 g $Cl_2CHCO_2H$ with 300 g abs. alc. in the presence of 3 cc. $H_2SO_4$. $Me_2C(OH)CHCl_2$, obtained in 74% yield, m. 8°, $b_5$ 38°, $b_{16}$ 52°, $d_4^0$ 1.2507, $d_4^{19}$ 1.2363, $n_D^{19}$ 1.4598. $Et_2C(OH)CHCl_2$ (V), obtained in 70% yield, $b_{11}$ 76°, $d_4^0$ 1.1999, $d_4^{21}$ 1.1750, $n_D^{21}$ 1.47102. $EtCOCHCl_2$ is obtained in the proportion of 12 g. to 100 g. V, in the prepn. of V. $Pr_2C(OH)CHCl_2$ and $Bu_2C(OH)CHCl_2$ were obtained by this method in very poor yield (15%) and in an impure state. $Ph_2C(OH)CHCl_2$ (VI), obtained as chief product along with $Ph_2$ and an unidentified very slightly sol. compd., $b_4$ 200°, crystals from a mixt. of $Et_2O$ and petr. ether, m. 95–6°. $PhCH_2MgBr$ acted on IV to form dibenzyl as the only isolated product. Type III compds. were prepd. more readily and in better yield than type II compds. by the action of the suitable organomagnesium compd. on $(EtO)_2CHCO_2Et$. As the reaction is violent cooling is necessary. Type III compds. are more sensitive to the action of mineral acids than type II compds. $Me_2C(OH)CH(OEt)_2$ (VII), obtained in 70% yield, $b_{18}$ 75°, $d_4^0$ 0.9478 $d_4^{24}$ 0.9277, $n_D^{14}$ 1.41109. $Et_2C(OH)CH(OEt)_2$ (VIII), obtained in 83% yield, $b_{18}$ 95°, $d_4^0$ 0.9409, $d_4^{11}$

0.9230, $n_D^{21}$ 1.4255. $Pr_2C(OH)CH(OEt)_2$ (IX), obtained in 70% yield, $b_4$ 98°, $d_4^0$ 0.9261, $d_4^{13}$ 0.9073, $n_D^{13}$ 1.4258. $Bu_2C(OH)CH(OEt)_2$ (X), obtained in 70% yield, $b_1$ 101°, $b_7$ 122°, $d_4^0$ 0.9167, $d_4^{19}$ 0.9001, $n_D^{19}$ 1.4315. $Ph_2C(OH)CH(OEt)_2$ (XI), obtained in 55% yield, $b_4$ 170°, m. 125°. Attempts to prep. type I compds. by heating type II compds. with $CaCO_3$ suspended in water, $Na_2CO_3$, PbO and water for various periods at various temps. never resulted in the isolation of type I compds. though small amounts of impure $Et_2C(OH)CHO$ (XII) were obtained by refluxing 72 g. V for 36 hrs. with 300 cc. water and 50 g. $CaCO_3$, extg. with ether, drying and fractionating, when 15 g. of a yellow oil $b_{14}$ 55–7° was obtained which gave a semicarbazone (XIII) of XII, m. 204–5°. Hydrolysis of XIII with aq. $(CO_2H)_2$ gave a liquid $b_{13}$ 28°, semicarbazone m. 210°, oxime m. 62°. Analysis indicates these compds. are derived from XII after elimination of 1 mol. of water. Hydrolysis of type III compds. with warm dil. HCl yielded type I compds., but with cold concd. HCl intermediate compds. of type XIV apparently resulted according to the scheme $2R_2C(OH)CH(OEt)_2 \longrightarrow R_2C(OH)CH(OH)OEt + R_2C(OH)CHO \longrightarrow O\,CR_2\,CH(OEt)\,O\,CHC(OH)R_2$ (XIV) + $H_2O$. Type XIV compds. on further hydrolysis yield type I compds. When 10 g. of VII, 2.5 g. water and 3.5 g. concd. HCl stood 24 hrs. in a flask and were then extd. with ether there was obtained 5 g. of a syrupy liquid, $b_{13}$ 105°, whose properties and analysis correspond to those predicted for the corresponding type XIV compd. Warm dil. HCl on VII gave a high boiling material not identified. Hydrolysis of 9 g. VIII with cold dil. HCl gave 5 g. liquid, $b_4$ 114–5°, which did not give a semicarbazone and has strong reducing properties and is probably a polymer of $Et_2C(OH)CHO$ (XV). Warm dil. HCl on VIII gives 65% of impure XV, characterized by its semicarbazone as a type II compd. Hydrolysis of 7 g. IX with cold HCl gave 3 g. of an apparently type XIV compd., crystals from ether, m. 87°. Hydrolysis of X with cold HCl apparently produces (from analysis and mol.-wt. detn.) a type XIV compd. (XVI), m. 90–1°. XVI (0.9 g.), distd. with 20 cc. water and 2 cc. HCl, produces 0.7 g. oil, $b_4$ 94–7°, $d_4$ 0.920, $d_{20}$ 0.9040, $n_D^{22}$ 1.4379, whose mol. wt., analysis and analysis of its semicarbazone, m. 141–2°, prove it to be pure $Bu_2C(OH)CHO$.

ODEN E. SHEPPARD

**The use of calcium chloride in the dehydration of alcohol.** K. B. EDWARDS AND R. LACEY. *J. Soc. Chem. Ind.* 49, 422T(1930).—Alc. residues are concd. to 80% by distn. Then 20 g. *of fused* $CaCl_2$ *per* 100 cc. *alc. is added. Distn. yields* 75% *of* 95.5% alc. and 8% of "tails." The alc. remaining with $CaCl_2$ in the still is recovered by adding water and distg. Simple tests for the concn. of the alc. have been worked out; they depend on the miscibility of one drop of alc. in 5 cc. of various solvents. Kerosene, miscible when the concn. is 99.35%; white spirit, 98.3%; com. xylene, 97.4%; permanent cloudiness with 3 drops of 97.2%. The tests are to be carried out between 15° and 18°.

ALBERT L. HENNE

**Triethylcarbinol.** W. W. MOYER AND C. S. MARVEL. *Org. Syntheses* XI, 98–100 (1931).—Detailed directions are given for the prepn. of $Et_3COH$ from EtMgBr and $(EtO)_2CO$; the yield is 82–8%. The following were prepd. by the use of the proper Grignard reagent and $(EtO)_2CO$: $Pr_3COH$ 75, $Bu_3COH$ 84, $Am_3COH$ 75 and $(C_7H_{13})_3COH$ 72%.

C. J. WEST

**Aliphatic ethers.** HERBERT HENSTOCK. *J. Chem. Soc.* 1931, 371–2.—PrI and iso-BuONa, shaken 12 hrs. at 10° and then heated 1 hr. at 100°, give 67.2% of *Pr iso-Bu ether*, $b_{758}$ 106°, $d^{15}$ 0.7540, $n_{6461}^{21.9}$ 1.3852. *iso-Pr Bu ether*, $b_{758}$ 108°, $d^{15}$ 0.7594, $n_{6461}^{21.9}$ 1.3889 (72.4% yield). iso-BuOPr, BuOPr, iso-PrOPr, EtOPr, MeOPr, iso-BuOBu, iso-PrOBu, EtOBu, MeOBu, iso-PrOEt, iso-PrOMe, iso-BuOEt and iso-BuOMe, heated with Na K in N at 190–200° for 24–100 hrs., are unchanged, it thus appears that in ethers the bonds between the simple alkyl radicals and the O atom are stronger than the corresponding bonds holding heavier radicals contg. highly branched chains.

C. J. WEST

**Syntheses with β,β'-dichlorodiethyl ether. II. Heterocyclic compounds containing two members of the oxygen group in the ring. 1,4-Selenoxane and its derivatives.** CHARLES S. GIBSON AND JOHN D. A. JOHNSON. *J. Chem. Soc.* 1930, 256–72. *Chemistry & Industry* 49, 896(1930); cf. *C. A.* 25, 681.—$(ClCH_2CH_2)_2O$ or $(ICH_2CH_2)_2O$ and $Na_2Se$ in water, heated 4.5 hrs. while H is passed through the mixt., give *1,4-selenoxane* (I), purified through the dibromide which is obtained in 33–40% yields; 164 g. dibromide gives 60 g. pure I; I $b_{760}$ 60°, $b_{30}$ 60.5°, $b_{760}$ 167.5–8.5°, m. −21.5°, $n_D^{22}$ 1.5480, $d_4^{16}$ 1.575, $d_4^t = 1.597 - 0.00135t$; $\gamma^{17}$ 42.08, $\gamma^{32.4}$ 40.80, $\gamma^{48.4}$ 39.75, $\gamma^{61}$ 38.67 dynes/cm.; I is a colorless liquid with penetrating but not unpleasant odor, it is volatile in $CCl_4$ vapors;

$SnCl_4$ gives a cryst compd decompd by atm moisture; I and $HNO_3$ (d. 1 42) give a deep red soln from which the *hydroxynitrate* sepd on cooling, it decomps 140–1° and detonates on heating in a sealed tube over a small flame, its aq soln gives the dibromide with HBr in the cold I and Cl in $CCl_4$ give the *dichloride*, m 127–9° (decompn.). Br in $CCl_4$ gives the *dibromide* yellow, m 132° (decompn.); the aq soln gives no ppt on cooling but HBr ppts the dibromide, *diiodide*, violet, m 106–7°. I and MeI in abs EtOH for 5 hrs or I and MeI for 2 hrs give the *methiodide*, m 171°. I and $HgCl_2$ in EtOH give the *mercurichloride* m 179°, *chloroaurate*, golden yellow, decomps 142–4°, *chloroplatinate* orange yellow m 149° (decompn.) The dibromide and moist $Ag_2O$ give a highly hygroscopic oil which gives the hydroxynitrate with $HNO_3$ The dibromide and dry $NH_3$ in $C_6H_6$ give the *compd* $C_4H_{11}ON_2Br_2Se$, begins to decomp 93° and turns brownish yellow 130° it is decompd by water, similar compds were formed with pyridine, piperidine and $EtNH_2$ The coördination compd of the dibromide with $C_2H_4(NH_2)_2$ yielded $C_2H_4(NH_2)_2 \cdot 2HBr$ on treatment with aq EtOH The parachor, 245 2, confirms the value of 62 5 for the at parachor of Se C. J. West

**Formation of sulfonium chlorides and of unsaturated substances by the action of water and of aqueous alcoholic potash on β,β′-dichlorodiethyl sulfide.** John S. H. Davies and Albert E. Oxford *J. Chem. Soc.* 1931, 224–30.—The hydrolysis of $S(C_2H_4Cl)_2$ (I) is generally assumed to occur in 2 stages $I + H_2O \longrightarrow ClC_2H_4SC_2H_4OH$ (II) + HCl, $II + H_2O \longrightarrow S(C_2H_4OH)_2$ (III) + HCl It is probable that II has not been isolated, attempts to prep II from $HOC_2H_4SH$ and $ClC_2H_4Cl$ or from $ClC_2H_4SH$ and $(CH_2)_2O$ failed II, evapd in the min quantity of water at a low temp under diminished pressure gives a sirup, insol in $CHCl_3$ and $Me_2CO$ and hence not II or III, but readily sol in cold $H_2O$ to give a soln contg much Cl ion I yields a *diphenylurea*, m. 128 5–9 5°, the methiodide is a viscous red oil, the *p toluenesulfilimine* formed from chloramine-T, m 86–7° III and $HOC_2H_4Cl$, heated on the water bath for 13 hrs., give *tri-β hydroxyethylsulfonium chloride* $(HOC_2H_4)_2SCl$, m 125–6°, the yield is largest with 3 mols $ClC_2H_4OH$, it develops no acidity when dissolved in water and the Cl content can be estd volumetrically, it is sol in concd HCl but no I is formed on prolonged boiling III and I, heated 6 hrs at 65–75°, give *sulfidobis-β hydroxydiethyl sulfide 1,3-di-β hydroxyethochloride*, $Cl(HOC_2H_4)_2SC_2H_4SC_2H_4S(C_2H_4OH)_2Cl$, m 101 5–3°; with HCl at 100° only I is formed, the *chloroplatinate*, yellow, amorphous, m 133–4°. This explains why II has not been isolated by the hydrolysis of I, for, even if it were formed momentarily, it might unite with itself and most certainly would combine with III to form sulfonium chlorides $HOC_2H_4SC_2H_4SC_2H_4OH$ and $ClC_2H_4OH$, heated at 100° for 14 hrs., give 2 sulfonium chlorides, probably IV and *sulfidobis-β hydroxydiethyl sulfide 1,2-di β hydroxyethochloride*, m 120–1 5° $HOC_2H_4SC_2H_4SC_2H_4OH$ and $HOC_2H_4Cl$ heated on the water bath for 8 hrs., or $HOC_2H_4Cl$ and 1,4-dithiane, heated at 100° for 28 hrs., give *1,4-dithiane 1-β hydroxyethochloride* (IV), m 175°, *mercurichloride*, m 95–6° Passing dry HCl into III at 100–6° gives 56% I and 44% of *oxidobis-β-chlorodiethyl sulfide*, $b_4$ 152°, the latter and PhOH with EtONa give the *phenoxy deriv.*, m 55–7° Hydrolysis of I with 2 25 vols water gives IV, but this was not found when 6 vols water was used The sirup obtained with 4 mols water, heated with concd HCl 40 min at 100°, gives I and a small quantity of $C_2H_4(SC_2H_4Cl)_2$ If 10 vols HCl is used, I is the sole product III and 2 mols HCl in 2 5 vols water, heated 5 hrs., give IV and other sulfonium chlorides Hydrolysis of 1 mol I with 4 mols 20% EtOH KOH (EtOH $H_2O$ = 4 1) gives a mixt of divinyl sulfide, b 85° (*sulfilimine*, m 91–3°), *β-ethoxyethyl vinyl sulfide*, $b_8$ 65°, $d_4^{20}$ 0 9532, camphor like odor (*mercurichloride*, m. 152–3°), $S(C_2H_4OEt)_2$, $b_4$ 101–2° and some $EtOC_2H_4SC_2H_4OH$, $b_4$ 117 5° With 1 mol EtOH-KOH, there was isolated *β-chloroethyl vinyl sulfide* $b_{10}$ 71–2° (*sulfilimine*, m. 101 5–3°, mercurichloride, amorphous, decomps about 150°), with HCl this yields *α,β′-dichlorodiethyl sulfide*, $b_8$ 68–9° C. J. West

**Heptylamine** W. H. Lycan, S. V. Puntambeker and C. S. Marvel *Org. Syntheses* XI, 58–60(1931).—Reduction of $Me(CH_2)_4CH$ NOH with EtOH and Na gives 60–73% of $Me(CH_2)_6NH_2$, b 152–7°. By use of the same method the following may be obtained $BuNH_2$, in 50–60% yields, *sec*-$BuNH_2$ and cyclohexylamine C. J. West

**Acrolein acetal.** E. J. Witzemann, Wm. Lloyd Evans, Henry Hass and E. F. Schroeder *Org. Syntheses* XI, 1–2(1931).—$ClCH_2CH_2CH(OEt)_2$ (167 g.) and 340 g. powd KOH heated at 210–20°, give 75% of $CH_2$ $CHCH(OEt)_2$, b 122–6°. Fe retorts should be used when many runs are to be made C. J. West

**β-Chloropropionaldehyde acetal** E. J. Witzemann, Wm. Lloyd Evans, Henry Hass and E. F. Schroeder *Org. Syntheses* XI, 26–7(1931).—EtOH HCl, satd at 0°

and treated with $CH_3CHCHO$ at about 0°, gives 34% of $ClCH_2CH_2CH(OEt)_2$, $b_4$ 58–62°. C. J. WEST

**Heptaldoxime.** E W BOUSQUET *Org Syntheses* XI, 54–6(1931) —$Me(CH_2)_5CHO$, $NH_2OH$ HCl and $Na_2CO_3$ give 81–93% of $Me(CH_2)_5CH$ NOH Cyclohexanone oxime is obtained in the same manner C. J. WEST

**Fatty acid distillation. A comparison of intermittent and continuous operation.** OTTO KREBS *Teer u. Bitumen* 28, 421–4, 440–3(1930) —Batch distn with superheated steam and continuous distn under reduced pressure (60 mm) are described with some detail and the economics of the 2 methods compared Vacuum distn permits an easy sepn of $C_{11}H_{21}CO_2H$, $b_{60}$ 255° $C_{17}H_{33}CO_2H$ boils only slightly lower than $C_{17}H_{35}CO_2H$, their sepn, therefore, requires a very efficient fractionation column K H ENGEL

**Addition of alkali alcoholates to acid esters. IV. Addition of sodium ethylate to formic ester.** F. ADICKES (WITH A WÄCHTERowitz, H. DU MONT AND O LÜCKER) *Ber* 63B, 3012–27(1930), cf *C A* 21, 1628, Scheibler, *C A* 20, 2824, 21, 1795 —S says in his 1st paper that NaOCOEt (I) is obtained quantitatively according to the equation $HCO_2Et + NaOEt = HC(ONa)(OEt)_2$ (II) = I + EtOH by letting NaOEt and 1 mol $HCO_2Et$ stand in $Et_2O$ 16 hrs, evapg *in vacuo*, adding another 0.5 mol $HCO_2Et$, letting stand again and once more evapg off the excess of $HCO_2Et$, along with the EtOH formed, *in vacuo* A showed that the product was not I (*C A* 21, 1628) but the conclusion drawn from analyses of the apparently homogeneous substance that it was quite pure II has now been found to have been incorrect. Contrary to S 's statement, a great part of the $HCO_2Et$ used is decompd into CO and EtOH and a part of the *EtONa is not added at all, so that the product consists in great part of NaOEt with more* or less EtOH of crystn (around 30%) and some $HCO_2Na$ (8%) and can, therefore, contain only about 10–20% II. With such a product, the Zeisel EtO detn can be carried out only with certain precautions in a modified app, the far too low results obtained in the usual Meyer app had led to an erroneous interpretation, and, moreover, the apparent absorption of 1 mol $HCO_2Et$ by the NaOEt (calcd from the amt of $HCO_2Et$ used and that recovered from the $Et_2O$ and EtOH vapors drawn off) was merely due to the aforesaid decompn. of the $HCO_2Et$ According to S 's 2nd paper, I is prepd. by splitting EtOH off from the (assumedly almost pure) II at 40° and completing the reaction by repeated treatment with $HCO_2Et$ and splitting off of EtOH No proof (by detn of the CO) is given of the decompn $I + H_2O = NaOH + CO + EtOH$ which S describes as characteristic but which A has never observed The apparent success of the new method of prepn. is due to the fact that the temp is raised by the "vigorous reaction" which takes place; the decompn of the $HCO_2Et$, which is slow at room temp, is now very rapid and the product is not I but NaOEt, more or less free of EtOH of crystn, depending on the length of the last heating *in vacuo* In both methods of prepn the $HCO_2H$ present in the product (as the acid and as $HCO_2Et$) can be detd by reduction of $HgCl_2$ or by back titration after sapon with excess of hot alkali The $HCO_2H$ is present partly as $HCO_2Na$ because ordinary abs alc and $HCO_2Et$ not dried over $P_2O_5$ are used in the process. This is also shown by analysis of the salt mixt obtained by passing $CO_2$ into the $Et_2O$ suspension of the supposed I; the $HCO_2Na$ remains unchanged, the NaOEt is converted into $EtOCO_2Na$ and a part of the total $HCO_2H$ is recovered as $HCO_2Et$, presumably from II, for I could not regenerate $HCO_2Et$ with $CO_2$ A time consuming method, based on the analytical detn of the total Na, total $HCO_2H$, the $HCO_2Na$ (by $CO_2$ decompn), total EtO (modified Zeisel method) and EtOH of crystn (Zerevitinov), was worked out to decide whether the product contained I or II (later it was found that light could be shed on this question by other means), the results showed that the product prepd by either of S 's 2 methods cannot be anywheres nearly pure I; that prepd by the 1st method may contain up to about 25% II and that prepd by the 2nd method none at all, and neither can possibly contain a I with the properties given by S With none of the many prepns was an evolution of CO on decompn with $H_2O$ observed That the ester still held bound in the reaction product is almost certainly present as II was shown by prepg II in pure form, when it is heated *in vacuo* at 40° according to S 's 2nd method for prepg his supposed I, soon only the formate-$HCO_2H$ remains and the end product is a mixt. of EtOH-free NaOEt + $HCO_2Na$ When EtOH-free NaOEt in $Et_2O$ suspension is allowed to react at 0° with $HCO_2Et$, the $HCO_2Et$ does not decomp. into CO, and 1 mol. (not more) is bound, the addn product, which is almost insol in $Et_2O$, is an exceedingly hygroscopic microcryst. powder which decomps. *into* CO *at room* temp. Attempts to obtain from it derivs. of $HC(OEt)_3$ with $ClCO_2Et$ or $PhCH_2Br$ failed so that it could not be proved directly that it has the structure II. The method previously used to det the structure of ester alcoholate addn products (cleavage of

equiv amts. of MeOH and EtOH with $H_2O$ or of NaOMe and EtONa with $CO_2$ from the mixed Et ester methylate or Me ester-ethylate) does not have the significance then ascribed to it, for, contrary to expectation, the esters may undergo an exchange of the alkyl (*Umesterung*) in $Et_2O$ under the influence of the mixed alcoholate. The addn. product dissolves when treated in $Et_2O$ suspension with $(CO_2Et)_2$ and $HCO_2Et$ is set free, correspondingly, the $(CO_2Et)_2$ addn. product does not react with $HCO_2Et$. C. A. R.

**3-Methylpentanoic acid.** E. B. Vliet, C. S. Marvel and C. M. Hester. *Org. Syntheses* XI, 70–8(1931).—EtCHMeCH$(CO_2Et)_2$, sapond. with KOH and the acid liberated with $H_2SO_4$ and refluxed 3 hrs., gives 62–5% of EtMeCHCH$_2$CO$_2$H, b$_{760}$ 193–6°. Caproic acid was obtained in 75% yield by this method. C. J. West

**The amides of α-methylbutenoic acids.** P. Bruylants, L. Errolfd and M. Dekoker. *Bull. soc. chim. Belg.* [5] 16, 721–40(1930), (cf. *Mem. acad. roy. Belg.* 9, 16(1927) and *C. A.* 22, 2304).—The amides, acids and nitriles of α-methylbutenoic acids were prepd. and certain phys. properties observed. The configuration of the angelic and tiglic nitriles were detd. by comparison with crotonic and isocrotonic nitriles and with 3,4- and 2,6-Me$_2$C$_6$H$_3$CN. The butenoic nitriles, amides and acids were prepd. by the dehydration of the cyanohydrins with $P_2O_5$ or SOCl$_2$, preferably the latter. The methylnitriles were converted into methylchlorobutanoic nitriles by addn. of HCl. Treatment with quinoline gave the isomeric butenoic nitriles. The following compds. were prepd. (I) α-methyl-β-chlorobutanoic nitrile, b$_{14}$ 64–5°. (II) α-ethyl-β-chloropropionitrile, b$_{14}$ 73–4°. I on treatment with quinoline gave 2 isomers of α-methylcrotonitrile, b$_{14}$ 121–2° and 137–8°. The high-boiling isomer (III) has been previously described. The low-boiling isomer (IV) gave $d_4^{20}$ 0.8196, $n_\alpha^{20}$ 1.42094, $n_\beta^{20}$ 1.42303, $n_\gamma^{20}$ 1.43087, Ex$_{\alpha\gamma}$ 0.66. The ClCH$_2$CHEtCN on treatment with quinoline gave α-ethylacrylonitrile (V), b$_{760}$ 115.0–115.4, $d_4^{20}$ 0.8139, $n_\alpha^{20}$ 1.41440, $n_\beta^{20}$ 1.41752, $n_\gamma^{20}$ 1.42456, Ex$_{\alpha\gamma}$ 0.51. The amide obtained from III m. 75–6°, that from IV m. 127–8°, and that from V m. 87.7–7.8°. The first 2 amides both yield tiglic acid on hydrolysis or treatment with $HNO_2$. Also in *Bull. soc. chim. Belg.* 39, 379–94(1930). Wallace R. Brode

**The preparation of ellagic acid.** Fritz Zetzsche and Margrethe Graef. *Helv. Chim. Acta* 14, 240–2(1931).—Ellagic acid (I) was obtained in 4% yield by acidifying the hydrolysis product of Turkish tannin with an equal wt. of $Na_2SO_3$ crystals. It forms an *addn. compd.* with 2 mols. of pyridine. Acetylation of I or its pyridine compd. with $Ac_2O$ yields *tetraacetylellagic acid*, m. 317–9°. The hydrolytic products also contained 3.3% of 1,2,3 C$_6$H$_3$(OH)$_3$. The residue from the aq. ext. of the tannin contained 24% of cellulose. Other tannins also yield I. I. M. Levine

**α-Bromoisovaleric acid.** C. S. Marvel and V. du Vigneaud. *Org. Syntheses* XI, 20–2(1931).—Me$_2$CHCH$(CO_2Et)_2$ is sapond., the free acid liberated by HCl, brominated and then heated at 125–30° until evolution of $CO_2$ ceases, the yield of Me$_2$CHCHBr-CO$_2$H is 55–66%. C. J. West

**Action of ethylmagnesium halides on ethyl diethylcyanoacetate.** A. Mayeux. *Compt. rend.* 192, 305–5(1931).—EtMgBr or EtMgI reacts with NCCEt$_2$CO$_2$Et (I) either at the CN or CO$_2$Et group but not with both groups in the same mol. The mixt. of products contains Et$_2$CO, Et$_2$CHCOCEt$_2$CO$_2$Et and Et$_2$CHCO$_2$Et, these compds. were also found when PhMgBr was used. Besides these compds. *3-cyano-4-keto-3,4-diethylhexane* (II), b$_{14}$ 132–3°, Et$_2$CHCN and Et$_2$COH were also produced. The last was isolated as the *allophanate* (reaction product with HCNO), m. 182–3°. I was transformed into *Δ$^3$-3,4-diethyl-4-cyanohexene*, b$_{14}$ 105°, by reaction with SOCl$_2$. The work confirms the hypothesis that the ester group in I undergoes enolization under the influence of the Grignard reagent, furthermore, the great complexity of the reaction is considered by M. to be due to the inertia and fragility imparted to the mol. by the tetrasubstituted C atom. I. M. Levine

**Action of ethylmagnesium bromide on *N*-diethylchloroacetamide.** Sou Phou Ti. *Compt. rend.* 191, 943–5(1930).—The principal product of the action of 3 mols. of EtMgBr on 1 mol. of CH$_2$ClCONEt$_2$ was neither a chloroamine nor a chloroketone as might have been expected but *2-diethylamino-2-ethyl 1-butanol*, Et$_2$C(NEt$_2$)CH$_2$OH (I) (20% yield), b$_{14}$ 90°, picrate, m. 90°, chloroplatinate, m. 140–1°. Heating I for 3 hrs. on a steam bath with excess $Ac_2O$ gave its acetate, b$_{14}$ 97–8°, picrate, m. 130–1°. Other products of the reaction were considerable Et$_2$NH, about 1% of an ethylenic base, C$_9$H$_{19}$N, with a picrate, m. 74° and a chloroplatinate m. 142–3°, Et$_2$NCH$_2$CONEt$_2$, b$_{14}$ 125–6°, with a picrate, m. 121° (Hahn and Loos report 133°, *C. A.* 13, 725) and a chloroplatinate, m. 164–5°, and the major product was a syrupy, yellowish, basic oil, C$_{14}$H$_{28}$N$_2$O$_2$, b$_{14}$ 160–2°, which did not react with $Ac_2O$, was not saponified by 48% HBr, gave no cryst. derivs. and could not be identified. C. H. Peet

**Chemistry of thiocholine halides (trimethylthioethylammonium halides). II. Thiocholine chloride and its derivatives.** TAICHI HARADA *Bull Chem. Soc. Japan* 6, 25–8(1931), cf *C A*. 24, 2428.—Forty g of $(CH_2Cl)_2$ was condensed with $NMe_3$, the chlorocholine chloride (I), $Me_3NClCH_2CH_2Cl$, formed being washed with $Et_2O$ and dried over $CaCl_2$. The 40 g of crude product, recrystd from 95% alc melted about 242°, with decompn above 163°. Six g of I was heated with 5 g of 2-thiouracil together with 25 cc. of $H_2O$ in a bomb tube at 150° for 2 hrs. After filtration from the uracil, the filtrate was neutralized with $NH_4OH$ and on concn more uracil was removed. Fractional crystn from a cold mixt of BzOH and EtOH gave 0.5 g thiocholine chloride (II), $Me_3NClCH_2CH_2SH$, m. 238° with decompn above 200°. II reacts with AgCl to form $Me_3NClCH_2CH_2SAg$. AgCl, sol. in $H_2O$ to the extent of 1.215 g. per l. at 37°. It decomps. above 70°, m. 228°. C. R. ADDINALL

**α-Aminoisobutyric acid.** H. T. CLARKE AND H. J. BEAN *Org. Syntheses* XI, 4–6 (1931).—Details are given for the prepn. of $Me_2C(NH_2)CO_2H$ from $Me_2CO$, NaCN and $NH_4Cl$, giving $Me_2C(OH)CN$, with $NH_3$ this yields $Me_2C(NH_2)CN$, hydrolyzed by HBr to the acid HBr salt, from which the free acid is obtained in 30–3% yield by $C_5H_5N$. C. J. WEST

**The action of formaldehyde on amino acids with special reference to the formation of amines.** LAWRENCE ZELENY AND ROSS A. GORTNER *J. Biol. Chem.* 90, 427–41 (1931).—On boiling casein, alanine, cystine, glutamic acid or tyrosine with HCHO in 20% HCl, 12–40% of the total N is converted first into primary, then into secondary and tertiary, amines, which were estd. by Weber and Wilson's method (*C. A.* 12, 1977). $NH_4Cl$ behaves similarly. The end product, which was reached more rapidly by autoclaving with HCHO at 180° in 5% HOAc, was in all cases $NMe_3$, identified by the compd. with Reinecke's salt or by the chloroplatinate. The action of HCHO is therefore one of deamination followed by methylation as suggested by Werner (*C. A.* 11, 3243), but occurring through some intermediate non-volatile, non-amino compd. This compd., which may be a $CH_2$ deriv., was not isolated, but after the amino-acid N has reached a const. value, the amt. of volatile N continues to increase on boiling. K. V. THIMANN

***N*-Alkylation of β-amino esters.** J. DÉCOMBE *Compt. rend.* 191, 945–7(1930).—Alkylation of β-amino esters by treatment with alkyl iodides proceeds unsatisfactorily because it is impossible to fractionate the resulting mixt. by distn. and because there is decompn. of the parent amine through splitting out of $NH_3$ with resultant formation of an unsatd. ester. However, 70% yields of alkylamino esters may be obtained by the catalytic hydrogenation in EtOH of equimol. mixts. of the β-amino ester and the appropriate aldehyde, with $PtO_2$ (Adams) as a catalyst. The reaction doubtless proceeds through a condensation of the amine with the aldehyde and reduction is accompanied by the formation of a certain amt. of resin. The following compds. were prepd. by condensing the proper β amino ester with AcH. $MeCH(NHEt)CH_2CO_2Et$ (I), $b_{11}$ 74–5° (HCl salt, m. 125°); $MeCH(NHEt)CH_2CO_2H$, m. 169–70°, $PrCH(NHEt)CH_2CO_2Et$, $b_{10}$ 110–1° (HCl salt, m. 79°); $C_5H_{11}CH(NHEt)CH_2CO_2Et$, $b_{20}$ 130–2° (HCl salt, hygroscopic, m. about 60°), $C_5H_{11}CH(NHEt)CH_2CO_2H$, m. 140–1°. The method is not so satisfactory for the introduction of 2 alkyl groups. With aldehydes of low mol. wt., a mixt. of amino esters is obtained which cannot be fractionated. Aldehydes of higher mol. wt. yield a small quantity of the dialkyl deriv. $MeCH(NEtBu)CH_2CO_2Et$, from PrCHO and I, $b_{15}$ 118–9° and forms a viscous HCl salt but a microcryst. chloroplatinate. Prepn. of dialkyl derivs. by treatment of the monoalkyl compds. with RI is also unsatisfactory. (The b. p. at 17 mm. of $MeCH(NH_2)CH_2CO_2Et$, incorrectly given in *C. A.* 24, 2110, is 68–9°.) C. H. PEET

***N*-Acyl derivatives of alanine. Resolution of externally compensated *m*-nitrobenzoylalanine.** WM. M. COLLES AND CHARLES S. GIBSON. *J. Chem. Soc.* 1931, 279–85.—The *N*-acyl derivs. of alanine (I) were studied not only as a means of isolating and identifying it but also because the nitroacyl derivs. may serve as convenient starting materials for prepg. arsonic acids for the study of the relative chemotherapeutic activities of *dl*- and active isomers. *dl-m-Nitrobenzoyl deriv.* (II) of I, m. 163–4°; at 20° 0.38 *g.* dissolve in 100 cc. $H_2O$, 0.37 *g.* in 100 cc. $Et_2O$ and 0.43 *g.* in 100 cc. $CHCl_3$; *Ag salt*, needles; *Et ester*, m. 89°; *Me ester*, m. 110–1°; $NH_4OH$ gives the *amide*, m. 189–90°. Reduction of II gives the *$NH_2$ deriv.*, whose *HCl salt* m. 150–2° (decompn.). *dl-o-Nitrobenzoyl deriv.* (III) of I, m. 165–6°, slightly less sol. in $H_2O$ and $Et_2O$ than II; *o-$NH_2$ deriv.*, does not m. 270°. *dl-p-Toluyl deriv.* (IV), m. 188–9° (95% yield). *dl-m-Nitrobenzenesulfonylalanine* (V), from I in *N* KOH and *m* $O_2NC_6H_4SO_2Cl$ in $C_6H_6$ added at regular intervals, yellow, m. 158.5–9° (89% yield). *dl-4-Nitrotoluene-2-sulfonylalanine* (VI), crystg. with 1 mol. $H_2O$, m. 91–7°; anhyd., it m. 125.5–6.5°. *dl Cin-*

*nomoylalanine* (VII), m. 199–7° (30% yield), in alk. soln. it rapidly decolorizes $KMnO_4$, giving BzH. I (15 g.) in 32.4 cc. 0.976 *N* NaOH and 1000 cc. $H_2O$, treated with 11.92 g. quinine and then with 10 cc. EtOH, gives 17 g. of the *quinine salt* of *l*-I, converted to a glass-like mass at 125°, crystals with 2 mols $H_2O$, $[\alpha]_{546}$ —137.1°; the mother liquor was freed of alkaloid and then treated with brucine, giving 58.2 g. of the *brucine salt* of *d*-I, crystg. with 3.5 mols $H_2O$, $[\alpha]_{546}$ —9.1° (EtOH, *c* 0.5511). *l*-I, m. 158°, $[\alpha]^{22}_{5461}$ —44.7° ($NH_4$ salt in $H_2O$, *c* 1.342) 5.87° (EtOH, *c* 1.261). *Et ester*, m. 104–5°, $[\alpha]^{22}_{5461}$ 6.91° (EtOH, *c* 1.465), in EtOH KOH (0.0832 g. KOH in 50 cc. EtOH) $\alpha_{546}$ changes from 0.17 to —1.05° in 26 hrs. *d*-I, m. 158°, $[\alpha]^{22}_{5461}$ 44.7° ($NH_4$ salt in $H_2O$, *c* 1.358), —5.62° (EtOH, *c* 1.335). *Me ester*, m. 126°, $[\alpha]^{22}_{5461}$ —12.7° (EtOH, *c* 1.429); *amide*, m. 193–4°, $[\alpha]^{22}_{5461}$ 21.2° (EtOH, *c* 0.238). The relative rates of hydrolysis of the *dl*-*N*-acyl derivs. were detd. by gently heating 3 hrs. with const.-boiling HCl, neutralizing the hydrolysis mixt. to *p*H 8 and titrating the liberated I by Sørensen's method to *p*H 10. The % hydrolysis is given: Bz, 96, IV, 95, VII, 92, phthalyl, 76, III, 47, II, 91; *p*-$O_2NC_6H_4CO$ deriv., 0; $PhSO_2$ deriv., 14, $\alpha$-$C_{10}H_7SO_2$ deriv., 66, $\beta$ isomer, 18 (45% after 9.5 hrs.); *p*-$MeC_6H_4SO_2$ deriv. 17, V, 21, VI, 2 in 4 hrs. C. J. West

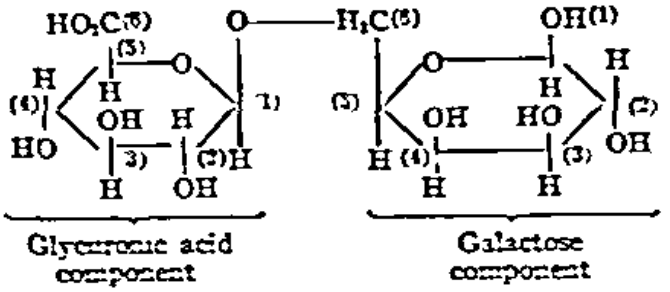
*dl*-Glyceraldehyde. E. J. Witzemann, Wm. Lloyd Evans, Henry Hass and E. F. Schroeder. *Org. Syntheses* XI, 50–1(1931).—Hydrolysis of 50 g. $HOCH_2CH(OH)CH(OEt)_2$ with 500 cc. 0.1 *N* $H_2SO_4$ at 20° for about 1 week gives 80% of $HOCH_2CH(OH)CHO$, m. 137–9°. C. J. West

*dl*-Glyceraldehyde acetal. E. J. Witzemann, Wm. Lloyd Evans, Henry Hass and E. F. Schroeder. *Org. Syntheses* XI, 52–3(1931).—$CH_2{:}CHCH(OEt)_2$ and $KMnO_4$ in $H_2O$ at 5° give 67% of $HOCH_2CH(OH)CH(OEt)_2$, b$_4$ 120–1°. C. J. W.

The two forms, *cis* and *trans*, of isobutylideneacetone and the isomeric unsaturated $\beta,\gamma$-ketone. R. Heilmann. *Bull. soc. chim.* [4], 49, 75–80 1931).—Escott and Linstead have shown (*C. A.* 24, 3091) that the condensation of $Me_2CHCHO$ with $Me_2CO$ gives the *trans*-modification of $Me_2CHCH{:}CHCOMe$ (I) which on boiling with 20% $H_2SO_4$ is isomerized into $Me_2C{:}CHCH_2COMe$ (II). In prepg. $Me_2CHCH{:}NH.N{:}CMeCH_2$ (III) by the action of $(NH_2)_2$, $H_2O$ on I, H. obtained a fraction which on hydrolysis with 20% $H_2SO_4$ gave II. Although II might result from the hydrolysis of the amine produced by the spontaneous oxidation of III (*C. A.* 24, 851), thus regenerating the 2 stereoisomeric forms of I, and by the consequent isomerization of the *trans*-modification, there does not seem to be absolute identity between the residues from the prepn. of III and the products obtained by controlled oxidation of the pyrazoline. In the 1st case the oil obtained consists almost entirely of III whereas in the 2nd case the principal product is I. H. is still of the opinion that I and II are formed simultaneously in the condensation of $Me_2CHCHO$ with $Me_2CO$ and proposes to return to this matter at a later date. C. R. Addinall

Compound uronic acids. Structure of the aldobionic acid from gum arabic. Sydney Wm. Challinor, Walter N. Haworth and Edmund L. Hirst. *J. Chem. Soc.* 1931, 258–65.—Aldobionic acid from gum arabic, with $[\alpha]^{22}_D$ 2.0° (Ca salt), on methylation with $Me_2SO_4$ and 20% NaOH and finally with $Ag_2O$ and MeI, gives a mixt. of $\alpha$- and $\beta$-forms of *Me heptamethylaldobionate* (*Me ester of hexamethyl-6-glycuronoside-β-methylgalactoside*), b$_{0.8}$ 185°, $n^{22}_D$ 1.4715, $[\alpha]^{22}_D$ —3.5° ($H_2O$, *c* 1.55), —24° ($CHCl_3$, *c* 2.0), which is non-reducing, after 14 days at 50–60° about 20% of the mixt. seps. as the cryst. $\beta$-deriv., m. 86°, $[\alpha]^{22}_D$ —21° ($H_2O$, *c* 0.67), —43° ($CHCl_3$, *c* 0.55). Hydrolysis of the liquid ester was effected by heating 3.5 hrs. at 100° in 7% HCl, $[\alpha]^{22}_D$ changing from —1° to 63.5° in that time. The 2 hydrolysis products were isolated in 87–8% yields. *2,3,4-Trimethylgalactose*, pale yellow syrup, $n^{18}_D$ 1.4727, $[\alpha]^{22}_D$ 83° ($H_2O$, *c* 0.6); further methylation gives 2,3,4,6-tetramethyl $\beta$-methylgalactoside. Br-$H_2O$ at 25° for 24 hrs. gives *2,3,4-trimethyl-6-galactonolactone* (after heating 2 hrs. at 100° and 12 mm.), which was characterized as the *phenylhydrazide*, m. 165–7°; the rate of hydrolysis of the lactone is given, becoming const. in 8 hrs. Oxidation of the lactone gives *2,3,4-trimethylmucic acid*, whose *di-Me ester* m. 98°, $[\alpha]^{22}_D$ 35° ($H_2O$, *c* 0.6). The other hydrolytic product is *2,3,4-trimethylglycuronic acid*, pale yellow, viscid syrup, $n^{15}_D$ 1.4709, $[\alpha]^{18}_D$ 58° (equil. value in $H_2O$, *c* 0.63) (this value is for a product that has not been distd.); further methylation gives a mixt. of the $\alpha$ and $\beta$-forms of *2,3,4-trimethylmethylglycuronide*, the $\beta$-form m. 123°, $[\alpha]^{22}_D$ —28° ($H_2O$, *c* 0.4), $[\alpha]^{21}_D$ —63° ($CHCl_3$, *c* 0.6). This was also obtained from glycuronic acid with $Me_2SO_4$ and alkali. *In N* HCl at 100° the velocity of hydrolysis of the glycuronide was almost identical with that of $\beta$-Me glucoside under

similar conditions. Thus, the structure of the aldobionic acid from gum arabic appears to be.




It is not certain whether α- or β-glycuronic acid is involved in the biose linking, although preliminary evidence favors the β-linking. C. J. West

Ethyl ethylenetetracarboxylate. B. B. Corson and W. L. Benson. *Org. Syntheses* XI, 36–8(1931).—$BrCH(CO_2Et)_2$ (1.25 mols.) and 1.9 mols. anhyd. $Na_2CO_3$ heated 3 hrs. at 150–60°, give 75–80% of $[C(CO_2Et)_2]_2$, $b_{15}$ 197°, $b_{17}$ 203°, $b_{20}$ 210°, $b_{30}$ 221°, $b_{40}$ 234°, m. 52.5–3.5°. The soly. in 95% EtOH is reported for 0 to 35.5°. C. J. West

Condensations giving diethyl dicyanoglutaconate. Yoshiyuki Urushibara. *Bull. Chem. Soc. Japan* 6, 29–31(1931).—The compd. termed di-Et dicyanoglutaconate, $C_{11}H_{12}O_4N_2$ (I) (*C. A.* 21, 3889), is now considered to be the semihydrate $(C_{11}H_{12}O_4N_2)_2 \cdot H_2O$ (II). The acidification of di-Et sodiodicyanoglutaconate gives II and no attempts were made to form I by direct condensation rather than by proceeding through this intermediate Na compd. Two such condensation processes were carried out in which the formation of I was proved by the pptn. of II on acidifying the alkali ext. of the crude products, *e. g.*, the condensation of HOCH:C(CN)·$CO_2Et$ with CNCH$_2$·$CO_2Et$ by the action of $Ac_2O$ and the condensation of ClCH:C(CN)·$CO_2Et$ with ClCH(CN)·$CO_2Et$ by the use of metallic Cu. C. R. Addinall

Mesaconic acid. R. L. Shriner, S. G. Ford and L. J. Roll. *Org. Syntheses* XI, 74–5(1931).—Citraconic anhydride (100 g.), 100 cc. $H_2O$ and 150 cc. dil. $HNO_3$ evapd. to red fumes, give 43–52% of mesaconic acid, m. 203–5°. C. J. West

Ethyl pimelate. Adolf Müller and Erich Rölz. *Org. Syntheses* XI, 42–5 (1931).—Details are given of the reduction of *o*-$HOC_6H_4CO_2H$ with iso-AmOH and Na and the esterification of the acid; yield of ester, $b_{16}$ 153–6°, 35–8%. C. J. West

Citraconic anhydride and citraconic acid. R. L. Shriner, S. G. Ford and L. J. Roll. *Org. Syntheses* XI, 28–9(1931).—Itaconic anhydride, distd. rapidly at atm. pressure, gives 68–72% of citraconic anhydride, soln. in slightly more than the necessary amt. of *H*$_2$*O* gives 94% of the acid. C. J. West

Fumaric acid. Nicholas A. Milas. *Org. Syntheses* XI, 46–8(1931).—Oxidation of furfural with $NaClO_3$ ($V_2O_5$ as catalyst) gives 50–5% of fumaric acid. C. J. West

Cyanogen bromide. W. W. Hartman and E. E. Dreger. *Org. Syntheses* XI, 30–1(1931).—Details are given of the reaction of NaCN and Br, giving 73–85% of BrCN. C. J. West

Isopropyl thiocyanate. R. L. Shriner. *Org. Syntheses* XI, 92–3(1931).—Directions are given for the prepn. of $Me_2CHSCN$ from iso-PrBr and NaSCN in 70–9% yields. C. J. West

Oxidation. IV. Action of ferric chloride and hydrogen peroxide on *S*-alkylthiosemicarbazones. Formation of triazoles. Satish Chandra De and Tarani Kanta Chakravorty. *J. Indian Chem. Soc.* 7, 575–8(1930); *cf. C. A.* 24, 4781.—By oxidation of *S*-alkylthiosemicarbazones of aldehydes thiodiazole formation is extended and triazoles formed. Yields with $FeCl_3$ were poor but with $H_2O_2$ the reaction proceeds smoothly. *5-Phenyl-3-methylthiol-1,2,4-triazole*, m. 164°, was obtained by condensing $NH_2C(SMe):NNH_2$ and BzH in alc. followed by $H_2O_2$ oxidation without isolation of the intermediate compd. *5-Phenyl-3-chlorothiol-1,2,4-triazole*, m. 166°. *Benzaldehyde-S-methyl-4-phenylthiosemicarbazone*, m. 66–7°; *HI* salt, m. 153°. *4,5-Diphenyl-3-methylthiol-1,2,4-triazole*, m. 165–6°. *Benzaldehyde-S-ethyl-4-phenylthiosemicarbazone*, m. 78°; *HI* salt, m. 118°; *HCl* salt, m. 178° (decompn.). *4,5-Diphenyl-3-ethylthiol-1,2,4-triazole*, m. 145°. *Benzaldehyde-S-methyl-4-o-tolylthiosemicarbazone*, m. 62°; *HI* salt, m. 159° (decompn.); *HCl* salt, m. 194° (decompn.). *4-o-Tolyl-5-phenyl-3-methylthiol-1,2,4-triazole*, m. 130°. *Benzaldehyde-S-ethyl-4-o-tolylthiosemicarbazone*; *HI* salt, m. 123°; *HCl* salt, m. 167°. *4-o-Tolyl-5-phenyl-3-ethylthiol-1,2,4-triazole*, m. 107°. *Benzaldehyde-S-methyl-4-p-tolylthiosemicarbazone*, m. 71°; *HI* salt, m. 180° (decompn.); *HCl* salt,

m. 130° (decompn.) *4-p Tolyl 5-phenyl-3-methylthiol-1,2,4 triazole*, m. 176°. *Benzylidene S-ethyl-4 p-tolylthiosemicarbazone*, *III salt*, m. 165°; *IICl salt*, m. 158°. *4-p-Tolyl-5-phenyl-3 ethylthiol 1,2,4 triazole*, m. 148°. JOSEPH DYE SNELL.

**Carbamidosulfonic acids.** PAUL BAUMGARTEN AND ILSE MARGGRAFF. *Ber.* 64B, 301–9(1931).—*N* Pyridinumsulfonic acid and urea give $NH_2CONHSO_3(C_5H_5N,H)$ (I) or $CO(NHSO_3)_2(C_5H_5N,H)_2$ (II) depending on the mol. proportions. The free acids are unstable. Both form stable metal salts. The salts of I in acid soln. decomp. into urea and $H_2SO_4$; in neutral or acid soln. (*i. e.*, the mono- or disalts) decomp. into $NH_3$, $CO_2$ and $H_2NSO_3Na$. The salts of II in acid or neutral soln. decomp. into urea and $H_2SO_4$ and also into $CO_2$ and $NH_2SO_3H$. The neutral disalts decomp. in dil. soln. into $CO_2$ and $H_2NSO_3Na$ and in solns. over 2% into urea and $NaHSO_4$. The tetrasalts are very stable. These reactions are analogous to those of nitrourea. V. F. HARRINGTON.

**Preparation of xanthates and other organic thiocarbonates.** LAURENCE S. FOSTER. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* 2, 8 pp. (1928).—The history of the xanthates is reviewed and methods are described for the prepn. of iso-Am, hexyl, heptyl, octyl, nonyl, lauryl and other xanthates, and K alkyl monothiocarbonate, Na Bu and K iso-Am trithiocarbonates. ALDEN H. EMERY.

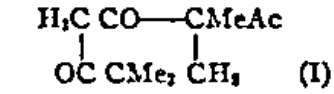
**A catalyst for the autoxidation of uric acid.** M. FRÉREJACQUE. *Compt. rend.* 191, 949–51(1930).—Autoxidation of uric acid (I) in KOH can be reduced from 15 hrs. to 10 min. by the addn. of 5% of active C, thus eliminating side reactions. Active C also catalyzes the alk. oxidation of 1-methyl-, 1,3-dimethyl-, hydroxymethylene- and 7-methyl- (II) uric acids although total oxidation of II in the absence of the catalyst appears impracticable. Autoxidation of allantoin (III) by active C in alk. soln. is slow and gives 30% of K oxonate (IV). In the absence of the catalyst, this step cannot be observed on account of the preponderant hydrolysis of III to allantoic acid. There is no autoxidation of the other purines (xanthine (V), hypoxanthine, caffeine, theobromine, etc.) even in the presence of C, hence, pure V is easily obtained by agitating the crude product from the reduction of I with O and C. Autoxidation of I fixes between 1 and 2 atoms of O per mol. of I—most at low temps., least at high. Acidification after oxidation at ordinary temps. gives a mixt. of III and IV, the amt. of IV increasing as the amt. of O absorbed increases. When I is oxidized at 0° in the presence of 1% of C, there is no evolution of $NH_3$ and acidification after filtering out the C ppts. oxonamide (VI). Perhaps the oxidation proceeds as follows: a peroxide of I ($RO_3$) is formed, this can decomp. into RO and O (C catalyzes this decompn.), the reagents present decomp. the $RO_3$ and RO into III and VI. C. H. PEET.

**Acetone compounds of the sugars and their derivatives. XVII. Conversion of monoacetoneglucose into a new amino- and anhydroglucose. Also a contribution to acyl migration.** HEINZ OHLE AND RUDOLF LICHTENSTEIN. *Ber.* 63B, 2005–12(1930); cf. *C. A.* 24, 1351.—In connection with the tautomerism problem of the sugars it was of interest to prep. the still unknown glucosyl 5-amine. *5-p*-Toluenesulfonyl-6-benzoyl-acetoneglucofuranose seemed to be a suitable starting material for this purpose, and after all attempts partially to hydrolyze it to the toluenesulfonylacetoneglucofuranose (I) had failed (the $MeC_6H_4SO_2$ group was split off along with the Bz group), it was treated directly with $NH_3$ in MeOH. The reaction might conceivably proceed in various directions. Presumably, the Bz group is first split off and the intermediate I might then (1) yield acetoneglucosyl 5-amine (II) by simple exchange of the $MeC_6H_4SO_2$ group for $NH_2$, or (2) lose $MeC_6H_4SO_2H$ to form 5,6-anhydroacetoneglucose (III) and add $NH_3$ to give acetoneglucosyl-6-amine (IV). Moreover, a Walden inversion at the 5-C atom might occur in either (1) or (2), giving (3) acetoneidosyl 5-amine (V) or (4) acetoneidosyl-6-amine (VI) through the corresponding ethylene oxide. As a matter of fact, the reaction is more complicated and has not yet been entirely cleared up but the results thus far obtained are published now because of the appearance of Josephson's paper (*C. A.* 24, 5285) in which he announces that he is going to attempt to prep. acetoneglucose 5-phosphoric acid. The reaction with $NH_3$ in MeOH proceeds only slowly at room temp. and the rotation of the mixt. does not become const. even after 3 weeks. If the reaction is interrupted after 14 days, there can be isolated the *p-toluenesulfonate* (VII) of an acetonehexosamine (VIII) and a sirupy, N-free, neutral substance (IX). VII is different from the toluenesulfonate of V. $HNO_2$ gives an acetoneanhydrohexose (X) different from either III or the 3,6-compd., nor, from its mol. wt. and low m. p., can it be a dimer of either of these compds. It does not add $NH_3$ even at 100°. Nor is the ring opened by acids, not even by *N* $H_2SO_4$ at 100°; there is merely obtained the free anhydrosugar (XI) which, like 3,6-anhydroglucose, is sweet and shows no mutarotation. This stability toward hot dil. mineral acids makes it very improbable that the O bridge is between C atoms 3 and 5. It is therefore assumed that XI is *3,6-anhydroidose* and

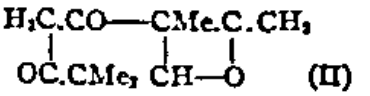
VIII is *acetoneidosyl-6-amine.* Of the 4 possible reactions mentioned above, apparently only (4) takes place. Some other reaction also takes place at the same time, however, as indicated by the formation of IX which on acetylation gives an *acetyldi-p-toluenesulfonylacetonehexose* (XII) different from the 3,5,6-compd and characterized by a surprising resistance to dil mineral acids Whatever the structure and configuration of IX may be, its formation is an entirely new phenomenon in the chemistry of the sugars, since the starting material contained only one $MeC_6H_4SO_2$ group, one part of it must have been toluenesulfonated under the influence of the $NH_3$-MeOH, at the expense of another part; the 5-position of the $MeC_6H_4SO_2$ group is thought to stand in some causal relationship with this reaction VII (15 g from 44 g of the toluenesulfonylbenzoylacetoneglucose), m 173–4° (decompn.), $[\alpha]_D^{22}$ —23 49° ($H_2O$, *c* 3 150) (the salt of V decomps. 176–7°, $[\alpha]_D^{20}$ —7 02° ($H_2O$, *c* 5 01)) XII, m 112°, does not reduce Fehling soln until after treatment with concd $H_2SO_4$ or heating with $NH_3$-MeOH at 100°, $[\alpha]_D^{20}$ 2.87° ($CHCl_3$, *c* 2 426) (the 3,5,6-compd. m 92°, $[\alpha]_D^{17}$ —28 76° ($CHCl_3$, *c* 4.347)) $H_2SO_4$ (0 05 *N*) completely splits off the $Me_2CO$ from VIII only after 8 days at 37°, $[\alpha]_D$ in a 1-dcm tube (*c* 10) falling from —1 0° to —0 25° Direct treatment of the hydrolyzate (after distg off the $Me_2CO$ split off and neutralizing the $H_2SO_4$ with KOAc) gives with $PhNHNH_2$ *phenylhydrazine p-toluenesulfonate*, $C_{13}H_{16}O_5SN_2$ $H_2O$, m. 183–4° (decompn.), identical with Ohle and v Vargha's supposed toluenesulfonate of the phenylhydrazone of glucosyl-6-amine *p-Nitrophenylosazone* of XI, dark red brown, m around 227°. *Tri-Bz deriv* of VIII, m 192°, $[\alpha]_D^{20}$ —19.30° ($CHCl_3$, *c* 2.280), one of the Bz groups is held very loosely and the compd is partially alcoholyzed when crystd from alc. *Tri-Ac deriv* of IV, m 86°, $[\alpha]_D^{18}$ 18 35° ($CHCl_3$, *c* 2 452), *tri Bz deriv*, m. 198–9°, $[\alpha]_D^{22}$ —76 43° ($CHCl_3$, *c* 2 682), is not appreciably alcoholyzed, *di-p-toluenesulfonyl deriv*, m. 172° (decompn.), $[\alpha]_D^{17}$ —2 54° ($CHCl_3$, *c* 3 145) *Hexabenzoylglucosyl-6-amine*, needles with 1 mol PhMe, reduces Fehling soln., $[\alpha]_D^{22}$ 22 89° ($CHCl_3$, *c* 0 830) *Acetone-3,6-anhydroidose* (X) (yield, 80%), m. 105°, $b_{0.3}$ 147–8° (bath temp.), $[\alpha]_D^{22}$ 24 94° ($H_2O$, *c* 2.566), mol. wt. in $H_2O$ 202 1 (*c* 1 022) (3,6-anhydroacetoneglucose, m 56–7°, $[\alpha]_D^{22}$ 29.33° ($H_2O$)); III, m 133 5°, $[\alpha]_D^{22}$ —26 5° ($H_2O$) XI, m. 105–6°, is markedly hygroscopic, strongly reduces hot Fehling soln., $[\alpha]_D^{22}$ 25.36° ($H_2O$, *c* 3.510) (3,6-anhydroglucose, m. 118°, $[\alpha]_D^{22}$ 55.39° ($H_2O$, *c* 2.888)) C. A. R.

Report (No. 93) of the most important work in the field of pure sugar chemistry published during the first half of the year 1930. E. O v. Lippmann. *Deut. Zuckerind.* 55, 1104, 1131–3, 1178–9, 1204(1930) —A comprehensive review. J. L. Leete

Essential oil of Backhousia angustifolia. III. Constitutions of angustione and dehydroangustione. Robert S Cahn, Charles S Gibson, Arthur R. Penfold and John L Simonsen *J. Chem Soc* 1931, 286–94, cf. *C. A.* 24, 3998 —The constitution ascribed to angustione (I) is further confirmed by the action of HBr, which gives 1,1,3-trimethylcyclohexane-4,6-dione, m. 130–1°, and by its oxidation with KOBr to $HO_2CCHMeCH_2CMe_2CO_2H$, m. 91–2°, $[\alpha]_{546}$ —12° ($H_2O$, *c* 1.546), oxidation with $KMnO_4$ gives a ketonic acid, further oxidized to the above acid with KOBr. Dehydroangustione (II), *p*-$MeC_6H_4NH_2$ and $ZnCl_2$, heated 2 hrs at 140–50°, give the *p-toluidino deriv*, m 63–5°. Heating II with HBr on the $H_2O$ bath for 4 hrs gives 1,1,3-trimethyl-$\Delta^2$-cyclohexene-4,6-dione (III), m. 156–7° Reduction of II gives *dl*-angustione, $b_{14}$ 127°, $d_{20}^{20}$ 1 083, $n_D^{20}$ 1.5087 (identical with the natural ketone, except for the value of *n*, the previous sample was contaminated with II), the *amino deriv*, m 139–40°, is formed by adding $NH_4OH$ to the EtOH soln.; the *4(or 6)-oxime*, m. 57–8°. Oxidation of II with NaOBr gives a mixt. of a compd. m 88 5°, identified as the anhydride of *cis*-α,β,γ-



(I)



(II)

trimethylglutaconic acid (IV), m 125° (on bromination, the product evolves HBr, giving the *lactone* of *β bromo-γ-hydroxy-α,α,γ trimethylglutaric acid*, m 147–8°) and *trans* β-hydroxy-α,α,γ-trimethylglutaric acid, m 156–7°. Oxidation of III with NaOBr gives as the main product IV; there also results a small quantity of a *compd*., $C_8H_{12}O_2$, m. 85–6°, which gives a purple color with $FeCl_3$, this is unstable and passes into a red oil on standing, it may be OC·CHMe·$CH_2$·$CMe_2$·CO or HOC·C(OH)·CMe:CH·$CMe_2$

Note on the parachors of angustione and dehydroangustione. Owen J. Evans and

FREDERICK G SOPER *Ibid* 289-90.—*dl* I, m 151-2°, $\gamma_{18}$ 34 9, *P* 442 (calcd., 462 1), II gave $\gamma_{18}$ 36 7, *P* 435 (calcd., 439 5), the $d^{18}$ were 1 083 and 1 103, resp The temp. coeff of the surface tension for I is —0 072 dyne/cm per degree, $d^{40}$ 1 074, Ramsay-Shields const 2 05, this indicates that I is a normal liquid, so that the neg anomaly cannot be attributed to assocn. The reason for this is discussed C J. WEST

*Model experiments for the theory of alcoholic fermentation. III. Degradation of α-diacetonefructosesulfuric acid.* HEINZ OHLE AND GEORG COUTSICOS *Ber* 63B, 2912-27(1930), cf *C A* 24, 1350.—It was shown in Paper I that β-diacetonefructose-1-sulfuric acid (I) with aq neutral $KMnO_4$ gives the tri K salt of 2,3 acetone β-*l* furtondiacid 1-sulfuric acid (II) (the mother substance, $HOCH_2C(OH)_2CH(OH)CH(CO_2H)_2$, being designated as furtondiacid) The prepn of this salt has since been materially improved and simplified and it is now quite readily available. A weak point in the *proof of its constitution was the detection and quant estn. of the* $HOCH_2CO_2H$ formed in its hydrolysis but this gap has now been filled in On the basis of the fact that $HOCH_2CO_2H$ forms a difficultly sol basic Pb salt a quant. method for detg this acid, sufficiently accurate for the present purpose, was devised and it was found that the above tri K salt does in fact give 1 mol $HOCH_2CO_2H$, as previously assumed That the yield of MeCOCHO does not exceed 80% is probably due to a small part of it undergoing a Cannizzaro reaction, with formation of $AcCO_2H$ and $AcCH_2OH$; the latter, though not isolated, was shown to be present by its characteristic odor. The reaction was next applied to α-diacetonefructose-3 sulfuric acid (III) Whereas with I the formation of II and the point where it is present in greatest concn can be readily recognized by following the oxidation polarimetrically to the max in the rotation curve, the curve for III shows no such max With 12 atoms O the III is completely broken down into optically inactive products, as is demanded by theory if the $Me_2CO$ split off is not attacked If each mol of III were at once broken down into the final products ($Me_2CO$, $H_2O$, $CO_2$, $H_2SO_4$) before the next mol underwent the same change, the rotation curve should be a straight line, but, as was to be expected, it is not To obtain further light on the course of the reaction, the splitting off of the $H_2SO_4$ was also followed and here again the curve obtained by plotting the no of mols $H_2SO_4$ split off against the no of *atoms of O used was not a straight line In both cases the max deviation from* a straight line was at a point corresponding to about 6 atoms O, and at this point it was possible to isolate an almost optically inactive product (IV) having the same compn as II, viz., the tri K salt of *1,2-acetone α-l furtondiacid-3 sulfuric acid*, and yielding the same hydrolysis products Attempts to isolate intermediate products in the formation of II and IV in order to det at what point of the fructose mol (C atom 5 or 6) oxidation first begins were unsuccessful, and the study of α acetonefructose-3 sulfuric acid (V) was therefore undertaken Since here the 4 and 5-HO groups are free, the V should be more readily attacked by $KMnO_4$ and the first oxidation phase should use up more $KMnO_4$ than with III and less $KMnO_4$ would be left for the further oxidation so that there would be an increased accumulation of the intermediate oxidation product The *max deviation of the exptl rotation curve from a straight line appeared at the point* corresponding to 5 atoms O, and at this point there were obtained large quantities of IV but also, although in small quantity, the di K salt of *1,2-acetonefructuronic-3-sulfuric acid* (VI), showing that, in part, at least, it is the 6-C atom which is first attacked Whether VI is an intermediate or a by product in the formation of IV could not be detd for lack of material VI, the first deriv of the hitherto unknown fructuronic acid, the analog in the ketose series of glucuronic acid, is decompd. by boiling dil HCl into $Me_2CO$, $H_2SO_4$ and $CO_2$, but the latter is evolved much more slowly than from II or IV. MeCOCHO and furfural were not formed To det how the $OSO_2H$ residue influences the course of the oxidation of α- (VII) and β-diacetone- (VIII) and α-acetonefructose (IX), the oxidation curves of these compds were also detd With VIII the rotation curve also changes from — *to* +, *with a max at the point corresponding to about 6 atoms O, so that 2,2 acetone*-2,2,3-trihydroxyglutar-4-carboxylic acid is probably formed, but the curve does not pass through $\alpha_D$ 0° at the point corresponding to 12 atoms O The same is true of the curve for VII. *The only possible explanation for this is that a part of the* $Me_2CO$ *split off is also* oxidized, probably after it has reacted with another cleavage product of the sugar mol The curve for VII also shows a dispersion of the exptl values which is not due to exptl error, as the individual values can be reproduced with great exactitude It is, therefore, assumed that a whole series of intermediate products is formed through different reactions, one of which, through the furtondiacid, is extraordinarily favored by the introduction of an $OSO_2H$ residue The curve for IX is parallel to the theoretical (straight line) curve from the points corresponding to 2 up to 9 atoms O, indicating that most of the IX is oxidized directly to $Me_2CO$, $CO_2$ and $H_2O$ *without the accumulation in*

appreciable amount of any intermediate product If, however, IX is not a pyroid fr tose but a fructofuranose, the curve might be interpreted on the assumption that w 2 atoms O there is an almost quant formation of acetonefructuronic acid, but an ex on a large scale under these conditions yielded only large quantities of unchanged I IX and its 3-sulfate (V) show most strikingly the selective action of the $OSO_3H$ gro which evidently depends on its adjacent position to the masked C O group, the strong electronegative $OSO_3H$ residue stabilizing the hydrate form of the C O group a therefore exerting the same influence as the Cl in $CCl_3CHO\ H_2O$ By the stabilizati of the hydrate form the union of the $Me_2CO$ is also strengthened and the upper end of t mol is protected from attack by the oxidizing agent Other electronegative grou must exert the same influence, and, furthermore, oxidation through derivs of the furto diacid type in the glucose series is at most possible only in those glucose derivs hav strongly acid residues on the 2-HO group It is believed therefore, that a degradati of glucose in the sense of the Neuberg fermentation scheme is possible only by way fructose. *K salt* of III, from VII and $ClSO_3H$ in $C_5H_5N$, needles with $^1/_2$ mol. $H_2$ decomps about 165°, $[\alpha]_D^{22}$ —124.3° ($H_2O$, *c* 1.094), is practically insol in abs. al swells in ordinary alc. and dissolves on heating, the satd cooled soln contg about 0.7 of the salt, more concd solns solidify to a more or less stiff jelly The alc. in the jellies can be for the most part squeezed out by gentle pressure The higher alcs beha like EtOH but with MeOH the property of gelatinizing is less marked *Na salt*, needl with $1H_2O$, decomps about 170°, $[\alpha]_D^{20}$ —128.3° ($H_2O$, *c* 2.144) The salts are stat toward boiling dil alkalies but split off $Me_2CO$ and $H_2SO_4$ with very dil acids at roc temp *Tri K salt* of IV (20 g. from 100 g. of the K salt of III with 2 *N* $KMnO_4$ (6 ato *O*) on the $H_2O$ bath), prisms with $3H_2O$ from *MeOH* $Me_2CO$ *EtOH*, $[\alpha]_D^{22}$ —1.7 needles with 4.5 $H_2O$ from MeOH, $[\alpha]_D^{22}$ —2.72° *K salt* of V, obtained by part hydrolysis of the K salt of III with *N* $H_2SO_4$ at room temp., decomps about 15 $[\alpha]_D^{22}$ —112° ($H_2O$, *c* 1.847) *Na salt*, decomps 140°, $[\alpha]_D^{20}$ —118.6° ($H_2O$, *c* 2.42 *Di-K salt* of VI (5 g. from 100 g. of the K salt of V with 2 *N* $KMnO_4$ (5 atoms *O*) at 100 prisms with 4 mols $H_2O$ (0.5 mol is firmly held even at 135°), $[\alpha]_D^{22}$ —45.68° ($H_2O$ 1.345). IX, from 50 g. VII allowed to stand 3 hrs. at 37° in 250 cc. of 70% AcOH, 120.5°, $[\alpha]_D^{22}$ —159.3° ($H_2O$, *c* 1.639) Tri-K salt of II (164 g. from 756 g. of the K s of I heated 10 hrs. at 100° with 1264 g. $KMnO_4$ in 20 l. $H_2O$) $[\alpha]_D^{22}$ 20.35° ($H_2O$, *c* 3.31

C A R

Lignin, humic acid and humin. W Fuchs *Z angew Chem* **44**, 111–8(193 cf. *C. A* 25, 761.—Investigations by F and co-workers are summarized E Schotte

Lignin and related compounds. V. Action of halogens on lignin and woo Harold Hibbert and Charles A Sankey *Can J Research* **4**, 110–8(1931); C. *A* 24, 5151, 5152.—Spruce meal and a variety of lignin products were treated wi Br dissolved in a variety of solvents The addn of Br was found to be a function time, concn., solvent used and the acidity of the reacting medium, and quite unsat factory for the detn of unsatn. VI. The mechanism of aqueous halogenation. Austin Taylor, O Maass and Harold Hibbert *Ibid* 119–33.—The rates of add of HClO and HBrO to several unsatd compds., under the influence of various catalys have been studied. The addn of HClO to allyl alc and dipropenylglycol is catalyz

by both $\overset{+}{H}$ and $\bar{Cl}$, the catalytic effects of these ions, mole for mole, being equal. T

effect of $\overset{+}{H}$ and $\bar{Cl}$, when added together as HCl, is not the sum of their sep effects but proportional to their product, indicating undissocd HCl as the real catalyst Th catalytic effect of varying amts of added HCl is approx. proportional to the square the amt. added, again indicating undissocd HCl as the real catalyst The addn HBrO to allyl alc. is catalyzed by HCl and HBr to about the same degree. This catalys of HBrO addn by HCl provides further support for the hypothesis of undissocd HCl the real catalyst in the addn of HClO This catalytic effect of undissocd halogen ac on the addn. of hypohalous acids is given as an explanation of the greater rates of add of HClO and HBrO from Cl and Br water as compared with solns of HClO and HBr The addn of HBrO to fumaric acid is not catalyzed by HBr but, on the other hand, considerably decreased It is catalyzed, however, by HCl, although not nearly to th same degree as the addn to allyl alc. This difference in behavior between fumaric ac and allyl alc. shows the necessity for studying the effect of HCl and HBr on the rate addn. of HBrO to a wide variety of unsatd compds., before any general theory of a halogenation applicable to all types of unsatd compds can be put forward Th

possible influence of conjugation has, however, been pointed out. An attempt has been made to apply the theory of hypobalous acid addn. catalyzed by undissocd. halogen acid to the aq halogenation of phenols. The reaction between HBrO and *m* nitrophenol has been shown to be catalyzed by HCl although not to the same extent as by HBr. This indicates HBrO addn., catalyzed by undissocd. HBr, as one of the mechanisms involved in the aq bromination of phenols. A similar mechanism cannot be the fastest one in the aq chlorination of phenols, since it is in disagreement with kinetic data of Soper and Smith (*C. A.* 20, 2840), showing Cl to react faster than HClO with phenols. Resorcinol and phloroglucinol do not fall under the general classification proposed by Soper and Smith for phenols. Even here, however, the main reaction between Cl water and the phenol seems to involve Cl rather than HClO. Several parallel mechanisms may be involved in the aq halogenation of phenols and the necessity for further work in this field has been emphasized. J. W. Smith

The enolization of ketones. V. Grignard and H. Blanchon. *Bull. soc. chim.* [4], 49, 23–42(1931).—The Grignard reagent has an enolizing reaction on ketones (*C. A.* 21, 731), and it is possible to esterify the mixt. of enol so produced and the accompanying tertiary alc. from the normal reaction by means of acid chlorides or anhydrides. After sepn. of the esters by distn., the enolic ester can be hydrolyzed with $H_2O$. With certain precautions the enol keto mixt. can be isolated by the decompn. of the Mg complex by $NH_4Cl$ (*C. A.* 20, 751). A systematic study was undertaken to establish a relation between the constitution of the ketone, its aptitude for enolization and the stability of the enol, the present paper dealing with the enolization of ketones (*C. A.* 24, 1342), and the prepn. of the enols. To obtain the max. amount of enolate iso-PrMgBr was selected as being the most readily prepd. reagent. In general, the ketone was dissolved in an equal vol. of $Et_2O$ and gradually introduced into the reagent. After refluxing for 30 min. and then cooling to —5°, the theoretical amt. of AcCl in 5 vols. of $Et_2O$ was added dropwise with stirring and the resulting yellow mass was dropped into iced water contg. $NaHCO_3$. The washed and dried $Et_2O$ exts., freed from $Et_2O$, were distd. under reduced pressure, giving 3 fractions, the keto-enol mixt., the enol acetate and the acetate of the tertiary alc. *Cyclohexanone-enol.*—100 g. of cyclohexanone gave 5 g. of keto-enol mixt. contg. 30% enol, 25 g. of the enol ester and 60 g. of isopropylcyclohexanol, $b_{13}$ 125°. The ester was hydrolyzed with 10% $(CO_2H)_2$, yielding a 70% enol, $n_D^{15}$ 1.4601. The tautomerization to cyclohexanone was complete in 10 hrs., the transformation being retarded by $(CO_2H)_2$, but not by $C_6H_4O_2$ or *o*-$C_6H_4(CO_2)O$, and accelerated by mineral acids, alkalies and Br. *Thujone-enol.*—Thujone formed mainly isopropylthujol acetate, $b_{13}$ 125°, on treatment with iso-PrMgBr, and also some thujone-enol mixt. contg. 89.5% enol, $n_D^{15}$ 1.4540, which reverts to the ketone in 15 hrs. The ketonization is completed in 2 hrs. with $NaHCO_3$ and instantaneously with Br, demonstrating the difficulty of obtaining the pure enol and the inapplicability of the Kurt Meyer method. *Carvone-enol.*—200 g. of carvone, enolized by EtMgBr, gave ethylcarveol, $b_{13}$ 142°, and 15 g. of 96.5% carvone-enol, $b_{13}$ 114–5°, $d_{15}^4$ 0.957, $n_D^{15}$ 1.5151, R. M. 47.2, calcd. 46.3. After 25 hrs. the mixt. contains 1.5% enol, tautomerization being accelerated by light, acids and alkalies. With Br the ketonization is complete in 1 hr. at 15° and in 15 mins. at 40°. The Kurt Meyer method applied at 0° would give results 10% below those furnished by the detn. according to Job and Reich. *Enol of mesityl oxide.*—Enolization of 100 g. of $Me_2C$:CH-COMe with iso-PrMgBr yielded in addn. to 31 g. of 2,3,5-trimethyl-4-hexen-3-ol, b. 172°, and 10 g. of enol acetate, 21 g. of a 70% enol, b. 134°, $d_{15}^4$ 0.8610, $n_D^{15}$ 1.4500, R. M. 30.8, calcd., 30.18, which ketonized in 5 hrs. to 64% enol. Enols can be formed through the chlorohydrins. These are transformed into the acetic ester by AcOK and then treated as above. From pulegone was obtained 50% yield of a 98.2% enol, $b_{13}$ 79–81°, $n_D^{15}$ 1.48115, $d_{15}^4$ 0.9130, R. M. 47.38, calcd. 46.76. The 75% enol derived from MeBr through the chlorohydrin was a very unstable liquid, b. 205°. Tautomerization was complete in 10 hrs. in the dark, 5 hrs. in light and was instantaneous in the presence of acids and alkalies. The ketonization was accelerated with Br. The enol *did not* give a color reaction with $FeCl_3$ nor did it form an ammoniacal enolate. C. R. A.

Bromomesitylene. Lee I. Smith. *Org. Syntheses* II, 24–5(1931).—Details are given of the bromination of $C_6H_3Me_3$ in $CCl_4$ at 10–5°, the yield of $C_6H_2Me_3Br$ being 79–82%, traces of side-chain derivs. are removed by treatment with EtONa. The Br deriv. $b_{40}$ 132°, $b_{19}$ 139°, $b_{12}$ 146°, $b_{760}$ 157°. C. J. West

Process for the preparation of mesitylene. V. Ipat'ev, B. Dolgov and I. Volnov. *Ber.* 63B, 3072–8(1930).—Ipat'ev, Jr., in connection with his work on the displacement of metals of the 5th group from their chlorides ($SbCl_3$, $BiCl_3$) by H in $Me_2CO$ under pressure, noticed an extensive condensation of the solvent, irrespective of the salt used,

which occurred even when the solns were dild. with $H_2O$. This made it seem probable that the condensation to mesitylene (I) and higher condensation products depends not only on the dehydrating action of the HCl but also on a catalytic action exerted by it. The present authors were chiefly interested in the mechanism of the condensation to I, and since the use of $H_2SO_4$ under the same conditions resulted in a very deep-seated condensation with formation of S-contg products, they discarded this acid and used HCl. By choosing the mildest possible conditions and studying the effect of varying them they were able to det *the optimum conditions for the prepn. of I.* Using the Ipat'ev high-pressure app., they found that the yield of I after 24 hrs. at 175° (initial pressure 100 atm.) rapidly increases with increasing concn. of HCl up to 5 vol. % of d. 1.19 acid and then slowly falls as the HCl concn. is increased to 50 vol. %, where higher, terpene-like condensation products appear. This explains the poor yields of I from $Me_2CO$ satd. with HCl. Keeping the concn. of HCl const. (5 vol. %) and varying the temp. gave a very rapid increase in yield (based on the $Me_2CO$ not recovered) with increasing temp. up to 140°, the yield based on the total amt. of $Me_2CO$ charged into the app. reached its max. at 170°. From 175° to 190° the 2 curves coincided, pointing to a complete utilization of the $Me_2CO$ charge. A very significant fact is the decrease in lower, O-contg. condensation products (mesityl oxide) with increasing temp. Under optimal conditions (5 vol. % and 145°), the yield of I no longer increases after 24 hrs., up to this point the yield increases very regularly. Under these conditions 3–4.5% mesityl oxide could be isolated as the primary condensation product. The absence of phorone in the condensation products indicates that either it is not formed at all under these conditions or quantitatively undergoes further condensation. Under the above optimal conditions, com. $Me_2CO$ gives 43% I, based on the $Me_2CO$ not recovered, up to 50% of the $Me_2CO$ charged does not react but it can be put through the process again. At 175–80° practically all the $Me_2CO$ is used up, giving 36% I, as against only 17.5% previously obtained. C. A. R.

**Isodurene (1,2,3,5-tetramethylbenzene).** Lee I. Smith. *Org. Syntheses* XI, 66–9 (1931); cf. *C. A.* 24, 1850.—2,4,6-$Me_3C_6H_2Br$ gives a Grignard reagent which yields 53–61% of 1,2,3,5 $C_6H_2Me_4$ with $Me_2SO_4$. C. J. West

***The forced reaction between tetraphenylethylene and some organomagnesium* derivatives.** Henry Gilman and Stanton A. Harris. *Bull. soc. chim.* [4], 49, 10–12 (1931).—The formation of *o*-phenylbenzohydrylaniline by the action of PhMgBr on $Ph_2C{:}NPh$ (*C. A.* 23, 3909), in which an addn. is made to a benzene ring in a compd. contg. several closely situated Ph groups, suggested the corresponding reaction with $(Ph_2C{:})_2$ (I). Fifteen g. of I (0.045 mol.) in 150 cc. of PhMe was heated with 0.174 mol. of PhMgBr at 60° for 20 hrs. and then at 90–100° for 6 hrs., the mixt. being guarded from the atm. Eighty-six % of I was recovered and on addn. of $CO_2$ to the reaction mixt. before hydrolysis only BzOH was formed. Similarly, after a forced reaction with $PhCH_2MgCl$, 85.5% of I was recovered and carbonation with $CO_2$ gave $PhCH_2CO_2H$ uniquely. Neither expt. showed any evidence of any reaction of the type expected in spite of the forced conditions and the highly phenylated nature of I. C. R. A.

**2,4-Diaminotoluene.** S. A. Mahood and P. V. L. Schaffner. *Org. Syntheses* XI, 32–5(1931).—Details are given of the reduction of 2,4-$(O_2N)_2C_6H_3Me$ with Fe and HCl, the di-$NH_2$ deriv. being obtained in 74% yield. C. J. West

***p*-Iodoaniline.** R. Q. Brewster. *Org. Syntheses* XI, 62–4(1931).—$PhNH_2$ in $NaHCO_3$, treated with 1 mol. powd. $I_2$, gives 75–84% of *p*-$IC_6H_4NH_2$, m. 62–3°. C. J. West

**The action of ethyl nitrate on phenylhydrazine in the presence of sodium ethylate.** Eugen Bamberger and Otto Billeter. *Helv. Chim. Acta* 14, 219–32(1931).—The method used for the prepn. of PhN:NOH from $PhNH_2$, $EtONO_2$ and NaOEt (*C. A.* 15, 1516) was applied to $PhNHNH_2$ with the hope of obtaining PhN(:$NO_2H$):NH but the attempt failed. $NaNO_2$, $C_6H_6$, $PhNH_2$, PhNHNHAc, $PhN_3$, (PhN:)$_2$, HOAc, $N_2$ and MeC(N:NPh).NNHPh (I) were isolated from the reaction mass. Mechanisms for the formation of these compds. are suggested and evidence in their support is offered. I was prepd. in 94% yield from PhNHN:CHMe (II) and PhN(:N)Cl. In the same manner *nitromethylformazyl*, MeC(:NNHPh)N:$NC_6H_4NO_2$, m. 154° (with 0.5 mol. of EtOH of crystn.), was prepd. in quant. yield from II and *p*-$NO_2C_6H_4N$(:N)Cl. I decomps. in the presence of dil. and concd. HCl to yield PhN(:N)Cl and $PhNHNH_2$, resp. I. M. Levine

**Condensation of ethyl acetoacetate with aromatic amines. I.** G. V. Jadhav. *J. Indian Chem. Soc.* 7, 669–76(1930).—$AcCH_2CO_2Et$ (I) and aromatic amines give MeC(NHR):CHCONHR and either $MeCOCH_2CONHR$ (II) or MeC(NHR).$CHCO_2Et$ (III), the effect of substituent groups in the aromatic nucleus was studied. Compds. of

type II were isolated in only a few cases and heating the reaction mixt was shown to convert them to compds of type III, except in the case of Et β-*p*-nitroanilinocrotonate The following compds were prepd by refluxing equal wts of I and the proper amine unless otherwise indicated *acetoacet m nitroanilide* (IV), pale yellow, m 120–1°, *β m nitroanilinocroton m nitroanilide* (V) yellow, m 152 3°, *Et β p-nitroanilinocrotonate*, yellow, m 122–3°, *β p-nitroanilinocroton p nitroanilide* (VI) orange, m above 250°, *acetoacet p-anisidide* (VII) m 117–8°, *β p-anisidinocroton p-anisidide*, m 235–6°; *Et p-phenetidinocrotonate* m 60–1° (from a cold mixt on standing 48 hrs), *β p-phenetidinocroton p phenetidide* m 230–1°, *β m (1,4,5) xylidinocroton m (1,4,5) xylidide*, m above 275°, *β m (1,3,4) xylidinocroton m (1 3 4) xylidide* m above 275°, *acetoacet-m-chloroanilide*, m 105–6°, *β m chloroanilinocroton m-chloroanilide* m 240 1°, *acetoacet p-chloroanilide* (VIII) m 132–3°, *Et β p-chloroanilinocrotonate*, m 55° (from a cold mixt. on standing 72 hrs) *β-p chloroanilinocroton p-chloroanilide*, m above 275°, *acetoacet-o-chloroanilide* (IX), m 107–8°, and *β-o chloroanilinocroton-o-chloroanilide*, m. 236°. V and VI with HCl give IV and *acetoacet p-nitroanilide* (X), m 122–3°, resp IV, X, VIII, IX and VII with $NH_4OH$ give the following *anilides of β-aminocrotonic acid m-$NO_2$*, orange red, m 129–30°, *p-$NO_2$* yellow m 189–90°, *p-MeO*, m 109–10°; *p-Cl*, m 110°, and *o-Cl*, m 96–7°

A F. Shepard

**Azoxybenzene.** H L Bicelow and Albert Palmer *Org Syntheses* XI, 16–8 (1931).—Details are given of the action of $As_2O_3$ and NaOH upon $PhNO_2$, PhN N( O)-Ph results in 85% yields, the compd is easily volatile with steam at 140–50°

C J. West

**Remarks concerning the most recent work of A. Angeli.** Eugen Bamberger *Helv Chim Acta* 14, 242–9(1931).—A mechanism offered by B for the reaction by which azohydroxyamides RN(OH)N NR, are obtained from the interaction between PhNO (I) and $PhNHNH_2$ (II) or their derivs involves an aldol condensation of the reactants followed by a loss of $H_2$ This mechanism is in contrast to that given by Angeli who supposed that II is first reduced to PhN NH which then adds I. Several instances of reactions easily explained by means of the aldol condensation are given Besides the simple compds., *p* $BrC_6H_4NO$ (III) $PhMeNNH_2$ (IV) and $Ph_2NNH_2$ (V) undergo the same type of reaction From IV and I, *phenylazomethylanilidoxide*, PhMe-NN N( O)Ph (VI), m 72°, PhMeNN NPh (VII) and PhNHMe (VIII) were obtained By reduction of VI with Zn, VII, VIII, $PhNH_2$ and $NH_3$ were produced Condensation of V and I yields *phenylazodiphenylamidoxide*, $Ph_2NN$ N( O)Ph, m 128.5–9°, $Ph_2NH$ and PhNHOH From III and IV *p-bromophenylazomethylanilidoxide*, $BrC_6H_4N$( O) N-NMePh (IX), m 77–8°, $BrC_6H_4N$ N( O)$C_6H_4Br$ (X), and possibly $BrC_6H_4N$.NNMePh were isolated Reduction of IX yielded $(BrC_6H_4N)_2$ (XI) and VIII. III and V interact to give *p bromophenylazodiphenylamidoxide*, $BrC_6H_4N$( O) $NNPh_2$ (XII), m. 119–20°. X and $BrC_6H_4NHOH$ The reduction products of XII consisted of X, $(BrC_6H_4NH)_2$. XI, $Ph_2NH$, $BrC_6H_4NH_2$ and $Ph_2NNHAc$.

I M Levine

**N-Diethylamino-N'-phenylurea** R Stollé and W Brandt *J prakt Chem* 129, 206(1931).—Hurd and Spence (*C A.* 21, 570) state that $Et_2NNH_2$ and PhNCO give the compd PhN C NNEt$_2$, S and B state the compd analyzes for $C_{11}H_{17}ON_3$ and is thus a semicarbazide deriv

C J West

**p-Methoxybenzylmagnesium bromide.** Henry Gilman and E A Zoellner *Bull soc chim* [4], 49, 7–9(1931).—The extraordinary activity of the halogen in the halides of the type *p*-$MeOC_6H_4CH_2X$ renders these compds so unstable that various workers have reported that *p*-$MeOC_6H_4CH_2Cl$ does not form a Grignard reagent (*C. A* 18, 237, 23, 823) By a modification of the usual procedure (*C. A.* 23, 2934) *p*-$MeOC_6H_4CH_2MgBr$ has been prepd in satisfactory yields To 1 82 g (0 075 atom) of Mg, 30–80 mesh, covered with 11 5 cc $Et_2O$, were added 10 drops of freshly distd *p*-$MeOC_6H_4CH_2Br$ ($b_{12}$ 129°, $d_{20}$ 1 41), and then 0 05 g of I After boiling for 10 mins without stirring, 4 35 g (0 0216 mol) of the bromide mixed with 23 5 cc. of $Et_2O$, was added uniformly over a period of 30 mins with stirring and refluxing After the addn. this treatment was continued for 10 mins The resulting soln gave a positive reaction for organometallic reagent (*C A* 19, 2473) and titrated for 54% *p*-$MeOC_6H_4CH_2MgBr$ (*C A* 17, 530) Treatment with $CO_2$ gave *p*-$MeOC_6H_4CH_2CO_2H$, m 84–5°, and some $(p\text{-}MeOC_6H_4CH_2)_2$ The yield could be raised to 75% by using 10–20 atoms of Mg and about 30 mols of $Et_2O$ per mol of bromide, an even better yield should be obtained of the corresponding organomagnesium chloride

C. R. Addinall

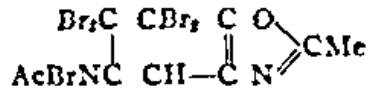
**Sulfur derivatives of 2-methoxytoluene.** G B Kolhatkar and K. V. Bokil *J Indian Chem Soc* 7, 843–50(1930).—3,4-$Me(MeO)C_6H_3SO_2Cl$ (I) and 2-$MeOC_6H_4Me$ in $CS_2$ with $AlCl_3$ give *3,3'-dimethyl-4,4'-dimethoxydiphenyl sulfone* (II), m. 138°. Alk. $KMnO_4$ oxidizes II to *3,3'-dicarboxy-4,4'-dimethoxydiphenyl sulfone* (III), sinters 245°,

dark red color *4,4' (3 Nitrobenzoyl)diphenyl ether*, m. 175°, sol. in concd. $H_2SO_4$ with a yellow color, *di 3 $NH_2$ deriv.*, greenish yellow, m. 150–1°; $H_2SO_4$ soln., red-orange; *azo dye* from β $C_{10}H_7OH$, orange, sol. in $H_2SO_4$ with a red color. *3 (3 Nitrobenzoyl)-diphenyl sulfide* m. 128–9°, sol. in concd. $H_2SO_4$ with an orange red color; the *di-4,4'-(3 nitrobenzoyl) deriv.* m. 229–30° and gives an orange red color in $H_2SO_4$. *Di-4,4'-(4-nitrobenzoyl) deriv.*, m. 278°, $H_2SO_4$ gives an orange red color. *Di-4,4'-(3 nitrobenzoyl)-diphenyl selenide*, greenish yellow, m. 221–2°, sol. in $H_2SO_4$ with an orange red color; the *di 4 4' (4-nitrobenzoyl) deriv.* yellow, m. 267–8° and gives a deep red soln. in $H_2SO_4$. *4 Benzoyl-4'-nitrodiphenyl sulfide*, m. 145°, concd. $H_2SO_4$ soln., orange. C. J. West

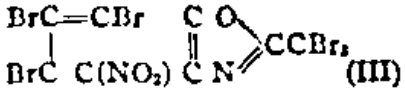
Aromatic disulfides and Sugden's parachors. S. S. Bhatnagar and Balwant Singh. *J. Indian Chem. Soc.* 7, 663–8 (1930).—The parachor values for several aromatic disulfides indicate that the conventional structure with 2 bivalent S atoms is correct. The following disulfides were studied and data for each were detd. at 3 or 4 different temps.: diphenyl, m. 60.5°, $d_4^{18.0}$ 1.110, γ 35.08, parachor (mean) 477.9; 4,4'-dichlorodiphenyl, m. 71.5°, $d_4^{121.3}$ 1.304, γ 39.39, parachor (mean) 559.6; 4,4'-dibromodiphenyl, m. 93.8°, $d_4^{116.0}$ 1.647, γ 40.23, parachor (mean) 575.9; 4,4'-dimethyldiphenyl, m. 46.0°, $d_4^{111.0}$ 1.068, γ 33.13, parachor (mean) 552.9; 4,4'-dimethoxydiphenyl (I), m. 73.5°, $d_4^{100.5}$ 1.139, γ 37.84, parachor (mean) 666.1; β,β'-dinaphthyl, m. 139.0°, $d_4^{149.0}$ 1.144, γ 37.20, parachor (mean) 689.6; dibenzyl, m. 71.0°, $d_4^{120.2}$ 1.085, γ 36.42, parachor (mean) 557.1; 2,2'-dinitrodibenzyl, m. 112.0°, $d_4^{115.0}$ 1.308, γ 44.81, parachor (mean) 665.7. The parachor value of I is 6.3 units lower than that calcd. for bivalent S, presumably this is due to assocn. A. F. Shepard

Action of bromine on phenols. Gustav Heller, Werner Dietrich, Theodor Hemmer, Horst Kätzel, Erhard Rottsahl and P. G. Zambalos. *J. prakt. Chem.* 129, 211–56 (1931).—The action of Br upon phenols may be divided into several categories. (1) *Br does not react.*—This is the case where the phenol group is protected as in 4,6,3-$Br_2(AcNH)C_6H_2OAc$; 2,4,6,3,5-$Br_5(AcNH)(O_2N)C_6HOH$ is also unchanged on heating with Br-AcOH. (2) *Br enters only in the nucleus.*—4,6,3-$(O_2N)_2(AcNH)C_6H_2OH$ and Br in AcOH, heated 8 hrs. on the $H_2O$ bath, give *4,6-dinitro-3-amino-2 bromophenol*, yellow, m. 207°; *di-Ac deriv.*, m. 222°; partial hydrolysis with dil. NaOH gives the *3-AcNH deriv.*, m. 223.5°. Warming on the $H_2O$ bath with concd. $HNO_3$ gives *4,6-dinitro-2 bromo-1,3-dihydroxybenzene*, golden yellow, m. 192.5–3°, 8% NaOH gives a carmine-red salt; this also results by diazotizing in concd. $H_2SO_4$. 2-Acetamido-4-nitroresorcinol and Br AcOH, shaken until soln. results and allowed to stand 24 hrs., give the *6-Br deriv.*, pale yellow, m. 173–4°. 6,3-$O_2N(AcNH)C_6H_2OH$ and Br-AcOH, warmed on the $H_2O$ bath, give *2,4-dibromo-6 nitro-3-aminophenol*, yellow, m. 199–200°; the alkali salt is orange-yellow, and *2 bromo-6-nitro-3-aminophenol*, yellow-brown, m. 230°; the structure of these compds. was established by removal of the $NH_2$ group. 3,5,4-$(O_2N)_2(AcNH)C_6H_2OH$ and Br-AcOH give the *2,6-di Br deriv.*, decomps. 274.5°; the free *$NH_2$ compd.*, brown, m. 138°. (3) *In addn. to substitution some of the groups are replaced by Br.*—4,3,5-$H_2N(O_2N)_2C_6H_2OH$ and Br AcOH, warmed 2 hrs. on the $H_2O$ bath, give bromoanil. Energetic bromination of 4,3-$O_2N(AcNH)C_6H_2OH$ gives 2,3,4,6-$Br_4C_6HOH$, with 1 mol. Br in AcOH there results the *6-Br deriv.*, yellow, m. 295° (decompn.), EtOH-KOH gives *6-bromo-4-nitro-3-aminophenol*, red brown, m. 244° (decompn.), whose structure was established by converting it into 6,4-$Br(O_2N)C_6H_2OH$, m. 113°. With more than 1 mol. Br, there also results the *2,6-$Br_2$ deriv.*, yellow-orange, m. 205°; *2,6-dibromo-4-nitro-3-aminophenol*, egg-yellow, m. 162.5°. 2,4-Dinitroresorcinol and a slight excess of Br in AcOH give the *6-Br deriv.*, m. 83°, a small quantity of the 5-Br deriv. and tetra-Br deriv. 4-Acetamido-6-nitroresorcinol and Br give the *2-Br deriv.*, m. 226° (decompn.). 3- and 4-Nitropyrocatechols, on energetic bromination, give the tetra Br deriv. and tetrabromo-o-quinone. (4) *The bromination is complete and leads to $Br_3C_6OH$.*—This is true of 3,4-$O_2N(AcNH)C_6H_2OH$; 3,4-$O_2N(H_2N)C_6H_2OH$, on the other hand, gives bromoanil. (5) *Besides complete bromination there follows addn. of Br and entrance of a halogen atom in the AcNH group.*—2,4-$(AcNH)_2C_6H_2OH$ and 1 mol. Br in AcOH give the *6 Br deriv.*, m. 215°, with $HNO_3$ (d. 1.4) and $H_2O$ (1:4) on the water bath, there results *2-acetamido-6 bromoquinone*, orange, m. 183°; $SO_2$ in EtOH gives the hydroquinone, m. 154°, excess Br gives tetrabromodiketo-R-pentene (I), m. 143–4°. Two mols. Br gives *2,4-diacetamido-5,6-dibromophenol*, crystg. with 2 mols. $H_2O$, m. 188.5°, anhyd., it m. 208°, $HNO_3$ gives *2-acetamido-5,6-dibromoquinone*, orange, m. 213°; the hydroquinone m. 188°. Four mols. Br gives *2-acetamido-3,5,6-tribromoquinone*, golden yellow, m. 198°. Excess Br gives *4-(N-bromoacetamido)-5,6-tetrabromo 2,1-ethenylaminophenol* (II), light orange, m. gradually above 210°, and I;

with 2 *N* NaOH there results *4-acetamido-5,6-dibromo-2,1-ethenylaminophenol*, m. 245°; fuming HCl gives 5,6,2,4-$Br_2(AcNH)_2C_6HOH$, *m* 188.5° 2,6-$(AcNH)_2C_6H_2OH$ and Br in AcOH give the *3,5(?)-$Br_2$ deriv*, m 209°, a *mono-Br deriv*, m 215° (decompn.). Excess Br gives an orange-yellow addn. product, amorphous, m 161–3° (decompn.), which gives with AcONa *6-acetylamino 3,4,5-tribromo-2,1-ethenylaminophenol*, m. 226°.



(II)



(III)

Oxidation of 2,6-$(AcNH)_2C_6H_2OH$ with $HNO_3$ gives *2,6-diacetamidoquinone*, orange, m 270° (decompn.). $PhNH_2$ gives an anilide, blue black, m 202°, the same quinone results from 2,4,6-$(AcNH)_3C_6H_2OH$ (6) *A quinone is formed with the retention of the AcNH group*.—2,4-$(AcNH)_2C_6H_2OH$, $NaNO_2$ and dil. $H_2SO_4$ give *2,4-diacetamido-6-nitrophenol*, orange, m 215°. Br in AcOH gives 2-acetamido-3,5,6-tribromoquinone (7) *In the case of quinone formation there generally follows complete bromination with the removal of substituents and formation of bromoanil*.—3,2,4-$H_2N(O_2N)C_6H_2OH$ and Br in AcOH, warmed 4 hrs. on the water bath, give the *6-Br deriv* yellow, m 148° (*di-Ac deriv*, m 161°, *mono-Ac deriv* pale yellow, decomps. 221°); excess Br gives bromoanil. Through the diazo reaction in concd. $H_2SO_4$ there results *2,4-dinitro-6-bromoresorcinol*, m. 89°. $HNO_3$ (d. 1.42) gives styphnic acid. 4,2,6-$AcNH(O_2N)_2C_6H_2OH$ and excess of Br give bromoanil. 2,5-Dinitrohydroquinone gives the same product (8) *Special behavior of 4,2,3,5-$H_2N(O_2N)_2C_6HOH$*.—Br in AcOH gives *5-bromo-2-nitro-1,4-quinone azide*, yellow-brown, m. 186° (decompn.), the Ac deriv gives bromoanil. *2-Acetamido-3,5,6-trinitrophenol*, light yellow, m. 151°, Br gives a compd., m. 218° (decompn.); the free $NH_2$ compd. with Br gives yellow needles, exploding at 180°. (9) *In several cases the Br opens the $C_6H_6$ ring with the formation of tetrabromodiketo R pentenes*.—*4-Nitro-2-acetamidophenol*, decomps. 267°, and Br in AcOH give the *6-Br deriv*, m. 206°, *this also results by brominating 2,4-$(O_2N)_2C_6H_2OH$, reducing and acetylating*. Excess of Br in AcOH gives I and *3,5,6-tribromo-2-amino-1-quinone 4-dibromide(?)*, m. 216° (*Ac deriv*, m. 208°). Heating 2,4,6-$AcNH(O_2N)_2C_6H_2OH$ with excess Br several hrs. also gives I. *2-Acetamido-5-nitrophenol*, m. 258–9°. 2,3,5,6-$H_2N(O_2N)_2C_6HOH$ and $HNO_3$ give *3,5,6-trinitro-1,2-quinone azide*, yellow, sepg. with $C_6H_6$ of crystn. and is very explosive, the alk. soln. gives a deep violet red color with β $C_{10}H_7OH$, cooking with 4–5 parts EtOH gives 2,3,5-$(O_2N)_3C_6H_2OH$; a shorter period of heating gives *3(?)-ethoxy-5,6-dinitro-1,2-quinone azide*, yellow, m. 166° (decompn.), alk. β $C_{10}H_7OH$ gives a deep brick red dye. 2,5-Acetamidonitrohydroquinone and Br-AcOH give *2-acetamido-5,6-dibromoquinone*, orange yellow, m. 213°, identical with that obtained on oxidation of 5,6,2,4-$Br_2(AcNH)_2C_6HOH$; an intermediate product is *2-acetamidotribromoquinone*, yellow, m. 189–90° (decompn.). *Hexaacetyl-2,5-diaminophentetrol*, $(AcNH)_2C_6(OAc)_4$, m. 216° (*decompn.*), 5 mols. Br give *2,5-diacetamidodihydroxyquinone*, red-brown, *does not* m. 280°. 3,4-$(AcNH)_2C_6H_2OH$ and Br-AcOH give the *6-Br deriv*, decomps. 258° and the *2,6-$Br_2$ deriv*, m. 223°, excess Br gives *2-methyl-5,7-dibromo-6-hydroxybenzimidazole*, greenish flakes which do not crystallize. *2,6-Diacetamidohydroquinone*, m. 240° (decompn.); Br gives *3-bromo-2,6-diacetamidoquinone*, red brown, m. 225°, $SO_2$ in AcOH at 40–50° gives *3-bromo-2,6-diacetamidohydroquinone*, m. 198° (decompn.). With 5 mols. Br there results *3,5-dibromo-2,6-diacetamidoquinone*, red-brown, m. 201°, the mother liquor contains a small quantity of $(CBr_3)_2CO$, I could not be detected (10) *Formation of hexabromoacetone*.—Excess of Br-AcOH with 2,6-diacetamidoquinone gives $(CBr_3)_2CO$, this also results from nitroaminophentetrol, in addn. to $Br_2C_6(OH)_4$, a *compd* $C_6H_3O_4NBr_2$ was obtained in some expts. *Pentaacetylnitroaminophentetrol*, m. *194°*, is formed with $Ac_2O$ and AcONa, in the presence of $H_2O$ there results the *di-Ac deriv*, light yellow, explodes at 214°. 2,3-$O_2N(H_2N)C_6H_2OH$ and 1 mol. Br in AcOH give the *6-Br deriv*, m. 233°; excess Br gives the *4,6-di-Br deriv*, yellow, m. 182°, warming with 6 mols. Br for 16 hrs. gives a mixt. of *2-dibromomethyl-4-nitro-5,6,7-tribromobenzoxazole*, m. 233°, and the *2-tribromomethyl deriv.* (III), m. 172°. Tetrabromodiketopentene and $PhNH_2$ in EtOH give *4,5-dibromo-2-dianilino-3-anil-1-ketopentamethylene*, m. 261°.

C. J. West

Quinone formation from nitroacetamidohydroquinone. Gustav Heller and Theodor Hemmer *J. prakt. Chem.* 129, 207–10(1931).—Dinitrohydroquinone is reduced by $SnCl_2$ and HCl in AcOH to *2,5-nitroacetamidohydroquinone* (I), brick-red, decomps. 220°; the *tri-Ac deriv* m. 183–4°. *2,5-Nitroaminohydroquinone*, red, carbonizes 154°; heating with dil. alkali gives a color change from blue through green to yellow; no characteristic substance was obtained through diazotizing. I and fuming $HNO_3$ in AcOH give *2-nitro-5-acetamido-3,6-dihydroxyquinone*, orange-yellow, m. 164°

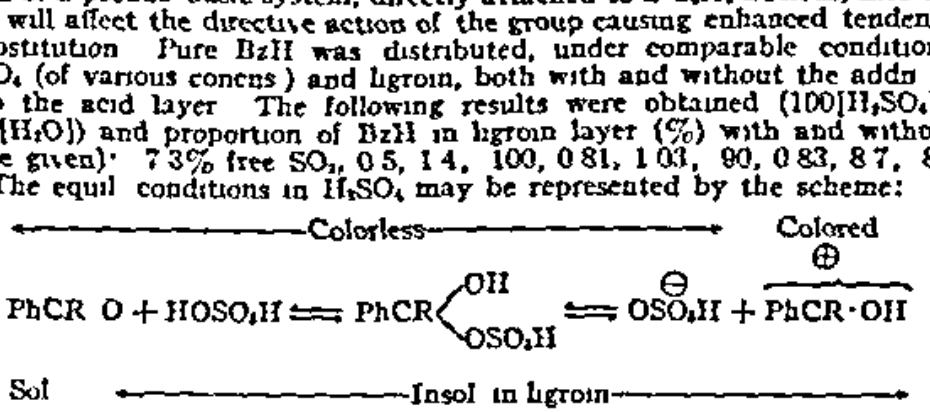
(decompn.) crystals with 0.5 mol. $H_2O$, with $PhNH_2$ there results *3,6-dianilino-2-acetamido-5-nitroquinone* (II), steel blue needles, gradually decomps. at 200°. Careful oxidation of I with $CrO_3$ in AcOH gives apparently a *monohydroxynitroacetamidoquinone*, gradually darkens above 140°, $PhNH_2$ gives II. C. J. West

Halogenation of optically active phenylmethylcarbinol in the presence and in the absence of pyridine by thionyl chloride and the chlorides and oxychloride of phosphorus. Joseph Kenyon, Henry Phillips and Frank M. H. Taylor. *J. Chem. Soc.* 1931, 382-9.—The halogenation of *l* PhMeCHOH by $SOCl_2$, $PCl_3$, $PCl_5$ and $POCl_3$ in the presence and absence of $C_5H_5N$ is studied. It is found that the presence of either pyridine or quinoline causes a reversal in the sign of rotation of the PhMeCHCl when $SOCl_2$ is used. When $PCl_3$, $PCl_5$ or $POCl_3$ are used in the presence of $C_5H_5N$, the signs of rotation of the PhMeCHCl obtained are the same as in its absence but the magnitudes of the rotations are greater. The presence of $K_2CO_3$ is without influence on the magnitude of the rotatory power of the PhMeCHCl obtained by the interaction of the *l* alc. with $PCl_5$. It is probable that the HCl produced in the initial stage of this interaction plays no further part in the reaction and that the PhMeCHCl produced arises through the decompn. of the intermediate compd., $PhMeC(OPCl_2)H$. In the absence of $C_5H_5N$, which causes the inversion reaction to predominate, the decompn. of the intermediate compd. appears to follow an indefinite course in which all the methods of decompn. may occur, since *d* PhMeCHCl with $[\alpha]_{5461}$ 10.1° is obtained in place of the probably optically pure chloride with $[\alpha]_{5461}$ 64.1° which is obtained when the decompn. occurs in the presence of $C_5H_5N$. It would appear that, in the absence of $C_5H_5N$, the decompn. of the intermediate compd. $PhMeC(OPOCl)H$ is initiated by the sepn. of a phenylmethylcarbonium cation without the simultaneous production of a Cl anion. The results of the various expts. may be tabulated as follows:

| Halogenating agent | | Tert. base | $[\alpha]_{5461}$ of *l* alc. | $[\alpha]_{5461}$ of PhMeCHCl |
|---|---|---|---|---|
| $SOCl_2$ | 2.5 mols | None | −51.7° | −63.5° |
| $SOCl_2$ | 2.0 mols. | $C_5H_5N$ 1 mol | 49.8 | 17.3 |
| $SOCl_2$ | 2.0 mols. | $C_5H_5N$ 2 mols | 49.8 | 36.3 |
| $SOCl_2$ | 2.0 mols | Quinoline 2 mols | 43.7 | 16.1 |
| $PCl_3$ | 3.5 mols | None | 51.7 | 10.1 |
| $PCl_5$ | 2.0 mols | $K_2CO_3$ | 51.7 | 10.0 |
| $PCl_5$ | 2.0 mols. | $C_5H_5N$ 1 mol | 49.8 | 64.1 |
| $POCl_3$ | 2.5 mols | None | 23.0 | 0.5 |
| $POCl_3$ | 2.0 mols | $C_5H_5N$ 1 mol | 52.1 | 12.6 |
| $PCl_5$ | 2.0 mols | None | 43.7 | 4.5 |
| $PCl_5$ | 2.0 mols | $C_5H_5N$ 1 mol | 49.8 | 10.4 |

The b. p. and *n* are given for many of the products. C. J. West

Salt-forming characteristics of doubly- and singly-linked elements of the oxygen groups. I. The carbonyl group in benzaldehyde and acetophenone. John Wm. Baker. *J. Chem. Soc.* 1931, 307-14.—The investigation of the salt forming characteristics of the carbonyl O in derivs. of the type ArCOR has been carried out along 2 lines. The first involves investigations of the condition of such groups in $H_2SO_4$ soln. by the purely phys. methods of partition, colorimetry, absorption spectra, etc. Secondly, the conversion of a pseudo-basic system, directly attached to a $C_6H_5$ nucleus, into the "onium" salt will affect the directive action of the group causing enhanced tendency toward *m*-substitution. Pure BzH was distributed, under comparable conditions, between $H_2SO_4$ (of various concns.) and ligroin, both with and without the addn. of $(NH_4)_2SO_4$ to the acid layer. The following results were obtained ($100[H_2SO_4]/([H_2SO_4] + [H_2O])$ and proportion of BzH in ligroin layer (%) with and without $(NH_4)_2SO_4$ are given): 73% free $SO_3$, 0.5, 1.4, 100, 0.81, 1.03, 90, 0.83, 8.7, 80, 1.77, 30.8. The equil. conditions in $H_2SO_4$ may be represented by the scheme:

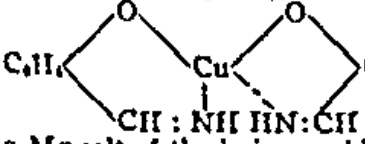



In the absence of $(NH_4)_2SO_4$ these equil. are displaced largely toward the right, the BzH being retained almost completely in the acid layer, even in 80% $H_2SO_4$. Addn.

of $(NH_4)_2SO_4$ causes a repression of the ionic dissocn which is followed in turn by a further decompn of the pseudo-salt into free BzH and $H_2SO_4$ with the result that a larger proportion of the BzH is found in the ligroin layer Color values of BzH in 100% $H_2SO_4$ at room temp are given, in agreement with the theoretical deductions, the product *cl* is not const as required by Beer's law, the intensity of the color decreasing with increasing dilu more slowly than this law requires The effect of the dilu of the $H_2SO_4$ was investigated by detn of the relative color intensities of solns of BzH in 100, 90, 80 and 70% $H_2SO_4$ in which the mol ratio, BzH/$H_2SO_4$, was kept const If, as has been assumed, the intensity of the color is a measure of the amt of the salt form present, then the figures show that, of the amt of oxonium salt present in 100% $H_2SO_4$, 15, 55 and 79%, resp., suffers hydrolysis in presence of the same mol quantity of $H_2SO_4$ but in 90, 80 and 70% dilu, resp A similar expt with BzMe shows that hydrolysis of the onium salt occurs even more readily, the diminution in color as the strength of the acid is diminished being too rapid to admit of accurate colorimetric measurement

**II. Nitration of benzaldehyde and acetophenone in sulfuric acid solution.** J W Baker and Wm G Moffitt *Ibid* 314–8.—Using $HNO_3$ of d 1.53 at 5° the following yields of *m* $NO_2$ deriv of BzH were obtained with varying concns of $H_2SO_4$: 73% free $SO_3$ 90.8, 5% free $SO_3$ 89.0, 27% free $SO_3$ 89.8 90% 86.5, 80% 83.9, 0% 72.1 With BzMe: 73% free $SO_3$ 90, 80% 83.1 0% 69.8 This establishes the anticipated increase in *m* substitution when nitration is effected in the presence of a large excess of $H_2SO_4$ Proof that these compds are nitrated mainly through the cations of the salt is afforded by the observation that the addn of $(NH_4)_2SO_4$ depresses the *m* substitution $Rb_2SO_4$ behaves similarly C J West

**Inner complex salts from hydroxyaldimines and hydroxyketimines** Paul Pfeiffer, E. Buchholz and O. Bauer *J prakt Chem* 129, 163–77(1931).—*o* $HOC_6H_4CHO$ and $CaCl_2$ in dil $NH_4OH$ give the *compd* $(C_7H_5O_2)_2Ca\ 2H_2O$, yellow, which loses the $H_2O$ over $CaCl_2$, the *Mg complex* also contains $2H_2O$ and is yellow $Zn(OAc)_2$, however, gives a *complex* of *salicylaldimine*, $(C_7H_6ON)_2Zn\ H_2O$, yellow, crystn from $C_5H_5N$ gives a compd with 1.5 mols $C_5H_5N$, which loses 1 mol on standing, the *Ni complex*, $(C_7H_6ON)_2Ni\ 1H_2O$, *red needles with golden luster, which crystallizes from* $C_5H_5N$ without solvent of crystn. The Cu complex was first prepd by Ittling (*Ann* 35, 205(1840)). The properties of these compds indicate the structure




*o*-Vanillin gives a *Mg complex*, $(C_8H_7O_3)_2Mg$, yellow, a Mg salt of the imine could not be prepd Zn gives the *complex*, $(C_8H_7O_3)_2Zn\ 2H_2O$, *yellow; in* $NH_4OH$ there results the *complex* $(C_8H_8O_2N)(C_8H_7O_3)Zn$, which crystallizes with 0.5 mol $H_2O$ Ni gives the *complex* $(C_8H_8O_2N)_2Ni$, glistening red-brown needles *o* $HOC_6H_4Ac$ *and* $Ni(OAc)_2$ *in* $NH_4OH$, *shaken 3 hrs., and the products crystd from* $C_5H_5N$, give the *compd* $(C_8H_7O_2)_2Ni\ 2C_5H_5N$, yellowish green leaflets, when $NiSO_4$ in 25% $NH_4OH$ is boiled 1.5 hrs., there results the *compd* $(C_8H_8ON)_2Ni$, orange-red or dark red from $C_5H_5N$; from hot $PhNH_2$ it crystallizes in dark red prisms with 1 mol $PhNH_2$. Peonol and $Cu(OAc)_2$ in EtOH give the *complex* $(C_9H_9O_3)_2Cu$, dark gray-green, which seps with 2 mols $C_5H_5N$ in glistening green crystals and from $PhNH_2$ with 1.5 mols $PhNH_2$, green. The *Ni complex* $(C_9H_9O_3)_2Ni$, green, seps in green crystals with 2 mols $C_5H_5N$ and with $2PhNH_2$, this salt does not absorb $NH_3$ In concd $NH_4OH$ there results the *salt* $(C_9H_{10}O_2N)_2Ni$, brick-red, crystg from $C_5H_5N$ or $PhNH_2$ *without solvent of crystn in red orange needles* Benzalpeonol *and* $NiSO_4$ in EtOH-$NH_4OH$ give the *compd* $(C_{16}H_{14}O_2N)_2Ni$, orange-red, crystg from $C_5H_5N$ in rust brown needles $AcOC_6H_3OMe$ and $NiSO_4$ in 25% $NH_4OH$, heated 0.5 hr., give *acetohydroquinone Me ether imine Ni* $(C_9H_{10}O_2N)_2Ni$, red prisms, it seps with 1 mol $PhNH_2$, in dark red crystals C J West

**Behavior of ketone hydrazones towards diazonium salts.** M Busch and Konrad Schmidt *J. prakt Chem.* 129, 151–62(1931).—PhMeC·NNHPh (4.2 g.) in 130 cc. *EtOH* at −5° and 2.8 g $PhN_2Cl$ in 50 cc. EtOH give 4 g. of *acetophenone benzeneazophenylhydrazone* (I), orange-golden yellow, m. 161°; this is more easily formed from the *phenylhydrazone in* $C_5H_5N$, cooled to 0° *and treated with* concd alc. $PhN_2Cl$, the *HCl salt* is a dark, brown-violet, glistening powder, reduction gives *p*-$C_6H_4(NH_2)_2$, $PhNH_2$ and BzMe PhMeC·NNH$C_6H_4Br$-*p* gives *acetophenone 1-benzeneazo-4-bromophenylhydrazone*, golden yellow, m. 183°. Acetophenone *asym m*-xylylhydrazone (II) and 2 mols $PhN_2Cl$ give I. *Acetophenone benzylphenylhydrazone* (III), pale yellow, m. about 58°, $PhN_2Cl$ gives *acetophenone benzeneazobenzylphenylhydrazone*, red-yellow

oil whose *HCl salt* is bright red. PhMeC NNHPh and *p*-$O_2NC_6H_4N_2Cl$ in EtOH give *acetophenone p-nitrophenylhydrazone* brown m 184°. *p*-$BrC_6H_4NHN$ CPhMe and $PhN_2Cl$ give the same product II and *p*-$O_2NC_6H_4N_2Cl$ give *acetophenone 2 p-nitrobenzeneazo-4 nitrophenylhydrazone* Cu bronze, m 300°. III and *p*-$O_2NC_6H_4N_2Cl$ give the *p-nitrophenylazophenylbenzylhydrazone* PhMeC.NN($CH_2Ph$)$C_6H_4N$ $NC_6H_4NO_2$-*p* brown red m 130° PhMeC NNHPh and *m* $(O_2N)_2C_6H_3N_2Cl$ in AcOH give *acetophenone m-dinitrophenylhydrazone*, dark brown, m 234° $Ph_2C$ NNHPh and $PhN_2Cl$ do not react *p*-$O_2NC_6H_4N$-Cl gives 30% of the *p-nitrobenzeneazophenylhydrazone*, $Ph_2C$ N-NHC$_6H_4N$ $NC_6H_4NO_2$-*p* bluish red with violet metallic luster, m 194–6° Ph($PhCH_2$)-C NNHPh and $PhN_2Cl$ give the *compd* Ph($PhCH_2$)C NNHC$_6H_4N$ NPh, golden yellow, m 138° (poor yield) *desoxybenzoin p-nitrophenylhydrazone*, red with bluish violet surface luster m 160°, results from Ph($PhCH_2$)C NNHPh and *p*-$O_2NC_6H_4N$-Cl or from Ph($PhCH_2$)CO and *p*-$O_2NC_6H_4NHNH_2$ C. J. West

The condensation of phenolic aldehydes and their ethers with methyl propyl or butyl ketones Kenji Iwamoto and Taro Kato *Science Rep's Tohoku Imp. Univ.*, 1st Ser., 19, 683–93(1930) cf *C. A.* 22, 575.—Aromatic aldehydes with an OH or OMe group in the *p*-position condense with MeCOPr or MeCOBu to give substituted styryl Me ketones while *m* substituted aldehydes yield substituted distyryl ketones. *p*-$HOC_6H_4CHO$ (2.4 g.) MeCOPr (1.8 g.) and dry HCl give 2.9 g. of *α-ethyl-p-hydroxystyryl Me ketone* (I), faint yellow, m. 120–1°. The following styryl Me ketones were prepd. similarly *α-propyl p-hydroxy*, pale yellow, m. 100° (*oxime*, m. 119.5–21.5°), *α-ethyl p-methoxy* (II), faint yellow, $b_2$ 171–2° (*oxime*, m. 93–4.5°), *α-propyl p-methoxy* (III), pale yellow, $b_{14}$ 183–4° (*oxime* m. 191–2°). I, II and III give the $CHI_3$ reaction. The distyryl ketones which follow were prepd. in the same way except that concd. HCl was used in forming IV and V: *α-ethyl m,m'-dihydroxy* (IV), brick red, *α-propyl m,m'-dihydroxy* (V) brick red, *α-ethyl m,m'-dimethoxy*, dark yellow, and *α-propyl m,m'-dimethoxy* dark yellow. A. F. Shepard

Behavior of stereoisomeric oximes of α,β-unsaturated ketones on hydrogenation. K. W. Merz *Ber.* 63B, 2931–3(1930).—Isovanillalacetone and NH$_2$OH·HCl in a little MeOH give 75% (as the *HCl salt*, needles, m. 174° (d.-compn.)) of the *syn-oxime* (*1-(3'-hydroxy-4'-methoxyphenyl)-1-buten-3-one oxime*), m. 168–9°, which, heated 1 hr. in 12 parts AcOH on the H$_2$O bath, changes into the *anti form*, m. 142–3°. Both forms give by the Schotten-Baumann method the same *di-Bz deriv.*, m. 148–9°, hydrolyzed by boiling alc. NaOH to the *anti-oxime*. The latter is not hydrogenated in alc. contg. a little AcOH by H and Pd-charcoal, but the *syn-oxime* (4.5 g.) yields a mixt. of 1.8 g. HO(MeO)$C_6H_3CH$ $CH_2COMe$ 0.9 g. of its oxime and 1.6 g. of HO(MeO)$C_6H_3CH_2$-$CH_2CH(NH_2)Me$. The same difference in the behavior of the *syn-* and *anti forms* on catalytic hydrogenation was noted with PhCH CHC(:NOH)Ph and dypnone oxime, only the *syn* forms being hydrogenated and yielding the corresponding satd. amine. It is thus shown in 3 cases that it is possible by hydrogenation to det. to which series the oximes of α,β unsatd. ketones belong. C. A. R.

Some reactions of phenyl propenyl ketone with semicarbazides and thiosemicarbazides. Alexander Y. Livingstone and Forsyth J. Wilson *J. Chem. Soc.* 1931, 335–7.—PhCOCH CHMe yields a *δ-phenylsemicarbazone*, m. 212°, even with excess of reagent; the *δ-phenylthiosemicarbazone* m. 140°, becomes yellow in light without change in m. p. $NH_2NHCSNH_2$ and the ketone in H$_2$O-EtOH give *thiosemicarbazidopropyl Ph ketone*, m. 140°; excess of reagent gives the same product. NH$_2$OH gives the *oxime*, $C_{10}H_{11}ON_3S$, m. 165°. *p*-MeO$C_6H_4$COCH CHMe gives a *δ-phenylsemicarbazone*, m. 249°. C. J. West

Some synthetic bases similar to ephedrine. E. Cherbuliez, Fr. Neumeier and H. Lozeron *Helv. Chim. Acta* 14, 186–200(1931).—ω-Hydroxy and alkoxy derivs. of ephedrine (I) were prepd. to test their vasoconstrictor action in comparison with that of I. The method of prepn. consisted of (*a*) the treatment of PhCH CHCH$_2$OH (II) and its Ac (III) and Bz (IV) derivs. and alkyl ethers, with $I_2$ and HgO, in $Et_2O$ and (*b*) subjection of the resulting iodohydrin (without sepn.) to the action of $MeNH_2$ under pressure, at 100°. The first step is favored by light. II, III and IV (the last 2 prepd. in 70 and 60% yields, resp., by simple acylation of II) gave *dl ω-hydroxyephedrine*, PhCH(OH)CH(NHMe)$CH_2OH$ (V), m. 110° (*HCl salt*, m. 159.5°). Thus step (*b*) involved a hydrolysis. In the prepn. of the alkoxy derivs. it was important to sep. the cinnamyl ethers from unchanged II, this was accomplished by benzoylation of the crude product, followed by fractionation. The intermediary compds., *cinnamyl Pr ether*, $b_{14}$ 131.2°, *cinnamyl Bu ether*, $b_{12}$ 138°, and *cinnamyl allyl ether*, $b_{12}$ 138°, were prepd. by the action of the alkyl iodide on the Na deriv. of II (from II and $NaNH_2$ in $C_6H_6$) in 35–40% 30–35% and 50–60% yields, resp., the Me and Et derivs. (Et, $b_{12}$

125–6°) were best obtained by means of the corresponding alkyl sulfates The alkoxy derivs of I obtained were *methoxyephedrine* (VI) PhCH(OH)CH(NHMe)$CH_2OMe$, $b_{12}$ 148° (yield 38%) (*HCl*, m 151 3°), *ethoxyephedrine*, $b_{18}$ 148°, *ephedryl Pr ether*, $b_{12}$ 151–3°, *ephedryl Bu ether*, $b_{12}$ 155–7°, and *ephedryl allyl ether* $b_{12}$ 155–7°, *all probably* mixts of racemates When the reaction was conducted in MeOH instead of $Et_2O$, II yielded 31% of *3,3 phenylmethoxy-2 methylaminopropyl alc*, PhCH(OMe)CH-(NHMe)$CH_2OH$ (VII), $b_{12}$ 143° VI was transformed into PhCH(OMe)CH(NHMe)-$CH_2OMe$ by interaction with MeI Of the derivs VI was the most active physiologically but it was much less active than I; in concns of 30 mg or more, per kg (for a cat), its action was reversed it lowered the blood pressure to an extent increasing with increase in concn V had a very light constrictor action while VII produced a reversal

I M. Levine

**β-Phenylethylamines. I. Mescaline and mescaline-like substances.** K H. Slotta and H Heller *Ber* 63B, 3029–44(1930) —In addn to the sympathomimetic action which is a general property of β aryl-ethylamines and -ethanolamines, mescaline, 3,4,5-$(MeO)_3C_6H_2CH_2CH_2NH_2$ (*I*), possesses *a peculiar narcotic action For a pharmacol* and clinical investigation of I and a study of its relationships to other sympathomimetic drugs it was necessary to find a way by which it would be possible to prep. several hundred g of I. The only method by which it had hitherto been synthesized ($RCHO$ (+ $MeNO_2$) ⟶ $RCH:CHNO_2$ (+ $H_2$) ⟶ $RCH_2CH:NOH$ (+ $H_2$) ⟶ $RCH_2CH_2NH_2$) serves to establish its structure rather than to prep the compd The new method *should also make it possible to prep more easily the isomers of* I, *as well* as mono- and dimethoxyphenylethylamines, in order to det the influence of the position and no of the MeO groups on the physiol action of the alkoxyphenylethylamines An examn. of 4 other possible methods of prepn indicated that the only feasible one was that based on the scheme $RCHO$ (+ $CH_2(CO_2H)_2$) ⟶ $RCH:CHCO_2H$ (+ $H_2$) ⟶ $RCH_2CH_2CO_2H$ (+ $SOCl_2$) ⟶ $RCH_2CH_2COCl$ (+ $NH_3$) ⟶ $RCH_2CH_2CONH_2$ (+ KOBr) ⟶ $RCH_2CH_2NH_2$ The *m* and *p*-mono- and the 2,3 , 3,4- and 3,5-di-MeO compds have already been prepd by this method but in all attempts to prep I it had hitherto been impossible to carry out the last step S and H have now found, however, that under certain conditions not only I but also its isomers can readily be obtained in very satisfactory yield by using concd NaOBr for the Hofmann degradation The condensation of the aldehydes with $CH_2(CO_2H)_2$ was effected in 2–3 parts $C_5H_5N$ (distd over KOH) and 1–5 cc piperidine per mol of aldehyde, com $CH_2(CO_2H)_2$ can be used directly and a 20% excess is quite sufficient The splitting off of $CO_2$ from the primary di $CO_2H$ acid is almost quant on the $H_2O$ bath and only in a few cases was it necessary to boil the $C_5H_5N$ soln a short while. The yield of $RCH:CHCO_2H$ was in general above 80% The reduction of the unsatd. acid was in all cases easily carried out with an excess of Na-Hg, usually on the $H_2O$ bath, a higher temp was required only where the unsatd acid was difficultly sol in NaOH, and a toning down of the alky with AcOH was necessary only with 3,4,5-$(MeO)_3C_6H_2CH:CHCO_2H$ The chlorides $RCH_2CH_2COCl$ were obtained by heating the acids in $CHCl_3$ 4 5 hrs on the $H_2O$ bath with twice the calcd. amt of $SOCl_2$, they were not isolated but the reaction mixts were concd to about 0 5 vol *in vacuo* and added, with cooling, to concd $NH_4OH$ contg about 10% NaOH (only 2,4 $(MeO)_2C_6H_3CH_2$-$CH_2CONH_2$ could not be obtained in this way) For the successful degradation of the amides to the amines, it is necessary to have a very pure amide The statement in the literature that NaOCl gives better yields than NaOBr was confirmed for only some of the amides (the best results were obtained with a soln prepd by passing 5 5 g Cl into 10 g. NaOH in 100 cc $H_2O$) The behavior of the amides in the Hofmann *degradation depends greatly on the position and nature of the nucleus substituents* The products are best worked up by distn *in vacuo* The physiol action of the amines *prepd will be described later by* Hesse and Lange *o*-$MeOC_6H_4CH:CHCO_2H$, m 183° (80% from *o*-$MeOC_6H_4CHO$), gave 99% $MeOC_6H_4CH_2CO_2H$, m 92° (literature, 85–6°), the *amide*, m 111° (86 3% yield), gave with NaOCl 35 2% *o*-$MeOC_6H_4CH_2$-$CH_2NH_2$, b 115–20° in the vacuum of a $H_2O$ pump (*HCl salt*, m 113°, *sulfate*, m 230°). *m*-$HOC_6H_4CHO$, m 106° (60% by diazotization of *m*-$H_2NC_6H_4CHO$, prepd from the $NO_2$ compd with $FeSO_4$), yielded 80% of the $MeOC_6H_4CHO$ which gave 69% $MeOC_6H_4CH:CHCO_2H$, *m* 177°, *the satd acid, m 80°* (80% yield) gave 27 5% of the amide, $b_{12}$ 222–5°, m 66°, which yielded with NaOBr 61% (with NaOCl 10%) of *m* $MeOC_6H_4CH_2CH_2NH_2$, $b_{12}$ 128°. *p* $MeOC_6H_4CH_2CH_2NH_2$ HCl, m 210°, was obtained in 43% yield with NaOCl from the amide which itself was obtained in 75% yield through the $MeOC_6H_4CH:CHCO_2H$ (92 5%) and the satd acid (81%). *p*-iso-$PrC_6H_4CH:CHCO_2H$, m. 165° (61%); satd. acid, m. 73° (98%); *amide*, m. 142°

(81.5%), boils explosively with NaOCl at 80° and at 65° gives only a little *β (p-isopropylphenyl)ethylamine*, b 160° in the vacuum of a $H_2O$ pump (*HCl salt*, m 270°). Vanillin Et ether, m 63° (85% from vanillin and alk $EtSO_4$), gave 89% *3-methoxy-4-ethoxycinnamic acid*, m 205°; *propionic acid*, m 130° (79%), *amide*, m 124° (33.9%), gave with NaOCl the ethylamine, $b_{15-6}$ 165° (*HCl salt*, m 120°). *m* $C_6H_4(OMe)_2$, $b_{12}$ 117–8° (90% from *m* $C_6H_4(OH)_2$ with alk. $Me_2SO_4$), gave in $Et_2O$ with HCN, HCl and $ZnCl_2$ 76% of 2,4 $(MeO)_2C_6H_3CHO$; 2,4-$(MeO)_2C_6H_3CH.CHCO_2H$, m. 138° (99%), propionic acid, m 105° (94%); attempts to prep the amide through the chloride gave a red brown oil which decompd on distn., *in vacuo* 3,4 $CH_2O_2C_6H_3CH:CHCO_2H$, m 232° (94%), propionic acid (92%); amide (83.5%), gave with NaOCl 37% of the ethylamine-HCl, m 206°. 1,2,3-$C_6H_3(OMe)_3$, $b_{12}$ 140° (65% with alk $Me_2SO_4$), gives with HCN and $AlCl_3$ in $C_6H_6$ 53% 2,3,4 $(MeO)_3C_6H_2CHO$, $b_{12}$ 170°. *2,3,4-Trimethoxycinnamic acid*, m 172° (94%), propionic acid, m. 76° (65%), *amide*, m 171° (63.5%), gives with NaOBr 71.5% *β (2,3,4 trimethoxyphenyl)-ethylamine*, $b_{12}$ 167°, quickly forms the carbonate in the air. 3,4,5-$(MeO)_3C_6H_2CO_2H$ (86% from $(HO)_3C_6H_2CO_2H$ with alk $Me_2SO_4$), chloride (86% with $PCl_5$) in boiling xylene (distd from Na) with Pd-$BaSO_4$ and H gave in 30 hrs 80% 3,4,5-$(MeO)_3C_6H_2CHO$, m 74°, cinnamic acid, m 124° (80%), *β (3,4,5 trimethoxyphenyl)propionic acid*, m 98° (88% yield), *amide*, m 106° (60%), gave with NaOBr (52 g Br and 150 g NaOH in 375 cc. $H_2O$) 66% I, $b_{12}$ 180° (HCl salt, m 181°). *p* $BrC_6H_4OMe$, $b_{12}$ 120° (82.9% from PhOMe in AcOH with Br vapors) gave in $Et_2O$ with Mg (activated with I) and ethylene oxide and subsequent decompn with HCl 31.1% of *p*-$MeOC_6H_4CH_2CH_2OH$, b 145–60° in the vacuum of the $H_2O$ pump, and this with boiling 47.5% HBr yielded 45% of the bromide, $b_{15-4}$ 140–50°, from which, when refluxed with a mixt. of $C_6H_4(CO)_2NH$ and 0.5 mol $K_2CO_3$ until no liquid condensed in the condenser tube, then treated in alc with $N_2H_4.H_2O$ and finally with HCl gas, was obtained 11.8% *p*-$MeOC_6H_4CH_2CH_2NH_2.HCl$, m 211°. 4-Bromoveratrole, *p*-$BrC_6H_4OH$, *p*-$BrC_6H_4OAc$, *o*- and *p*-$BrC_6H_4NO_2$ and *o* $C_6H_4Cl_2$ could not be made to react with Mg in either $Et_2O$, $(iso\text{-}Am)_2O$ or otherwise. C. A. R.

*o*-Toluic acid. H. T. Clarke and E. R. Taylor. *Org. Syntheses* XI, 96-7(1931). — Sapon. of *o*-$MeC_6H_4CN$ with 75% $H_2SO_4$ gives 80–9% of *o*-$MeC_6H_4CO_2H$, m 102-3°; *p*-$MeC_6H_4CO_2H$ is obtained in the same yield by the same method. C. J. West

Preparation of aromatic acid amides. C. H. Kao and Shao-Yuan Ma. *J. Chem. Soc.* 1931, 443–4; cf. *C. A.* 25, 1230. — If 100 g. aromatic acid and 150 cc. 90% AcOH are used with 90 g. $(NH_4)_2CO_3$ the following yields of amides are obtained: *p*-$O_2NC_6H_4CO_2H$ 60 g., *m* $NO_2$ deriv., 58 g., *o*-$NO_2$ deriv., 15 g., *p* Cl deriv., 79 g., benzilic acid, 77.5 g. (71 g. with 60 g. $(NH_4)_2CO_3$). $C_6H_4(CO)_2O$ (60 g.), 90 g. imide; *o* $HOC_6H_4CO_2H$, 0, $PhCH_2CO_2H$ and $PhCH_2CH_2CO_2H$ give the amides quantitatively, which are in part dehydrated to the nitriles, $PhCH:CHCO_2H$ (100 g.) gives 20 g. amide. $(CH_2CO_2H)_2$ (100 g.) gives 71 g. of the imide. C. J. West

Nitration of 6-methoxy-*m*-toluic acid. A correction. John L. Simonsen. *J. Chem. Soc.* 1931, 444. — Nitration of 3,6 $Me(MeO)C_6H_3CO_2H$ gives the 5-$NO_2$ deriv. and 5-nitro-*o*-tolyl Me ether, m 69–70°, and not the 6-$NO_2$ deriv., as reported in *C. A.* 13, 127. C. J. West

A method for the preparation of phenyl-, *o*-chlorophenyl- and *p*-chlorophenylmalonic acids. D. Ivanoff and A. Spassoff. *Bull. soc. chim.* [4], 49, 19–23(1931). — Grignard syntheses designed to produce ketones frequently give hydrocarbons and a complex (I) instead. I and S. made use of I in synthesizing phenyl- (II), *o*-chlorophenyl- (III), and *p*-chlorophenyl malonic acids (IV) according to the scheme: $PhCH_2CO_2MgX + RMgX \longrightarrow PhCH(MgX)CO_2MgX$ (I) + RH, I + $CO_2 \longrightarrow PhCH(CO_2MgX)_2$, which on hydrolysis yields II. I. and S. found that all aliphatic, arylaliphatic and hydroaromatic, but only certain aromatic organomagnesium compds. reacted in the above manner, and they have studied the reaction quantitatively to find out which gives the best yields. With $PhCH_2CO_2MgCl$ the yields of mixed acids (in g.) and of II (in %) from the following Grignard reagents were, resp.: EtMgBr, 15.25, 62.5, PrMgCl, 11.90, 45, iso-PrMgCl, 14.10, 65.6, iso-PrMgBr, 10.90, 48.9; BuMgBr, 11.00, 42.2, $C_6H_{11}MgBr$, 9.8, 40., *o*-$MeC_6H_4MgBr$, 11.80, 50.6; $\alpha$-$C_{10}H_7MgBr$, 13.00, 53.3, $PhCH_2MgCl$, 12.40, 3.1. MeMgI gave a little gas evolution but hardly a trace of II. The procedure in all cases was to treat 0.1 g. mol. of the Grignard reagent (*e. g.*, $PhCH_2CO_2MgCl$) in 100 cc. ether at 0° with dry $CO_2$ in excess in a closed system, expel the excess $CO_2$ by evapg. half the ether, add 0.15 g. mol. of the 2nd Grignard reagent (*e. g.*, EtMgBr), reflux on the water bath, treat again with dry $CO_2$ in excess at 0°, hydrolyze, ext. the org. acids with ether, ext. the org. acids from the ether with dil. alkali, acidify, ext. again with ether, dry and weigh. This product contains

the corresponding phenylmalonic acid phenylacetic acid and the acid from the 2nd Grignard reagent. A weighed sample heated to 150-60° in a flask gave $CO_2$ and the corresponding phenylacetic acid The wt. of $CO_2$ collected gave the % of the corresponding phenylmalonic acid Only the phenylmalonic acids are sol. in benzene and can be sepd easily in the pure state by extn with benzene. With *o*-$ClC_6H_4CH_2CO_2MgCl$, iso-PrMgCl gave 10 5 g. mixed acids and 46.2% III; PhMgBr gave 10 5 (?) g mixed acids and 52 8% of III. III m 139° (decompn ), heating quantitatively produces $CO_2$ and *o*-$ClC_6H_4CH_2CO_2H$ With *p*-$ClC_6H_4CH_2CO_2MgCl$ iso-PrMgCl gave 13 5 g mixed acids and 56 4% of IV; *o* $MeC_6H_4MgBr$ gave 13 0 g mixed acids and 48 3 g IV. IV m. 163° (decompn ) and on heating yields quantitatively $CO_2$ and *p*-$ClC_6H_4CH_2CO_2H$. The hydrocarbons evolved in the prepn of I by the use of EtMgBr, PrMgBr, and iso-PrMgBr were collected, washed free of ether with concd $H_2SO_4$ and burned with excess O for quant. detn The amts found checked very well with those calcd ODEN E SHEPPARD

Dibenzylsuccinic acids. P CORDIER *Compt rend* 192, 361-3(1931) —Stobbé (*Ber* 27, 2406(1894); 37, 2241, 2666(1904), *C A* 3, 438, 651) prepd dibenzylsuccinic acid, $[CH(CH_2Ph)CO_2H]_2$, and reported obtaining 2 isomeric acids· the one (m. 203°) (I) he considered inactive by internal compensation and the other (m. 204°) as racemic Further, S indicated that the inactive compd gave an anhydride m. 104° (II) which under the action of heat yielded an anhydride m 128° (III), while the *dl*-compd gave an anhydride m 155° which under the action of heat yielded an anhydride m. 140° Following the same procedure, C obtained I, which gave 2 anhydrides, the first (II) being obtained by moderate treatment with $Ac_2O$, and the second (m 125°) (IV) by more vigorous treatment of II. His 2nd anhydride (IV) seemed to correspond to the III of S. However, it did not give the original dibenzylsuccinic acid on hydration but a new isomeric acid (m 172°) (V) which could easily be converted back to IV. C. found that I was inactive and could not be resolved into active components by strychnine sulfate, V was also inactive but it gave, by the same treatment, 2 active components, the one with $\alpha_4$ —29 5°, the other, less pure, with $\alpha_4$ 22 8°. These last 2 acids are much more sol. in water than V, and the m. ps. are much lower (about 130°). ALBERT L. RAWLINS

Esters of orthophenylacetic acid. PETER P. T. SAH, SHAO YUAN MA AND CHUNG HSI KAO. *J. Chem Soc* 1931, 305-7 —$PhCH_2CN$ and abs. MeOH (EtOH) in an equal vol. of abs $Et_2O$ with 1.25 mols. HCl at 0° give 85% of $PhCH_2C(OMe)$ NH HCl (or the Et deriv.), with 2 mols. abs. alc. at room temp for 2 weeks, there results 40–5% of $PhCH_2C(OMe)(OR)_2$ (I) or $PhCH_2C(OEt)(OR)_2$ (II); they are colorless liquids with a pleasant odor. Derivs. of I (R = ) (b. p at atm. pressure, $d_4^{20}$ and $n_D^{20}$ are given): *Me*, 216–8°, 1 0651, 1 5075, Et, 224-6°, 1 0356, 1 5000, *Pr*, 239–42°, 1 0109, 1 4950; *iso-Pr*, 227–9°, 1 0079, 1 4913, *Bu*, 254–7°, 0 9953, 1 4911; *iso-Bu*, 245–8°, 0 9929, 1.4898; *iso-Am*, 260–5°, 0 9880, 1.4900. Derivs. of II: *Me*, 217–9°, 1 0640, 1.5080, *Et*, 225–7°, 1 0308, 1 4997; *Pr*, 238–41°, 1 0094, 1.4967, *iso-Pr*, 228–30°, 1 0030, 1.4908; *Bu*, 254–7°, 0 9974, 1 4916, *iso-Bu*, 248–51°, 0.9867, 1 4883; *iso-Am*, 260–5°, 0 9867, 1 4887 C. J. WEST

Ethyl phenylcyanopyruvate. ROGER ADAMS AND H. O. CALVERY. *Org Syntheses* XI, 40–1(1931) —$PhCH_2CN$, $(CO_2Et)_2$ and EtONa, followed by acidification, give 69–75% of $PhCH(CN)COCO_2Et$, m 130°. C. J. WEST

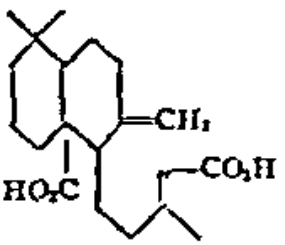
New method for the preparation of δ-ketonic esters. (MLLE ) S. GRATEAU. *Compt. rend.* 191, 947-9(1930) —The acid chloride obtained by treating $EtOCO(CH_2)_4CO_2H$ with $SOCl_2$ reacts with PhH in the presence of $AlCl_3$ to give $PhCO(CH_2)_4CO_2Et$ (I) in 80% yield. I, $b_3$ 164°, is sapond. to give $PhCO(CH_2)_4CO_2H$, m. 71°, which forms a semicarbazone m. 183°. I treated with EtONa gives $CH_2(CH_2)_2CO\ CH(COPh)$, $b_3$ 137° (semicarbazone, m. 223°, Maquenne block). Reduction of I by the Clemmensen method gives $Ph(CH_2)_4CO_2Et$ (II), $b_{12}$ 162–4°. Sapon. of II gives $Ph(CH_2)_4CO_2H$, $b_{11}$ 186–8°, m 11°, anilide, m. 80°; *p*-toluide, m. 78°. C. H PEET

Lichen substances. VI. Gyrophoric acid. YASUHIKO ASAHINA AND MASATOSI WATANABE *Ber.* 63B, 3044–8(1930), cf. *C. A* 23, 4477 —The conclusion that gyrophoric acid (I) is a tridepside, $C_{21}H_{22}O_{12}$, of orsellinic acid is confirmed by the present investigation The m. p of I from various sources (*Gyrophora esculenta* Miyoshi, *Lobaria pulmonaria* Hoffm ) can be raised by repeated crystn. to 220° (202–3° has hitherto generally been given as the m. p ) Titration of the I.$H_2O$ in $Me_2CO$ with bromothymol blue as indicator gave a mol. wt. of 477.5-7 8 (a parallel titration with lecanoric acid gave 340 1). *Tetra-Ac deriv.* of I, from I, $Ac_2O$ and a drop of concd. $H_2SO_4$, m. 228°, gives no color in alc. with $FeCl_3$ or bleaching powder soln , mol. wt.

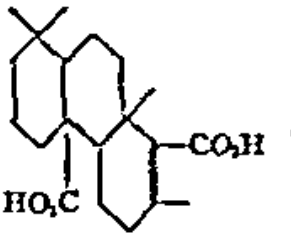
(by titration) 625.6–641.1, in camphor (Rast) 617–32 *Tetra(chloroacetyl) deriv.*, from I in $C_5H_5N$ and $ClCH_2CO_2H$ treated alternately with $C_5H_5N$ and $ClCH_2COCl$, cryst. powder with 2 $H_2O$, m. 163–4°, gives no color in aq. $Me_2CO$ with $FeCl_3$ or bleaching powder, mol. wt. (anhyd.) in boiling $Me_2CO$ 704–815 *Quinine salt* of I, faintly yellowish cryst. powder with 1 $H_2O$, m. 162°, mol. wt. (anhyd.) in boiling $Me_2CO$ 766.2–782.7 Me tetramethylgyroporate (0.6 g. from 1 g. I in $Et_2O$ with $CH_2N_2$), m. 196–7° (previously given as 187°), insol. in $Na_2CO_3$, gives no color in alc. with $FeCl_3$ or bleaching powder, mol. wt. in freezing PhOH 510.4 Since, according to Hesse, umbilicaric acid, $C_{29}H_{34}O_{19}(OMe)$ (II), which is also found with I in many *Gyrophorae*, is decompd. by $Ba(OH)_2$ into $CO_2$, orcinol and umbilicarinic acid, isomeric with evernic acid, the relation of I to II seems to be the same as that of lecanoric acid to evernic acid, viz., $^{3}Me(HO)(XO)C_6H_2{}^{1}CO\ {}^{4}OC_6H_2{}^{3}Me(OH){}^{1}CO\ {}^{4}OC_6H_2{}^{3}Me(OH){}^{1}CO_2H$, where X = H for I and Me for II. Also in *J. Pharm. Soc. Japan* 51, 104–9 (1931). C. A. R.

Symmetrical and unsymmetrical *o*-phthalyl chlorides. Erwin Ott. *Org. Syntheses* XI, 88–91 (1931).—*o*-$C_6H_4(COCl)_2$ results from $C_6H_4(CO_2)O$ and $PCl_5$ in 92% yield. $AlCl_3$ gives 72% of the unsym. chloride C. J. West

Higher terpene compounds. XLIII. The Bouveault reduction of the esters of agathic- and isoagathicdicarboxylic acids. Transformation of the latter into a new methylpimanthrene. L. Ruzicka and J. R. Hosking. *Helv. Chim. Acta* 14, 203–19 (1931); cf. *C. A.* 25, 1222.—R. and H. suggest I and II as the skeleton formulas for agathic- (III) and isoagathicdicarboxylic acids (IV). The facts upon which these formulas are based are as follows. (*a*) I yields 1,5,6-$C_{14}H_7Me_3$ (V) and 1,7-dimethylphenanthrene (VI) upon reduction with Se. II also yields VI but no V. (*b*) The 2 $CO_2H$ groups in III are different; one of the $CO_2Me$ groups in the di-Me ester of III is easily hydrolyzed, while the other resists hydrolysis. The esters of IV, noragathic acid (VII), and isonoragathic acid also resist hydrolysis. (*c*) Upon reduction of III with Na in alc. at 115–20° a mixt. was obtained of which 30% was neutral and 70% acidic. Of the neutral portion 28% consisted of *mono-Me hydroxydihydroagathate*, $C_{13}H_{17}(CO_2Me)CH_2OH$, $b_{0.5}$ 133–5°, $d_4^{15}$ 1.026, $n_D^{15}$ 1.5056, $M_D$ 97.57, (calcd. 97.47). The remaining 2% contained *dihydroxydihydroagathene*, $C_{13}H_{19}(CH_2OH)_2$, m. 112–3°, which absorbed 1 mol. of $H_2$ in the presence of PtO to give the satd. compd. *dihydroxytetrahydroagathene* $C_{13}H_{21}(CH_2OH)_2$, m. 107.8°. The acidic portion was distd. *in vacuo* and yielded the Me ester of VII; upon repeated redistn. of the acidic portion of the distillate *mono-Me dihydroagathicdicarboxylate*, $C_{13}H_{19}(CO_2Me)CO_2H$, $b_{0.5}$ 210–2°, was obtained. The stability of this compd. in comparison to that of its precursor, $C_{13}H_{17}(CO_2Me)CO_2H$ (VIII), illustrates the effect of the double bond in close proximity to the $CO_2H$ group. VIII contains a double bond which is easily reduced, close to a $CO_2Me$ group which is also easily reduced and hydrolyzed. This indicates that the C atoms on either side of the double bond are unsubstituted. Reduction of the di-Me ester of IV with Na and alc. yields *Me hydroxyisoagathate*, $C_{13}H_{19}(CO_2Me)CH_2OH$ (IX), m. 125–6°, and *dihydroxyisoagathene*, m. 172–3°, in almost equal amts. A small quantity of a dehydro deriv. of IX, $C_{18}H_{28}O_2$, $b_{0.4}$ 186–90°, was also isolated. Treatment of IX with 4 vols. of 99% HCO$_2$H yields a mixt. ($b_{0.4}$ 155–8°) of the esters $C_{13}H_{18}(CO_2Me)Me$ and $C_{13}H_{17}(CO_2Me)Me$. This mixt. when reduced with Se yielded $C_{17}H_{14}$ (X), m. 142–3° (*picrate* m. 161–3°). Oxidation of X with $CrO_3$ gave the *quinone*, m. 194°, from which the *quinoxaline compd.*, m. 131–2°, was obtained. It is believed that X is a homolog of VI. XLIV. The constitution of pimanthrene. L. Ruzicka, G. B. R. de Graaff and J. R. Hosking. *Ibid.* 223–9.—Pimanthrene (XI) and retene (XII) were each oxidized in parallel expts. with $K_4Fe(CN)_6$ and KOH, and the mixt. of resulting acids, sepd. by means of cold MeOH, was esterified with $CH_2N_2$. In both cases *tri-Me 1,2,1',2'-biphenylitetracarboxylate* (XIII), m. 153–4°, and *1,7-phenanthrenedicarboxylic acid*, m. 151–2°, were formed. Likewise the *o*-quinones of XI and XII were oxidized with $KMnO_4$. The XII quinone yielded *3'-hydroxyisopropyl-1,2,1'-*



(I)



(II)

*biphenyltricarboylic acid* (XIV), m 188° (Bucher, *C A* 4, 1465, obtained the same compd in a similar fashion but he gave no m p ), *and an amorphous substance which* gave upon further oxidation with $HNO_3$ (d 1 5) and esterification of the product, 1,2,3- (XV) and 1,2 4 $C_6H_3(CO_2Me)_3$ The XI quinone and XIV upon oxidation yielded XIII and XV. From these facts it is concluded that XI is 1,7-dimethylphenanthrene.
I M Levine

*Catalytic influences in three-carbon tautomerism. II.* The action of acid catalysts on ketones George A R Kon *J Chem Soc* 1931, 248–51, cf. *C A*. 23, 4454 — The action of $H_2SO_4$, HCl and $(CO_2H)_2$ on cyclohexylidene- (I) and cyclohexenylacetone and on isopulegone is reported The acids are less rapid in their action than the catalysts previously employed, *e g*, *N* aq EtOH $H_2SO_4$ at 25° produces only 22% change in I in 4 hrs , which is equiv to about 4-min treatment with *N* EtONa. Longer treatment gives rise to extensive side reactions (addn ), at 100°, however, isomerization proceeds smoothly and side reactions are negligible in the time required to reach equil *Heating for 0 5 hr is sufficient to produce the same equil from either ketone by means* of *N* $H_2O$ EtOH $H_2SO_4$ With HCl the same equil p is reached but side reactions occur more readily and a Cl-contg high boiling fraction is obtained. $(CO_2H)_2$ is much slower in action The new value for the equil p is 23% of $\alpha,\beta$-ketone Isopulegone is rapidly isomerized to pulegone by hot alc $H_2SO_4$, the equil p being coincident, within expti error, with pure pulegone Although pulegone is readily isolated from the equil mixt as the semicarbazone, its phys properties differ somewhat from those of pure pulegone and it may be that the equil of isopulegone is a less simple process than hitherto supposed *Results of 18 expts are given in tabular form* C. J. W.

The energy value of the ozonide linkage determined from the ozonide of $\alpha$-terpineol. E Briner, M Mottier and H Paillard *Helv Chim Acta* 13, 1030–5 (1930) —Comparison of the heats of combustion of a compd and its ozonide would give the energy equiv of the ozonide linkage The heat of formation would appear to be *strongly exothermic since the ozonization of* $C_2H_4$, etc., is accompanied by a considerable rise in temp but this rise may be due to decompn of the ozonides as well as to the heat of formation of the ozonide For the detn , the ozonide of $\alpha$-terpineol (I) was chosen because it is stable and a solid *I* was ozonized in specially dried hexane (II), the II was then decanted off and the I ozonide was placed in a vacuum desiccator to remove the residual II. Small quantities of an unidentified gas were continuously given off and it was found that the heat of combustion decreased as the age of the ozonide increased The av heat of combustion of freshly prepd. I ozonide was 1445 *cal per g mol and that of I was 1501 cal , from which the heat of ozonization of I was* found to be 90 cal This value is probably significant though not rigorously exact. Since it indicates a lower energy content than that of the components which enter into the ozonides, there would appear to be no advantage in the suggested employment of ozonides as explosives unless ozonization alters the mol to maker disuption of its linkages easier. C. H. Peet

Oil of Eucalyptus dives. K. Stephan and Marg Dücker *J. prakt Chem* 129, 145–50(1931) —The oil from *Eucalyptus dives* contains 35% of piperitone, the oil also contains about 4 5% *of terpinen-4-ol and also an acid*, $C_{16}H_{30}O_3$, *m* 109–12°. *Oxidation* of piperitone with $FeCl_3$ gives 90% of thymol, oxidation with neutral $KMnO_4$ gives diosphenol, but the yield is too small to make this a technical method of prepn.
C J. West

Thiobenzophenone. H Staudinger and H Freudenberger *Org Syntheses* XI, 94 5(1931) —$Ph_2CCl_2$ and NaSH in EtOH give 42-9% of $Ph_2CS$, m 53–4°; if the chloride is added to the NaSH a 70% *yield of the disulfide is obtained.* C J West

4-Nitro-4'-methoxystilbene. A correction. J T Hewitt and Wm Lewcock. *J. Chem Soc* 1931, 444 —*4-Nitro-4'-methoxystilbene m* 132°, *not* 162° as reported in *C. A* 6, 3264
C J West

$\alpha$-Chloronaphthalene. V. The chlorination of naphthalene in solution. P. Ferrero and J. Corbaz. *Helv Chim Acta* 13, 1009–25(1930), cf *C. A*. 22, 2938; 23, 4944; 24, 106, 1652 —The study of the chlorination of $C_{10}H_8$ (I) was continued in a variety of solvents to establish, if possible, a series which would either be protected by the chlorination product or which would prevent the chlorination of I. In every case, 2 mols of I was dissolved in 500 g of solvent and $Cl_2$ passed in at the rate of 35 g per hr. When a catalyst was used, a wt was taken *equal to 0 5% of the I* present Below the limits at which partial oxidation occurs, higher temps favor monohalogenation $I_2$ always favors monohalogenation while $FeCl_3$ favors polyhalogenation. The concn mentioned above was about the optimum, less solvent approaching the condition of no solvent with consequent polyhalogenation and more solvent resulting in gradual

chlorination of the solvent and polyhalogenation of I. The theoretical amt. of $Cl_2$ should be added but the rate of addn is immaterial so long as the $Cl_2$ is thoroughly dispersed throughout the reaction mixt. *The chem. nature of the solvent is more important than the amt. present or the phys. properties of the soln.* Solvents which cannot be acted upon by $Cl_2$ (*e. g.*, $CCl_4$) favor a considerable formation of poly Cl derivs. and are less desirable than no solvent. Solvents which might be chlorinated (*a*) (*e. g.*, PhH or PhCl) may be protected from chlorination by the I even in the presence of $I_2$ and are the *most satisfactory solvents for use in chlorination or* (*b*) (*e. g.*, PhMe or $C_{10}H_8$) they may protect the I against chlorination and hence be entirely unsatisfactory solvents. PhH, PhCl and AcOH are the most satisfactory solvents investigated. PhMe, *o*-$C_6H_4Cl_2$, $PhNO_2$, $C_2H_2Cl_4$, $C_2HCl_5$, EtOH, AcOEt and $Et_2O$ are all unsatisfactory for reasons mentioned above. C. H. Peet

**Naphthalene series. III. Preparation of 3-amino-2-naphthyl methyl ether.** Gev Bamanshaw Jambusarwalla, Sidney Holt and Frederick A. Mason. *J. Chem. Soc.* 1931, 373–7; cf. *C. A.* 19, 497.—2,3-$HOC_{10}H_4CO_2H$ (48 g.) in 100 cc. 20% NaOH with 64 g. $Me_2SO_4$ at 15° gives 49.6 g. of *2-methoxy-3-naphthoic acid*, pale yellow, m. 133–5°, the use of too great excess of alkali decreases the yield; the chloride is a transparent yellow gum, m. about 50° (decompn.), which gives with $(NH_2)_2CO$ in $C_6H_6$ 77% of *2-methoxy-3-naphthamide*, m. 172–3°. 15 g. of the amide in EtOH, treated with KOBr, gives not over 3 g. of 3,2-$H_2NC_{10}H_4OMe$, m. 109–10°. The diazo compd. with CuCl gives 82% of *3-chloro-2-naphthyl Me ether*, m. 78.5°. HI gives *3-chloro-2-naphthol*, m. 63–4.5°, gives a green color with $FeCl_3$. 2,3-$MeOC_{10}H_4CO_2Et$, b$_{18}$ 198°, gives 98% of *2-methoxy-3-naphthhydrazide* (I), m. 121–4°; it melted slowly when heated on the $H_2O$ bath and then m. 137–8°. with 2,3-$MeOC_{10}H_4COCl$ there results 80% of *di-(2-methoxy-3-naphth)hydrazide*, m. 218–20°. I and BzH give the *benzylidene* deriv., m. 222.5° (cor.), *m-nitrobenzylidene* deriv., canary yellow, m. 223–4° (cor.), *o-isomer*, canary yellow, m. 185–6° (cor.). I and vanillin give *4′-hydroxy-2,2′-dimethoxybenzylidene-3-naphthhydrazide*, m. 211–2° (cor.). I in EtOH-HCl with $EtNO_2$ gives 72% of *Et 2-methoxy-3-naphthylcarbamate*, m. 104–5° (cor.). Hydrolysis with concd. HCl at 120° for 3 hrs. gives quant. 3,2-$H_2NC_{10}H_6OH$. 10% $H_2SO_4$ gives the naphthol and some Me ether; heating with slaked lime for 3 hrs. at 200° gives 85% *of the Me ether*. *40% NaOH on refluxing 1 hr. gives 92.5% of the Me ether.* **IV. Preparation and properties of 2-naphthol-3-sulfonic acid.** S. Holt and F. A. Mason. *Ibid.* 377–81.—3,2-$H_2NC_{10}H_6OMe$ (14 g.) was diazotized in a mixt. of 48 cc. concd. $H_2SO_4$ and 160 cc. $H_2O$ at 0° with 2 *N* $NaNO_2$. $SO_2$ was passed into the diazo soln. until frothing became noticeable and 10 cc. liquid $SO_2$ were then run in, chem. prepd. Cu powder (30 g.) was then added, a slow stream of $SO_2$ being maintained, the ppt. was then extd. with 30% $K_2CO_3$ and the ext. acidified with concd. HCl, giving nearly quant. *2-methoxynaphthalene-3 sulfinic acid* (I), m. 133–4°. Oxidation with $KMnO_4$ in $Me_2CO$ gives nearly quant. the *K salt* (II) of the $SO_2H$ acid; oxidation in $H_2O$ gives 75% of a less pure product. The alk. soln. of the salt gives no color with 2,4-$(O_2N)_2C_6H_3N_2Cl$. *2-Methoxynaphthalene-3 sulfonyl chloride*, m. 137–8°; the amide m. 113°; the *anilide* m. 173–4°. I and 2,4-$(O_2N)_2C_6H_3Cl$ in EtOH-AcONa give *2,4-dinitrophenyl 2-methoxy-3-naphthyl sulfone*, m. 213–4°. II and HCl (1:1), refluxed 1 hr., give 93% of *2-naphthol-3 sulfonic acid* (III), which seps. with 1 mol. $H_2O$; the *Na salt* also seps. with 1 mol. $H_2O$; the chloride is amorphous; the $PhNH_2$ salt m. 241–2°; the $\alpha$-$C_{10}H_7NH_2$ salt m. 247–8°; the sulfonamide, yellow, m. 110°; 2-naphthol-3-sulfonanilide, buff, m. 112° (decompn.). *1-Nitroso-2-naphthol-3 sulfonic acid*, yellow, decomps. 268°. $FeCl_3$ gives a deep brown color; it dyes Fe-mordanted cotton a tobacco-brown. III yields azo dyes as follows: *$PhNH_2$*, red needles with blue reflex; *p-$O_2NC_6H_4NH_2$*, red needles; *m-xylidine*, red powder; *$\alpha$-$C_{10}H_7NH_2$ dianisidine*. Dyeings with these on wool were deeper in all cases than the corresponding shades obtained from Schaffer acid. The peaks of the absorption curves of these dyes are given. C. J. West

**Alkamines and ether bases of the tetralin and hydrindene series.** Julius v. Braun and Karl Weissbach. *Ber.* 63B, 3052–9(1930).—It was recently shown (*C. A.* 25, 1812) with $CH_2O_2C_6H_3CH(OH)CHBrMe$ (*I*) that it is possible to det., by methylation with $Me_2SO_4$, whether in the alkamines formed (through the $\alpha$-oxide) by treating I with an amine $RNH_2$ the RNH is in the $\beta$ position originally occupied by the Br and the OH in the $\alpha$ position, as in the I, or whether, when the intermediate $\alpha$-oxide ring is opened, the NHR group goes to the $\alpha$-position and the HO to the $\beta$-position. This method has now been used to answer the long unanswered question as to the structure of the alkamines (II) obtained from $\alpha,\beta$-dibromotetralin through the bromohydroxy compd. with various amines. Methylation of the alkamine obtained

with $NHMe_2$ and treatment with KI gives a *quaternary iodide* (III) different from that (IV) obtained by replacing the Br in α-methoxy-β-bromotetralin by $NMe_3$ and adding MeI. While IV decomps into a tertiary base and MeI on heating, III gives $NMe_3$·HI and the *Me ether* (V), $C_6H_4$ CH C(OMe) $CH_2$ $CH_2$, of the enol form of the tetralone;

V readily takes up 2 atoms H and on dehydrogenation with Br yields β $C_{10}H_7OMe$, showing that in the II the HO occupies the β position. Analogous expts in the indene series showed that, contrary to the hitherto generally accepted view, the alkamines (VI) obtained from α-hydroxy β bromohydrindene have the HO group in the β position Partly to confirm these results by a different method, and partly to obtain the α-HO isomers of the I and VI for pharmacol. comparison with the I, attempts were made to prep these α-HO isomers by demethylation of the corresponding α-MeO compds *These attempts were successful only with α methoxy-β methylaminotetralin, the* resulting alkamine (VII) being different from the II from α-hydroxy-β-bromotetralin with $MeNH_2$ When the basic substituent of the α MeO compds. is $NMe_2$ or $NC_5H_{10}$, the only definite products of demethylation in the tetralin series are the unsatd bases $C_6H_4$CH C($NR_2$) $CH_2$ $CH_2$ (VIII), and the analogous unsatd bases are the chief

products in the indene series even where the basic substituent is NHMe VII, which may be considered as a cyclic ephedrine, acts pharmacologically like ephedrine, although not as powerfully III, m 168°. V, $b_{15}$ 136°, $d_4^{27}$ 1.0674, turns yellow and thickens on standing several weeks, gives the same blue color as β tetralone when shaken in alk. soln in the air, gives the tetralone, m. 132–3°, when shaken several hrs with 2 *N* HCl, is reduced by H and Pd to *ac-β-tetralyl Me ether*, $b_{14}$ 123–4°. *α-Methoxy-β-dimethylaminotetralin*, from the β-Br compd. and $NHMe_2$ in $C_6H_6$ at 100°, yellow, $b_{11}$ 147–9° (30% yield), *HCl salt*, m 184°, *picrate*, m 192°; *methiodide* (IV), m 210°, depresses the m p of III to 135–48° *α-Methoxy-β methylaminotetralin* (50% yield), $b_{14}$ 144–6°; *HCl salt*, m. 228°, *picrate*, m. 150° Exhaustive methylation of the base gives IV. *α-Methoxy β-piperidinotetralin*, $b_{15}$ 191–3°, *HCl salt*, m 230°, *picrate*, m. 153°. *α-Hydroxy-β methylaminotetralin* (VII) (60% from the α-MeO compd with 66% HBr at 55–60°), m. 77–9° (*HCl salt*, m 206°), if the heating with HBr is carried out at 100°, the product is the *unsatd. base*, $b_{12}$ 162–4°, of the type VIII; it forms a hygroscopic *HCl salt*, m. 148–50°, and a yellow *picrate* m 149° The unsatd *dimethylamino base* (VIII), $b_{8-4}$ 102–4°, is obtained even when the temp in the heating with HBr is not raised above 40–5°, it darkens and thickens in the air and forms an oily HCl salt and a *picrate* m. 148° The *piperidino analog*, $b_{3.5}$ 168–70°, m. 40°, is likewise formed at 40–5°, *picrate*, yellow, m 149° *β Hydroxy α methylaminohydrindene* (VI), m. 130°, *HCl salt*, m. 175°, *picrate*, m. 153° Methylation with $Me_2SO_4$ and treatment with KI gives a quaternary *iodide*, m 187°, which splits off $NMe_3$ HI only slowly and incompletely above its m. p., and gives a light yellow oil, $b_{14}$ 114–6°, having approx. the compn of *β hydrindone enol Me ether* and giving β hydrindone when shaken with $H_2O$ A more complete decompn can be effected by distn. *in vacuo*, which gives β hydrindone and a base $C_{12}H_{17}ON$, regenerating the iodide with MeI and different from IX (below), it is therefore probably *α-dimethylamino-β-methoxyhydrindene*. It $b_{14}$ 132°, *picrate*, m 159°. The *β,α-isomer* (IX), from *β-bromo-α-methoxyhydrindene* ($b_{11}$ 134°, obtained in 90% yield from the di Br compd with boiling MeOH) with $Me_2NH$ in $C_6H_6$ (yield, 20%), $b_{11}$ 128–9°, rapidly reddens, forms a *methiodide* m 176°, which quantitatively regenerates IX and MeI on dry distn. *Methylamino analog* of IX (35%), $b_{14}$ 127–8°, darkens even more rapidly than IX; *picrate*, m. 118°, *HCl salt*, m. 173° Demethylation of the MeO is much more difficult than in the tetralin series, heating with concd. HBr at 100° for even only 1 hr gives a thick non-distillable basic oil, apparently a polymerization product of the unsatd amine, for by heating 1 hr. at 50°, treating with NaOH-$K_2CO_3$, extg with $Et_2O$ and treating in petr. ether with HCl in $Et_2O$ there is obtained a *salt* m 165–6° having very nearly the compn. $C_{12}H_{13}NCl_2$ of the HCl addn product of the unsatd amine. The *α-hydroxy β-methylaminohydrindere*, m. 77–9°, was finally obtained in small yield by allowing the MeO compd. to stand 40 hrs. with fuming HBr at room temp. and then heating 15 min. at 45–50°; its yellow *picrate* m 171°. IX on short heating with HBr gave a basic oil which soon began to thicken and could not be distd. C. A. R.

1-Amino-2-naphthol hydrochloride. J. B. Conant and B. B. Corson. *Org. Syntheses* XI, 8–11(1931).—1,2-$C_{10}H_6$(NO)ONa, reduced with $Na_2S_2O_4$ at 60–5°, gives 66–74% 1,2 $C_{10}H_6(NH_2)OH$. C. J. West

1-Amino-2-naphthol-4-sulfonic acid. Louis F. Fieser. *Org. Syntheses* XI, 12–4

(1931).—1,2-$C_6H_4(NO)OH$ in $NaHSO_3$ and *N* NaOH, treated with concd. $H_2SO_4$, gives 82–4% of 1,2,4-$H_2N(HO)C_6H_2SO_3H$ C. J. West

2-Iodo-3-naphthoic acid. Henri Goldstein and Ernest Cornamusaz *Helv. Chim. Acta* 14, 209–3(1931).—Diazotization of 2,3-$C_6H_4(NH_2)CO_2H$ and treatment of the product with KI gives 70% of *2-iodo-3-naphthoic acid* (I), m. 214°. *Me ester* (85% yield), m. 55°. *Et ester* (87% yield) m. 78°. *amide* (from the action of concd. $NH_4OH$ on the impure *chloride* prepd. by treatment of I with $PCl_5$), m. 241° (yield 90%). anilide, m. 205° (yield 80%). I. M. Levine

Syntheses of antiseptic derivatives of indan-1,3-dione. I. Interaction of malonyl chloride and of alkylmalonyl chlorides with the methyl ethers of resorcinol and β-naphthol. Raphael Black, Herbert Shaw and Thomas K. Walker. *J. Chem. Soc.* 1931, 272–9.—$CH_2(COCl)_2$, obtained in 36% yield from the acid and $PCl_5$, with *m*-$C_6H_4(OMe)_2$ and $AlCl_3$ in $PhNO_2$ gives 20% of *7-hydroxy-5-methoxyindan-1,3-dione*, lemon yellow, m. 217°. $MeCH(COCl)_2$, bp. 45–50°, gives the *2-Me deriv.*, m. 225–6°. *2-Et deriv.* pale fawn-colored, m. 192.5°. *2-Pr deriv.*, pale fawn, m. 190.5°. the Bu deriv. could not be obtained cryst. β-$C_6H_3OMe$ and $CH_2(COCl)_2$ with $AlCl_3$ in $PhNO_2$ give 31% of *5-hydroxyperinaphthindan-1,3-dione*, dull yellow, m. 276–80°. *2-Et deriv.*, golden brown, m. 215° (20% yield). *2-Pr deriv.*, bright canary yellow, m. 181°. *2-Bu deriv.*, yellow, m. 185°. These compds. exert no action on *B. coli communis* when tested by the Rideal-Walker technic and they were also without effect on the proliferation of organisms of the *B. pyocyaneus* group, very definite inhibition of growth was observed with *S. pyogenes* and a no. of Gram-positive bacilli. These compds. are to be regarded as possessing selective antiseptic properties distinct from the general disinfectant properties of the phenols from which they are derived. Detailed results are given with *Bacterium C*. The introduction of an alkyl substituent into the 2-position of the dione ring in the parent resorcinol derivs. results in a lowering of the antiseptic power, but this depressing effect is counterbalanced to an increasing degree as the length of the substituent alkyl chain is increased. Such lowering effect is absent in the alkylated indandiones derived from β-$C_{10}H_7OH$. C. J. West

Anthracene derivatives. II. Edward de Barry Barnett and Norman P. Goodway. *Ber.* 63B, 3048–51(1930); cf. *C. A.* 24, 3936.—In order to obtain further data on the influence of substituents in the side ring on the reactions of atoms and groups in the *ms* position, attempts were made to reduce 1,5-dimethoxyanthraquinone (I) to the corresponding anthrone, but in spite of numerous trials in both acid and alk. soln. neither the anthrone nor the anthracene could be obtained. The now commercially prepd. and hence readily available 1,5-diphenoxyanthraquinone (II) also did not yield the *anthrone* (III) by either the usual Sn-HCl or the Al powder-cooled $H_2SO_4$ method. III was obtained in satisfactory yield, however, with $SnCl_2$ and HCl in AcOH. It was unchanged by MeMgI and $PhCH_2MgCl$, the copious evolution of gas with MeMgI pointed to the anthranol rather than the anthrone structure. Attempts to obtain a mono- or di-benzylanthrone by boiling with $PhCH_2Cl$ and NaOH gave only resinous products and unchanged III. III is readily brominated and the *10-Br deriv.* (IV) resembles 1,5-dichlorobromoanthrone more than bromoanthrone itself. It readily yields 10-RO and 10-NHR derivs. This seems to support the theory of *peri*-coördination, but in view of the contradictory results recently obtained, a theoretical discussion is reserved for a later date. With the object of detg. the influence of a β-PhO group, $C_6H_4(CO)_2O$ was condensed with $Ph_2O$ but the resulting *4'-phenoxybenzophenone 1-carboxylic acid* (V) could not be converted into the anthraquinone. It was, however, easily reduced to *4'-phenoxydiphenylmethane 1-carboxylic acid* (VI), attempts to convert this into the anthrone have thus far failed. The I, pale yellow, m. 241°, was obtained in about 20 g. yield from 1,5-$Na_2O_3SC_6H_3(CO)_2C_6H_3SO_3Na$ and 1.5 parts NaOH boiled 40 hrs. with continuous stirring in MeOH. III, yellow, m. 166°, gives with $C_5H_5N$-$Ac_2O$ on the $H_2O$ bath *1,5-diphenoxyanthranyl acetate*, yellow, m. 165°. IV, yellow, m. 190–3° (gas evolution). *10-EtO deriv.*, from IV refluxed in alc. with $CaCO_3$, m. 148°, quickly turns light pink on the surface. *anthranyl acetate*, yellow, m. 238°. *10-Piperidino deriv.*, m. 126°. *10-Anilino deriv.*, yellow, m. 159° (decompn.). *10-N-Methylanilino deriv.*, yellow, m. 159°. *10-p-Dimethylaminophenyl deriv.*, faintly yellow, m. 205°. V, m. 162°. VI, from V with Zn dust and aq. $NH_4OH$ on the $H_2O$ bath, m. 128°. C. A. R.

Oxalic acid as a condensing agent. I. Condensation of phthalic anhydride and phenol. S. Nakayama. *J. Pharm. Soc. Japan* 51, 31–4(1931); German abstr. 10–11.—$C_6H_4(CO)_2O$ (I) (10 g.), when treated with hydroquinone (5 g.) and $(CO_2H)_2$ (20 g.) at 120–40° for 2 hrs., gave *quinizarin*, $C_{14}H_8O_4$, m. 194°. I (5 g.), α-naphthol (5 g.) and

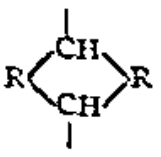
$(CO_2H)_2$ (20 g.), when treated as above, give *α-naphthofluoran*, $C_{23}H_{10}O_2$, m. 300° (yield 3 g.). F. I. NAKAMURA

Constitution of the aloins. E. LEGER. *Bull. soc. chim.* [4], 49, 70–2(1931).—A polemic. Cf. Gibson and Simonsen, *C. A.* 24, 2752. ODEN E. SHEPPARD

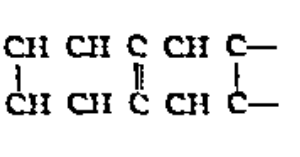
Anthraquinhydrone. OSCAR BALLY. *Ber.* 63B, 2938(1930), cf. Scholl and Böttger, *C. A.* 25, 695.—In 1905 (Ger. pat. 194,252), in applying alc. KOH fusion to the prepn. of isoviolanthrone B. observed with anthraquinone itself an intense bottle-green color. Scholl, apprised of this observation, ascribed the color to the formation of K anthraquinhydrone. C. A. R.

Polynuclear aromatic hydrocarbons and their derivatives. VII. A new class of deeply colored radical hydrocarbons and the supposed pentacene of E. Philippi; also a reply to remarks of Roland Scholl and Oskar Böttger. E. CLAR AND FR. JOHN. *Ber.* 63B, 2067–77(1930), cf. *C. A.* 24, 2157.—*lin*-Dibenzo-9,10-dihydroanthracene (I), when dehydrogenated by passing over heated Cu *in vacuo* or by boiling in $PhNO_2$ with phenanthrenequinone or in xylene with chloranil, gives a deep violet-blue hydrocarbon, $C_{22}H_{14}$, to which (see below) is assigned the structure of a *2,3 6,7-dibenzanthracene 9,10-diyl* (II, R = III). The homologs of I yield corresponding violet blue hydrocarbons. These deeply colored very difficultly sol. and high melting hydrocarbons differ from the hitherto known condensed aromatic hydrocarbons of the same mol. magnitude not only in their deep color but also in their interesting reactions. The red xylene soln. of II is unchanged by dry O but moist O or air changes it to yellow, with green fluorescence, and ppts. an insol. colorless *peroxide* (IV), and the mother liquor on concn. yields yellow brown needles, $C_{22}H_{14}O_2$ (V). IV has the compn. $C_{44}H_{28}O_2$ and regenerates II when heated to its m. p. or in high boiling solvents ($PhNO_2$), *properties agreeing well with the peroxide structure given*. IV is then *apparently* formed by the addn. of $H_2O_2$, not of $O_2$. Unfortunately mol.-wt. detns. could not be made because of the insoly. of the IV. The *endocyclic peroxide* V is accompanied by varying amts. of the monoquinone $R(CO)_2R$ (VI), apparently formed by further oxidation of V. In 1 case where the di mol. IV was not formed, the monomeric V was readily isolated in pure form. It does not dissolve in NaOH and on fusion shows the decompn. characteristic of peroxides. Light greatly accelerates the oxidation. $CrO_3$ and AcOH, as already reported, give VI exclusively. In xylene suspension, II is immediately decolorized by benzoquinone with the formation of a faintly yellow cryst. product to which is assigned the structure VII; on heating it does not break down into its components but melts to a dark mass, with evolution of gas. With chloranil in xylene the reaction is somewhat slower and there are obtained a yellow (VIII) and a brown-red product (IX). VIII, from its compn., is the analog of VII but on heating alone or in high boiling solvents breaks down into its components. IX contains 1 mol. more of $H_2O$ and does not split up into its components when heated, it is provisionally assigned the structure shown. Dil. NaOH converts it into a colorless, difficultly sol. compd., while *VIII* dissolves only in alc. *KOH*, with brown red color. Crystn. of *IX* from *AcOH* changes it into a light red *substance* (X) of much higher m. p. which is no longer altered by dil. NaOH. With phenanthrenequinone, II does not react, it reacts at once with halogens, including I, and readily with boiling $PhNH_2$ contg. a little $PhNH_2$ HCl. Among the reaction products with halogens are halogen-contg. diradicals of great stability. If II, which sublimes undecompd. below 300° in $CO_2$, is sublimed above this temp., it gives, depending on the temp., small quantities of I, m. 270°, and the residue, which retains the cryst. structure of the II, has a glittering, graphite like appearance. It is probably formed by a graphite like linking together of many hydrocarbon mols., while the H thereby set free reduces a part of the II to I. The properties of II indicate that it has the structure shown. Rontgen ray studies by Debye's method have established the uniplanar position of the $C_6H_4$ rings and leave hardly any doubt as to the correctness of the structure II. The supposed 2,3 6,7-dibenzoanthracene, which Philippi, with Scholl, Houben and de Diesbach, calls *lin* pentacene (*C. A.* 24, 356), is really the dihydro deriv. (I). Using their own method of prepn. (*C. A.* 24, 1634), C. and J. obtained a hydrocarbon with the same properties as P.'s but with the compn. $C_{22}H_{16}$, not $C_{22}H_{14}$, and yielding II on dehydrogenation, and VI exclusively on oxidation. On standing some months, the m. p. of the I rises to 300–10° and the substance (XI) now agrees in all its properties with that first described by Mills and Mills, on oxidation it gives the diquinone, $C_6H_4(CO)_2C_6H_2(CO)_2C_6H_4$, although with $FeCl_3$ it gives only VI; this is readily explained by an intermediate dehydrogenation to II by the $FeCl_3$. XI, which is apparently more stable at room temp. than I, is probably formed from I by a change in position of two H atoms and is the *1,4-dihydro*

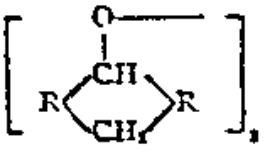
*compd.* $RC_6H_3\langle{}^{CH_2}_{CH_2}\rangle C_6H_4$. The reverse rearrangement has been effected by heating XI for some time above its m. p. under $CO_2$; the resulting product with $CrO_3$ now gives VI along with traces of the diquinone. There is no change in compn., as P. believes, in the rearrangement. Both forms give red melts. A brief reply is made to the criticisms of Scholl and Bottger (*C. A.* 25, 696). IV decomps. 535–60°, imparts a faint green color to concd. $H_2SO_4$. V, m. 320–30° (decompn.), sol. in $H_2SO_4$ with green color. *2,3:6,7-Dibenzanthracene-9,10-diol hydroquinone ether* (VII), decomps. 262° with gas evolution (m. 355° with carbonization if heated very slowly). *Tetrachlorohydroquinone ether* (VIII) m. 263° (gas evolution), sol. in $H_2SO_4$ with dirty green color. *mono-ether* (IX), m. 207–8° (gas evolution), also sol. with dirty green color in $H_2SO_4$. X, apparently formed from IX by loss of 2 mols. HCl and 1 mol. $H_2O$, darkens 300°, m. 370° (decompn.), sol. in $H_2SO_4$ with violet red color.



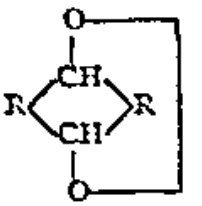
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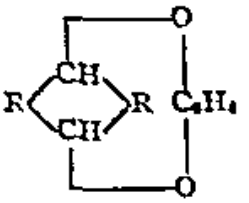
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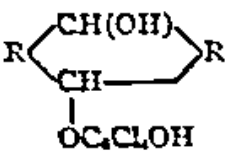
(IV)



(V)



(VII)



(IX)

C. A. R.

**Unsaturated compounds. XII.** Action of hydroxylamine on furfurhippuric acid and its esters, as also on furfuracrylic esters. THEODOR POSNER AND IRMENGARD SICHERT, NÉE MODROW. *Ber.* 63B, 3078–88(1930); cf. *C. A.*, 18, 3067.—The addn. at conjugated double bonds has hitherto been studied chiefly on variously substituted cinnamic acids. The present work deals with the influence on the additive power of the replacement of the $C_6H_5$ nucleus by the furan ring and the relation to the strength of the acid. *Acid addn. products*.—The furan ring increases the dissocn. of the acid and quite materially increases the difficulty of addn., *furfuracrylic acid (I) adds more difficultly than hippuric acid (II), furfurhippuric acid (III) more difficultly than benzalhippuric acid (IV) and III more difficultly than I;* the increase in the yield of $NH_2OH$ addn. products of the acids of the furan series agrees well with the decrease in the dissocn. of the acids, insofar as these consts. have been detd. On short heating the formation of hydroxamino acids, $RCH(NHOH)CH_2CO_2H$, increases with decrease in dissocn., and on longer heating the oxamino acids are more and more oxidized to the ketones. The formation of the other oxidation product, the isoxazolone, N CR $CH_2$ CO.O, and of the reduction product, $RCH(NH_2)CH_2CO_2H$, is irregular. *Ester addn. products*.—The esters add much more easily than the corresponding acids, the Et ester generally somewhat easily than the Me ester, they generally react quite well with $NH_2OH$ in the cold, whereas the acids only form the $NH_2OH$ salts. Unlike the acids, which add only 1 mol. NH·OH when heated, the esters react in the cold with 2 and 3 mols. $NH_2OH$ and the ability to add 1–3 mols. increases from the ester of the strongest to that of the weakest acid (the Me ester of III adds 1, the Et ester of IV 2, PhCH CHCO$_2$Et 3 mols.) *Most of the cinnamic esters with HO and MeO substituents on the nucleus are exceptions*, they in general do not add at all in the cold. The yield of oxime and isoxazolone increases inversely proportionally to the dissocn. consts. of the corresponding acids, only *o*-$O_2NC_6H_4CH$ CHCO·Et is an exception. The amino acids also are generally formed in smaller amounts the weaker the corresponding acids are (except with the esters of III, *o*-$O_2NC_6H_4CH$ $CHCO_2H$ and *trans*-*o*-$MeOC_6H_4CH$ $CHCO_2H$). The ester of III forms oxidation and reduction products even in the cold, and in spite of the slow addn. even when boiled, it yields a relatively large amount of amino acid. In the expts. at the boiling temp., esters of III, contrary to the cinnamates, form small

1 g IX with 8 cc concd $H_2SO_4$ and 2 cc AcOH, m 125–6°. The lack of color is unexpected if the suggested formula is correct (cf Weissgerber and Kruber, *C. A.* 15, 88 who point out that the Na compd of X is not yet explained) Diphenyl 2(?) thionaphthylmethane (XII) $Ph_2CHC_8H_5S$, obtained in 90% yield by splitting out $CO_2$ from IX as VI was obtained from I, m 104–5°, dissolves in concd $H_2SO_4$ with intense greenish orange color Diphenyl-3(?) bromothionaphthylacetic acid (XIII), $Ph_2C(C_8H_4BrS)CO_2H$ obtained in almost quant yield by treating 1.7 g IX with 1.6 g Br, m 223–4° (decompn) dissolves in concd $H_2SO_4$ with violet red color Diphenyl-3(?) bromothionaphthylcarbinol (XIV) $Ph_2C(OH)C_8H_4BrS$, obtained in 75% yield by the method of prepg XII from IX, m 166–7°, dissolves in concd $H_2SO_4$ with violet-red color 4,4' Dimethoxydiphenyl (?) thionaphthylacetic acid (XV), $(MeOC_6H_4)_2C(C_8H_5S)CO_2H$ obtained in 90% yield by treating a soln of 2.9 g of anisic acid and 1.7 g X in 20 cc AcOH with 20 cc of a mixt of equal wts $H_2SO_4$ and AcOH, letting stand 2 days, m 245–6° (decompn) the Ba salt is almost insol in water, Me ester, in 90% yield prepd as the Me ester of IX, m 166.7° CO evolution resulted when XV was treated with $H_2SO_4$ or $H_2SO_4$ and AcOH but no product was isolated 9-(2(?)Thionaphthyl)xanthene O $(C_6H_4)_2CHC_8H_5S$ obtained in 50% yield by refluxing 2 hrs 2 g VIII, 1.7 g X, 3 g $P_2O_5$ and 5 cc ether, and letting stand 2 days, m 172–3°, dissolves in $H_2SO_4$ with yellow color and intense blue green fluorescence O I S

**New methods of formation of coumarone and of diphenylene oxide.** N A. Orlov and V V Tishchenko *Ber* 63B, 2948–51(1930), cf *C A* 24, 110.—Coumarin (350 g), passed at the rate of 50 g per hr through a 2-cm tinned Fe tube, 60 c long, at 860° gave a gas consisting of 4.0% $CO_2$, 71.6% CO, 19.2% H and 4.8% $C_nH_m$, and 297 g of a thick brown product sepd by distn into 56 g b 80–200° (I), 16 g b 200–88°, 75 g b 288–305° and 146 g residue The 3rd fraction and a considerable portion of the 2nd fraction consisted of unchanged coumarin and the residue, which was very similar in all its properties to coumarone resin, gave on dry distn 78.6 g oil (II), which was combined with I, and 56 g of a porous coke The combined I and II, freed of acid products (phenols) with NaOH, was sepd by careful fractionation into 8 g b 80–172° (chiefly $C_6H_6$ hydrocarbons), 122 g practically pure coumarone, b 172–4°, and 8 g residue (mainly coumarin) Under pressures greater than atm the decompn of coumarin follows another course, heated 4 hrs at 420° in an autoclave the coumarin gave only gases and coke Coumarin may be considered as an $\alpha$ benzopyrone, and xanthone (dibenzo-$\gamma$ pyrone) (100 g) treated like the coumarin at 880°, gave a gas consisting of 94% CO 1.76% $CH_4$ and 2.1% H, and a black cryst mass giving on distn 15 g of a product b 285–300° which, through the picrate, gave 9.5 g diphenylene oxide, m 85° Dimethylpyrone was similarly treated, but because of lack of material the best conditions for a smooth degradation into CO and dimethylfuran could not be worked out The formation of a volatile compd with pronounced furan properties and the evolution of large quantities of gas rich in CO was observed, however

C. A *R*

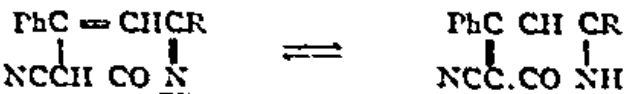
**The hydrolysis of acetylindoxylic acid and the acetylindoxyls** Geoffrey Spencer *J. Soc Chem Ind* 50, 63–4T(1931).—*N-Acetylindoxylic acid*, AcN $C_6H_4$ CO CHCO$_2$H (I) A melt of 10 g of *o*-$HO_2CC_6H_4NHCH_2CO_2H$ and 45 g of 80% KOH, fused at 260° for 10 min, was ground up, mixed with 50 g of ice and partly neutralized with 35 cc of AcOH at 0° in a $CO_2$ atm Ten cc of $Ac_2O$ was added and after 30 min the ppt of O acetylindoxyl was filtered off Acidification of the filtrate with HCl gave I, m 179° (decompn) I was also obtained by acetylating acid indoxylic acid solns Hydrolysis of I was expected to give indoxylic acid, indoxyl and then indigo but on the contrary a marked tendency to ring cleavage was shown Hydrolysis with $Na_2CO_3$, alk $H_2O_2$ and NaOH gave 50% of $NH_2C_6H_4CO_2H$ and some indigo, whereas treatment with HCl or acid $FeCl_3$ yielded $NH_2C_6H_4CO_2H$ solely *N Acetylindoxyl* (II) was prepd by the method of Vörlander and Pfeiffer (*C A* 13, 2356), after attempts to decarboxylate indoxylic acid by boiling had failed On boiling II in the presence of air with dil $Na_2CO_3$, indigo, diacetylindigo and isatin were obtained in 55, 8 and 12% yields, resp Dil NaOH gave mainly indigo (74%) together with isatin, while acid $FeCl_3$ gave only isatin *O-Acetylindoxyl* (III) An indoxylic acid melt was partly neutralized boiled for 10 min, cooled, and acetylated with $Ac_2O$ After standing for 30 min, III was filtered off, washed free from acetylindoxylic acid and crystd from $H_2O$ After drying *in vacuo*, 15% yield of III, m 127.5°, was obtained Hydrolysis with $Na_2CO_3$ yielded 95% indigo and 3–4% isatin, treatment with alk $H_2O_2$ gave mainly isatin 18% indigo and some $NH_2C_6H_4CO_2H$ Acid $FeCl_3$ gave indirubin (18%) and isatin

C. R Addinall

**3,5-Diketopyrazolidine derivatives. I.** TOKUICHI TSUMAKI *Bull. Chem. Soc. Japan* 6, 1–9(1931).—*1,2-Diphenyl-3,5-diketopyrazolidine* (I). (PhNH)$_2$ (18.5 g.) in 300 cc. of Et$_2$O was added from a dropping funnel to a soln. of 10 g. of $CH_2(COCl)_2$. The white ppt. washed with Et$_2$O in the absence of moist air, was extd. with petroleum ether and recrystd. from EtOH, yield 6 g., m. 175°. The ether filtrate was washed with water and shaken with 1% Na$_2$CO$_3$. On acidification with HCl the alk. soln. gave a ppt. which when dissolved in CHCl$_3$ and treated with EtOH yielded crystals of *1,2-diphenyl-3,4-dihydroxy-5-pyrazolidone* (II), m. 160–2°. This compd. was also obtained by dissolving I in a mixt. of CHCl$_3$ and EtOH, and allowing the soln., acidified with a trace of HCl, to stand for a few days. I and II were obtained by the action of $C_2O_3$ on (PhNH)$_2$, the poor yields being accounted for by polymerization of the main part of the $C_2O_3$ during the reaction. I forms an NH$_4$ salt, m. 138–9°, and an isonitroso deriv., m. 163–4°. It condenses readily with aldehydes and ketones, giving products easily decompd. by hot alkali. From BzH, O CH CH CH CH CCHO, PhCH:CHCHO, Me$_2$CO, MeBz and PhBz the following 1,2-diphenyl-3,5-diketopyrazolidine derivs. were formed: 4-benzylidene, m. 164–5°; 4-furfurylidene, m. 157–8°; 4-cinnamylidene, m. 190–2°; 4-isopropylidene, m. 113°; 4-(α-phenylethylidene), m. 148–9°; and 4-(diphenylmethylene), m. 209. C. R. ADDINALL

**Equilibrium and "intermediate stage."** F. ARNDT *Ber.* 63B, 2963–6(1930).—In agreement with v. Auwers *et al.*, who, in their work on the *N*-alkyl γ-pyridones (*C. A.* 25, 295), misunderstood the attempted explanation, in footnote 2 to the paper by A. and Kalischek (*C. A.* 24, 3239) on an electronic theoretical basis, of A.'s conception of the difference between equil. and "intermediate stage." A. explains more fully this conception, which is dealt with in detail by his pupil Lorenz (*Diss. Breslau*, 1927) but is referred to only incidentally here and there in A.'s own papers. C. A. R.

**Reactivity of conjugated systems. II. Condensation of acetylenic ketones with cyanoacetamide.** CHITTARANJAN BARAT *J. Indian Chem. Soc.* 7, 851–62(1930); cf. *C. A.* 24, 4785.—PhCOC:CPh and CNCH$_2$CONH$_2$ condensed according to Michael's method to *3-cyano-4,6-diphenyl-2-pyridone* (I), m. 320°, in 60% yield. I is identical with the dehydrogenated product from PhCOCH:CHPh and CNCH$_2$CONH$_2$. The Na salt of I is sparingly sol. in water, on much dilu. the soln. becomes turbid from hydrolysis. With Knoevenagel's reagent 40–50% of an identical compd. was obtained on 1 week's standing. The structure is

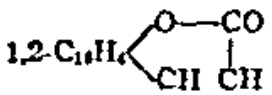


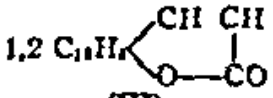
(II) (III)

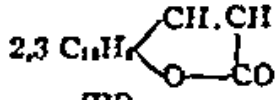
of which III predominates in the presence of alkali. The *N*-Me deriv. (IV), m. 175°, is identical with that from condensation with CNCH$_2$CONHMe. Dilu. of the H$_2$SO$_4$ soln. of I gives 4,6-diphenyl-2-hydroxypyridine (V). I and II give no color with alc. FeCl$_3$ but V does. V does not yield a Me deriv. readily and is probably PhC CH CR N C(OH) CH. V could also be reached from I by an intermediate compd. PhC(CH$_2$COR) C(CN)CONH$_2$. The stability of the condensation products increases with increasing neg. character of R. An extension of Fry's substitution rule is offered in explanation. *p-Tolylphenylacetylene*, b$_{15}$ 200–10°, m. 72°, and CNCH$_2$CONH$_2$ gave *3-cyano-4-phenyl-6-p-tolyl-2-pyridone* (VI), m. 268°. VI was also obtained from *p*-MeC$_6$H$_4$COCH:CHPh and from α-methoxy-α-*p*-tolylstyrene; *N-Me* deriv., m. 136–8°. *4-Phenyl-6-p-tolyl-2-hydroxypyridine*, m. 228°. *Et 4-phenyl-6-p-tolyl-2-pyrone-3-carboxylate*, m. 85°. *4-Phenyl-6-p-tolyl-2-pyrone*, m. 133°. *p*-NO$_2$C$_6$H$_4$COC:CPh, m. 161–2°. *3-Cyano-4-phenyl-6-p-nitrophenyl-2-pyridone*, m. 332–3°; *N-Me* deriv., m. 322–4°. *4-Phenyl-6-p-nitrophenyl-2-hydroxypyridine*, m. 275–6°. *Et 4-phenyl-6-p-nitrophenyl-2-pyrone-3-carboxylate*, m. 148°. *4-Phenyl-6-p-nitrophenyl-2-pyrone*, m. 235°. *3-Cyano-4-phenyl-6-methyl-2-pyridone*, m. 275–6°; *N-Me* deriv., m. 146°. *4-Phenyl-6-methyl-2-hydroxypyridine*, m. 206–8°. *Et 4-phenyl-6-methyl-2-pyrone-3-carboxylate*, m. 92°. *4-Phenyl-6-methyl-2-pyrone*, m. 185–6°. *3-Cyano-4-phenyl-6-ethyl-2-pyridone*, m. 267–8°; *N-Me* deriv., m. 158°. *4-Phenyl-6-ethyl-2-hydroxypyridine*, m. 165°. FOSTER DEE SNELL

The third *o*-hydroxynaphthaldehyde and the isomeric β-naphthocoumarins. THEODOR BOEHM AND ELMAR PROFFT. *Arch. Pharm.* 269, 25–37(1931).—Of the 3 possible *o*-hydroxynaphthaldehydes only 2 were known, to which the structures 1,2- and 2,1-C$_{10}$H$_6$(OH)CHO were ascribed. The prepn. of the 2,3-isomer (I) was un-

successfully attempted some years ago by Zetzsche and co-workers by the catalytic reduction of $C_{10}H_6(OH)COCl$. These expts. were taken up anew by B. and P. who, following the procedure of Rosenmund and starting with 2,3 $C_{10}H_6(OH)CO_2H$ succeeded in prepg. I, by the following transformations: $C_{10}H_6(OH)CO_2H \longrightarrow C_{10}H_6(OAc)CO_2H \longrightarrow C_{10}H_6(OAc)COCl \longrightarrow C_{10}H_6(OAc)CHO \longrightarrow$ I. This synthesis clarifies the questions hitherto existing in the constitutional make up of the isomeric β-naphthocoumarins (III and IV).


(II)


(III)


(IV)

Owing to its derivation from α naphthol no question arises respecting the structure of α naphthocoumarin (II). Of the isomeric β naphthocoumarins, the one prepd. by Kauffmann from β naphtholaldehyde according to Perkin, m. 118°, is represented by (III). A 2nd β naphthocoumarin was described by v. Pechmann and Welsh (cf. *Ber.* 17, 1646), it m. 141° and was designated as iso-β naphthocoumarin. Its constitution was left undetd., from K.'s work only structure IV would remain for it. However, when β naphtholaldehyde was subjected to the Perkin synthesis, a product m. 163°, resulted, entirely unlike Pechmann's "iso-β naphthocoumarin," and undoubtedly having the structure IV. Repetition of the v. Pechmann expts. on condensation of β naphthol with malic acid in the presence of $H_2SO_4$ yielded a product m. 118° and identical with K.'s β naphthocoumarin. If the same reaction is applied to α-naphthol—which according to Pechmann does not react at all—a product, m. 141°, results (already observed by Bartsch, *Ber.* 36, 1966), it is II, which had been previously prepd. by another procedure by Bezdzik and Friedländer (cf. *Monatsh. Chem.* 30, 280). Accordingly, the assumption is safe that v. Pechmann and Welsh had in hand II and that an "iso-β naphthocoumarin," m. 141°, has no existence in fact and should be deleted from the literature. During the present study, the following compds. were prepd. and characterized. 2,3 $C_{10}H_6(OH)COCl$, m. 100° (Graff, *Ann.* 367, 253, reports m. p. 89°), which gave on reduction *2-acetoxynaphthoic aldehyde*, $C_{13}H_{10}O_3$, bright yellow, m. 100–1°, likewise the related by product *acetoxynaphthoic anhydride*, $C_{26}H_{18}O_7$, m. 156°. I, $C_{11}H_8O_3$, yellow plates from dil. AcOH, m. 99–100°, *phenylhydrazone* $C_{17}H_{14}ON_2$, yellow, m. 246–8°, *p-nitrophenylhydrazone*, $C_{17}H_{13}O_4N_3$, brownish yellow, m. 271–3°, *semicarbazone*, $C_{12}H_{11}O_3N_3$, m. 270°, *oxime*, $C_{11}H_9O_3N$, m. 207°; *anil*, $C_{17}H_{13}ON$, golden, m. 158–9° (*p-nitrophenylhydrazone*, $C_{17}H_{12}O_4N_3$, golden, m. 213–4°, *semicarbazone*, $C_{12}H_{12}O_3N_4$, m. 211–2°, *oxime*, $C_{11}H_{10}O_3N$, m. 202–3°). *β-Hydroxy-β-naphthylideneacetone*, $C_{14}H_{12}O_2$, yellow, m. 207–8°. *β-Hydroxy-β naphthylideneacetophenone*, $C_{19}H_{14}O_2$, yellow, m. 188–9°. *β Hydroxy-β naphthylideneacetylacetone*, $C_{16}H_{14}O_3$, bright yellow, m. 162–3°. *β-Hydroxy-β-naphthylideneoxalacetic ester*, $C_{17}H_{14}O_5$, yellow, m. 112–3° (*Ac deriv.*, $C_{21}H_{18}O_7$, m. 142–3°). Condensation of I with $Ac_2O$ and AcONa yielded IV, yellowish white, m. 163–4°. Alc. $PhNH_2$ or $NH_3$ effects condensation of I with malonic acid to yield *iso-β naphthocoumarincarboxylic acid*, $C_{14}H_8O_4$, yellow, m. 258–9° (*Et ester*, $C_{16}H_{12}O_4$, yellow, m. 157–8°). With $AcCH_2CO_2Et$ and piperidine I yields *3-acetyl(iso β naphthocoumarin)*, $C_{15}H_{10}O_3$, yellow, m. 209–10° (*p-nitrophenylhydrazone*, $C_{21}H_{15}O_4N_3$, yellow, m. 266–7°. *Bz deriv.*, $C_{22}H_{12}O_3$, yellow, m. 225°). *Et (3-cyano-3,4-dihydro-iso-β naphthocoumarin)cyanoacetate*, from the condensation of I with $NCCH_2CO_2Et$ in the presence of piperidine, m. 158–9°.

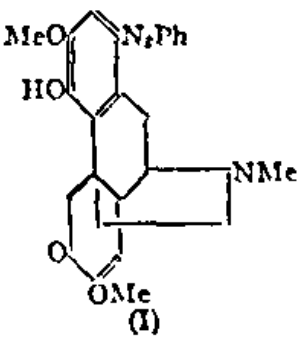
W. O. E.

α-Naphthoic acid. Henry Gilman, Nina B. St. John and F. Schulze. *Org. Syntheses* XI, 80–3(1931).—Complete details are given for the prepn. of α-$C_{10}H_7CO_2H$ from α-$C_{10}H_7Br$ through the Grignard reagent, yield, 68–70%. C. J. West

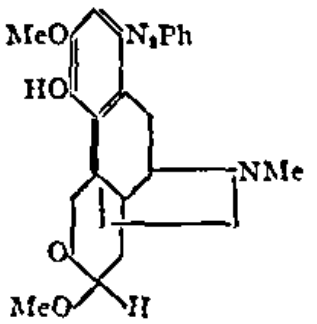
10-Chloro-5,10-dihydrophenarsazine and its derivatives. XIV. Chloro derivatives. Leslie A. Elson and Charles S. Gibson. *J. Chem. Soc.* 1931, 294–305, cf. *C. A.* 24, 5301.—Condensation of Cl derivs. of $Ph_2NH$ with $AsCl_3$, producing derivs. of 5,10-dihydrophenarsazine, takes place except when the Cl is in the *o*-position. The production of isomers from *p*-$YC_6H_4NHC_6H_4X$-*m* and from *o*-$YC_6H_4NHC_6H_4X$-*m* is discussed and their orientation considered. 2,2'-$ClC_6H_4NHC_6H_3ClCO_2H$, heated 5 hrs. at 300–20°, gives *o-chlorodiphenylamine*, $b_{12}$ 174–5°, m. 15–6°, *2,5 $Cl_2$ deriv.*, $b_{12}$ 195°, does not solidify at —16° (85% yield), *3,4-$Cl_2$ deriv.*, $b_{18}$ 218–20°, m. 69°, in 75% yield from *3,4-dichlorodiphenylamine-2'-carboxylic acid*, pale yellow, m. 178°, *3,5 $Cl_2$ deriv.*, $b_{12}$ 200°, does not solidify at —16°, in 74% yield from the corresponding *2'-carboxylic acid*, m. 245°, *3,4,5 $Cl_3$ deriv.*, $b_{20}$ 248°, m. 85°, from the *2'-carboxylic acid*, m. 238°. *5 Chloro-2 methyldiphenylamine*, $b_{18}$ 205–7°, from the *2'-carboxylic acid*,

pale yellow, m 200° *N 3-Chlorophenylbenzimino-4-chlorophenyl ether*, m. 77°, from benz-*m*-chloroanilide iminochloride and *p*-$ClC_6H_4ONa$, heating 2 hrs at 290° and hydrolysis of the Bz deriv. gives *3,4'-dichlorodiphenylamine*, $b_{15}$ 235°, m 63–4°, *3,3'-$Cl_2$ deriv*, $b_{16}$ 225–30° *N-o Tolylbenzimino 2 chlorophenyl ether*, m 64°, heating 2 hrs at 290° gives *benzoyl-2'-chloro-2-methyldiphenylamine*, m 132°, which could not be hydrolyzed by the usual methods, the corresponding *3'-Cl deriv* m. 106°; hydrolysis gives *3'-chloro-2-methyldiphenylamine*, $b_{16}$ 203° *N-4-Chlorophenylbenzimino-o tolyl ether*, m 65°, isomerization and hydrolysis give *4'-chloro 2 methyldiphenylamine*, $b_{16}$ 200–5°, darkens in the air *N-o-Tolylbenzimino-2,4-dichlorophenyl ether*, m 53° this gives *2',4'-dichloro 2 methyldiphenylamine*, $b_{16}$ 205°, m 48° Condensation of 3,4 $Cl_2C_6H_3NHPh$ and $AsCl_3$ in *o* $C_6H_4Cl_2$ gives 20% of a mixt of *1,2,10-* and *2,3,10 trichloro 5,10-dihydrophenarsazine*, m 265–8° and 220°, the same compds were obtained by reducing I with $SO_2$ in HCl, the products m 273–4° and 230–5° 3,4 $Cl_2C_6H_3NH_2$, *o*-$BrC_6H_4AsO_3H_2$, $K_2CO_3$ AmOH and Cu boiled 8 hrs., give *3 4-dichlorodiphenylamine-6'-arsonic acid* (I), m 150° 3 5 $Cl_2C_6H_3NHPh$ and $AsCl_3$ give the *1,3,10 $Cl_3$ deriv*, yellow, m 251–2°, boiling with 20 vols $H_2O_2$ and AcOH gives *1,3-dichlorophenarsazinic acid*, does not m 280° 3,4 5-$Cl_3C_6H_2NHPh$ and $AsCl_3$ give *1,2,3,10 tetrachloro-5,10 dihydrophenarsazine*, yellow, m 260°, oxidation gives *1,2,3 trichlorophenarsazinic acid*, does not m 290° $(3\ ClC_6H_4)_2NH$ gives *1,9,10-, 1 7,10* or *3 7,10 trichloro-5,10-dihydrophenarsazine*, yellow, m 208° 3,4' $ClC_6H_4NHC_6H_4Cl$ and $AsCl_3$ give a mixt. of the *1,8,10-* and the *3,8,10 tri Cl derivs*, m 292° and 240 2°, resp., the yield of the mixt. is about 20% 4,2 $ClMeC_6H_3NHPh$ and $AsCl_3$ give 70% of *2 10-dichloro-4-methyl-5,10-dihydrophenarsazine*, bright yellow, m 245° (decompn), 3 $ClC_6H_4NHC_6H_4Me$-2 gives 53% of the *1*(or *3*),*10-dichloro-6-methyl deriv*, bright yellow, m 262° (decompn), 4 $ClC_6H_4NHC_6H_4Me$ 2 gives 25% of the *2,10-dichloro-6-methyl deriv*, deep yellow, m 199° C J West

Sinomenine and disinomenine. XX. Benzeneazosinomenine. Kakuji Goto and Hideo Shishido *Bull Chem Soc Japan* 5, 311–4(1930), cf. *C A* 25, 299.—By means of a diazo coupling reaction, a radical is introduced in the sinomenine mol., in the *p*-position with regard to the phenol group *Benzeneazosinomenine* (I), dark red tetragonal or hexagonal plates, m 253° (decompn) *Benzeneazodihydrosinomenine* (II), red prisms m 231° (decompn) *Benzeneazothebainone*, m 152° *Aminodihydrosinomenine HCl salt*, m. > 300°.



(I)

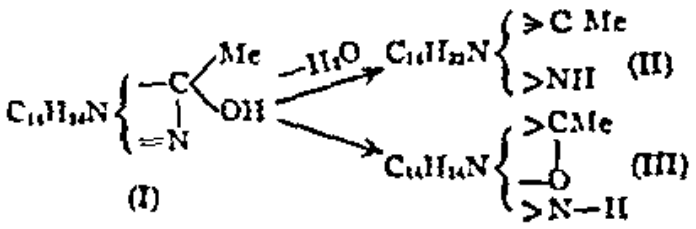


(II)

XXI. The reaction between sinomenine and formaldehyde. Kakuji Goto, Hideo Shishido and Reikichi Inaba *Ibid* 315–20.—The interaction of sinomenine and 40% HCHO gives *5 hydroxymethylsinomenine* (I) and *1,5-dihydroxymethylsinomenine (II) 1 m 260° (decompn), $[\alpha]_D$ —40 71°*, oxime, m *240–5°*, methiodide, m 223°, gives a green $FeCl_3$ reaction, a faint ferricyanide reaction, an intensely red diazo reaction and a green brown HCHO-$H_2SO_4$ reaction. II m. 242° (from alc.) or 252° (from $CHCl_3$), $[\alpha]_D$ —74 39°, oxime m 200–15°; methiodide m. 210°, decomps 280°, gives a brown $FeCl_3$ reaction, a red diazo reaction, no ferricyanide reaction and a green HCHO $H_2SO_4$ reaction The reduction of V gives *dihydro-5 hydroxymethylsinomenine*, m 244°, $[\alpha]_D$ 73 03°; oxime, m 215–25° (decompn), gives a green $FeCl_3$ reaction, an intensely red diazo reaction, a faint ferricyanide reaction and a blue-violet HCHO-$H_2SO_4$ reaction Albert L. Henne

Constitution of matrine. XIII. Action of Grignard reagent on matrine (I). H Kondo, E. Ochiai and K Iwaya. *J. Pharm Soc Japan* 51, 1–8(1931), German abstr. 1–3; cf *C. A.* 23, 2447.—*Matrine* (18 5 g), when treated with MeMgI, followed by decompn with $NH_4Cl$, gave a compd (I), m 221–30°, with mol formula of $C_{16}H_{28}N_2O$ HI $H_2O$ or $C_{15}H_{26}N_2O$ HI $H_2O$ On hydrolysis I gave bases (II), $b_4$ 165° and

(III), $b_6$ 236–40° II, m 65°, $d_4^{20}$ 1.0342, $n_D^{18.8}$ 1.531886, *picrate* decomps. 268°; styphnate decomps 306° II cannot be reduced with a catalyst, but gives pos diazo and Liebermann reactions II can be neither benzoylated nor acetylated III, $C_{10}H_{10}N_2O$ or $C_{11}H_{12}N_2O$, gives pos diazo and Lieberman reactions, but the reaction for the C O group is neg The reaction is shown in the following equation.



F. I. NAKAMURA

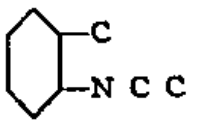
**Mechanism of the oxidation of laudanosine.** VINAYAK K. BHAGWAT, DOUGLAS K. MOORE AND FRANK L. PYMAN *J. Chem. Soc.* 1931, 443.—The compd., $C_{14}H_8(OMe)_4$, m. 231°, obtained by Pyman in the oxidation of laudanosine by $MnO_2$ in $H_2SO_4$ (*C. A.* 3, 2966) is 2,3,6,7-tetramethoxy-9,10-dihydroanthracene (Robinson, *C. A.* 9, 1602), it seps. from $Me_2CO$ with 0.5 $H_2O$ and from $C_6H_6$ with 0.5 $C_6H_6$. This identification counteracts the view of Gadamer (*C. A.* 10, 1033) of the mechanism of this oxidation.

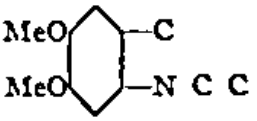
C. J. WEST

**Oxonitine and remarks on a paper of S. Akabori and K. Saito.** ERNST SPÄTH AND FRIEDRICH GALINOVSKY *Ber.* 63B, 2994–7(1930).—Earlier workers have assigned to oxonitine a formula with 23–25 C atoms, with 3 MeO groups, and it therefore seemed that if the 3 MeO, the Ac and the Bz groups were split off there would remain a compd. with only 11–13 C atoms whose structure, it was hoped, might be established and prove of great importance for the elucidation of the chemistry of the aconitines. It was soon found, however, that the formulas of the earlier investigators are incorrect, as oxonitine contains only 2.21% N instead of the 3.04–2.76% required by these formulas, and 4 instead of 3 MeO groups. Especially convincing evidence of the incorrectness of these formulas was afforded by a careful detn. of the Bz content by sapong. the oxonitine with alc. KOH, extg. the BzOH with $Et_2O$, subliming it at 130–50° under 10 mm. and weighing the sublimate (a control detn. on aconitine gave 16.09–16.16% Bz, calcd. 16.27). In this way oxonitine was found to contain 16.08–16.28% Bz instead of the 4.1–6.1% calcd. for the older formulas. Numerous analyses gave an av. C and H content of 60.48 and 6.90%. The formula for oxonitine is therefore $C_{32}H_{46}O_{11}N$ (the true H content may differ from this by 2 atoms) and the hope of obtaining a relatively simple product by its hydrolysis proved to be illusory. Akabori and Saito (*C. A.* 25, 700), in referring to a paper by Spath and Lederer, convey the erroneous impression that S. and L. considered their β-(6-methoxy-β'-indolyl)ethylamine, m. 112–30°, to be the pure base, it was obtained by a ring closure proceeding in 2 directions, which would naturally give impure end products, and S. and L. made no attempt to sep. the resulting mixt. of free bases but isolated them as their *N*-Ac derivs. C. A. R.

**Constitution of the strychnos, yohimbe and quebracho alkaloids.** ERNST SPÄTH AND HERMANN BRETSCHNEIDER *Ber.* 63B, 2997–3006(1930).—Oxidation of strychnine with alk. $KMnO_4$ on the $H_2O$ bath until the consumption of the $KMnO_4$ slowed up gave a mixt. of acids sepd. by their different acidities, one fraction gave an $Et_2O$-sol. acid (I) whose purification was rendered difficult by the fact that $H_2O$, the best solvent for it, gradually decomps. it at high temps. It was accordingly treated with $CH_2N_2$ which gave a pure di-Me deriv. $C_{11}H_{11}O_4N$ (II) which regenerated I with alc. KOH. Thermal decompn. of the K salt of I gave *o*-$H_2NC_6H_4CO_2H$ and I was identified as *o*-$HO_2CCONHC_6H_4CO_2H$ and II as its *di-Me ester* by synthesis. A sample of the acid, m. 195°, obtained by Warnat by oxidation of yohimboaic acid and to which he assigned the compn. $C_8H_7O_4N$, also proved to be identical with I. Intending to oxidize yohimboaic acid themselves, S. and B. used for its prepn. a sample of com. yohimbin hydrochloricum and found that the decompn. products and rotation of this base and the acid obtained from it by sapon. agreed almost completely with Hahn's data on quebrachine, and oxidation of the acid obtained from the quebrachine HCl yielded I. These results show that strychnine and the yohimbe and quebracho alkaloids contain the grouping III; whether the N is present in a quinoline or an indole ring cannot as yet be stated. Brucine uses up $KMnO_4$ more rapidly than strychnine and the yield of resulting acid is smaller, this was identified by synthesis as *4,5-dimethoxy-N-oxalylanthranilic acid* (IV), showing that brucine contains the grouping V, as assumed by Leuchs and by

Perkin and Robinson I, prepd. by Kretschy's method, decomps 229–30° (the m. ps 180–210°, recorded in the literature, are probably due to the presence of impurities acting catalytically) II, m. 152 5°. The *di-Me ester*, m 205–6°, of IV was synthesized by fusing 2,4,5-$H_2N(MeO)_2C_6H_2CO_2Me$ with anhyd. $(CO_2H)_2$ and methylating the resulting *mono-Me ester*, decomps 230° to a turbid liquid which clears up at 232°, with $CH_2N_2$.


(III)


(V)

C A R

The melting point of pure yohimbine (remarks on the communication of G. Hahn and W. Schuch). K Warnat *Ber* 63B, 2959–61(1930), cf H and S, *C. A.* 24, 5039.—H and S claim that *pure* yohimbine, obtained by fractional crystn. of a com product contg as chief impurity the so-called α-yohimbine, m 215–6° instead of 230–5°, as generally accepted W, in earlier work on the sepn of these 2 alkaloids, had found that this is by no means easily effected by fractional crystn, for his isoyohimbine is none other than H and S's α-yohimbine, and this isoyohimbine easily depresses the m p of yohimbine to 212–8° A few new expts with pure yohimbine have confirmed the old m p, 234°, of the base, which showed $[\alpha]_D^{20}$ 98 8° ($C_5H_5N$, *c* 0 921), HCl salt, m. 302°, $[\alpha]_D^{22}$ 103 3° Yohimboaic acid, m 259°, anhydride, m 298°. The rotation of 70–95° given by H and S for yohimbine-HCl and the decompn temp 284° for the yohimboaic acid also point to contamination with isoyohimbine C A. R

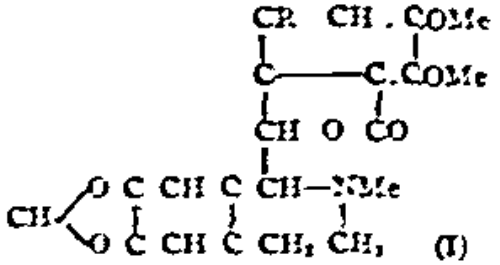
Identity of α-yohimbine with isoyohimbine. G Hahn and W Schuch. *Ber* 63B, 2961–2(1930), cf *C A* 24, 5039.—Whether or not Warnat's isoyohimbine (see preceding abstr.), which he did not sharply characterize, is identical with α yohimbine, there is no doubt that the alkaloid decompg 239–40°, which H and Brandenburg called isoyohimbine (*C. A* 21, *1815*) is different from α yohimbine C. A R.

Properties of nicotine and its derivatives. III. Chloronicotine and methylnicotine. Thomas M. Lowry and Hamid Khan Gore. *J. Chem Soc* 1931, 319–23, cf. *C. A.* 23, 5186.—Chloronicotine (I) in EtOH shows an absorption band with max log ε = 3 55 at 2700 A. U., as compared with log ε = 3 37 at 2600 for nicotine Methylnicotine (II) gives a max. log ε = 3 44 at 3100 A U. in cyclohexane and 3 66 at 2950 in $H_2O$. The rotatory dispersion of *l*-I can be expressed by 1 term of Drude's equation with characteristic wave length $\lambda_0$ = 2550 A U. II gives $\lambda_0$ = 2668 A. U. in cyclohexane and 2654 in $H_2O$ Both compds, therefore, behave like the parent base and not like its salts, which are *d* rotatory and of much lower dispersion C. J. West

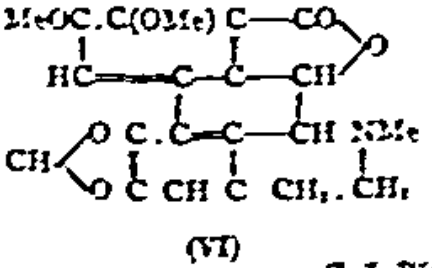
Santoninic acid amide. Karl Josephson. *Svensk Farm. Tids.* 35, 69–75(1931); cf. *C. A.* 25, 1534.—Five g. santonin in 50 cc. abs alc. was satd with dry $NH_3$ and shaken for over 1 day and then set aside for 2 days in a dark place. The $NH_3$ was removed by evapn at reduced pressure Yellowish red crystals formed but the color was completely removed by acetone. The yield is quant. The product m 177°, $[\alpha]_{H_2}^{22}$ —18 1°, it is more sol in water than santonin and is not very sol. in org solvents; of these alc. is best On heating it reverts to santonin A R. Rose

Synthesis of hydrastine. I. Edward Hope, Frank L Pyman, Frederick G. P. Remfry and Robert Robinson *J. Chem. Soc.* 1931, 236–47, cf. *C. A.* 7, 2927.—Condensation of hydrastinine and nitromeconin in boiling EtOH gives 80–90% of a mixt. of *anhydrohydrastininenitromeconins* (I, R = $NH_2$), it is orange-yellow, two samples m. 167–8° and 173°, *HCl salt*, yellow, m 137–8°, sepn by means of the HCl salt was not successful Reduction with Sn or $SnCl_2$ in HCl and AcOH gives a mixt of aminohydrastines *a*(II) and *b*(III), which were sepd. by the difference in soly of the HCl salts and also of the bases II, m. 216–7° (cor), sparingly sol in EtOH and $Et_2O$, in which it exhibits an intense blue fluorescence, *HCl salt*, m. 267–8°, *tartrate*, m. 201–3° (cor); *Ac deriv*, m. 208–11°. III, m. 196–7° (cor), cryst. salts could not be obtained. Reduction of the diazo compd from II gives *hydrazinohydrastine-a*(IV), m. 175° (cor); *acid oxalate*, m 225° (decompn), *isopropylidene deriv*, m. 190°. The *b-isomer* (V), crystals with 1 mol $CHCl_3$, m. 183–4°, *isopropylidene deriv*, m 217–8°. Oxidation of IV with $Cu(OAc)_2$ gives *hydrastine a*, m 137–8° (cor), HCl salt, decomps. above 165°; acid oxalate, sparingly sol in cold $H_2O$, *picrate*, bright yellow, m 219° (decompn.) (the *picrate* of *l-hydrastine*, bright yellow, m 184°), *H d-tartrate*, crystals with 3 5 mols. $H_2O$, m 108–10° (cor, decompn), *d-camphorsulfonate*, crystals with 0.5 mol. $H_2O$, m 145° (cor, decompn). V gives only a small quantity of *hydrastine-b*,

m. [illegible]° and tartrate, m. 67–70°, the main product of the reaction is *dehydrohydrastine* (VI), m. 182°; the $H_2SO_4$ soln. changes from colorless to yellow, orange, reddish brown, green, brown, slaty blue and violet on heating. A comparison is made of the behavior of hydrastine, hydrastine-a and -b and VI on oxidation in $H_2SO_4$ with $MnO_2$. IV and CuCl in about 0.5% HCl give *dihydrohydrastine-a*, m. 152°, reduced with $H_2$ to hydrastine-a (poor yield); the I deriv. (VII) m. 172° and gives a better yield of hydrastine-a on reduction. Condensation of hydrastinine and *m*-cresol gives as the main product VII but some of the base, m. 193–5°, is also formed. The HCl salt of the 2 bases m. 232–3° (dec., decomp.). Protocotoin gives a *monoether*, m. 170–1° (dec.), *HBr salt*, m. 247–8° (decomp.). Noroxycotoin Me ether with Ac$_2$O and AcO$_2$H gives 90% *4-acetoxy-3-methoxyphthalide*, m. 127–8° (dec.); *4-benzoxy* deriv., m. 132–6° (dec.), *m-nitrobenzoxy* deriv., m. 192–3° (dec.), *p-nitro* deriv. m. 202–3°. These acyl derivs. did not condense with hydrastinine under any conditions tried. The Me ether itself gives a *hydrastininium salt*(?), m. 204° (dec.), gives no color with $FeCl_3$ but on warming with dil. acid or alkali, the blue color of the Me ether could be obtained.



(I)



(VI)

C. J. West

Salicortin of *Salix cordata* L.; its identity with populin. J. Pabaut. *Bull. sc. pharmacol.* 12, 449–73 (1905). *C. A.* 24, 4517, 4756.—The 2 compds. are identical (*p*-glucoside of *p*-hydroxyacetophenone). C. G. Kinz

Saponin of *Panax repens*, Maxim. V. Panaxapogenin. S. Aoyama. *J. Pharm. Soc. Japan* 50, 1173–74 (1930). German abstr. 153–7; *C. A.* 25, 1533.—In the previous paper A. proposed the structure $-CH_2{\cdot}CH(OH){\cdot}CH(CH_2Me){\cdot}\overset{|}{C}\,\overset{|}{C}\,\overset{|}{C}.CCH(CO_2H)-OH$ for panaxapogenin (I) and showed that OH$^1$ can be acetylated while OH$^{II}$ cannot, and that the positions of the ethylenic bonds are as shown above. I (50 g.) when treated with an equal wt. of Se at 250–60° for 70 hrs. gave a compd. (II), m. 250–300° which reduced the m. p. of I to 247°. II was fractionated into (*A*) b$_{10}$ 70–100° (0.25 g.), (*B*) b$_{10}$ 130–5° (0.28 g.), (*C*) b$_{10}$ 150–70° (4.45 g.). (*B*) was distd. further over Na which gave (*B*$_1$) b$_{10}$ 125° (1.12 g.), (*B*$_2$) b$_{10}$ 127–45° (2.45 g.) and (*B*$_3$) b$_{10}$ 145–50° (1.25 g.). The picrate of (*B*$_1$) m. 123–7° and corresponds to *sipolin* picrate, $C_{11}H_{16}O_2$. $3C_6H_3N_3O_7$. On distg. over Na (*C*) gave (*C*$_1$) b$_{10}$ 147–9° (0.27 g.) and (*C*$_2$) b$_{10}$ 149–56° (2.63 g.). Picrate of (*C*$_2$) m. 125–6° and corresponds to *tetramethylsipolene* picrate, $C_{14}H_{22}.3C_6H_3N_3O_7$. I (7 g.) when treated with 50% $HCO_2H$ (d. 1.215) for 2 hrs. gave a compd., $C_{25}H_{34}O_5$ (III), m. 242–3.5°, $[\alpha]_D^{20}$ 67.54°. III is called *reposin*. *Me ether* of III m. 151–4°, $[\alpha]_D^{20}$ 22.22°, *phenylurethan* m. 220°. III cannot be acetylated. Fusion of III with alkali, followed by careful acidification, gave *isoreposin*, m. 203–4°, probably a lactone. The formation of a lactone from I may be due to the formation of an *a* hydroxy-γ lactone, followed by dehydration. F. J. Nakamura

Acid- and alkali-binding power of peptides. E. Stuehr and H. Sobotka. *Ber.* 63B, 2777–82 (1930).—The object of this work was to det., by a study of the titration curves of glycine and its mono-, di-, tri-, tetra- and pentaglycyl derivs. (which contain only 1 $NH_2$ and 1 $CO_2H$ group but an increasing no. of peptide linkages), whether the peptide linkages play a part in the acid and alkali-binding power of peptides. The titration curve of glycine anhydride (diketopiperazine) was also detd. The curves show that glycine behaves like a weak monoacid base and a weak monobasic acid. Addn. of HCl at first greatly diminishes the $p_H$ value of its soln. and then slowly decreases the $p_H$ value of the resulting buffer. After the addn. of 1 equiv. HCl the curve coincides with that of HCl itself. Addn. of NaOH increases the $p_H$ value in an analogous way. The dipeptide behaves exactly like glycine with HCl but with NaOH the curve does not show an inflection as soon as 1 equiv. NaOH has been added and further addn. of NaOH gives lower $p_H$ values than would be obtained if the curve coincided with that for pure NaOH. The same behavior toward HCl and NaOH is shown by the higher peptides except that the greater the no. of peptide linkages present the further away from the

point corresponding to 1 equiv NaOH is the point of inflection of the curve shifted, and the greater is the difference between the curve for the peptide and that for pure NaOH (the hexapeptide curve is not entirely comparable with those of the other peptides because a suspension had to be used) These results show that the peptide unions take part in the binding of alkali but not in that of acid. The curve for glycine anhydride indicates that there is no acid binding and only a very slight binding of alkali The following dissocn consts ($K_a \times 10^8$ and $K_b \times 10^{11}$) and isoelec. points ($p_m$), resp., are calcd. for the peptides from the curves di, 0.63, 1.35, 5.66, tri, 1.0, 1.26, 5.50 tetra, 1.78, 1.12, 5.40, penta, 2.0, 1.12, 5.38 hexa, 2.5, 1.12, 5.32 For glycine, the values are $K_a \times 10^{10}$ 1.99, $K_b \times 10^{12}$ 2.6, $p_m$ 6.06 C. A. R.

The bile acids. XXXIII. Bromination of dehydrocholic acid and of dehydrodesoxycholic acid. Heinrich Wieland and Takahi Noguchi. *Z. physiol. Chem.* 194, 248–59(1931); cf. *C. A.* 25, 1535.—The 2 simplest keto acids of the bile acid series, viz., dehydrocholic acid (I) and dehydrodesoxycholic acid (II), were brominated and the Br removed by hydrolysis, in order to obtain material for a study of oxidative breakdown Contrary to expectation, the substitution of Br in all positions adjacent to CO is not easily accomplished. Ring I appears to be the most reactive, since bromination is much more difficult in the case of desoxybilianic acid where this ring has been opened by oxidation *Bromodehydrocholic acid*, m. 182–3° (decompn.), was obtained from I and the calcd. quantity of 4 *M* Br in AcOH at 15° *Et ester* m. 192° (decompn.) Treatment of the acid with cold 0.1 *N* KOH converted it to *hydroxydehydrocholic acid*, m. 187° (decompn.) Further bromination of I in the cold gave *α-dibromodehydrocholic acid* which contains solvent of crystn. not removable at 100° *in vacuo* With 1 AcOH the m. p. is 200°, with 0.5 $Et_2O$ it is 174° and with 1 EtOH the decompn. point is 205° Treatment of the di-Br deriv. with 0.5 *N* KOH gave *dihydroxydehydrocholic acid*, 2 fractions m. 198° and 212–3°, resp., both contg. 1 $Et_2O$ A similar treatment with 0.315 *N* $Ba(OH)_2$, followed by acidification, and $Et_2O$ extn. of the ppt. gave the unsatd. *hydroxytriketocholenic acid*, m. 257° (decompn.), crystg. with 0.5 AcOH. When I was brominated at higher temps. with excess $Br_2$ an isomeric *β-dibromodehydrocholic acid*, m. 265–6°, was obtained It holds 1 AcOH tenaciously This isomer probably results from a rearrangement due to a reversal of the reaction after the 1st Br is substituted Treatment of I with 5 $Br_2$ at 30° gave a *tetrabromodehydrocholic acid*, m. 213°. The mother liquor contained a *tribromodehydrocholic acid*, decomps. 202–3°, which could not be freed from admixt. with the tetra deriv Finally, a *pentabromodehydrocholic acid*, m. 192°, was obtained from I and 8 $Br_2$. An improved method is described for the prepn. of II, which consists essentially in dissolving I in a large vol. of AcOH, cooling the soln. to 10° and turbining with $CrO_3$ at this temp., then pptg. the product with water, dissolving in $Na_2CO_3$, reppting with HCl and extg. with $Et_2O$ Bromination of II yielded *tribromodehydrodesoxycholic acid*, m. 212–3° (decompn.), contg. 0.5 AcOH. Recrystd. from MeAc, the acid decomps. 184°. An isomeric *tribromodiketocholanic acid*, m. 213–4°, was obtained from the mother liquor.

A. W. Dox

The biose of chitin. Max Bergmann, Leonidas Zervas and Ephm Silberkweit. *Naturwissenschaften* 19, 20(1931).—By acetolysis of lobster chitin a disaccharide of glucosamine was obtained as a cryst. octa Ac deriv., m. 289°, $[\alpha]$ 50° in AcOH, I no (cf. B. and Machemer, *C. A.* 24, 2877) 31.3 (calcd. 29.6). The new disaccharide, chitobiose, may be as useful for chitin study as cellobiose for cellulose research

B. J. C. van der Hoeven

Cholesterol. XIII. Action of phosphorus pentasulfide. E. Montignie. *Bull. soc. chim.* [4], 49, 73–5(1931); cf. *C. A.* 25, 1256.—Cholesterol (I) in $CS_2$ was refluxed with a like wt. of $P_2S_5$ and yielded *thiocholesterol*, $C_{27}H_{45}SH$ (II), m. 191°, $\alpha_D$ —39°, (*di-Br deriv.* m. 152–3°, nitro deriv. m. 125°) II does not combine with $HgCl_2$ and does not give the Liebermann reaction. I reacts with white P and $O_2$ to yield a noncryst. *phosphorate* according to the equation: —CH CH— + $P_2$ + $2O_2$ ⟶ —CH.P(:O) O.P(:O) O CH—. Upon hydrolysis of this compd. $(OH)_2P(:O)OCHCH$-$PH(:O)OH$ was obtained. The Ag, Pb, Ba, $Sn^{++}$, Zn, Hg, U, Cu and Hg salts were prepd. The acid yields an *acetylated product*, m. 250°, decompg. about 200°. The OH group is left intact.

I. M. Levine

Ursolic acid. Charles E. Sando. *J. Biol. Chem.* 90, 477–95(1931).—Ursone (I) was isolated from the leaves of *Arctostaphylos uva-ursi* by extg. with $Et_2O$, dissolving in EtOH contg. 1% NaOH and repeatedly crystg. from aq. EtOH contg. a little NaOH; by decompn. of the Na salt with HCl a yield of 30 g. was obtained from 2.2 kg. leaves.

On fractional crystn from 75% EtOH, 4 out of 5 fractions gave a const m p at 284–5° and formula $C_{30}H_{48}O_3$. *Prunol*, prepd from leaves of *Prunus serotina* (Power and Moore, *C A* 4, 2182) in the same way, and *malol*, prepd from apple peels as previously described (Sando, *C A* 18, 1003) both had the same formula and m 284–5°. The malol was obtained by the above method and also by fractional crystn. without conversion to the Na salt, to avoid the possibility of change by the alkali The identity of these 3 compds., as claimed by van der Haar (*C A* 18, 2511), is confirmed by analysis and by crystal data, but the formula, based on 92 combustions, is as above and not $C_{31}H_{48}O_3$, as van der Haar states The *di Ac derivs* of all 3 compds., prepd in good yield by boiling several hrs with excess $Ac_2O$, were also identical From 4.56 g. of the di-Ac deriv by refluxing 3 hrs with 70% EtOH, 4 g. of the *mono Ac deriv*, $C_{30}H_{48}(OAc)CO_2H$ (II), m 289–90°, was obtained From I was prepd by boiling with excess $Me_2SO_4$ in MeOH and NaOH, extn with $Et_2O$ and crystn from 70% EtOH, *Me ursolate* (III), $HOC_{29}H_{48}CO_2Me$ m 170.5–1.5° Acetylation of III gave a *mono Ac deriv*, m 246–7° Prepn of the same compd. by action of $SOCl_2$ on II, followed by boiling with MeOH, confirmed the HO acid formula The name *ursolic acid* is therefore adopted for I, for prunol and for malol. The following derivs were also prepd: from 1 g. I by treatment with excess *o*-$C_6H_4(CO)_2O$, 1 g. *phthalylursolic acid*, m 264–5°, from 1 g. III by similar treatment, 0.7 g. *Me phthalylursolate*, m 214–5°, from 2.3 g. I, suspended in 70% aq. EtOH, by making nearly alk. and boiling 1.5 hrs. with 1 g. $BrCH_2Br$, 2.85 g. *phenacylursolate*, m 199–200° K. V. Thimann

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Alkylbeechwood lignins and their cleavage (von Wacek) 23 The porphyrins (Fischer, *et al.*) IIA. Electrolytic reduction of 4-keto-3-phenyl-3,4-dihydroquinazoline (Iyomi) 4. The alleged electrochemical sulfonation of an aromatic hydrocarbon (Fichter, *et al.*) 4. New methods of organic thermochemistry (Reber) 2. Study of E. Fischer's polypeptides with x rays (Levene) 2. The reduction potential of thymoquinhydrone (Billmann, Mitts) 2. Electric moment and molecular structure (Smyth, Walls) 2. The work of the International Bureau of Physical-Chemical Standards. *IV Study of the physical constants of 20 organic compounds* (Timmermans, Hennaut-Roland) 2 The isolation of the isomers of hexane from petroleum (Brown, Hicks-Brown) 22. Determination of C in sewage and industrial wastes (Mohlman, Edwards) 14. Chlorophyll formation (Noack, Kiessling) IID. Fe oxide pigment (U. S. pat. 1,793,941) 26

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**Oxygenated organic compounds by synthesis from hydrogen and oxides of carbon.** H. Dreyfus. Brit. 337,409, July 24, 1929 Compds such as EtOH, acetaldehyde, HOAc and their homologs and esters are prepd. from H and C oxides or from compds. such as MeOH synthesized from them (with or without presence also of H and C oxides) by use of catalysts such as Fe, Ni or Co borates, silicates, phosphates or salts of other oxyacids of P Various details and examples are given, and app. may be used having Cu or Cu lined chambers or formed of steel contg. Mo, Mn, Co or Ni Temps. up to 600° and pressures up to 500 atm. are mentioned as suitable. Cf. *C A* 25, 1839

**Oxygenated organic compounds from methane and steam.** H. Dreyfus. Brit. 337,410, July 24, 1929 Compds such as EtOH, HOAc, AcH and their homologs and ketones are formed from $CH_4$ and steam at 200–500° and pressures up to 500 atm. or more, and the products may be varied by adding to the reaction mixt. C oxides, H or O, and inert gases such as N also may be present. Among the catalysts which may be used are Zn, Mg, Ca, Al, Cr, Mn, V, Mo, Ti, Fe, Co, Ni and rare earths, or their compds., such as oxides, As or S compds., phosphates, silicates or borates. Also there may be used mixts. of these with alkali or alk. earth compds., with each other, with Cu, Ag or Au, with compds. such as Zn vanadate, Zn chromate, Mn chromate, Zn tungstate or molybdate or with the corresponding salts of Mg, Ca or Al. App. of Cu or lined with Cu or of steel contg. V, Mn, Ni or Co is suitable.

**Olefinic or aromatic hydrocarbons by catalytic conversion.** I. G. Farbenind. A.-G. Brit. 337,434, May 30, 1929 Chambers serving for conversions of this character are alternately heated (suitably to about 900°) and initial materials intermittently passed through them, while in assocd. operation with heat regenerators, and the heat regenerators are preferably made of material catalyzing the desired reactions such as firebricks impregnated with Cu salts or bricks made from fireclay and Si, or other refractory materials may be used such as alloys of Cr and Ni, ferro-Si or SiC. Initial materials which may be used include gases obtained by the degasification of carbonaceous materials with steam and (or) gases contg. O, and reaction gases from the de-

structive hydrogenation of coals, tars, mineral oils, etc., contg homologs of $CH_4$. Various details and examples of procedure are given.

**Olefin oxides from chlorohydrins.** Josef Weber, Hans Schrader and Erich Wiedenhaupt (to Th. Goldschmidt A.-G.). U. S. 1,702,668, Feb. 17. In reactions such as the production of ethylene and propylene oxides from chlorohydrins, there is established and maintained (in an app. which is described) a slowly flowing body of boiling aq. liquid having an extensive surface, and to this, at a point near the beginning of flow, there is supplied corresponding quantities of chlorohydrin soln. and of alkali, and the condensed olefin oxide vapors are collected.

**Organic isocolloids.** L. Auer and L. Susztek. Brit. 337,735, April 21, 1929. See Fr. 661,339 (*C. A.* 25, 1839).

**Aminoalkyl and alkylaminoalkyl compounds.** Joseph Klarer and Fritz Mietzsch (to Winthrop Chemical Co.). U. S. 1,703,176, Feb. 17. A described process comprises the reaction of a compd. of the general formula $R_1R_2N$ alkylene halogen, wherein $R_1$ and $R_2$ stand for substituents of the group consisting of H and alkyl, with a compd. of the general formula halogen $MgR_3$, wherein $R_3$ stands for a substituent of the group consisting of aryl and hydroaromatic residues and heterocyclic residues contg. N and decomposing the reaction product with water. Details are given of the production of $\beta$-I $Et_2NC_2H_4Ph$, I $Et_2N(CH_2)_3Ph$, I $Et_2N(CH_2)_4Ph$, I $Et_2NCH_2CH_2C_6H_4OMe$-4, 1-$Et_2$-$NCH_2CH_2C_6H_4Br$ 4, 2-methyl-3-$\beta$-diethylaminoethylindole (b$_{15}$ 171° and forming white crystals after manipulation with ether), I $MeNHCH_2CH_2C_6H_4OMe$-4 and a base of the formula $PhCH_2CH_2NH_2$.

**Replacing amino groups by halogen in aromatic and aliphatic compounds.** Richard Kuhn and Ernst Lichtenberger. Swiss 141,750, Oct. 30, 1928. Addn. to 136,900 (*C. A.* 24, 1305). The method of 136,900 is improved by removing the N atom from the diazonium halide compd., formed by diazotizing the amine in the presence of a high halogen concn., by radiation. In the example, the diazonium chloride obtained by diazotizing *o*-toluidine in the presence of a paste of $ZnCl_2$ and $NH_4Cl$, is subjected to the radiation of a Hg lamp, this induces the evolution of N.

**Methylarylamines.** Edgar C. Britton and Wm. H. Williams (to Dow Chemical Co.). U. S. 1,703,093, Feb. 24. In making an *N*-methyl deriv. of an arylamine such as dimethyl *p*-toluidine, reaction is effected between the arylamine and MeOH with the addn. of a relatively small proportion of MeBr.

**Sulfonating aromatic amines.** Arthur R. Murphy and Joseph B. Orsch (to Newport Chemical Corp.). U. S. 1,701,861, March 3. For introducing a sulfo group in *o*-position to the $NH_2$ group, an aromatic amino compd. such as *m*-xylidine or $\beta$-naphthylamine is treated with $SO_3$ in an inert solvent such as $C_2H_2Cl_4$.

**Polymers of vinyl alcohol.** I. G. Farbenind. A.-G. (Fritz Klatte and Arthur Zimmermann, inventors). Ger. 514,503, Nov. 13, 1928. Halogenated polyvinyl esters are saponified with $NH_4OH$. Thus, polyvinyl chloroacetate is saponified with aq. $NH_4OH$.

**Esters of organic acids and polyhydric alcohols.** I. G. Farbenind. A.-G. (Martin Luther and Walter von Knilling, inventors). Ger. 514,503, June 10, 1927. Small quantities of metal soaps are added during the esterification in the liquid phase. Thus, stoichiometric amts. of olive oil, fatty acid and glycerol are heated in a high vacuum to 170–250° with addn. of 0.2% Mg oleate.

**Esters of glycolic acid.** I. G. Farbenind. A.-G. Brit. 337,609, Nov. 8, 1929. Dry anhyd. alkali metal or alk. earth metal salts of chloroacetic acid are heated with aliphatic alcs. such as ethyl, butyl or allyl alcs., 1,3 butylene glycol, glycerol or cyclohexanol, in the presence of an esterifying agent (generally above 100° and suitably under pressure). Examples are given of the production of the ethyl, butyl and allyl esters and that of 1,3 butylene glycol.

**Esters and amides of 2-aminonaphthalene-3-carboxylic acid.** I. G. Farbenind. A.-G. (Ludwig Sander, inventor). Ger. 514,596, July 15, 1928. Alc., phenol, $NH_4OH$, or primary or secondary amines (except acyclic aliphatic secondary amines) is caused to react on 2,3 naphthoisatoic acid anhydride. Bases may be present. Thus, alc. $NH_4OH$ contg. 5% $NH_3$, if stirred with the anhydride for 3 hrs. at 50°, gives a 60% yield of 2-aminonaphthalene-3-carboxamide, m. 231–236°. Several other examples are given.

**Stabilizing thiocarbanilide solutions.** I. G. Farbenind. A.-G. (Philipp Siedler and August Moeller, inventors). Ger. 494,910, Jan. 29, 1928. Supersatd. solns. of thiocarbanilide in aromatic amines or heterocyclic bases are stabilized by addn. of synthetic or natural resin. Thus, a soln. of thiocarbanilide in *o*-toluidine is stabilized by addn. of colophony, turpentine basic waste resin and thick tar and cooling to —15° for 2 hrs.

Purifying benzanthrones. Ivan Guebelmann, Robert J. Goodrich and Edward T. Howell (to Newport Chemical Corp.). U. S. 1,794,545, March 3. A reaction mass comprising benzanthrone and assocd. impurities in concd. $H_2SO_4$ is dild. with water to a concn. of $H_2SO_4$ in which benzanthrone is relatively insol., and the benzanthrone is extd. by means of a selective solvent such as toluene which is immiscible with the $H_2SO_4$ and is then recovered from the solvent. Cf. *C. A.* 25, 1539.

Substituted guanidines. Eduard Tschunker and Helmuth Metz (to I. G. Farbenind. A.-G.). U. S. 1,794,875, March 3. See Ger. 502,045 (*C. A.* 24, 4791).

*Acenaphthene derivatives.* I. G. Farbenind. A.-G. (Ernst Runne, inventor). Ger. 517,264, Aug. 27, 1929. 5-Hydroxyacenaphthene and its derivs. are prepd. by heating 5-aminoacenaphthene and its derivs. with water and a mineral acid or acid salt. Thus, 5-aminoacenaphthene may be heated for 8 hrs. at 200° with $H_2SO_4$ of about 10% concn. The prepn. of *5,6-dihydroxyacenaphthene*, m. 196°, from the diamino compd. is also described.

*Benzophenone derivatives.* I. G. Farbenind. A.-G. (Sebastian Gassner and Bernhold Ehrert, inventors). Ger. 517,478, Feb. 14, 1929. Di- and tri-carboxylic acids of alkoxybenzophenones and their substitution products are prepd. by oxidizing alkoxy mono- or di-methylbenzoyl-o-benzoic acids or their substitution products with $KMnO_4$ in alk. soln. Thus, 4'-methoxy-5'-methylbenzoyl-o-benzoic acid yields *4'-methoxybenzophenone-2,5'-dicarboxylic acid*, m. 224–5°. Examples are given also of the prepn. of *2'-methoxybenzophenone-2,4'-dicarboxylic acid*, m. 249–50°, *2'-methoxybenzophenone-2,5'-dicarboxylic acid*, m. 228–9°, *2'-methoxy-5'-chlorobenzophenone-2,4'-dicarboxylic acid*, m. 262–4°, *2'-methoxybenzophenone-2,3',5'-tricarboxylic acid*, m. 140–2°, *2'-methoxy-3-chlorobenzophenone-2,5'-dicarboxylic acid*, m. 234–6°, and *2'-methoxy-3,5'-dichlorobenzophenone-2,4'-dicarboxylic acid*, m. 213–21°. Cf. *C. A.* 25, 1528.

Safrole derivatives such as protocatechuic aldehyde and isoeugenol. Frits E. Stockenbach. U. S. 1,792,715, Feb. 17. It has been found that, contrary to previous investigations, safrole yields, when heated with alc. potash to a temp. of 140–170°, a mixt. of two isomers, namely, 4-alkoxymethoxy-3-hydroxy-1-propenylbenzene, and 4-hydroxy-3-alkoxymethoxy-1-propenylbenzene, and that when this mixt. is subjected to the action of certain oxidizing agents, only the 4-hydroxy isomer is oxidized, while the 3-hydroxy isomer remains unoxidized and is readily recoverable. This makes possible the com. production of protocatechuic aldehyde and of obtaining as a by-product isoeugenol. Numerous details of procedure are described.

Safrole derivatives such as vanillin and isochavibetol. Frits E. Stockenbach. U. S. 1,792,717, Feb. 17. When the isomeric reaction product produced by heating safrole with alc. KOH at 140–170° (see preceding abstr.) is methylated a product contg. a mixt. of methyl ethers of the two isomers is obtained, and upon heating this resulting product in a weak acid soln., the mixed ether group is split off with the evolution of formaldehyde and an alc. and the formation of isoeugenol and its isomer isochavibetol. When this mixt. of isoeugenol and isochavibetol is subjected to the action of certain oxidizing agents, only the 4-hydroxy isomer, that is, isoeugenol, is oxidized, while the 3-hydroxy isomer, that is, isochavibetol, remains unoxidized and is readily recoverable. This makes possible the com. production of vanillin from safrole, and of obtaining as a by-product isochavibetol. Various details of procedure are described.

*N*-Substituted derivatives of aromatic aminohydroxy and polyamino compounds. I. G. Farbenind. A.-G. Ger. 514,747, June 18, 1927. Addn. to 429,825. The methods of 429,825 (*C. A.* 24, 4521) and 512,476 (*C. A.* 25, 1026) for producing *N*-substituted amines of aromatic aminohydroxy and polyamino compds. are modified by replacing the aliphatic, heterocyclic and hydroaromatic linked N, by N in the form of alkylaminoalkyl compds. contg. two or more N atoms capable of conversion into strongly basic polyamino compds. Thus, 1-amino-3-methoxy-4-isopropoxybenzene and the dihydrochloride of ethyldiethylaminoethylaminoethyl chloride are fused together at 100–110° for 8 hrs. to give the base 3-MeO-4-*iso*-PrOC$_6$H$_3$NHCH$_2$CH$_2$NEtCH$_2$CH$_2$NEt$_2$. Other examples are given.

Organic compounds of lithium. Karl Ziegler. (Herbert Colonius, inventor). Ger. 512,882, Oct. 15, 1929. Org. compds. of Li with the metal linked directly to C are obtained by the reaction of org. halogen compds. with Li in a solvent indifferent to Li alkyl and Li aryl compds., at temps. at which the reaction velocity between the Li alkyl or aryl compds. and the halogen alkyl or aryl compds. is low. Thus, Li wire or dust is added to abs. ether and PhBr added to produce a 70–80% yield of PhLi and LiBr. Other examples describe the production of MeLi and BuLi.

Aliphatic arseno compounds. Charles S. Palmer (to Parke, Davis & Co.).

of $CO_2$ on the Na salt of thiophenol at 150–100° and 30–50 atm. Other examples are given

**1-Methyl-5-chlorobenzene-2-carboxamide-3-thioglycolic acid.** I. G FARBENIND A.-G. (Norbert Steiger, Erwin Hoffa and Hans Heyna, inventors). Ger. 514,505, April 1, 1927. 1-Methyl 2-cyano 5-chlorobenzene 3 sulfonic acid chloride is reduced with a metallic reducing agent in the presence of a strong mineral or org. acid and with addn. of an inert org. solvent for the sulfonic acid chloride, and condensing the resulting 1-methyl-5-chlorobenzene 2-carboxamide 3 mercaptan *with* $ClCH_2CO_2H$ *at suitable* temps. Examples are given.

**Purifying sulfonic acids.** GRIGORI PETROFF. Ger. 517,156, Jan. 18, 1927. Sulfonic acids of high mol. wt. are freed from unsulfonated material, resins, $H_2SO_4$, etc., by mixing them, *or their solns. in water and (or) alc., with porous cellulosic material, e. g.*, saw dust, wood meal or hydrocellulose. The mixt. is dried and then extd. in turn with benzine, $C_6H_6$, and LiOH. The first extn. removes mineral oils, resins, etc., the sulfonic acids being taken up in the later extns. $H_2SO_4$ remains in the cellulosic material. The method may be applied to octahydroanthracenesulfonic acid, alkylnaphthalenesulfonic acids, sulfo aromatic fatty acids, etc. An example is given.

**Anhydro-*N*-pyridiniumsulfonic acid.** PAUL BAUMGARTEN. Ger. 514,821, Mar. 17, 1926. $SO_3$ or $SO_3$-yielding agents such as oleum, $ClHSO_3$ or its esters, or $SO_2Cl_2$ is caused to react on pyridine or its *C*-alkyl homologs, alone or in presence of a diluent. Thus, a 90% yield is obtained by the action of $SO_3$ on a soln. of pyridine in $CCl_4$. Other examples are given.

**Acetic anhydride, etc.** H. DREYFUS. Brit. 336,668, July 10, 1929. Aliphatic acid anhydrides are made by heating the vapor of the corresponding acid in contact with a catalyst supported upon or mixed with asbestos, *e. g.*, HOAc vapor is passed rapidly through a Cu tube at 400–500° contg. Ca tungstate upon asbestos and the anhydride formed is sepd. by fractional condensation. Cf. *C. A.* 25, 1538.

**Tetrahydrofurfuryl alcohol.** GEORGE D. GRAVES (to E. I. du Pont de Nemours & Co.). U. S. 1,794,453, March 3. Furfural is heated under pressure with H, a Ni catalyst and water.

**Formaldehyde from oxidation of hydrocarbons.** H. HARTER. Brit. 337,407, June 24, 1929. An app. is described for oxidizing gaseous or readily volatile hydrocarbons by air (or air enriched with O) which, just before use in the reaction, is passed through an elec. flaming arc by which N oxides are formed which facilitate the production of $CH_2O$. The oxidation may be assisted by catalysts such as Cu, Ag, Co or Mn, assocd. with silica gel or active C.

**Acetaldehyde from acetylene.** I. G. FARBENIND A.-G. Ger. 514,501, Nov. 9, 1916. Addn. to 504,862 (*C. A.* 25, 524). $C_2H_2$ is treated with catalyzers consisting of Fe compds. which are converted by $C_2H_2$ into reducible oxides. Thus, powd. hydrated $Na_2SiO_3$ $Al_2(SiO_3)_3$ is suspended in a soln. of $FeCl_3$ and the Fe pptd. by concd. $NH_4OH$. The ppt. is washed, pressed and dried, and $C_2H_2$ is led over it at 350° to give AcH. Other examples are given.

**Acetone from isopropyl alcohol.** N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 337,566, Oct. 10, 1929. Dehydrogenation of isopropyl alc. at temps. below 400° (preferably not over 350°) is effected in the presence of catalysts such as Cu, $MnO_2$, $BaO_2$, metals of the Pt group, ZnO, CdO, blue W oxide, Mn oxide, V pentoxide, MgO, or oxides of Be or Zr, with the addn. of small quantities (preferably not over 1%) of Th oxide, $Na_2CO_3$, Ce oxide, or of oxides of Zn or Zr if these are used merely as auxiliary addns. The catalyst may be regenerated with steam or air or both, by heating followed by reduction.

**Urea.** I. G. FARBENIND A.-G. Brit. 337,394, July 29, 1929. Various details are described relating to the distn. of crude melts contg. urea together with $NH_4$ carbonate or $NH_4$ carbamate and water, obtained in the production of urea from $NH_3$ and $CO_2$ under pressure, to recover $NH_3$ and $CO_2$. During the stage of the distn. effected at temps. *over 150° under pressures sufficient to cause the distillate to collect as a liquid*, an excess of $NH_3$ over that required to combine with all the $CO_2$ present in the distn. app. is continuously maintained in the app. in order to check decompn. of urea.

**Nitrobenzene purification.** SYLVESTER BOYER (to General Elec. Co.). U. S. 1,793,304, Feb. 17. The material is passed through fuller's earth, then treated with Al oxide and distd.

**1,2,3-Trihalobenzenes.** I. G. FARBENIND. A.-G. (Richard Herz and Eduard Albrecht, inventors). Ger. 517,429, Oct. 6, 1927. See Fr. 661,490 (*C. A.* 24, 379).

**Dimethylaniline.** EDGAR C. BRITTON and WM. H. WILLIAMS (to Dow Chemical

Co ). U. S 1,794,057, Feb 24. A mixt of aniline and MeOH is heated with addn. of a small proportion of MeBr

**2,6-Xylidine.** Imperial Chemical Industries, Ltd Ger. 517,338, Mar. 1, 1930. See Brit 328,418 (*C A* 24, 5309)

**Benzidine and its substitution products.** Henry J Weiland and Ivan Gubelmann (to Newport Chemical Corp ) U S 1,794,097, Feb 24 For effecting purification of benzidine or derivs such as *o*-tolidine or bi *o*-anisidine, a salt of the impure material such as the hydrochloride or sulfate is treated with an alk aq soln such as NaOH to give an alk reaction to the resulting soln and with a sufficient quantity of a water-immiscible org solvent to dissolve the benzidine compd when hot, insol impurities are sepd , the benzidine compd is crystd from the org solvent and is recovered without any intermediate isolation

**Carbazoles.** I G Farbenind A -G (Friedrich Stolz, Walter Kross, Gustav Ehrhart and Hans Schlichenmaier, inventors) Ger 514,822, Jan 29, 1929 Perhydrogenated carbazoles are obtained by treating carbazole or its *N* alkyl derivs with H under pressure and at high temps , in the presence of a catalyzer formed by heating a Ni salt alone or mixed with another metal (preferably of the Fe group) with a carrier such as $SiO_2$, to a temp of above 400° Examples are given Cf *C A* 25, 801

**Isatins.** I G Farbenind A G (Hans Colombara, inventor) Ger 514,595, Mar 28, 1928 Isatins are obtained by treating oxamyl halides of primary amines of the general formula R NH CO CO halogen (R = a residue of the benzene series, with at least one substituent) with a condensing agent Thus, 5,7-dimethylisatin (m 242°) is obtained by treating 2,4 dimethyl 1 phenyloxamyl chloride with $AlCl_3$ Many other examples are given

**1-Phenyl-2,3,4-trimethyl-5-pyrazolone.** I G Farbenind A -G (Max Bockmühl, Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors) Ger 514,823, May 7, 1929 More than 5 mols of $CH_2O$ is caused to react on 1-phenyl 2,3-dimethyl-5-pyrazolone or on methylenebis(1-phenyl 2,3 dimethyl 5-pyrazolone) in the presence of concd HCl The reaction takes place at raised temp and under pressure. Examples are given Cf *C A* 24, 4521

**Antipyrine.** Ernest F Grether and Joseph P Belsley (to Dow Chemical Co.). U. S 1,792 833, Feb 17 Methylation of compds such as 1-phenyl-3 methyl-5-pyrazolone in the production of antipyrine is effected with MeOH and an alkyl halide such as EtBr, the alkyl radical of which contains at least 2 C atoms

**α-Hydroxy-β'-iodopyridine.** Curt Räth U S 1,793,962, Feb 24 In forming compds of this character, an α substituted β' aminopyridine is diazotized and the diazo soln is caused to react with a metal iodide such as KI The α hydroxy-β'-iodopyridine is a white cryst compd sol in water Cf *C A* 24, 2472

**Menthol.** Walter Schoeller, Hans Jordan and Reinhard Clerc (to Schering-Kahlbaum A -G ). U. S 1,793,020, Feb 17 See Ger. 508,095 (*C A* 25, 717).

**Menthol.** Schering Kahlbaum A -G (Walter Schoeller, Hans Jordan and and Reinhard Clerc, inventors) Ger 514,594, July 16, 1927 Addn to 512,719 (*C A* 25, 1260). The condensation product from acetone and *m* cresol is acetylated and the product hydrogenated until 8 H atoms are taken up Sapon then gives menthol Examples are given Cf *C A* 25, 717

**Sterols.** I G Farbenind A G (Robert Griessbach and Otto Ambros, inventors). Ger. 517,499, April 7, 1927 See Brit 322,465 (*C A*. 24, 2760)

**Styrene and its homologs.** I G Farbenind A -G Brit. 338,262, Sept 10, 1929. *See Fr 682,569 (C. A 24, 4527)*

# 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

## A—GENERAL

FRANK P. UNDERHILL

**The birth of chemical biology.** J. B Leathes *Brit Med. J.* 1930, II, 671–6.—A lecture. J. B Brown

***The porphyrins. XXVII. The mechanism of iron introduction into porphyrins and isolation of crystalline hemes.*** H Fischer, Alfred Treibs and Karl Zeile *Z. physiol Chem* 195, 1-27(1931), cf *C. A*. 25, 118.—In the various hemins the Fe is

tervalent. With few exceptions all contain the group FeCl substituted in the NH groups of 2 pyrrole rings. A curious fact is that the prepn of these Fe complexes from porphyrins is best accomplished by the use of $Fe^{++}$ instead of $Fe^{+++}$. The explanation of Haurowitz that a ( N)$_2$Fe complex is first formed which immediately reacts with HCl to form ( N)-FeCl and H was tested experimentally with protoporphyrin in an atm. of N. Neither free H nor the hydrogenation product mesoporphyrin could be detected, the product obtained was hematoporphyrin On the other hand, the treatment of mesoporphyrin with $Fe^{++}$ in the absence of O gave a product with the characteristic spectrum of hemin. The reaction is strikingly demonstrated by the use of an inverted V-tube, one arm contg a soln of porphyrin in AcOH, a little HCl and $Fe(OAc)_2$. The air is displaced by N and the app sealed When heat is applied to the mixt. the HCl distils to the other arm and the residual soln suddenly changes color because of the formation of Fe complex If the distillate is now poured back by tilting the tube the reaction is reversed and the original color restored The process may be repeated 5–10 times until finally a partial oxidation results from secondary reactions After air has been admitted the complex formation is no longer reversible With $FeCl_2$ and pure AcOH or $PrCO_2H$ the complex is not formed unless high temps are used, and then only partially, because of a reduction of $Fe^{+++}$ to $Fe^{++}$ by decompn products The addn of Fe to a porphyrin thus occurs via an $Fe^{++}$ complex Such complexes for which the term *heme* is proposed (cf Anson and Mirsky *C. A.* 23, 1428) have now been prepd and isolated in cryst. form from etio-, proto- and meso-porphyrin and its ester. All are Cl-free even in the presence of Cl ions When treated with pyridine they give an intense hemochromogen spectrum The hemes are extremely unstable to HCl, the Fe is split off as $Fe^{++}$ as shown by the Turnbull blue reaction with $K_3Fe(CN)_6$. They are easily oxidized to the stable $Fe^{+++}$ complex especially in the presence of Cl ions Only $Fe^{++}$ can be introduced into the porphyrins. Since the $Fe^{++}$ complex is more easily oxidized than the $Fe^{++}$ salt, only a min. quantity of the latter is required, because the $Fe^{+++}$ salt present effects the oxidation of the $Fe^{++}$ complex This institutes a chain reaction which proceeds almost as rapidly as that in which the required quantity of $Fe^{++}$ is initially present. Atm O plays an important role, as also the catalytic property of hemin itself. By using a technic which excludes the possibility of oxidation, *etioheme*, *protoheme*, *mesoheme* and *meso-ester heme* were obtained cryst. from the corresponding porphyrins. In the dry state they are more stable to atm. O than their solns. A cryst. hemochromogen was prepd. by addn of pyridine to the meso-ester heme Hemoglobin is probably a mol. compd of heme with globin, the latter effecting a stabilization of the mol O converts it to oxyhemoglobin which is still more stable. Methemoglobin, on the other hand, contains hematin with $Fe^{+++}$ and is extremely stable to reducing agents It is surprising that the spectrum of hemoglobin bears no resemblance to that of hemochromogen, such as might be expected on the assumption of a mol compd of heme and globin. A possible explanation may be its peculiar state of dispersion, since reduced hematin with native globin gives hemochromogen. A. W. Dox

The effect of radioactive emanations on the automatic activity of the frog heart with particular reference to the action of large doses of such radiations and to the antagonism of $\alpha$- and $\beta$-rays. E Polák. *Arch ges Physiol* (*Pflugers*) 226, 659–75(1931). Arthur Grollman

Purinolytic enzymes of the human organism. Richard Truszkowski. *Biochem J* 24, 1681–5(1930).—Uricase was found to be absent from the livers of a new born child and in 2 adults Xanthine oxidase is present in liver exts. from the 12th to the 40th week of pregnancy Benjamin Harrow

Denaturation of proteins. VII. Denaturation in the presence of alcohol. Norman Booth *Biochem J* 24, 1699–1705(1930), cf. *C. A.* 24, 5314.—The speed of denaturation of hemoglobin has been detd. in the presence of alc. ranging from 0 to 30 vols. %, the temp varying from 30° to 60.5°, and the $p_H$ from 5.19 to 7.74 The min point on the $p_H$ velocity curve was shifted considerably from the neutrality point of water to the acid side by the addn. of alc. The critical increment of activation increased appreciably with the amt. of alc. present. Benjamin Harrow

Effect of light and salts on gelatin. Ada Galinsky *Biochem J* 24, 1706–15 (1930).—When gelatin is made insol by treatment with dichromate and exposed to light, a change in the protein similar to denaturation takes place, but this involves no change in the Hausmann *nos*, *nor in the digestibility of the protein.* Cr is fixed as its sesquioxide. Coagulation probably takes place in 2 stages, the first being a chem. action, and the second, which is phys in nature, produces the coagulation. B H

Enzymes and vitamins in present-day chemistry. H C. Sherman *J. Chem Education* 8, 652–60(1931) E H.

**Physico-chemical studies of phosphatides.** KORETOSHI OSR. Gifu Imp Coll. of Agr (Japan), *Research Bull* 2, 30 pp (1930) (in German).—Com egg yolk lecithin electrodialyzed for 1 month resulted in isolation of 2 cryst substances, one white, m 57.5°, $C_{70}H_{138}N_2PO_{11}$, the other brown, m 50.5°, $C_{37}H_{138}NPO_{17}$. The latter is readily sol in cold 95% EtOH, the former with difficulty. K KITSUTA

**A case of sterilization in man due to Röntgen rays.** H MADISSON *Deut Z. ges. gerichtl Med.* 16, 210–5(1931). FRANCES KRASNOW

**The story of histamine.** D ACKERMANN *Z Biol* 91, 73–4(1931). FRANCES KRASNOW

**The disintegration of proteins by amides. Disintegration of casein in acetamide.** E. CHERBULIEZ AND G DE MANDROT *Helv Chim Acta* 14, 163–83(1931).—Proteins in general are sol in acid amides and when such solns are heated, the proteins are disintegrated yielding substances of relatively low mol wt. For instance, when finely divided casein suspended in molten $AcNH_2$ is heated to 200°, a mixt is obtained, the mol wt of which fluctuates between 247 and 390. The elementary analysis and color reactions (biuret, Millons, xanthoproteic) of the mixt were similar to those of casein. However, the COOH groups were free but the $NH_2$ groups were not. When the casein was subjected to the heat treatment 5 min or less, the products gave a pos biuret test immediately, otherwise the test was obtained only when the mixt was allowed to remain in the presence of alkali for some time. C and M consider that the long heat treatment caused a profound change in the casein mol and that the alkali polymerized the products to compds capable of yielding the biuret test. They agree with previous workers that the open chain mols in casein are broken and transformed into closed chain substances of lower mol wt. I M LEVINE

**Denaturation of proteins by urea and related substances.** F GOWLAND HOPKINS *Nature* 126, 328–30, 383–4(1930).—If in a few cc of egg albumin recrystd by the method of Hopkins and Pinkus and freed from the $NH_4$ sulfate, or in a soln of ordinary egg white, urea be dissolved and the soln evapd in vacuum, the urea denaturizes the protein so that the former can be extd with $H_2O$, while the protein becomes wholly insol. A change in the $p_H$ from 4 to 7 does not affect the acquired condition of the protein. The denaturized protein gives a red-purple color characteristic of a sulfhydryl reaction when tested with nitroprusside and $NH_4OH$. Nondenaturized proteins do not give this reaction, indicating that a mol rearrangement has taken place. The assumption is made that the precursor of the active thiol group is a disulfide grouping not present in the native protein, but established on denaturation. Pos results obtained with certain N-contg substances and neg with certain others indicated that to some degree at least a relationship exists between denaturizing power and constitution. An amide structure appears to be necessary, and in dialkyl compds 1 amino group apparently must remain active. The effect of urea on protein varies in detail with the abs and relative concns of the 2 constituents. Concomitant with the mol rearrangement are profound changes in the colloidal and general phys properties of the protein. A study of these resulted in the development of a simple method of detg the degree and rate of protein denaturation, which in its turn was used for further study of the phenomenon of protein denaturation. Serum proteins, on the whole, are affected by similar denaturants in a similar manner on evapn. Observed in soln their behavior indicated that blood proteins are more resistant to dehydration, which characterizes the change from lyophil to the lyophobe condition. The behavior of euglobins has not been studied. B S LEVINE

**The absence of asparagine among the biuret-free products of proteins hydrolyzed by enzymes.** A. CLEMENTI AND D TORRISI. *Boll. soc ital biol sper.* 5, 956–8(1930).—During the digestion of casein, egg albumin and peptone to the point of their complete transformation into biuret-free products by the successive action of proteolytic enzymes present in the gastric, pancreatic and enteric juices of the dog, and thus without the intervention of asparaginase, 95% (often 100%) of the amide N is set free as $NH_3$. The amide N present in biuret-free products is set free completely as $NH_3$ by guinea-pig serum in which asparaginase is present, by dog serum, or by dog enteric juice in which asparaginase is surely absent. Conclusion: During digestion of the protein mol aspartic acid is liberated as such and not in the form of asparagine. Asparagine cannot be considered as one of the intermediate enzyme degradation products of protein. PETER MASUCCI

**The action of phosphatase of the bones on glycerophosphoric acid.** A DE RIENZO. *Boll. soc ital biol sper.* 5, 1034–6(1930).—The action of phosphatase on asymmetric α-glycerophosphoric acid was studied. The enzyme was prepd according to the Robison method and purified by electroultrafiltration. The α-glycerophosphoric acid was prepd. according to the Karrer method. I ive cc. of Na α-glycerophosphate (0.1332% soln.),

2 cc. of borate buffer soln. of varying $p_H$ values and 0.5 cc. of a 1.5% soln. of the enzyme were placed in each of 3 test tubes. In another set, an equal vol. of equimol. soln. of β-glycerophosphate was used. After 24 hrs. at 37° the inorg. P in each tube was detd. by the Bell and Doisy colorimetric method. The results obtained show that bone phosphatase hydrolyzes α-glycerophosphoric acid more readily than β glycerophosphoric acid. PETER MASUCCI

The kinetics of fermentation processes. The kinetics of invertase. E. AVTONOMOVA. *Biochem. Z.* 231, 13–24(1931).—The invertase reaction like the catalase reaction may follow the equation of a monomol. reaction but under various conditions the consts. calcd. on this basis may be either increasing or decreasing. Decreasing consts. for invertase are obtained when a very low sugar concn. and relatively high enzyme concn. are used. On the contrary, with high concn. of catalase and low concn. of $H_2O_2$ the consts. are increasing. Obviously enzymes whose activity tends to deviate from the monomol. type do so in a definite direction, and in the case of catalase this is predominantly toward decreasing, whereas in the case of invertase toward increasing values. This is not due to differences in the nature of these enzymes but rather to the fact that the $H_2O_2$ is a powerful agent which destroys the catalase whereas the invertase is inhibited by the reaction products. The following equations are proposed to describe every instance of the enzyme kinetics where the activity either decreases or increases: $C_1 = 1/t(A - D) \times \log D(A - X)/A(D - X)$ and $C_1 = 1/t(A + D) \times \log A(D + X)/D(A - X)$, resp. The value $D$ is proportional to the initial enzyme activity. S. MORGULIS

Changes in the chloride distribution in blood under the influence of ultra-violet radiation. JERZY GLASS. *Biochem. Z.* 231, 45–53(1931).—Intensive ultra violet radiation causes 2–4 hrs. after the treatment a change in the Cl distribution in the blood, with a tendency to accumulation in the red cells, which may persist for 24 hrs. This indicates a shift in the blood acid base equil. toward an acidotic condition. S. M.

Enzymic formation of an ester of mandelic acid. P. ROSA, R. AMMON AND H. A. OELKERS. *Biochem. Z.* 231, 59–66(1931).—In the presence of isomolar concns. of *l*- and *d*- mandelic acid and Bu alc. the esterase from human, pig and cat liver, or from pig pancreas and kidney forms the Bu ester of mandelic acid with equal velocity. Thus, the marked specificity of these esterases which was found previously in the study of the hydrolysis of mandelic acid esters is not observed in the enzymic esterification. S. MORGULIS

The enzymic transformation of guanidine to urea. NICOLAI N. IVANOV AND A. N. AVETISSOVA. *Biochem. Z.* 231, 67–78(1931).—*Aspergillus niger* grown in a peptone culture can utilize guanidine very well as a source of N if this is furnished in conjunction with glucose, when the guanidine is changed to urea and $NH_3$. This depends upon the presence in the mycelium of a guanidinase. The dry mycelium of *Aspergillus niger* contains only guanidinase and no urease and can change guanidine quantitatively to urea and $NH_3$. Boiling this dry mycelium destroys its guanidinase activity. S. M.

The Boas benzidine reaction of the potato. T. YOSHIOKA. *Biochem. Z.* 231, 233–8(1931).—The potato enzyme described by Boas (*C. A.* 25, 307) which reddens benzidine is entirely unaffected at 50°, but is weakened in its action at 60° and is completely inactivated at 70°. The enzyme can be pptd. by half satn. with $(NH_4)_2SO_4$ or full satn. with $MgSO_4$, and is made insol. by alc. or acetone. With kaolin one obtains an insol. ppt. which has the full enzyme activity, but the enzyme cannot be leached out. With $Al(OH)_3$ no adsorption could be obtained. KCN or $HgCl_2$ inhibits the enzyme activity. Ni powder has no effect. The enzyme shows a great tendency to become insol. Through $(NH_4)_2SO_4$ pptn. enzyme preps. can be made poor in N and of good potency, but through acetone pptn. active preps. are made which retain full enzymic activity permanently, but they are insol. S. MORGULIS

A protein ethereal sulfate compound from spleen. ALFRED EBEL. *Biochem. Z.* 231, 306–8(1931).—A kg. of fresh spleen is chopped up fine, mixed with 1 l. $H_2O$ and 40 cc. *N* AcOH and heated to 70°. The coagulum is filtered off, and the filtrate is pptd. with 200 cc. 20% $Pb(OAc)_2$. After this is made alk. with $NH_4OH$ the ppt. is sepd., and the clear filtrate is freed from Pb with $H_2S$. The final filtrate is evapd. *in vacuo* to a small vol. and again filtered. The addn. of twice the vol. of alc. causes no turbidity. The concentrate is dialyzed 48 hrs. and, after filtering, is once more concd. *in vacuo*. Treated with 10 times its vol. of alc. a thick ppt. is formed which is allowed to settle in the ice box and is collected on a hardened filter paper, washed with alc. and dried. This powder is dissolved in very little $H_2O$ and again pptd. as before with 10 vols. alc., the ppt. washed with abs. alc. and ether. This substance gives no Millon reaction, a weak tryptophan reaction and a Molisch test for carbohydrate. The substance can be salted

out by full satn with $(NH_4)_2SO_4$, and contains about 1 70% S which is hydrolyzable with 10% HCl at 100° S MORGULIS

**Studies on phosphatase. I. The kidney phosphatase of different laboratory animals.** MASAKI UMENO *Biochem Z* 231, 317–23(1931) —The phosphatase activity of the kidney from different animals has been tested on a Na glycerophosphate substrate The relative activity follows the series: hen>cat>dog>steer>toad>rabbit>guinea pig The phosphatase content of the various portions of the kidney was cortex>medulla>papilla **II. The liver phosphatase of different laboratory animals.** *Ibid* 324–27 —The liver phosphatase activity is about half as strong as the kidney phosphatase, and is also differently distributed in the animal series hen>rabbit>dog>guinea pig>frog **III The phosphatase content of the kidney and liver in experimental nephritis.** *Ibid* 328–33 —In exptl nephritis the kidney phosphatase activity is reduced to $^1/_5$–$^1/_8$ of its normal value The liver phosphatase activity during nephritis is also diminished but only to a small degree **IV. The optimum temperature and the inactivation temperature of the kidney phosphatase.** *Ibid* 334–8 —The optimum temp for the activity of the steer or dog kidney phosphatase is 42.5° The enzyme is destroyed at a temp between 60 and 65° **V. The glycerophosphatase of leucocytes in blood.** *Ibid* 339–45 —The leucocytes of a leucemia patient were found to contain much phosphatase One cc rabbit leucocytes hydrolyzes 0.036 g Na glycerophosphate per day, while the erythrocytes show no phosphatase action **VI The presence of phosphatase in bile and pancreatic juice.** *Ibid* 346–51 —Bile contains a very strong phosphatase, whereas pancreatic juice possesses only about half as much phosphatase activity Saliva and gastric juice are free from phosphatase, but the mucosa of the stomach, duodenum and small intestine and the salivary gland are rich in phosphatase Phosphatase is also present in the liver, pancreas and spleen The phosphatase content of an organ is independent of that of its secretion S MORGULIS

**Resistance of insulin to certain bacteria.** A A SCHMIDT AND KLARA TULICHINSKAJA *Biochem Z* 231, 352–64(1931) —*B coli communis, Staphylococcus aureus, Streptococcus hemolyticus* and some anaerobic bacteria from dog feces cannot inactivate insulin. However, it is possible to obtain from feces putrefactive organisms which do destroy insulin very vigorously. It is suggested that bacteria of the peptolytic group, devoid of proteolytic enzymes, do not inactivate the insulin, which is perhaps due to the similarity between the insulin and the protein mol S MORGULIS

**Influence of ptyalin on starch. II. Effect of electrolytes.** J R. BROEZE *Biochem Z.* 231, 365–84(1931), cf. *C. A.* 23, 1917 —The action of dialyzed ptyalin solns on the starch sol in the presence of small quantities of electrolyte has been studied by changes in the expression $y_t - y_\infty/y_\infty$ in the course of time. The symbol $y$, of course, refers to viscosity Without electrolyte addn. the velocity of the change is very small, and is very much increased by the least concn. of all electrolytes, with only a small advantage in favor of cations with increasing valence A cation lyotropy is not observed but in the univalent anions the increase in reaction velocity seems to coincide with the lyotropic series. CNS<$NO_3$<Cl,F. The $SO_4$ ion does not behave according to its lyotropic position S MORGULIS

**Specificity of the α-glucosidases.** H KARSTRÖM *Biochem Z* 231, 399–403 (1931) —With a strain of *Bacillus coli* which ferments maltose, glucose and fructose but not sucrose it was shown that the α-glucosidase which is operative in the hydrolysis of maltose cannot hydrolyze sucrose. S MORGULIS

**The chemical constitution of serum proteins. IV.** ANTON FISCHER AND ALFRED BLANKENSTEIN *Biochem Z.* 231, 404–11(1931), cf *C A* 25, 977 —Two pathological sera showed a greatly increased sedimentation reaction and an abnormally high tryptophan content. A study of the seven different chem fractions shows that, as compared with the normal serum, there was a diminution of the albumin and an increase of the globulin content, this increase was not shared by all globulin fractions but principally by the euglobulin, which is pptd by NaCl S MORGULIS

**Influence of pancreatin on collagen in the absence of neutral salts and buffer mixtures. I.** A KÜNTZEL AND O. DIETSCHE *Biochem Z.* 231, 423–34(1931) —The pancreatin action is exerted chiefly at the beginning of the reaction, so that prolongation of the action is safe only so far as no bacterial effect comes into play. There is practically a direct relationship between the amt of pancreatin and the extent of the hydrolysis but the curve nevertheless shows a tendency to flatten out gradually so that an excess of pancreatin does not present any serious danger of carrying the hydrolysis too far. The enzyme activity does not increase proportionally to the rise in temp, and from about 45° the increase becomes quite remarkable, and this factor must be guarded most cautiously to prevent injury to the skins treated with pancreatin S M.

Influence of pancreatin on collagen in the absence of neutral salts and buffer mixtures. II. A Kuntzel and O Dietsche. *Biochem. Z.* 231, 435-40(1931), cf preceding abstr —This is in general a corroboration and extention of Merrill and Fleming's expts. on the digestion of collagen by pancreatin (*C. A.* 21, 1309 2396). S. Morgulis

Relation between swelling and proteolysis of collagen. F. Nalen. *Biochem Z* 231, 441-5(1931) —Salts of benzoic, salicylic and *p*-hydroxybenzoic acids promote proteolysis in the same order as they increase the swelling The digestion of collagen by pancreatin is definitely promoted by previous swelling S. Morgulis

Influence of physical factors on blood catalase. II. The influence of some physico-therapeutic procedures on the blood catalase. A I Alexeev and K. I Rossinova *Biochem Z* 231, 470-71(1931), cf *C. A* 24, 1347.—The blood catalase of man under const. phys. conditions is practically the same. The outside temp influences the blood catalase very much and should therefore be considered in the detn. of the catalase content and index Elec. warm baths diminish the activity of the blood catalase more the higher the temp of the bath. In a similar manner hot water baths greatly diminish the activity of the blood catalase, while a $CO_2$ bath or plain baths of ordinary temp have no effect. The Scharko baths under 2.5 atm. pressure greatly diminish the blood catalase, but this does not occur until 30 min. after the bath. Air baths produce no noticeable changes in the blood catalase content. S. Morgulis

Specific dynamic action of protein. Henri Borsook and Howard M. Winegarden *Proc Natl Acad Sci* 17, 75-91(1931) —Analyses of data on the relation of the increase in metabolism following ingestion of protein or amino acids and the efficiency of renal excretion show that the course of the sp. dynamic action parallels the course of N excretion Of the sp. dynamic action, 25-60% is due to the work of renal excretion and the rest to N and C metabolism. This will explain previous anomalies in the sp. dynamic action of protein. The sp. dynamic action of protein is not necessarily due to the conversion of the deaminized fractions into glucose D. S. Searle

The relation of life to electricity. II. The relation of stainability to electromotive force in tissues and in a variety of artificial substances, like esters, etc. R. Beutner and Jos. Loener. *Protoplasma* 12, 52-65(1931) —Many data are given of potential measurements of the system

| + aq saline | ester or alc. + fatty acid | ester or alc. + amine | aq − saline |
|---|---|---|---|

The relation between stainability and e. m. f.

+ basophilic substance/acidophilic substance −

holds for fats, esters alc., hydrocarbons etc. B. A. Sottle

The effect of ultra-violet radiation on the respiration of avian erythrocytes and yeast cells. Gy Surányi and M Vermes. *Magyar Orvosi Arch.* 30, 585-90(1929) — Ultra violet radiation under aerobic and anaerobic conditions of avian erythrocytes and yeast cells in Tyrode soln., at $p_H$ 7.2, increases the $O_2$ consumption, measured by the method of Warburg The increase is about 50%. Cyanide inhibits the increased part as well as the normal respiration. This effect is reversible. H Tauber

X-ray analysis of bone and teeth. H H Rosenberg, A. Baird Hastings and J K. Morse. *J Biol Chem* 90, 395-405(1931) —From the analysis of x ray spectrograms of bone powder a crystal structure similar to that of the apatites is deduced resembling closely the structure of dahlite, $CaCO_3 \cdot nCa_3(PO_4)_2$ in which n is not less than 2 nor more than 3 Neither $CaCO_3$ nor $CaHPO_4$ exists as such in bone The results of de Jong (*C. A.* 20, 2602) and of Taylor and Sheard (*C. A.* 4, 24) are confirmed $Ca_3(PO_4)_2$ also has a crystal structure similar to that of the apatites, varying slightly with different samples, but entirely different from that of $CaHPO_4$ The crystal structure of enamel also resembles the apatite series, and can probably be represented as a close-packed hexagonal lattice, of which $a_0 = 20.8$ A. U., $b_0 = 12.0$ A. U., $c_0 = 8.82$ A. U., referred to orthorhombic axes. The results of equilibration expts. between serum and solns. of Ca salts are considered to be of doubtful biol. significance K. V. Thimann

Studies on the dielectric constant of protein solutions. Jeffries Wyman, Jr. *J. Biol. Chem.* 90, 443-76(1931), cf *C. A.* 23, 5074 —The dielec. const. of solns. of zein in 70% EtOH alc. was measured by the method previously described for high frequency (*C. A.* 24, 3681) and by a new resonance method at lower frequencies. At wave length 4 m the dielec. const. of the zein solns. is lower than that of the solvent by an amt. proportional to the concn. of protein (cf Furth, *C. A.* 17, 1579) resembling in general behavior that of

amino acid solns (cf Hedestrand, *C. A* 22, 3571) It rises with temp, becoming greater than the solvent at 60° The dielec const, however, rapidly increases with wave length up to 200 m —the longest wave used—becoming up to 50% greater than the solvent, and indicating anomalous dispersion The zein mols are therefore highly polar and possess a permanent elec moment of about $60 \times 10^{-18}$ e s u. No change in dielec const occurs during gelation, from which W. deduces that only a small fraction of the mols is involved in the network, and that the viscosity of the whole gel is not the true viscosity of the soln given by Stokes' expression, since it is to this viscosity that the relaxation times of the mols are related The theory of dielec. consts and the application to mol. structure are briefly discussed K. V Thimann

**The $p_H$ of human mixed saliva irradiation for intraoral carcinoma.** George S. Sharp *Am J Roentgenol Radium Therapy* 25, 200-70(1931) —The saliva $p_H$ for the individual patient taken during the 3 phases of irradiation forms a curve, starting with an abnormally acid saliva ($p_H$ 6 1), rising during the acute reaction ($p_H$ 6 5) and returning approx to the pre irradiation value during the post irradiation period ($p_H$ 6 0) R C Willson

**The effect of radiation on the acidity of the blood** Helen Q Woodard and Helen R Downes *Am J Roentgenol Radium Therapy* 25, 271-5(1931) —No consistent change was observed in the $p_H$, $CO_2$ combining power or lactic acid content of the blood of patients after they had received one skin erythema dose of high voltage Röntgen rays. No significant change was observed in the $p_H$ of the blood of rabbits after lethal doses of high-voltage Röntgen rays R C Willson

**The effect of Röntgen rays on the inorganic phosphorus content of blood and urine of patients with carcinoma.** F I Rivosh and E R Novotelnov *Voprosy Onkologii* 3, 150-6(1930), *J Am Med Assoc* 96, 155 —A normal P content was found in most of the 81 patients before treatment. In 2 hrs after the treatment a steady increase in the P content of the urine and of the blood of all the patients was observed. After 24 hrs. the blood P was still increased but the urine P was normal. The same results but with larger increases in the urine and blood P were observed after Röntgen and Ra therapy of sarcoma, seminoma and lymphogranuloma The sugar content changed in inverse proportion to the P content R. C. Willson

*Rotation dispersion of optically active substances* (Kuhn) **2.** *Evolution of* $H_2S$ in the Bay of Krasnovodsk (Zubkov) **2.** Phenomena of adsorption and protection in complex colloidal media (Marie, Marinesco) **2.** The bile acids (Wieland, Noguchi) **10.**

**Peroxidase preparations.** W. Sailer. Brit. 337,405, April 25, 1929. Vegetable substances contg peroxidases such as embryos of rye, wheat, rice, maize or barley or parts of plants such as potatoes or bran are treated with water and fermentation is allowed to proceed in the presence of substances which in the soln form buffer substances such as oxides, hydroxides or carbonates of alkali, alk earth or other metals, such as ZnO, or metals not acting as catalysts After filtering off the solids, the filtrate is treated with a preservative such as ale, benzoic acid or benzoic acid esters

## B—METHODS AND APPARATUS

STANLEY R BENEDICT

**An exact rapid method for determination of water in blood and serum.** M. Dolch and E. Porchmueller. *Z. physiol Chem* 195, 28-31(1931) —The ordinary method of $H_2O$ detn by drying to const. wt. does not exclude 3 possible sources of error in samples contg protein, ess, adsorption, occlusion and chem reaction The method here described obviates these errors and is far more rapid, requiring only 10-15 min It is based on the fact that the temp at which a mixt of EtOH and xylene in definite proportions becomes cloudy varies with the $H_2O$ content of the EtOH. A calibration curve is first plotted for the abs EtOH to be used This is done by mixing 11, 11 5, 12, etc., cc of $H_2O$ with 100 cc of the EtOH, then mixing a 20-cc aliquot with 20 cc of dry xylene in a suitable app. provided with thermometer and stirrer, immersing in a freezing mixt. and detg the temp. at which turbidity develops The curve, in which temp is plotted against amt. of $H_2O$ added, is a straight line Detn of $H_2O$ in blood or serum is performed as follows: Pipet a 15-cc sample into a tared 150 cc. Erlenmeyer flask and weigh the sample. Add exactly 100 cc of the EtOH, mix thoroughly, boil 10 min. and allow the pptd. protein to settle. Pipet 20 cc of the supernatant liquid into the app, add 20 cc. of xylene and det the temp. of clouding Locate this temp on the calibration curve and read the corresponding wt of $H_2O$ from the other axis This value × 100 + wt. of

sample is the per cent of $H_2O$ by wt The per cent by vol is the wt. of $H_2O$ × the factor 6.667 Addn of cholesterol or dried protein did not affect the results The values obtained by this method are slightly higher than those obtained by drying the sample to const wt and are claimed to be more accurate A. W. Dox

A new method for the quantitative estimation of dissolved protein in gastric contents. Walter Wolff and Erich Jochmann *Arch Verdauungskrankh* 48, 151–7 (1930) —To 5 cc of the filtered gastric contents add 5 cc of a reagent contg 10% phosphotungstic acid 0.5% HCl and 10% alc., centrifuge and wash the ppt with $H_2O$ 3 times Then dissolve in 3% NaOH, add 3 drops of 20% $CuSO_4$ soln and 3% NaOH up to 10 cc Centrifuge and compare the clear violet supernatant fluid colorimetrically with standards Lowest values (<500 mg %) are commonly obtained in achylia gastrica. Normal values may be as high as 1000–1500 mg % H Eagle

The Kaufmann method of blood-sugar determination. H Heinemann. *Arch Schiffs Tropen Hyg* 34, 559–61(1930) —The iodometric method of Kaufmann can be used upon one drop of blood H Eagle

The estimation of iodine in the thyroid glands of albino rats. C. Newcomb and G Sankaran *Indian J Med Research* 18, 557–61(1930) —The gland is dissolved in 10% KOH ashed extd with alc and again ashed The residue is dissolved in water, and the color which develops upon the addn of $H_2SO_4$, Na arsenite, $CS_2$ and nitrose compared with standards H Eagle

The determination of bile pigments in the blood serum. Fritz Müller and Ludwig Engel *Klin Wochschr* 9, 2304(1930) —The degree of absorption of light of wave length 4933 A U is an accurate index of the amt. of bilirubin in serum The diazo reaction used in the van den Bergh test detects only 30–60% the quantity as detd. by the spectrophotometer The normal value is 0.6–2 mg % There is no regular correlation between the amounts as detd by the two types of test. The proportion of bilirubin adsorbed on serum protein when the latter is pptd may vary from 30 to 70% of the total, moreover contrary to van den Bergh, such adsorption occurs even in sera which give the indirect reaction In jaundice, there is a parallel increase in the results obtained by the two methods H Eagle

The Meinicke-Klarungs reaction as a rapid micro method for inactivated sera. Ernst Meinicke *Klin Wochschr* 9, 2304–5(1930) —Good results are reported, although the test is not as sensitive as the technic employing active serum. H. E

The use of coal gas in making anatomical preparations in natural color. A. Schultz. *Klin Wochschr* 10, 213–4(1931) —Tissues may be kept in Jores soln. through which coal gas has been passed, for many weeks without losing their natural blood tinge Even the color of the organs, such as that of the liver, heart muscle and fat, is preserved by the CO Jores soln consists of 5% formalin, 2.5% chloral hydrate and 5% of synthetic Carlsbad salts in water The aeration with CO-contg coal gas must be carried out immediately before the tissue is immersed After 3–10 days, depending upon the size of the prepn., the tissue is placed in the permanent preserving fluid 1000 cc. $H_2O$, 6000 cc glycerol and 300 g Na acetate. For strongly jaundiced organs it is necessary to omit the glycerol and to increase the salt to 500 g per 1000 cc $H_2O$ H Eagle

Determination of cholesterol and lecithin. Evaluation of egg products. J Tillmans, H Riffart and A Kühn *Z Untersuch Lebensm* 60, 361–89(1930) —The methods suggested by other workers are critically discussed For cholesterol a modification of the method of von Szent Gyorgyi (*C. A.* 17, 3197) is the most direct and accurate A soln of not more than 4 mg of cholesterol in 2 cc. of warm acetone is evapd on a water bath with 1 cc of a 2% soln of digitonin in 80% alc until 1.5 cc remains After 15 min at room temp the mixt. is filtered on a sintered glass crucible enclosed in a jacket through which steam can be passed, the ppt. transferred with acetone and twice washed with $Et_2O$, followed by 3 washes with $CHCl_3$, 2 with $Et_2O$, 1 with acetone and 1 with cold $H_2O$ (1.5 cc. at a time) The suction is adjusted to filter 1 drop per sec., and the ppt. should always be covered with liquid to protect it from the air Steam is then passed through the jacket, ten 1.5-cc. portions of $H_2O$ are added, and the washing is finished with the full suction of the pump The suction and heating are continued while 10 cc. of a clear 1% soln of $K_2Cr_2O_7$ in concd $H_2SO_4$ is slowly pipetted on the ppt. so as to fill ¼ of the crumble The crucible is washed with 3 1-cc. portions of cold $H_2O$, sucked well and the total filtrate collected. The oxidation is complete in 1 hr., and 100 cc. of $H_2O$ and 10 cc of 5% KI soln are added. The liberated I is titrated with 0.1% starch soln. for every 10 cc. of chromic acid taken, allowance being made for the blank titration The mean of 15 expts. with pure cholesterol showed that the vol of $Na_2S_2O_3$ soln. equiv to the chromic acid consumed, divided by 8.7, gives the cholesterol content in mg for 0.5–4.0 mg The factor for phytosterol was 7.9, the m. ps were 145° and 136°

for the 2 sterols, recrystd from abs EtOH, and 114° and 120°, resp., for their acetates Egg products are first dried on the water bath with sand, extd in a Soxhlet app with $Et_2O$, evapd and the residue is dried at 100° and weighed A weighed portion is then dissolved in warm acetone, filtered, dild to a suitable vol with acetone and the above procedure followed This gives free cholesterol Another portion of the ethereal ext. is then sapond on the water bath for 1 hr with a 20% alc soln of KOH, the residue dried mixed with sand and extd as before to give the cholesterol after sapon Results are given for various egg and pastry products *Lecithin* was detd by various methods, the technic giving the most accurate results consistent with the time consumed is based upon the Juckenack test (*Z Untersuch Lebensm* 8, 97(1904)) The powd 10 g sample is extd for 3 hrs with hot alc in a Soxhlet app, and the residue left on evapn of the ext is warmed with 15 cc of perhydrol and 5–10 cc of concd $H_2SO_4$ until brown in color The cool mixt. is dild to 100 cc, 25 cc neutralized with $NH_3$ to methyl orange, and the lecithin phosphate pptd in the cold in a vol of 60 cc with 5 cc of 1 5% strychnine nitrate soln and 15 cc of a mixt of 33 33 g of $NH_4$ molybdate in 100 cc of $H_2O$ and 300 cc of dil. $HNO_3$ contg 200 cc of acid, sp gr 1 4 After 20 min the ppt is filtered off on a weighed crucible, washed with 25 cc of the ice cold mixed reagents (dild 5-fold), and with ice water until free from acid The wt of the ppt dried at 100° and divided by 39 gives $P_2O_5$ The method has an accuracy of 0 02 mg for 0 5–4 0 mg of $P_2O_5$ The contents of $H_2O$, cholesterol and lecithin are tabulated for 21 samples of pastry products contg eggs A table is given for the calcn of egg content of a sample from the cholesterol content, 58 7 and 71 4 mg per 100 g of ordinary and hard pastry, resp., corresponding with 1 egg per 500 g of flour, and 151 5 and 164 2 mg, resp., for 3 eggs Storage of samples for a year with the exception of a few home baked pastries showed no loss of lecithin or cholesterol The free lecithin content of egg products or pastries is not a reliable means of detg the freshness of the product C R Fellers

**The determination of the concentration of oxidizing agents by means of the residual current.** G Tammann and H Thiele *Arch ges Physiol* (*Pflügers*) **226**, 694–6(1931).—An attempt was made to devise a method for detg the concn of oxidizing agents in biol materials from the residual current, $i$, as defined in Nernst's equation: $i = (D\ o\ n\ F/\delta)\ c$. In this equation $D$ is the diffusion coeff of the depolarizer, $n$ is the electrochem valence of the oxidizing agent, $F$ the electrochem equiv., $o$ the surface area of the electrode, $c$ the concn of the oxidizing agent and $\delta$ the thickness of the diffusion layer at the cathode. With platinized Pt electrodes roughly approximate results were obtainable for the concn of $H_2O_2$ in aq solns The residual current for oxygenated blood was 0 002 amp. as compared to 0 0001 amp for venous blood A. G.

**The determination of the freezing points of small quantities of fluids by means of thermal elements. Experiments with turtle blood.** T. Minosima. *Arch ges Physiol.* (*Pflügers*) **226**, 794–8(1931).—The f ps of 0 5 to 1 cc. quantities of fluids were detd. with an accuracy of ±2% by the use of *constantan-iron* thermoelements and a sensitive elec arrangement for measuring small p ds The method is particularly applicable to biol fluids when only small quantities of material are available Arthur Grollman

**Influence of formol on the precipitation of serum proteins.** Marcel Mascre and Maurice Herbain. *Bull soc. chim biol* **12**, 978–93(1930), cf *C A* **24**, 5052.—Formol affects the pptn of proteins both by forming formol proteins and by increasing the acidity of nonprotein matter present. The latter factor is responsible for the greater effect upon pptn. by alc acetone and salts than by $CCl_3COOH$. The effect is more marked at lower temps Pptn with $CCl_3COOH$ includes peptides, and pptn of serum globulin with Na and Mn sulfate includes much of the albumin C G King

**The use of copper and iron salts for the deproteinization of blood.** Michael Somogyi *J Biol Chem* **90**, 725–9(1931), cf. *C. A* **24**, 3808.—*Fe salts can be used* instead of colloidal $Fe(OH)_3$ for the removal of blood proteins in the detn of true sugar Cu salts are preferable to Fe salts for this purpose and fully the equal of Zn salts in regard to speed and simplicity of technic. For the pptn of plasma or serum proteins Cu is superior to Zn The technic is described in detail. A. P. Lothrop

**The optimum conditions for the precipitation of casein from human and from cow milk.** Chi Che Wang and Agnes A. Wood *Am J. Diseases Children* **40**, 787–90 (1930).—A clear, edible whey can be prepd from human milk by treating 100 cc of fat-free milk with 33 mg of rennin suspended in 1 cc. of 1 *N* HCl for 15–30 min at 38°, removing the curd by centrifugation and filtering the supernatant liquid The max. pptn of casein from human milk by the action of rennin (and HCl) occurs at $p_H$ 4 97 and represents 50% of the total N of the whole milk. The max pptn. of cow milk by lactic acid occurs at $p_H$ 4 61, representing 80% of the total N. The max pptn by rennin (and HCl) occurs at $p_H$ 6 53, representing 73% of the total N. E R. Main

The determination of lead in feces and urine and its significance for the diagnosis of lead poisoning. Fritz Feigwerst and Artur Heintz. *Arch. Hyg.* 104, 315–25 (1931).—A method is described for the detn. of Pb in feces and urine by which 0.01 mg. of Pb may be detd. The samples are ashed with $HNO_3$, the Pb is pptd. first as PbS and finally as $PbCrO_4$, and the latter dissolved in $HNO_3$ and titrated with $Na_2S_2O_3$. The av. values for normal persons who have not worked with Pb are 0.05 mg. Pb per 100 g. of feces and 0.03 mg. per l. of urine; for persons who have worked with Pb but show no symptoms of poisoning, 0.06 mg. per 100 g. of feces and 0.03 mg. per l. of urine; for persons who have worked with Pb and have symptoms of poisoning 0.2 mg. per 100 g. of feces and 0.07 mg. per l. of urine. E. R. Marx

The determination of the $p_H$ of phosphate buffer solutions by means of the antimony-antimony oxide electrode. Ernest J. Fosbinder. *J. Lab. Clin. Med.* 16, 411–4 (1931).—The Sb-SbO electrode gives a linear relation between observed e. m. f. and $p_H$ values. The $p_H$ of phosphate buffer solns. can be detd. with an accuracy of ±0.01 $p_H$. The electrode is not applicable to the detn. of the $p_H$ of blood plasma. E. R. Marx

Chart for computation of daily basal metabolism and percentile basal metabolic rate from spirometer data. Curtis Bates. *J. Lab. Clin. Med.* 16, 415–8(1931). cf. *C. A.* 24, 3225.—A nomogram-like chart is presented by which the daily basal metabolism and the percentile basal metabolic rate may be computed from the observed values for vol. decrement of O per min., the av. spirometer temp. and atm. pressure. E. R. Marx

The determination of silver in organs and in organic liquids. E. Mentzerritt. *Bull. soc. méd. hôp. Paris* 5, 813–4(1930).—The organs or liquids are dried and ashed with $Na_2CO_3$ in a crucible. Complete ashing is obtained by repeated addns. of small amts. of $KNO_3$. Concd. $HNO_3$ is added and evapd. to dryness. For qual. tests, the residue is digested with $NH_4OH$, filtered and the filtrate is tested for Ag (pptn. of $Ag_2S$ with $H_2S$, AgCl with $HNO_3$). For the detn. $H_2O$ is added and then the soln. is treated with $H_2S$ for 5 min. and centrifuged, the ppt. is washed carefully 3 times with $H_2S$ water and centrifuged each time. Concd. $HNO_3$ is then added to the ppt. and brought to dryness on the water bath. The residue is dissolved in $H_2O$ (up to this point the operations are all made in the original crucible), filtered and the ppt. on the filter washed repeatedly with $H_2O$. To the filtrate in the dark is then added with caution dil. HCl until complete pptn. of the chloride. The ppt. is allowed to settle and collected on a Gooch crucible, the ppt. being washed first with cold $H_2O$ contg. a small amt. of $HNO_3$ until the washings are free of chlorides and then twice with alc. It is dried at 100°, then at 130° to const. wt. (all the later operations are carried out as much as possible away from the light). Peter Masucci

Electroultrafiltration, a method for the determination of the physical state of the inorganic constituents of the serum. Rudolf Spitzer. *Biochem. Z.* 230, 253–8 (1931).—An app. is described for carrying out ultrafiltration with and without electrodialysis. S. Morgulis

New substrates for use in detecting proteolytic activity. Robert L. Jones. *Ind. Eng. Chem., Anal. Ed.* 3, 149–51(1931).—With a modified method for the prepn. of adsorption systems of egg albumin and dyes a number of reagents can be prepd. which can be used for the detection of proteolytic activity. Two reagents, *egg albumin-adsorbate* and *egg albumin-basic fuchsin*, give good results with com. pepsin, trypsin and artificial gastric and pancreatic juices. The prepn. of these reagents is easier than that of previous ones. They can be prepd. in powder form and are stable indefinitely. H. T.

A study of glutathione. Harold L. Mason. *J. Biol. Chem.* 90, 409–16(1931). cf. *C. A.* 25, 719.—The oxidized form of glutathione prepd. by aeration at $p_H$ 7.6, or by treatment with $I_2$ or $K_3Fe(CN)_6$, followed by isolation from alcoholic soln., gives low analyses, as found by Hopkins (*C. A.* 23, 5477). This is due to the presence in close combination of 2 mols. EtOH, which can only be removed with great difficulty. Heating at 110–20° *in vacuo* leads to loss in wt. but is accompanied by a reduction in the no. of $CO_2H$ and $NH_2$ groups. The aeration method gives a quant. yield of the oxidized form and is a convenient procedure for its prepn. E. V. Tiedmann

Photometric determination of the cholesterol in the serum. E. Brill and Gustav Horr. *Münch. med. Wochschr.* 77, 142–4(1930).—Heilmeyer first used the step-photometer, which was designed for the detn. of color in the textile industry and for the detn. of cholesterol. In order to obtain an easier standardization of both halves of the field and to obtain an idea of the light absorption within the various spectral regions, color filters are introduced into the photometer. These are of 2 types (1) 3 filters, red, green and blue, which have a relatively wide penetrable area and (2) a larger no. of color filters which allow very definite, narrowly limited, regions of wave length to

pass By this app it is possible to det the amt of rays absorbed by a color soln within the spectral region detd by the various color filters From this one can det the corresponding color value of the soln Results differed as much as 20% when checked with the Windau method The colorometric method gave the same results indicating that other cholesterol like substances give a color reaction R C WILLSON

Determination of Ca, Mg and P in cattle excreta (MORRIS, *et al*) 7. Device for regulating the quantity and compositions of gas mixtures used for anesthesia (U. S. pat 1,793,608) 1.

## C—BACTERIOLOGY

CHARLES B MORREY

**The bactericidal power of viosterol.** B E MONTGOMERY *Proc Soc Exptl Biol Med* 28, 481(1930).—Irradiated ergosterol in corn oil neither modified the cultural characteristics nor inhibited the growth of *Bacillus coli* and of *Staphylococcus aureus* C V BAILEY

**The present state of chemical study of the tubercle bacillus.** ERWIN CHARGAFF. *Naturwissenschaften* 19, 202-6(1931).—A review of recent work (cf Anderson and C., *C A* 24, 878, 1131, 25, 128 Sabin, Doan and Forkner, *Am Rev Tuberculosis* 21, 290(1930)(cf *C A* 25, 541), Doan, *Proc Soc Exptl Biol Med* 26, 672(1929)) with numerous references B J C VAN DER HORVEN

**Fluoroscopic examination of certain actinomycetes.** FRANZ CORTESE *Boll soc stal. biol sper* 5, 842-4(1930).—The influence of anaerobiosis, $p_H$ of culture media and chem constitution of the media on fluorescence was studied The fluorescent substance was extd from the media by weak alc and purified by shaking with acidified ether. It is an amorphous, odorless, reddish brown material, sol in alkalies, pyridine, EtOH, MeOH, acetoacetic acid, acidified $Et_2O$ and concd inorg acids slightly sol in weak inorg acids or acetone, insol in $H_2O$ or glycerine, benzene and other fat solvents In 25% $NH_4$ it shows 4 absorption bands $\lambda$ = 630-614, 588-576, 560-536, 518-492 The substance is a pigment belonging to the group of porphyrins Fluoroscopic examn. showed that *A. albus* and *A. sulphureus* Gasperini are different species of *A bovis* Harz PETER MASUCCI

**Destruction of sugar in the intestine by the coli group of bacilli. The etiology of pernicious anemia.** KOLOMANN V KNORR. *Folia Hematol* 43, 32-91(1930).—An organism called *Diplococcus anemiae perniciosae* is described and found present in the mouth and duodenal contents of cases of pernicious anemia *B coli* plays a secondary role by splitting carbohydrates and proteins, producing especially compds. with the NH-OH group This aids the toxin produced by the diplococcus JOHN T. MYERS

**Toxin production and properties of bacillus Preisz-Nocard.** ANGL. ROTTGARDT. *Zentr. Bakt. Parasitenk.*, 1 Abt, 119, 323-33(1931).—The toxin can be pptd by $(NH_4)_2SO_4$ and dried *in vacuo* over $H_2SO_4$ Heat destroys it but the dried toxin is more stable than liquid Cold preserved either liquid or dried toxin The same is true of the organisms or endotoxin Air and light have little effect on the exotoxin Filtration of exotoxin decreases its toxicity about 50% Toxin concd at 45° loses a major part of its toxicity but retains its antigenic power. Toluene, ether or mixts of them have no effect. At a temp of zero, 5% phenol has no harmful effect Formalin weakens the toxin, its effect increasing with temp. The pus producing power of the toxin is independent of its toxicity JOHN T. MYERS

**Method for preparing photographs of Petri dish cultures by direct contact printing on photographic paper.** J. T. BUCHHOLZ AND I M LEWIS *J. Bact* 19, 105(1930).—The Petri dishes are used in the same manner as negatives and the resulting prints are positives in natural size, the colonies appearing as white objects on a black background. The process is carried out in a dark room, the source of printing light being a 150 w. Mazda lamp at 3 m from the object, centered directly above the exposing table to avoid cast shadows The dish, with cover removed, is pressed bottom down upon the sensitized surface of the paper, and exposed. Color and transparency of the agar, its depth in the dish, type of paper, the developer and its temp influence the time of exposure required L. G PARAGALLO

**Resistance of trypanosomes to arseno compounds.** M. ADANT. *Compt rend. soc. biol.* 106, 57-8(1931).—*Tryp pecaudi* in mice are not rendered resistant to tryparsamide by a prolonged or even double contact with tryparsamide complex obtained from the liver of mice, which complex, however, according to Levaditi, would be the trypanocide elaborated by the organism following the injection of drugs such as atoxyl or tryparsamide ALBERT L. RAWLINS

Existence of a specific carbohydrate substance in B. perfringens. Marie E Jimenez. *Compt rend soc biol* 106, 140–1(1931).—The precipitogen of *B. perfringens* in salt water or broth is pptd. by addn of alc contg 1.3% Na acetate; a white, gelatinous sediment is obtained which, on drying in vacuum, yields a yellowish powder almost entirely sol in water the aq soln. of this powder ppts. strongly in the presence of the serum obtained in the immunization of horses by means of *B perfringens;* it does not give the biuret reaction, contains a carbohydrate (Molisch reaction pos.), does not reduce Fehling's soln. except after boiling for 1 hr with 0.5% $H_2SO_4$ and it contains N.

Albert L. Rawlins

Brucella abortus in Porto Rico Pablo Morales-Otero. *Porto Pico J. Pub Health Trop Med* 6, 1–83(1930).—Sunlight has a deleterious action on cultures of *Brucella abortus*, since cultures exposed to sunlight were sterile in 3 hrs. Ultra violet light from an Alpine sun lamp had a similar effect. The temp was kept low by exposing the cultures on ice, when the temp was allowed to rise the destructive effect of light was even more pronounced. In studying the influence of heat alone on the cultures it was found that a marked diminution of viable organisms occurred in suspensions of *B abortus* when incubated in the water bath at 42°, but the suspensions were not sterile after 3 hrs. Organisms which survived the exposure to sunlight and ultra-violet light were cultured in broth and injected into mice to test their virulence. The virulence was altered very little if any by the exposure to light. Vaccination with living vaccines as a method for control of Bang's disease was studied, it is believed that this method deserves further investigation. The glucose utilization, the liberation of $H_2S$ and the growth in Huddleson's dye media were studied on 8 strains of *Brucella* and differences were noted. The serological relations of these strains were examd., but with the exception of 2 they could not be differentiated by agglutination or agglutinin absorption. A striking similarity was found between some of the strains isolated from human beings and some of the porcine strains in their action toward $CO_2$, their glucose metabolism and the pathol. lesions produced by them in guinea pigs. *B abortus* seems to be capable of going through a Berkefeld W filter Sterile filtrates of a broth culture of *Brucella* when injected into mice did not affect them and produced no appreciable pathological lesions in their viscera. Human infection is very low in Porto Rico despite the high cattle infection. Expti. infection with *B abortus* in man suggests that the porcine strains are more virulent for man than are the bovine varieties. Only the most virulent bovine strains can infect man through the gastro-intestinal tract. Smaller doses are necessary to produce infection through abraded skin than through the gastro-intestinal canal. Numerous tables, graphs and references are given. G. Schwoch

Gardner, A D *Microbes and Ultramicrobes:* Being an Account of the Bacteriophage in its Relations to Bacterial Variation and the Invisible Viruses. London: Methuen. 3s. 6d., net.

## D—BOTANY

THOMAS G. PHILLIPS

Synthetic nutrient solutions for culturing Ustilago zeae. Emery R. Ranker. *J. Agr Research* 41, 435–43(1930).—A standard reproducible culture medium is recommended for culturing *Ustilago zeae* This is a synthetic nutrient soln. which has the following compn., expressed as g /l. of soln.. 0.3 g. $K_2SO_4$, 0.1 g $NH_4NO_3$, 0.1 g $CaCl_2$, 0.1 g $Mg_3(PO_4)_2 \cdot 4H_2O$, 10 g dextrose and enough distd. $H_2O$ to make up to 1 l. The reaction of this nutrient soln. before sterilization is $p_H$ 7.4 and after sterilization it is $p_H$ 5.6 The optimum quantity of dextrose varies from 5 to 10 g /l. depending upon the length of time the culture is inoculated. Maltose is preferable to dextrose for certain physiologic forms of smut. When a solid medium is desired 1.5% of agar can be added.

J. R. Adams

Seasonal changes in the catalase activity of conifer leaves. Joseph Doyle and P. O'Connor. *Ann Botany* 44, 907–15(1930).—In confirmation of the results of Doyle and Cinch (*cf. C. A. 23, 2459*) and contrary to the statements of Burge (*C. A. 20, 2691, 3200*) the authors find that the catalase activity of leaves of *Tsuga albertiana, T. canadensis, Juniperus communis, J. rigida, Pinus laricio, P. strobus, P. contorta, Abies webbiana, J rigida* and *Picea amorica* is in all cases very markedly higher in winter (January) than in May, July or October Increase in temp of the plants for short periods during the winter did not alter the catalase activity. In conifers there is no correlation between catalase content and degree of metabolic activity. J. S. C.

The effect of ionized air on the rate of respiration of fungi. S. R. van Asperan de Boer. *Ann Botany* 44, 989–99(1930).—Expts with *Phycomyces blakesleeanus* and

*Polyporus destructor* by the Pfeffer-Pettenkofer method and by a microrespirometer method gave consistently neg effects upon respiration rate Ionization of the air was effected by means of Po, the degree of ionization ranging from 200 times to several million times that of normal air JOSEPH S CALDWELL

**The resistance to poisons of desiccated plant tissue.** WALTER W ALLEN *Ann. Botany* **44**, 1001–9(1930) —Air-dried material of *Mnium hornum* submerged in abs alc. for 1 to 13 hrs was able to grow when thoroughly washed and again placed in the soil. Material placed in abs. alc 1 hr, then in xylene 1 hr then washed in alc and in water, also grew, as did material similarly treated with alc and acetone or alc and ether Submersion in dil (50%) alc or in chloroform was fatal JOSEPH S CALDWELL

**Further studies on transport in the cotton plant. I. Preliminary observations on the transport of phosphorus, potassium and calcium.** F G MASON AND E G MASKELL. *Ann. Botany* **45**, 125–73(1931) —The ringing methods employed in earlier studies of the transport of carbohydrates and N were used (*C. A* **24**, 5331) In plants deprived of a ring of bark, P, K and Ca accumulate above the ring and diminish below it just as do carbohydrates and N P, K, Ca and ash constituents ascend the stem mainly by way of the wood, and P and K are returned by way of the phloem to the roots. No evidence of the return of Ca from the leaves was obtained There is evidence that N, K and P may be transported to the lower portion of the plant in amts. in excess of the needs there, and may there pass into the tracheal sap and again be transported to the leaves This downward movement of mineral nutrients must affect the rate of entrance of the salts and may in part explain the absence of a marked increase in salt uptake when transpiration is increased. It was possible to reverse the direction of movement of P and of ash constituents by reversing the relative positions of the leafy and leafless portions of the stem Removal of bolls is followed by marked increases in concn. of P and ash and smaller increases in Ca in the stem and leaves. P, K and some ash constituents travel to the boll along gradients in the phloem, Ca mainly through the xylem J S C.

**The effect of chloroform upon the rotation in the internodes of Nitella.** SUSAN P. NICHOLS. *Bull Torrey Bot. Club* **57**, 153–63(1930) —In continuation of earlier work upon the effect of wounding upon the rotation of protoplasm (*C. A* **20**, 433) chloroform has been applied to the wall of an internode with a capillary pipet An area of non-motile protoplasm is produced at the point of application, over which the general protoplasm pushes as rotation continues. The non motile area ultimately resumes movement Dipping the internode into chloroform for 2–5 seconds always resulted in cessation of movement after 3–6 hrs. The effect of chloroform is considered to be one of gelation JOSEPH S. CALDWELL

**Purification and certain properties of the virus of typical tomato mosaic.** P. H. BREWER, H R. KRAYBILL, R. W. SWANSON AND M W GARDNER. *Phytopathology* **20**, 943–50(1930) —A clear, colorless virus suspension was obtained by mincing and pressing affected plants, passing the ext. through the supercentrifuge, discarding the liquid, suspending the residue in distd water, centrifuging and clearing and decolorizing with slightly acid Al gel Such a suspension was highly infectious and continued to be so after filtering through a Pasteur-Chamberland F filter or Schleicher and Shull 1½% collodion filter, but was made non infectious by passage through a Pasteur-Chamberland B filter, collodion filters of 3% or more, or atmometer cylinders The material retained by the filters was infectious. Of 9 suspensions stored at 36–40° F, 4 became somewhat weakened with age and 1 had lost its virulence after 504 days. The virus was inactivated when alkalinized to $p_H$ 7.5–8.5 and reactivated by restoring its acidity. It was not inactivated by acid up to $p_H$ 2.46. Heating to 82–84° for 25 min or to 88° for a shorter time destroys the virus. In cataphoresis tests, the virus-bearing particles accumulate at the pos. pole JOSEPH S. CALDWELL

**Effect of mineral nutrition on the reaction of wheat varieties to leaf rust.** K. D. DOAK. *Phytopathology* **21**, 105–9(1931) —Wheat varieties showing various types of reaction to one physiologic form of *Puccinia triticina* were grown in sand cultures with various degrees of excess and deficiency in N, P and K. N increased susceptibility and P and K decreased it Excess N induced the development of larger primary uredinia, more abundant secondary uredinia and decreased chlorosis Excess P increased chlorosis and retarded or prevented development of secondary without affecting primary uredinia. Excess K increased chlorosis and decreased the size of primary uredinia In varieties of intermediate reaction, excess N increased the no of infection points, while N deficiency, excess P and excess K decreased it Deficiency of P or of K decreased chlorosis. JOSEPH S. CALDWELL

**Hydrogen sulfide as related to the fungicidal action of sulfur.** S E. Q McCALLAN AND FRANK WILCOXON. *Phytopathology* **21**, 113(1931) —$H_2S$ is exceedingly toxic to

fungus spores and is evolved when S is applied to spores or to leaves of plants. Germination of conidia and uredo spores of 8 species of fungi were completely inhibited by concns of $H_2S$ ranging from 0.2 to 40 mg. per l., the order of sensitivity being identical with that of these fungi to S. Evolution of $H_2S$ has been demonstrated in 19 fungi and 26 higher plants. Spores of *Sclerotinia* and *Glomerella* produce 5 and 15% of their weight of $H_2S$ in 6 hrs. Indications point to the reduction of S on or within the spores and its initiation by glutathione. The presence of glutathione in spores of *Sclerotinia* has been demonstrated. JOSEPH S. CALDWELL

The influence of hydrogen-ion concentration and of sodium bicarbonate and related substances on Penicillium italicum and P. digitatum. RAIMUND H. MARLOTH. *Phytopathology* 21, 169–98 (1931).—Citrus fruits are dipped in a 3% soln. of $NaHCO_3$ prior to packing to prevent decay by blue and green molds (*Penicillium italicum* and *P. digitatum*). An attempt was made to det. whether the action is specific or has a general physiol. basis. The fungi were cultured on modified Duggar's soln. to which an autoclaved aq. orange ext. was added in an app. which permitted daily renewal of the medium. *P. italicum* grew nearly equally well over a $p_H$ range of 2.9 to 6.5, *P. digitatum* over a range of $p_H$ 3.0 to 6.0. Germination of spores in hanging drop cultures was inhibited at $p_H$ 1.5–2.5 and excellent at 3.0 to 5.3, falling off at $p_H$ 7.0–9.0. The Na ion markedly inhibits germination at concns. of 15,000–20,000 p. p. m.; the K ion does not. Na tetraborate is more toxic to *P. digitatum* and $NaHCO_3$ is more toxic to *P. italicum*. The effect of the wash treatment in preventing decay is due to the fact that the film of salt left upon the fruit forms a satd. solution of $Na_2CO_3$ about the developing germ tubes which is toxic thereto. JOSEPH S. CALDWELL

Enzyme formation in Penicillium glaucum. I. SAKISABURO WADA. *Acta Schol. Med. Univ. Imp. Kioto* 13, 123–41 (1930).—A study of the relationship between the compn. of the nutrient medium and the enzyme content of *Penicillium glaucum*. When this mold is grown on a protein free, carbohydrate free medium (salts and glycerol), it contains desamidases, urease, a glucosamine-splitting enzyme, nuclease, pepsin and trypsin like enzymes and erepsin. It does not show the relation between the nutrient medium and enzyme content exhibited by bacteria. II. *Ibid* 145–57.—In the mold cultivated with the above medium lactase and a glucolytic enzyme were absent but these are also lacking in a carbohydrate-contg. medium. In the culture liquid, a nuclease, pepsin, glycogenase, invertase, a glucosidase, a lipase and a hippuric acid-splitting enzyme were present. III. *Ibid* 158–61.—A comparison of the enzyme content of the mold when grown on a medium contg. protein and carbohydrate (glucose, meat ext. and peptone) with that above shows that the pepsin, trypsin and lipase content is much decreased when these foodstuffs are absent from the medium. H. J. D., Jr.

Chlorophyll formation. KURT NOACK AND WILHELM KIESSLING. *Z. angew. Chem.* 44, 93–6 (1931); cf. *C. A.* 25, 723.—Protochlorophyll, the precursor of chlorophyll, is present in small amt. in seedlings germinated in the dark but is more easily obtained from the inner membrane of the seed coat of pumpkin seeds. It yields a series of derivs. analogous to those prepd. by Willstatter from chlorophyll. Like chlorophyll it contains 3 carboxyls, one of which is esterified with phytol, another with Me, while the 3rd occurs in lactone or lactam linkage. Removal of Mg by acid treatment yields *protopheophytin* contg. the phytol, Me and lactam groupings of the parent substance. Esterification of this with 20% HCl in MeOH replaces the phytol by Me and esterifies the lactam carboxyl, yielding *protophytochlorin trimethyl ester*, m. 234–5°. The opening of the lactam ring causes a marked change in the spectral behavior of the protopheophytin as shown in the intensity sequence of the absorption bands. Partial sapon. of protopheophytin should yield protopheophorbide, but this method is unsatisfactory because the concn. of alkali required leads to anhydridization. *Protopheophorbide* was obtained, however, by partial sapon. of the above trimethyl ester. The substance contains 1 $CO_2H$, 1 $CO_2Me$ and the lactam group, and is analogous to pheophorbide a. The dimethyl ester, *methylprotopheophorbide*, in which the lactam group remains intact, is best prepd. by reduction of methylpheophorbide a from chlorophyll by means of Fe and 80% $CH_3O_2$. Its spectrum is midway between that of protopheophytin and that of phylloerythrin. Both protopheophorbide and its Me deriv. yield the same trimethyl ester identical with that obtained from protopheophytin. Derivs. of the protochlorophyll series differ from the corresponding chlorophyll derivs. in that they contain 1 less O. This O, which is a structural part of the chlorophyll, is present in a linkage as yet undetd. Phylloerythrin, the chlorophyll deriv. present in beef bile, is closely related to protopheophytin. Like the latter it yields a green pigment when Mg is introduced by the Grignard reaction with *p*-$Me_2NC_6H_4MgI$. The pigment thus obtained resembles protochlorophyll spectroscopically in the same manner that phylloerythrin resembles proto-

pheophytin, *i. e.*, in a displacement of the absorption bands toward the violet. Derivs of the phylloerythrin series are isomeric with the corresponding protopheophytin derivs The phylloerythrin used in this work was prepd from 900 l of beef bile It is neither an ester nor a free acid but an intramolecular anhydride, and may be converted into an acid by treatment in the cold with KOH in $Me_2CHOH$ The accompanying spectral change is similar to that observed in the conversion of protopheophytin to the protophytochlorin trimethyl ester The product is probably a tricarboxylic acid in which 1 $CO_2H$ is anhydridized With $CH_2N_2$ it yields a *trimethyl ester*, m 232–3°, isomeric with the trimethyl ester of protophytochlorin Phylloerythrin, like protochlorophyll, is a reduction product of chlorophyll It gives a secondary series of derivs in which a splitting off of $CO_2$ has occurred Esterification of phylloerythrin with MeOH-HCl yields a mono- or a mixt of mono- and di esters according to the intensity of action Sapon of the ester gives a tricarboxylic acid contg 1 Me, and this when esterified yields a *trimethyl ester*, m 205° Phylloerythrin thus contains an acid anhydride and a lactam group, the latter probably identical with that of chlorophyll Chlorophyll formation represents a photooxidation of protochlorophyll The addn of O yields chlorophyll a, which in turn is the precursor of the more highly oxidized chlorophyll b Phylloerythrin formation is the reverse process and consists not only in reduction, but also in Mg cleavage, sapon and anhydridization Probably phylloerythrin is a biol transitional stage between leaf and blood pigment A W Dox

**The copper and manganese content of some vegetable tissues.** Maria van Leeuwen *Ann physiol physicochim biol* 6, 178–81(1930) —Cu and Mn are present in approx the same concn (0.2–2.5 mg % averaging around 1) in the leaves of rhododendron, nasturtium, ivy, vine, hops, poplar, fir, etc H Eagle

**Saponin from spinach.** O Dafert *Z Untersuch Lebensm* 60, 408–9(1930) —Very little saponin occurs in the stem or leaf, and none at all in the seed of spinach The hemolytic index of the root, because of its saponin content, is 1 1000 for sun dried roots, and 1 400 for roots dried in an oven at 100° The index rises from 1 85 for a plant 3 weeks old to a max of 1 800 after 7 weeks, and then falls to 1 280 after 20 weeks The saponin is extd from the scraped and sun-dried root in a 5-fold vol of 70% EtOH for 2 hrs., followed by extn for 1 hr with a 2 fold vol of EtOH The exts are filtered, the residue is pressed and the crude saponin then separates from the filtrate after 1 day in the ice-chest. It is filtered off, washed with abs alc., the filtrate evapd to ½ its vol., cooled and an addnl yield of saponin is thus obtained The total quantity is dried, extd with EtOAc, and the saponin recrystd from hot 90% EtOH as pointed white needles with a hemolytic index of 1 1,000,000 and m 260–2° The properties of saponin are given Hydrolysis with $H_2SO_4$ in 50% EtOH, and treatment with charcoal gave a white amorphous *sapogenin*, $C_{27}H_{44}O_7$, m 208–12°, sol in alc and EtOAc and insol in $H_2O$, $C_6H_6$ or $Et_2O$ C R Fellers

**Vegetable rennet.** D. Milne *Rept Operations Dept Agr., Punjab, Year ending June 30, 1929*, Pt I, 48–9(1930) —The ripe berries of *Withania coagulans*, which grows wild on the Punjab plains, yields an ext which is rich in rennet The crude ext imparts a brown coloration and a bitter taste to milk and is unsuitable for use in the prepn of cheese By repeated pptn the active principle is obtained free from these objections and in a very pure condition, one part of the prepn being sufficient to coagulate 1000 parts of milk in 1 min K D Jacob

**Decomposition of salts of organic acids by the mold fungus Aspergillus fumaricus.** W. Thies *Ber.* 64B, 214–8(1931) —*Aspergillus fumaricus* decomposes sugar, forming not only $H_2CO_3$ and $H_2C_2O_4$ as end products, but also citric (I), fumaric (II) and gluconic (III) acids If other acids are formed as intermediate products, the fungus should decomposes these acids in sugar-free cultures to I or II. Two series of expts were carried out; one with the Ca salts of I, II and III, and of saccharic, succinic, tartaric, malic and lactic acids, the other with the K, Na and $NH_4$ salts of the same acids I and II were included in order to det whether they are exclusively end products, or whether they are further utilizable by the fungus In the first series $H_2CO_3$ was the end product of the decompn., as shown by the formation of considerable quantities of $CaCO_3$, in the second, the end product was $H_2C_2O_4$ The results indicate that the nature of the cation affects the change: if the cation is bivalent, the end product is $H_2CO_3$; if univalent, the end product is $H_2C_2O_4$ The expts show clearly that there is no support for the theory that in the decompn of sugar to I or II, other acids are formed as intermediate products Louise Kelley

**The influence of environmental factors on acid formation by Aspergillus fumaricus.** W. Thies *Zentr. Bakt Parasitenk.*, 2 Abt., 82, 321–47(1930); cf preceding abstract —The influence of various factors as, neutralization with Pb or $BaCO_3$, O tension, character of the medium and $p_H$, had little influence on acid production. Gluconic and citric

acids are always formed, oxalic and fumaric acids sometimes result Other acids are not formed JOHN T MYERS

Presence of rutoside in the leafy stems of Bupleorum falcatum L. J RABATE. *Bull soc chim biol* 12, 974–7(1930) —Extn with alc gave 4 3 g per kg dry wt. C. G KING

Wall structure and mineralization in coralline algae. L. G M. BAAS-BECKING AND E WAYNE GALLIHER *J Phys Chem* 35, 467–79(1931) —The optical properties of the cell walls of the algae, *Corallina officinalis* Lamark and *Amphiroa dorbignyana* Decaisne were studied in the hopes of detg their chem and phys nature. The data show that the cell walls of these 2 organisms are made of a non-cellulosic material, probably a pectin like substance, and are birefringent in longitudinal and isotropic in cross section The fibers are built up of tangentially arranged, elongate lamellae interspersed with concentrically arranged interstices, both of which are small in relation to the wave length of light. Calcite is the only mineral deposited by the living organism, the individual crystals of which are only a few tenths of a micron long, and arranged with the c axis perpendicular to the longitudinal axis of the fiber The deposition of Mg is a secondary phenomenon H W. LEAHY

Investigations on the nutrition of fruit trees. Some effects of deficiencies of nitrogen, potassium, calcium and magnesium, with special reference to the behavior of certain varieties of apple trees. M B DAVIS *J. Pomology and Hort Sci* 8, 316–44 (1930) —Bramley seedling, Worcester Permain and Allington Pippin apples were grown under controlled conditions in pots in sand and in soil and given differential nutritional treatments Omission of N resulted in restricted shoot growth, yellowed leaves and delayed bud break in spring Lack of $K_2O$ caused early partial defoliation and later retention of the remaining foliage, leaf scorch and much earlier bud break $P_2O_5$ omission produced earlier defoliation, very restricted shoot growth, typical bronzing of the foliage and delayed bud break Absence of CaO resulted in increased shoot growth and larger leaves, which later broke down either in the center or along the margins Omission of MgO was characterized by reduced shoot growth in most cases, earlier defoliation and marked breakdown of foliage as brown spots in the center and margins of the leaves The omission of an element always resulted in a lower percentage of that element in the ash and dry matter of the young shoots and leaves Reduction of $K_2O$ was assocd with increases of CaO and MgO, low CaO was accompanied by high $K_2O$, high MgO and low $P_2O_5$ low MgO was assocd with high CaO, low $P_2O_5$ and low $K_2O$ A high degree of correlation existed between symptoms exhibited and amt of the related element in the ash and dry matter A L MEHRING

Prolonging the longevity of rice seed G SAMPIETRO *Giorn risicoltura* 21, 1–5 (1931) —Rice seed, dried to a moisture content of 5% and kept in an atm of N, gave a 99% germination after 8 years Seed kept in $CO_2$, in vacuum or in air did not germinate at all when dried to a normal 13% or to a 5% moisture content; likewise seed kept in N when contg 13% moisture ALBERT R. MERZ

The influence of iodine on the reproduction of yeasts. J. KOOIJMANS *Zentr Bakt Parasitenk*, 2 Abt., 82, 347–53(1930) —Minute amts. of I (about one ten millionth part) have a slight growth stimulating effect on some strains of yeast There is no relationship between I and bios JOHN T. MYERS

The pigment of the watermelon. L ZECHMEISTER AND P. TUZSON *Ber* 63B, 2881–3(1930) —The pigment consists of a mixt. of lycopin and carotene (8–10 parts of the former to 1 of the latter in melons from southern Hungary) In small scale expts 0 2 g of the mixt was obtained from fourteen kilograms of the fresh melons, while 150 kg of the melons yielded 1 3 g lycopin and 0 07 g. carotene, and another 0 07 g of the latter remained in the mother liquors C A R

Permeability of I on some economic plants (MALHOTRA) 15 Salicinerein of *Salix cinerea* L., its identity with piceoside (RABATE) 10

## E—NUTRITION

PHILIP B HAWK

Animal experiments on the significance of increased vitamin administration in the therapy of tuberculosis. W. PFANNSTIEL AND B SCHARLAU *Beitr klin Tuberk* 73, 351–72(1930) —The authors used not only primary infected animals but also superinfected immune animals which had been given the preliminary infection with low virulent human tubercle bacilli In rabbits vitamin B concentrate contg in 1 cc the equiv. of 100 g of yeast, and vitamin D (ergosterol, vigantol) revealed no therapeutic effect. Vitamin A (cod liver oil), however, had a favorable influence on some of the animals

Therapeutic action was noted with a coincident peroral administration of yeast and irradiated ergosterol. With weak infections in immune animals there was a complete lack of tuberculosis following the use of vitamins B and D, while with larger infections there occurred a favorable type of disease. A similar, though smaller, effect was noted in primary infected animals. A decidedly less effect resulted when vegetable oils was not given perorally but by inhalation. Primary infected animals were unfavorably affected by overdoses of vitamins B, D and A. In children wt. control can prevent overdosing of vitamin D, and the danger of a D hypervitaminosis need not be feared. H. J. C.

Vitamin A and carotene. Norman S. Carter. *Nature* 126, 663(1930).—The administration of 1 mg. doses of carotene daily to chickens on a vitamin-A-free diet cured the vitamin-A deficiency and enabled normal growth to take place. The livers of these birds gave strong positive tests for vitamin A. It is concluded that carotene may serve as a precursor of the vitamin. H. J. Detwiler, Jr.

The significance of the ultra-red range for the protective substance against rickets. Walter Hixson and Doris Kellner. *Jour. Biol. Chem.* 10, 171-2(1931).—Ergosterol has an absorption band at 3.0 μ (ultra red) following irradiation with ultra violet light the ergosterol develops a new weak absorption band at 0.97 μ while the normal band increases in intensity. Ergosterol, irradiated with ultra violet light, has 2 absorption ranges in the ultra violet range at 280-300 and 250-270 mμ. Both are increased by subsequent ultra red irradiation. In the case of the former, the increase suggests a decomposition of the sp. protective substance, in the latter it suggests the formation of a new substance. The antirachitic factor of ergosterol irradiated with ultra-violet light is destroyed by the ultra red. H. Fiske.

Importance of sugar as the fuel of life. F. Frenzel. *Arch. Pharm.* 269, 9-22 (1931).—An address. W. O. K.

Detection of vitamin A in invalid food products. H. Martin and E. Nauss. *Arch. Pharm.* 269, 22-4(1931). The results obtained with 3 sorts of rats in an exptl. examn. of the products Nervotropon and Ferrupan are graphically shown in connection with the keratomalacia induced and later therapeutic by feeding with vitamin-A-free products and the above-named invalid foods. W. O. K.

Influence of the canning industry in the changing dietary. P. F. Kohman. *J. Am. Dietetic Assoc.* 6, 123-9(1930).—Canned foods have 3 distinct advantages from the standpoint of their vitamin content: (1) they are always canned promptly after harvesting; (2) oxidation, which destroys the vitamins, is not permitted to take place in open canning as it does in open kettle cooking and (3) after canning, the vitamins in canned foods are apparently stable and may be stored for long periods with inconsiderable or no loss. For example, canned tomatoes are richer in vitamins A and B than orange juice and are only slightly lower in vitamin C. Canned fish products of all descriptions contain an unusual amt. of I. The diet, even though complete in its chem. constituents, will not produce its optimum effect unless eaten with relish and enjoyment. C. R. Fellers.

Influence of fertilizer treatment on the vitamin A content of spinach. Hannah E. Honeywell and K. Adams Peterson. *Penna. Agr. Expt. Sta., Bull.* 258, 8(1930); *Ind. Eng. Chem. Report* (Abstract).—Fourteen samples of Rhode Island spinach, dried and stored under $CO_2$, were assayed for vitamin-A content. The spinach was grown under various fertilizer treatments. No significant results were obtained except that where spinach is grown with Mn as a heating soil nutrient, less vitamin A is found. This indicates that pigmentation, metabolism and vitamin A synthesis are correlated. The work is being continued. C. R. Fellers.

"Luxury consumption" and feeding. R. Bonnet and T. H. Tsui. *Arch. intern. physiol.* 31, 333-57(1929). *Physiol. Abstracts* 15, 248.—In overfeeding, rabbits and pigeons do not make a "luxury consumption," and in underfeeding the breakdown processes of the body are cut down correspondingly. G. G.

Physiological ketogenesis in herbivora. P. H. Fentsch. *Arch. intern. physiol.* 31, 393-412(1929); *Physiol. Abstracts* 15, 245(1930).—In herbivora there is an abundant excretion of keto bodies on any diet or in inanition, these substances are of both endogenous and exogenous origin. Proteins are more ketogenic than carbohydrates, which are in turn more so than fats. The addn. of HCl to the food diminishes the excretion of "keto bodies," but there is no relation between the excretion and the total acidity or alky. of the urine. Variations occur in any one animal on a const. diet, and also in different animals. G. G.

Mineral feeding experiments. Iodine, lime and saltbush questions. R. W. Swanson. *New Zealand J. Agr.* 42, 18-23(1931).—The I content of beets and lucerne was increased about 10-fold by the application of small amts. of I salts to the soil. The

percentage increase in the growth of rabbits receiving I either in the form of inorg salts or in the form of foods high in I was distinctly greater than that of the control animals. Addn of lime, alone or in the form of salt lick, to the diet of rabbits did not cause enlargement of the thyroid gland K. D JACOB

**The vitamin D content of grasses varying in origin and fertilization.** ARTHUR SCHEUNERT AND JOHANNES RESCHKE *Tierernähr* 2, 262–9(1930).—A no of green grasses of varying origins were tested for their vitamin D content Different types of grass have different vitamin D contents The same type of grass may show a widely varying vitamin D content. The reasons for this cannot be explained No decisive influence seems to be attributable to the use of artificial fertilizers The conditions of the soil presumably play the most important part. J. C JURRJENS

**A new cereal mixture containing vitamins and mineral elements.** FREDERICK F TISDALL T G H DRAKE AND ALAN BROWN *Am J Diseases Children* 40, 791–9 (1930).—The prepn of a cereal mixt is described, composed of wheat meal, oat meal, corn meal, wheat germ, bone meal dried brewer's yeast and alfalfa The mixt. supplies the minerals and vitamins which are lacking in the ordinary milled, part grain cereal. The Fe content of the mixt is 0.024%, the Cu content, 0.0013%, and the Ca content, 0.78% Vitamin A is supplied by the wheat germ and the alfalfa, vitamin $B_1$ and $B_2$ by wheat germ and yeast and vitamin D by the wheat germ Vitamin D may be secured by irradiation either of the wheat germ or the yeast. The mixt. is palatable and does not irritate the intestinal tract. E. R. MAIN

**Milk sugar in infant feeding** A study of the effects of the routine use of milk sugar in infant feeding. B WINSTON JARVIS *Am J. Diseases Children* 40, 993–9 (1930).—Lactose given to infants in 10 g quantities at 3-day intervals is well tolerated when methods are used to give the other elements of the diet their max digestibility. Infants fed with lactose resemble breast fed infants in firmness of tissue and resistance to infection When compared according to age-wt., they possess more living tissue than infants fed on vegetable sugar, and are less susceptible to sudden dehydration with acidosis as a result of parenteral infection The use of lactose is desirable as a source of galactose for the development of the central nervous system E R MAIN

**The carbon dioxide absorption curve of infants fed lactic acid, hydrochloric acid and boiled cow milk.** DANIEL C DARROW *Am J. Diseases Children* 40, 1016–23(1930).—The $CO_2$ absorption curves for children fed either boiled whole milk or milk to which lactic acid, or both lactic acid and HCl have been added are essentially normal The same changes in diet produce no significant changes in the bicarbonate concn., lactic acid concn or $p_H$ of the blood The $p_H$ of the venous blood, in infancy, is 7.37 ± 0.05 The venous $CO_2$ tension is 41 ± 5.0 mm of Hg The hemoglobin exerts the same influence on the slope of the $CO_2$ absorption curve as in adults E R MAIN

**Recent progress in poultry nutrition.** GRIGORIJ CHOMKOVIC AND JAN PODHRADSKY *Wiss Arch Landw., Abt B, Tierernähr Tierzucht* 2, 27–214(1930).—A review. Seven pages of references are appended W. GORDON ROSE

Banana—a challenge to chemical investigation (VON LOESECKE) 12. Vitamins and palm oil in margarine (EPSTEIN) 27. Determination of Ca, Mg and P in cattle excreta (MORRIS, *et al.*) 7.

BERG, RAGNAR Eiweissbedarf und Mineralstoffwechsel bei einfachster Ernährung Leipzig Hirzel 239 pp M 10.50, linen, M 12

## F—PHYSIOLOGY

B K MARSHALL, JR

**Citric acid content of animal fluids (cerebrospinal, follicular and amniotic fluids and aqueous humor).** I I NITZESCU AND I D GEORGESCU *Compt rend* 190, 1325–7 (1930).—The citric acid content of the following animal fluids has been detd by Thunberg's methylene blue test: human cerebrospinal fluid 0.075–0.080 g per l.; of dog, 0.090–0.100 g per l.; aq humor of oxen, 0.012 g per l.; follicular fluid of cows, 0.040 g per l., human amniotic fluid, 0.025–0.027 g per l. B C. A

**Occurrence of metallic elements in biological material.** W. B S BISHOP *J Cancer Research Comm Univ of Sydney* 1, 242–53(1930).—The elements of groups I and II in the periodic table are widely distributed Group III is the poorest as regards biol. occurrence, the presence of Al in animal tissues being much in dispute Pb (group IV) is the 1st toxic element occurring in tissues As and V are biologically the most interesting members of group V, the latter being but slowly eliminated after injection The carcinogenetic action of tar does not depend on its As content Mn is found in small

amt. in animal tissues but is not related to sarcomata or carcinomata. Cu is connected with hemoglobin formation, while Zn may play some part in reproduction B C. A.

**Fibrillar structures in the albuminous layer of the egg of the fowl.** G C. Heringa and S H van Kempe Valk. *Proc Acad Sci Amsterdam* 33, 530–2(1930).—The albuminous layer surrounding the egg yolk consists of a series of strata, the outer layers being clear and transparent, while the rest is opaque The membranes are of fibrillar structure The fibrils are dissolved on digestion with pepsin and HCl at 37°, when the albumin of a hard boiled egg is dissolved completely In a raw egg the membranes are dissolved less readily than is the remainder of the albumin, and when sections are prepared from a frozen egg the membranous structures remain in connection even after digestion The membranes are completely sol in alk trypsin Evidence is obtained that the fibrils are composed of a keratinic substance B C A

**The absorption of ultra-violet light by the liquids of the organism.** J. Cluzet and T. Kofman *Compt rend soc biol* 103, 1123–5(1930).—Serum, plasma, urine, bile and aq humor (ox) are completely opaque in a layer 15 mm thick to ultra-violet light (3000–2300 A U) Cerebrospinal fluid, however, has an opacity relative to $H_2O$ of 68 6 The opacities of increasing dilns of these liquids show important differences The electrolyte contents of bile and urine are responsible for as much absorption of ultra-violet light as the proteins of serum or plasma The opacity of defibrinated blood at dilns. of 1/100–1/1000 is much greater than that of plasma for the same dilns B C Bruynsetter

**Acetylcholine in beef blood. Comment on the paper of J. Kapfhammer and C. Bischoff.** Fritz Wrede and Werner Keil *Z physiol Chem* 194, 229–31(1931).—Kapfhammer and Bischoff (*C A* 25, 127) have reported the occurrence of acetylcholine (28 8 mg per l) in beef blood, but neglected to verify their findings by physiol tests on isolated intestine Exts prepd by the method of K. and B failed to show any physiol action on guinea pig intestine in Tyrode soln An ext. which should contain 2 9 mg acetylcholine per cc according to K and B gave no appreciable contraction with quantities of less than 5 cc. Acetylcholine added to the blood in quantities up to 30 mg per l disappeared completely during the process of purification On the other hand, treatment of acetylcholine-HCl salt with 10% $CCl_3CO_2H$ during 12 hrs did not impair its physiol action It appears that the acetylcholine, originally present or subsequently added, is carried down in the protein pptn., and does not appear in the ext as claimed by K and B A W. Dox

**Choline in the uterus and its relation to labor pains.** Erich Strack and Adalbert Loeschke. *Z. physiol Chem* 194, 269–76(1931), cf *C A*. 23, 5493.—Although the human placenta contains 180 mg of choline per kg. no choline could be found in the gravid uterus The av. choline content of the non gravid human uterus was 47 mg per kg Beef and pig uteri, on the other hand, showed practically the same choline content in the gravid as in the non gravid state, approx 160 mg No physiol relationship could be demonstrated between choline content of the uterus and the onset or severity of labor pains. A W Dox

**Regulation of the secretion of insulin, with observations on the regeneration of the islands of Langerhans in the pancreas.** G Jorns *Klin Wochschr* 8, 2319–22 (1929).—An inconclusive, highly theoretical discussion H Eagle

**The hormones of the anterior lobe of the hypophysis.** I. Bernhard Zondek. *Klin. Wochschr.* 9, 245–8(1930); cf. *C A* 23, 4738.—The hormone of the anterior pituitary lobe is the true sex hormone. An ext (prolan) injected into the infantile rat causes (1) ripening of follicles, ovulation and rut, (2) the appearance of blood points in the ovary, and (3) formation of corpora lutea Prolan is not the same as the growth-promoting ext. of Evan, and although it contains prephyson, the substance which regulates the sp dynamic action of foods (Kestner), its hormonal effects upon the sex glands are not due to this substance. The sex hormone in prolan contains at least 2 distinct substances one which initiates follicular ripening, uterine hyperemia and mucosal changes in the vagina of infantile white rats 4–5 weeks old (prolan A), and another which causes the formation of corpora lutea in 3–4 weeks old female mice, and which has no effect upon the uterine or vaginal mucosa (prolan B). Folliculin is formed both by the follicles and by corpora lutea in women, but only by the former in animals In the animal prolan A would mobilize folliculin, which induces rut, prolan B would induce luteinization The formed corpora lutea would then induce the hypersecretion of the uterine and vaginal mucosa by their hormone, which Corner calls lutin II. Follicular ripening hormone (prolan A). Menopause. Castration. *Ibid* 393–6.—Prolan A can usually not be demonstrated in the urine of non-pregnant women unless it is concd more than 5 times before extn At the onset of climacterium there is an enormous

increase in the excretion of folliculin, up to as high as 200 units per 1000 cc of morning urine, to be contrasted with the 10 and 30 units normally excreted during the intermenstrual and premenstrual period, resp. There is at this time a polyfolliculin amenorrhea. The second stage begins weeks or months later and is characterized by a complete absence of folliculin from the urine with accompanying vasomotor disturbances. Finally, there is increased excretion of prolan A which can be demonstrated in the urine of 25% of women at the menopause. Following removal of both ovaries, prolan A promptly appears in the urine in 75% of the cases. Even after Röntgen ray castration, it appeared in 4 out of 10 cases. Z. suggests that it is excreted in the urine only when the ovaries, its elective site of action, are removed. Its increased formation following castration may be due to the removal of an ovarian inhibiting substance. It is significant that the hypophysis undergoes histological changes at the menopause or following castration. H. Eagle

**Energy metabolism and its clinical significance (formation of lactic acid and oxygen consumption, function and metabolism, diet.)** S. G. Zondek and F. Matakas. *Klin. Wochschr.* 10, 11–7(1931).—The recent evidence tending to show that the formation of lactic acid is not the actual cause of muscle contraction is summarized. (1) Acetylcholine and other substances cause contraction without the release of lactic acid. (2) In tonic contractions, the formation of lactic acid follows the beginning of contraction. (3) Lactic acid production can be entirely inhibited by bromoacetic acid, *e. g.*, the possible *rôle of phosphocreatine* is discussed. In muscles under tension there are structural and functional changes which may explain the anomalous increase in lactic acid. Similar aerobic glucolysis is observed in other conditions involving nonspecific disturbances in metabolism (Basedow's disease) as also in the metabolism of old leucocytes and mature erythrocytes. Deviations from the usual course of metabolism, in general, may therefore be due to non specific cellular injury. Thus, lactic acid is not the cause, but a product, of muscle fatigue. The authors discuss the relation of these problems of muscle metabolism to clinical conditions. H. Eagle

**The relationship of fat in its passage through the placenta (contribution to the physiology of the placenta).** Werner Dickenbach and Hans Rupp. *Klin. Wochschr.* 10, 63–4(1931).—The fetus receives its fat directly from the maternal organism, unchanged by its placental passage. Thus, if pregnant rabbits are fed with linseed oil, containing an oil with an I no. of 165–175 (normal rabbit fat = I no. of 50–60), the fat of the fetus is found to have exactly the same I no. as that of the mother. There is no real evidence for a splitting of fat in its passage through the placenta, such as occurs in the intestinal wall. Indeed, if the methyl esters of oleic acid, and the amyl ester of palmitic acid are injected into a pregnant rabbit intravenously, they can be found as such in the fetal tissue, but no free amyl alc. or MeOH is demonstrable, indicating that there had not been any splitting of the fat in its placental passage. H. Eagle

**Pyroracemic acid in the metabolism of animal cells.** Bruno Mendel, Milly Bauch and Frida Stralitz. *Klin. Wochschr.* 10, 118–9(1931).—Pyroracemic acid increases anaerobic fermentation by body cells more than 100%, causing them to approximate glucolytic activity of cancer cells. A simple test for pyroracemic acid is described, which is based on the fact that it prevents glyceraldehyde from inhibiting the fermentation by Jensen sarcoma, a test which detects several thousandths of a mg. Using this test, as well as that of Warburg, the authors find that cancer cells under normal conditions form very large quantities of pyroracemic acid. It is also present in mammalian sera. 10 mg. % in the serum of white mice, and somewhat less in rabbit, rat, guinea pig and human serum. H. Eagle

**The solubility, dissociation and tension of carbonic acid in urine.** Fritz Maixner. *Klin. Wochschr.* 10, 119(1931).—The soly. coeff. $\alpha$ (38°) varies between 0.44 and 0.51, the apparent dissocn. const. $P$ (38°) is 5.8–6.3. The tension is very variable, ranging between 16.7 and 21.2 mm. Hg in 20-odd urines, obviously, however, it is much greater than it can possibly be in the tissues. H. Eagle

**The occurrence of very small quantities of mercury in the urine and stools. Its diagnostic significance and causes.** Paul Borinski. *Klin. Wochschr.* 10, 149–53(1931).—38 of 75 normal people excreted as high as 10γ Hg daily, despite the absence of any known exposure to Hg. People with recent dental amalgam fillings excrete considerably more. Almost all foods contain Hg, the total quantity in the daily intake being about 5γ, corresponding to the urine output. H. Eagle

**Activating split products and hormones of the tissues.** Wolfgang Weichardt. *Klin. Wochschr.* 10, 153–4(1931).—Tissue exts. injected into mice increase the performance of its muscles, in larger doses they cause paralysis. Non specific toxic processes may cause the liberation of these tissue hormones in the body, as shown by expts. upon

hearts. Very small quantities have no effect upon normal tissues, but do increase the performance of fatigued organs. Thus, 1:20,000 dilu. of a hydrolysis product of the skin had a definite effect upon the contraction of a fatigued heart. H. Kahn.

**The specific gravity of blood and its constituent parts.** C. Oppenheimer. *Klin. Wchschr.* 10, 160-2(1931).—The sp. gr. of whole blood is 1.05-1.06, that of plasma 1.025-1.030. In *pernicious anemia*, the sp. gr. of the erythrocytes proper is increased from a normal value of 1.085-1.094 to 1.095-1.1. H. Kahn.

**The time relationship of the formation of lactic acid in muscle contraction.** Otto Meyerhof. *Klin. Wchschr.* 10, 211-5(1931). M. confirms the finding of Lehnartz that the supposed const. $K$ = tension (g) × duration of tetanus (seconds) × (cm. of muscle length/lactic acid formed (g)) is larger if the muscle is killed immediately after the tetanic contraction than if 2-5 min. are allowed to elapse, i. e., that there is a post-tetanic formation of lactic acid. However, he is unable to find that the const. $K$ = tension (g) × muscle length (cm.)/lactic acid (g) for single contractions is dependent upon the time interval between stimuli, over a wide range (1-10 sec.). This late formation of lactic acid may play an important rôle in making possible the anaerobic resynthesis of creatinephosphoric acid which is an endothermic reaction. H. Kahn.

**Growth and development with special reference to domestic animals. XVI. The influence of temperature and breeding upon the rate of growth of chick embryos.** Karl W. Henderson. Missouri Agr. Expt. Sta., *Research Bull.* 149, 5-47(1930).—Temp. exerts a profound influence on the growth rate of chick embryos as measured by daily dry wt. and N content as indicated by temp. coeffs. This influence is greatest in the earliest stages of growth and it decreases at successive stages and practically ceases when the embryo is about 16 days old or when it reaches a dry wt. of approx. 2 g. Loss of moisture of eggs is slightly increased by an increase in temp. if the relative humidity is const. In general, the limits of the growth periods at 38.8° coincide with the periods marking a change in the type of chem. compd. utilized for energy. C. R. Fellers.

**Respiration of the tissues. V. Respiration of blood, in vitro, of various homothermal animals.** J. Roche and R. S. Soria. *Arch. intern. physiol.* 31, 413-27(1929); *Physiol. Abstracts* 15, 220-1; cf. *C. A.* 21, 2199.—With the same content of erythrocytes the blood of animals with nucleated red cells has a greater respiratory intensity than that of animals with non-nucleated cells. There is no direct relationship between the oxyhemoglobin content of the blood and the $O_2$ consumption. If the plasma is replaced by Ringer's soln., the respiratory intensity is diminished. G. G.

**Muscular work and glucemia.** V. Rivera. *Arch. intern. physiol.* 31, 428-32(1929); *Physiol. Abstracts* 15, 238-9.—In the rabbit, starvation causes an immediate fall in blood sugar, followed by a const. level. Intense work after several days' starvation produces a marked but very transient increase of the order of 100 mg. per l. G. G.

**A new function of the stomach—its role in the metabolism of urea.** R. Virasoro, D. Samuel and M. Dorfman. *Compt. rend.* 192, 308-10(1931); cf. *C. A.* 24, 5811.—A 14 kg. dog was anesthetized with chloralose and gastric secretion stimulated by injection of 2 mg. histamine. A sample of the gastric juice showed some $NH_3$ present but no urea, 45 min. and 90 min. after the intravenous injection of 15 g. urea the gastric juice contained 1.5 and 2.7 times the normal amt. of $NH_3$ but no urea. When a 3% soln. of urea was kept at 37° *in vitro* in contact with washed dog stomach mucosa the urea was almost completely converted into $NH_3$ in a few hrs. Conclusion.—The normal stomach removes a little urea from the blood and excretes it as $NH_3$. In times of renal insufficiency this action may be increased 5-10 times in amt. L. E. Gibson.

**The relation between blood sugar and blood-clotting time. V. Inter-relation between blood sugar, clotting time and glucolysis.** A. Partos. *Arch. ges. Physiol. (Pflüger)* 226, 317-33(1930); cf. *C. A.* 24, 4547.—The hyperglucemia following the administration of adrenaline or morphine is accompanied by an accelerated glucolysis. Insulin administration is accompanied by an inhibited glucolysis. No relation was found to exist between the rate of glucolysis and the clotting time of blood. VI. **The relation of the blood sugar to the lactic acid content during glucolysis.** A. Partos and A. Herzog. *Ibid.* 401-71.—The lactic acid content of blood was always increased at the beginning of glucolysis. No relationship was discovered to exist between the sugar and lactic acid contents of the blood. Arthur Grollman.

**The constancy of the alveolar ventilation and the variations in the alveolar carbon dioxide and oxygen deficit during voluntary variations of the frequency and depth of respiration.** Hans Hyckschek, H. Paddenburg and Erik Mogensen. *Arch. ges. Physiol. (Pflüger)* 226, 415-30(1930). Arthur Grollman.

The oxygen deficit and carbon dioxide tension of the alveolar air. HANS HECKSCHER *Arch ges Physiol (Pflugers)* 225, 431–47(1930). cf *C A* 24, 4770 ARTHUR GROLLMAN

The chemical composition of the lung: a contribution to the metabolic physiology of the lung. H MISCHKAN, H SCHOEVEN AND P JONKERSOOKP *Arch ges Physiol (Pflugers)* 226, 446–63(1930).—Data are given for the $H_2O$, glycogen, fat, total N, total I, Lipoidal I and Ca contents of dog lungs. The $H_2O$, glycogen and fat contents of the liver, muscle and heart of the same animals were also detd. The effect of the type of food ingested, glycogen feeding, starvation, phlorhizin, insulin and adrenaline injections, on the chem. compn. of the above mentioned organs are also given. A. G

Investigations of the chemical composition of the various lobes of the liver. W. SCHEER *Arch ges Physiol (Pflugers)* 226, 481–92(1931).—The glycogen, fat, total N, rest N and $H_2O$ contents of the various lobes of the liver differ to an appreciable extent. Various parts of the same lobe also differ as regards their chem. compn. A. G

The heat formation of skeletal muscle when lactic acid formation is inhibited. ERNST FISCHER *Arch ges Physiol (Pflugers)* 226, 500–17(1931).—The *caloric quotient* of frog muscles poisoned by $CH_3BrCOOH$ is not altered from the normal. The poisoned muscles fail to show the evolution of *an aerobic recovery heat*. A. G

The complex nature of the hypophyseal sex hormone: its action on the female. E DOSCHEMANN AND S. E. DE JONGH. *Arch ges Physiol (Pflugers)* 226, 543–6(1931).—The *sex hormone* of the hypophysis consists of at least 2 substances. One factor causes maturation of the Graafian follicles; the other causes *luteal formation*. A. G.

The action of the hypophyseal sex hormone on the male organism. S. E. DE JONGH. *Arch ges Physiol (Pflugers)* 225, 547–58(1931).—Young male rats or mice were treated with extr. of *menstruum free urine*. Such extr. contain only the hypophyseal sex hormone. The physiol. action of this hormone was demonstrated. ARTHUR GROLLMAN

The absorption of dyes by the red corpuscles. R. HÜBER AND G PUTNALL. *Arch. ges Physiol (Pflugers)* 225, 559–80(1931).—The distribution of dyes between red blood corpuscles and serum is detd. by the nature of the dyes—particularly its soly. relationships—and by the Lipoid content of the corpuscle. ARTHUR GROLLMAN

The action of potassium and calcium ions on the function of the isolated salivary gland supplied with degenerated nerves. O V NIKOLAEV *Arch ges Physiol (Pflugers)* 225, 663–83(1931).—If the $[Ca^{++}]$ of the perfusate through an isolated salivary gland, whose nerve supply is degenerated, is increased, there is an increase in the salivary secretion. An increase in the $[K^+]$ diminishes the secretion. In both cases there is a diminished blood flow through the gland due to vascular constriction. ARTHUR GROLLMAN

Sleep, sleeplessness and physical exercise and their effect on the blood chemistry. II. The recovery period. H. HOCHREIN, J MICHELSEN AND H. BECKER. *Arch ges Physiol (Pflugers)* 225, 728–47(1931).—The blood chemistry (lactic acid, O capacity, and *pH*) of individuals deprived of sleep differs in the recovery period after exercise, from that of normally rested individuals ARTHUR GROLLMAN

The humoral nature of nervous excitability. I P RAZENKOV AND A. N PORELINA. *Arch ges Physiol (Pflugers)* 225, 765–83(1931).—Stimulation of the vagus leads to the formation of substances in the glandular cells of the stomach and pancreas which act as hormones in the circulation. ARTHUR GROLLMAN

The relation between the hormone of the anterior lobe of the hypophysis (prolan) and the male sex gland. M. BURET *Deut med Wochschr* 56, 1117–20(1930).—The injection of *prolan*, an ext. of the *anterior lobe* of the hypophysis, into young male mice caused marked degenerative changes in the testicle. In the case of older mice, the effect was less pronounced. ARTHUR GROLLMAN

The importance of the thiocyanate present in gastric juice. G LOCKEMANN AND W. LIEBICH. *Deut med Wochschr* 56, 1740–2(1930).—The presence of $SCN^-$ in gastric juice greatly enhances its bactericidal power ARTHUR GROLLMAN

Hormones. BENJAMIN HARROW *J Chem Education* 8, 651–9(1931).—A review E. H.

The coenzyme of lactic acid formation of the muscle. KARL LOHMANN *Naturwissenschaften* 19, 150(1931).—Previously the coenzyme of lactic acid formation in the muscle was found to consist of an autolyzable and a non-autolyzable part, the former being adenylpyrophosphoric acid (*C. A* 24, 145, Meyer, *C. A* 22, 2566). It was now found that the non-autolyzable part can be replaced by Mg salt. The system dialyzed muscle ext. + more phosphate + adenylpyrophosphate + Mg salt is able to split

glycogen into lactic acid. Absence of any of the 4 components inactivates the mixt. Muscle ext. inactivated after prolonged standing (4 days at 0°) by enzymic demolition of the adenylpyrophosphate (Meyerhof, *C. A.* 20, 1035) can be reactivated by addn. of this substance or of adenylic acid but to a lesser extent. A slight reactivation is caused by inosinpyrophosphoric acid, no action is found on addn. of inosinic acid. An adenylpyrophosphoric acid similar to that in the skeleton muscles of vertebrates or that of non-vertebrates occurs in heart muscle. The Harden Young hexosediphosphoric acid and Embdens hexosemonophosphoric acid are only cleaved by adenylpyrophosphate in the presence of Mg, likewise for the reverse reaction. An additional case where this combination is essential to effective action is in ale. fermentation by dialyzed maceration juice or by washed yeast (washed in weakly acid soln.). The system Mg + adenyl pyrophosphate fulfills all conditions for a coenzyme. Its relation to that of Euler and Myrbäck (*Z. physiol. Chem.* 1929-30; cf. *C. A.* 24, 5312) is uncertain. The system is not active for methylglyoxalase (Neuberg, *C. A.* 7, 2413, Dakin and Dudley, *C. A.* 7, 1522).
B. J. C. VAN DER HOEVEN

*The surface potential of the gastric mucous membrane in warm-blooded animals under various conditions.* KURT KRAMER. *Z. Biol.* 91, 25-30(1931).—Surface potentials of the gastric mucous membrane were derived by using KCl, HCl and NaOH in different concns. The direction and intensity depend entirely and characteristically on the soln. It seems that HCl can vary the permeability if its concn. is varied. Contrary to other membranes, these changes are very small and reversible. NaOH causes irreversible changes.
FRANCES KRASNOW

*Investigation on the fluctuations of the potential of the gastric mucous membrane in warm-blooded animals.* HANS SARRE. *Z. Biol.* 91, 37-42(1931).—The initial potential is varied by changing the soln., in contact with the membrane. When acid gastric juice is in contact with the membrane, the potential is always negative, of variable height and depends upon the condition of the animal. At death the potential falls steadily and reaches positive values.
FRANCES KRASNOW

*The influence of oxygen on the generation of lactic acid in the muscle of warm-blooded animals.* ARMANDUS HAHN, E. FISCHBACK AND H. NIEMER. *Z. Biol.* 91, 53-62(1931).—In work on pig muscle it was found that in the presence of $O_2$ the lactic acid content of muscle mash may be kept const. The amt. of total carbohydrate remains const. or decreases very slightly.
FRANCES KRASNOW

*The activity of the heart and the central nervous system of mammals during great oxygen deficiency.* L. ASHER AND N. SCHEINFINKEL. *Z. Biol.* 91, 66-72(1931).—In certain cases it was possible to maintain normal breathing and circulation by inspiring air containing only 3% $O_2$.
FRANCES KRASNOW

*Hydrogen-ion concentration of the alimentary tracts of fowl, cat and rabbit.* ALVAN R. MCLAUGHLIN. *Science* 73, 191-2(1931).—Fowls, rabbits and cats were killed very rapidly and the $p_H$ value of the contents of several portions of the alimentary canal was measured by means of a quinhydrone electrode. The fowls and rabbits were killed very soon after feeding. All portions of the alimentary canal of the *former* were acid, while those of the latter were slightly alkaline excepting the stomach ($p_H$ 1.83) and cecum ($p_H$ 6.26). The results for the cats were uncertain because of the lack of knowledge of their past history, all portions were definitely acid.
I. M. LEVINE

*The alleged presence of "bound potassium" in muscle.* WM. E. CALLISON. *J. Biol. Chem.* 90, 665-8(1931).—"The decrease in 'bound K' in muscle tissue placed in isotonic saline is related to the amt. and frequency of change of isotonic NaCl soln. and to the size of the pieces of muscle tissue. Autolysis for a period of 24 hrs. did not apparently affect the diffusion of K into the soln. The present expts. furnish no evidence for the existence of 'bound K' in muscle tissue" as claimed by Neuschloss (*C. A.* 20, 3497, 3498) and corroborate the findings of Raab (*C. A.* 21, 3227) and Höber (*C. A.* 23, 3748). Neuschloss' method for the detn. of 'bound K' is unsatisfactory.
A. P. L.

*Studies on arginine. I. The rate of catabolism of arginine in rats, including a method for the determination of arginine in biological material.* VIRGIL C. KIRCH, JAMES M. LUCK AND ANNA EVELYN SMITH. *J. Biol. Chem.* 90, 677-96(1931).—A volumetric method, in principle resembling that of Benoit and Cahn (*C. A.* 21, 1471), is described for the detn. of very small amts. of arginine in protein free tissue exts. The proteins are ppted. by $H_2WO_4$, the arginine is converted by arginase into ornithine and urea and the urea is detd. as dixanthydryl urea by oxidation with $K_2Cr_2O_7$ and $H_2SO_4$ according to the vol. procedure of Allen and Luck (*C. A.* 23, 5206). Muscle tissue of fasting *female rats* contains an av. of 20.1 mg. of arginine per 100 g. and the whole carcass 27.5 mg. If administered subcutaneously, arginine is rapidly catabolized and the ornithine which would presumably be formed must be catabolized almost as rapidly

as less than 12% of the injected N is present at any time in substances other than urea and arginine Bibliography of 26 references A P Lothrop

**The distribution of blood sugar.** Michael Somogyi *J Biol Chem* 90, 731–5 (1931).—Folin and Svedberg (*C A* 25, 335) have recently reported a ratio of 60 100 for the distribution of corpuscle and plasma sugar for healthy persons and claim that the corpuscles in the blood of diabetics contain relatively more sugar than those of non-diabetics S has redetd the values for true sugar using his new method of deproteinization (*C A* 25, 2165) and obtains results approx. the same as those previously reported (*C A* 22, 3204), 77 100, in both diabetics and non-diabetics F. and S detd total reduction values and not true sugar in plasma and slight and negligible as the amt. of non sugar reducing substances in plasma may appear (5–6 mg %) it suffices grossly to distort the true picture of the distribution of sugar If the figures are corrected to true sugar values by the deduction of 5 mg % of reducing non-sugars, a rise in the distribution ratios occurs and at once removes the apparent difference between the ratios of normal and diabetic individuals which is actually non-existent The corrected figures are well in accord with those obtained by S. A P Lothrop

**Local metabolism and tissue reaction. Further investigations of the relations between local metabolism and cell growth** Gerhard Meyer-Dörkin *Beitr. path Anat* 85, 555–64(1930).—The growth-stimulating effect of solns of inorg salts upon the endothelial cells of the lymph spaces of white mice observed in earlier expts (*C A*. 24, 5358) was not observed in later expts carried out under more carefully controlled conditions F R. Main

**The physiologic variations in the inorganic blood phosphorus content at the different age periods. An attempt to explain these in the growing child.** J K. Bullock. *Am J Diseases Children* 40, 725–40(1930).—The inorg P content of the serum of newborn infants is 4 82 mg per 100 cc It increases rapidly to a value of 5 66 mg per 100 cc. at the 7th month From this time it tends to diminish gradually until the 19th or 20th yr, the period of termination of osseous growth, and then remains more or less const The age periods of most rapid growth do not show as marked an increase in inorg P as the seasonal periods of most rapid growth E R. Main

**The intermediate metabolism of fats. The influence of the administration of certain fatty acids of the aliphatic series on ketogenesis and on the acid-base equilibrium of the organism in diabetics and on patients suffering with liver disturbances** L Cannavo *Boll soc ital biol sper* 5, 805–10(1930).—The acidosis caused by the administration of various fatty acids and the relation of acidosis and the production and elimination of "ketone bodies" were studied clinically on patients. From the data accumulated, it appears that all or nearly all the acids of the aliphatic series produce acidosis, however, only those which contain an odd no of C atoms are intensely ketogenic. The acidosis caused by the administration of acids with the odd no of C atoms may be due to non ketogenic org acids formed from the former by the degradation of their mols Whenever, as a result of the administration of fatty acids there arose a more or less intense acidosis, an increase of $NH_3$ in the urine was observed In patients with hepatic lesions a fair amt of ketones was observed in the blood and urine, this points to a diminution of the function of the hepatic cell which in all probability is a factor in hepatic acidosis and coma Peter Masucci

**The reticulo-endothelial system in the defense of the organism.** Lamberto Lenzi *Boll soc ital biol sper* 5, 825–8(1930).—Contrary to what has been observed with inorg poisons, animals which have been previously stimulated with metallic colloids (collargol) do not become more resistant to org poisons (morphine HCl or quinine sulfate) Peter Masucci

**Experimental studies on the influence which blood plasma exerts on arterial pressure in contrast to that exerted by the corpuscles.** Luigi Spadafina *Boll soc ital biol sper* 5, 829–32(1930).—Repeated infusions of distd $H_2O$ in dogs such that the no of corpuscles was reduced to $^1/_2$ or even $^1/_4$ of the normal did not appreciably change the arterial blood pressure Injections of pyridine, subcutaneously or intravenously, reduced the corpuscles to $^1/_4$ the normal, but did not change the arterial pressure These results lead S to conclude that plasma plays a much more important role in the maintenance of the normal blood pressure than the blood corpuscles Peter Masucci

**The sedimentation of the blood studied by means of the nephelometer. IV. The influence of the viscosity of the medium.** A Aggazzotti and G Bucciardi *Boll. soc ital biol sper* 5, 867–9(1930), cf *C A* 24, 1897.—By increasing the viscosity of Ringer soln by the addn to it of glycerol, starch or glucose, and using the modified Ringer as a diluent for blood (9 1% citrated blood), the variations in the luminosity which precede and follow sedimentation of the corpuscles are changed markedly. The

increase of the initial luminosity which precedes the beginning of sedimentation is noticeably retarded PETER MASUCCI

The permeability coefficient of aqueous solutions of lactic acid on muscle. P. ROWINSKI *Bull soc ital biol sper* 5, 899–901(1930).—Frog muscle prepns. were perfused with Ringer soln. (without bicarbonate) and after having frozen and powd the muscles with liquid air, lactic acid was detd. (1) *Perfusion with Ringer soln. contg lactate*.—The lactic acid in the muscle increased with increasing concn of the salt in the perfusion liquid. (2) *Perfusion with Ringer soln contg lactic acid*.—The concn. of lactic acid in the muscle varied according to the concn of the acid in the perfusion liquid Up to 40 mg % ($p_H$ 3.0) the lactic acid in the muscle increased rapidly, but with greater concns. the increase became slower (3) *Perfusion with Ringer soln contg HCl*.—When the liquid coming out of the muscle had a $p_H$ of 6.8 the amt of lactic acid was normal, but when the muscle failed to regulate the $p_H$ of the circulating liquid, the amt. doubled P. M.

*Studies on the surviving hepato-pancreatic preparation.* I. The metabolism of fats. OSCAR CANTONI *Bull soc ital biol sper* 5, 918–21(1930).—The fatty acid content of the blood did not vary noticeably in fasting animals but did decrease in dogs with alimentary lipemia The circulating fatty acids apparently went through a process of desaturation as evidenced by the lowering of the m. p. and solidification point, and by the increase of the iodine no. II. The metabolism of cholesterol. *Ibid* 921–2 The diminution of cholesterol during circulation was gradual, const. and independent of the amt of alimentary fat III. The respiratory exchange. *Ibid* 922–4 The R. Q. was generally low, indicating intensive oxidative processes. IV. The ureopoietic function of the liver. *Ibid* 924–5. There was an increase of urea in the blood flowing from the liver The increase was gradual, const. and bore no relation to the alimentary fat. PETER MASUCCI

The lipoidal hormone of the hypophysis and the vitamin of fertility. RENZO AGNOLI *Bull. soc. ital. biol. sper.* 5, 937–9(1930).—Some preliminary evidence is offered that the lipoidal hormone of the anterior pituitary lobe is similar to the fat sol. vitamin E. PETER MASUCCI

The action of adrenaline on the reduction processes of frog muscle pulp. M. COMEL. *Bull. soc. ital. biol. sper.* 5, 932–4(1930).—With methylene blue or *m*-dinitrobenzene as indicators, adrenaline in concns. of $10^{-4}$ to $10^{-11}$ when added to frog muscle pulp did not accelerate or inhibit reduction processes. PETER MASUCCI

Experimental uricolysis in the heart-lung preparation. GINO BERGAMI. *Bull soc. ital. biol. sper.* 5, 934–6(1930).—Uric acid injected into the heart lung prepn. is not destroyed. The addn of uricase to the blood circulating in the prepn causes only a slight diminution of the uric acid content PETER MASUCCI

Parathyroids and irradiated ergosterol. G. GANTINI *Bull. soc. ital. biol. sper.* 5, 953–5(1930).—Irradiated ergosterol cannot be substituted for the parathyroid hormone, the former merely retards tetany without influencing cachexia PETER MASUCCI

The influence of nonelectrolytes on the buffer action of animal and vegetable organs. GIUSEPPE RUSSO *Bull. soc. ital. biol. sper.* 5, 955–5(1930).—The aim was to establish whether a given organ displaces with equal intensity the reaction of 2 isotonic solns. of equal $p_H$ The nonelectrolytes used were urea, glucose, sucrose and galactose; the electrolyte was NaCl. The results show that nonelectrolytes aid in an acid reaction and inhibit in an alk. reaction the unfolding of the buffering action of tissues, *e. g.*, NaCl and glucose soln had initial $p_H$ of 5, after shaking both with equal amts. of frog leg tissue and for equal lengths of time, the NaCl had a $p_H$ of 7.18, the glucose $p_H$ 7.45. When the initial $p_H$ was 5, after the solns. were shaken with the tissue, the NaCl soln had a $p_H$ of 5.65, the glucose $p_H$ 5.93. This behavior explains in all probability the action of nonelectrolytes on the permeability of protoplasm. PETER MASUCCI

The so-called influence of the suprarenal medulla on alimentary hyperglycemia. S. RACCHETTA AND A. CRISERA. *Bull. soc. ital. biol. sper.* 5, 903–6(1930).—Dogs subjected to the complete or incomplete ablation of the suprarenal capsule showed, immediately after the operation, a marked lowering of temp. which reached 34–35° in some cases. After the complete ablation of the suprarenal medulla, and in some cases after the removal of the greater part of the cortex, not only was there no hypoglucemia but in some cases there was a tendency toward hyperglucemia after the administration of glucose. PETER MASUCCI

The direct action of follicular liquid on the motility of the tubes. LUIGI MANNI. *Bull. soc. ital. biol. sper.* 5, 1009–5(1930). PETER MASUCCI

The energy of movement of spermatozoa. E. E. IVANOV. *Z. Tierzucht. Zuchtungsbiol. Tierernähr.* 20, 404–18(1931).—The onward movement of dog spermatozoa

group. Ammoniacal AgOH colors the yellow rods an intense black, demonstrating a reducing power, this is not due to an aldehyde group, however, because decolorized fuchsin does not have its color restored, neither is it due to the presence of 2 phenol groups, nor to the presence of one phenol and one aromatic amine group, since the chromaffin reaction is negative, on the contrary, prolonged oxidation by alk. dichromate causes the rods to disappear, an irreversible reaction as shown by treatment with reducing agents. The expts. of Bach and Haehn on the action of tyrosinase on tyrosine make it possible to deduce the presence of a quinonic nucleus, *in vitro* the quinone is condensed very easily with tyrosine to give derivs. with properties very similar to those described for the melanic pigment, therefore L. concludes that this latter substance is a condensation product of a compd. having a phenolic base like tyrosine, with a deriv. possessing a quinonic structure. This compd., first stage of melanogenesis, preserves intact a phenolic hydroxyl. ALBERT L. RAWLINS

The relation existing between the factors determining the amount of oxygen consumption of the organism. G. LITARCZEK, H. AUBERT, I. COSMULESCO AND B. NESTORESCO. *Compt. rend. soc. biol.* 106, 108-10(1931).—The following equation is derived

$$O_2 = \text{Output} \times Hb O_2 \left/ \left\{ \frac{[100x_a^n}{(1/k_a) + x_a^n]} - \frac{[100x_v^n}{(1/k_v) + x_v^n]} \right\} \right., \text{ where}$$

output is the quantity of blood which passes through the capillaries from the arterial to the venous system, expressed numerically by considering 100 cc. as unity, $HbO_2$ is the total $O_2$ capacity of the blood, $1/k_a$ and $1/k_v$ are the consts. of dissociation of the oxyhemoglobin of arterial and venous bloods, resp., $x_a$ and $x_v$ are the tensions, resp., of arterial and venous $O_2$ expressed in mm. of Hg. ALBERT L. RAWLINS

The growth-promoting hormone of the pituitary body. H. B. VANDYKE AND ZONIA WALTER LAWRENCE. *J. Pharmacol.* 40, 413-22(1930).—An alk. ext. of the anterior lobe, which appears to be free of the lutenizing principle, further purified by filtration through a Berkefeld filter, pptn. with $Na_2SO_4$, dialysis, etc., is described. A method of assay is given; it involves the use of hypophysectomized or normal adult rats. C. R.

A critical study of the assay of female sex hormone preparations. P. E. D'AMOUR AND R. G. GUSTAVSON. *J. Pharmacol.* 40, 473-84(1930).—The work of Coward and Burn (*C. A.* 22, 632) on standardization of female sex hormone prepns. was repeated. D'A. and G. agree with Coward and Burn that the rat unit should be the amount of hormone necessary to produce estrus in 50% of a large group of animals, and that a standard unit be used by all workers. C. RIEGEL

The preparation and assay of crystalline female sex hormone. P. E. D'AMOUR AND R. G. GUSTAVSON. *J. Pharmacol.* 40, 485-9(1930).—Prepn. of a cryst. estrin is described which on assay showed 1 rat unit equal to 0.28γ. C. RIEGEL

The diuretic hormone of the brain. J. OLIVET. *Münch. med. Wochschr.* 77, 58-9 (1930).—A substance with a strong diuretic action is mobilized by stimulations of certain portions of the brain. The substance was isolated to the extent that it was active when administered to other animals. The hormone is formed in the midbrain. R. C. WILSON

NEWBURGH, LOUIS H., AND JOHNSTON, MARGARET W. **The Exchange of Energy between Man and the Environment.** Springfield, Ill.: C. C. Thomas. 101 pp.

## G—PATHOLOGY

H. GIDEON WELLS

Presence of pancreatic enzymes in the bile. H. L. PORTER. *Wiener klin. Wochschr.* 42, 800-3(1929).—In certain pathol. conditions the bile, which usually contains no diastatic enzyme, showed high diastatic values. B. C. A.

Ketosis in seasickness. J. R. MAYRACK. *Brit. Med. J.* 1931, I, 178-9.—Ketosis occurs in seasickness after vomiting appears, sometimes before. Ketosis is not the cause of seasickness, but rather is an evidence of some unknown metabolic disturbance. J. B. BROWN

Relation of calcium to the hemorrhagic tendency in obstructive jaundice. ROBERT R. LINTON. *Ann. Surgery* 93, 707-21(1931).—The lowered coagulability of the blood in cases of obstructive jaundice does not seem to be due to a deficiency or abnormality of the blood Ca. The most effective means of preventing and stopping postoperative hemorrhage in obstructive jaundice is repeated direct blood transfusions used in conjunction with a high carbohydrate and fluid intake. RACHEL BROWN

*is no I deficiency. However, I deficiency may be one of several possible causes of goiter.* H Raub

**"Uremia" following protracted vomiting.** Paul Meyer *Klin Wochschr.* 10, 155 7(1911). Protracted vomiting may cause acidosis, increased nonprotein nitrogen in the blood, anuria and even convulsions, without any anatomical changes in the kidneys. In one case, the administration of insulin, glucose and physiol. NaCl soln. caused the disappearance of all symptoms. H Raub

**The color of the urine in diffuse hematogenous kidney disease.** Erwin Becher *Klin Wochschr.* 10, 157 60(1911). H Raub

**The demonstration of brain antibodies in human syphilis.** F Gronot and O Fischer *Klin Wochschr.* 10, 207 10(1911), cf. *C. A.* 24, 3853. The mere fact that an alc. ext. of brain may give complement fixation with syphilitic spinal fluid and not with blood from the same patient does not prove the presence of brain antibodies in the fluid. The same phenomenon can be produced with any organ ext. by proper dilu. and is due to the fact that spinal fluid continues to react even with high dilus. of alc. ext., while the serum does not. A concd. brain ext. gives complement fixation with the spinal fluid and serum from many non-syphilitic, organic neurological conditions, which strongly indicates that there may be a true antibody to brain lipoids. H Raub

**The electrolyte content of the blood in a case of diabetes insipidus.** M Grabowski *Deut. med. Wochschr.* 36, 1700 2(1910). The blood in a case of diabetes insipidus showed an increased K, a decreased Ca, and an increased Na content. The $H_2O$ binding capacity of the corpuscles was increased. Arthur Croftman

**Value and duration of immunity conferred by antidiphtheritic anatoxin. Titration of antitoxin present in the serum of vaccinated children.** G Ramon and Robert Debré *Am. J. Diseases Children* 41, 1 7(1911), cf. *C. A.* 24, 2171. The antitoxin content of the blood serum of children who have a neg. Schick test after immunization with diphtheria anatoxin is more than $^1/_{10}$ unit per cc. It is approx. the same whether 2 or 3 injections of anatoxin are given but may be higher if a 4th injection is given and if there is a prolonged interval between 2 of the injections. It appears to be higher the older the child is when inoculated and does not tend to diminish with increase in the time after inoculation. L. R. Main

**Cell and plasma chloride in the pyloric stenosis of infants.** Montague Maitland and Catherine H McArthur *Am. J. Diseases Children* 41, 35 44(1911).—The blood plasma of normal infants less than 3 months of age contains 22 28 millimols of bicarbonate ion and 90 106 millimols of chloride ion. The cells contain 11 56 millimols of chloride ion. In pyloric stenosis in infants, the *p*H of the plasma and the concn. of bicarbonate are normal or increased. The chloride concn. of the plasma and of the *cells is often decreased, the chloride content of the cells usually being lowered to a* greater extent than that of the plasma. The vol. of the blood often is decreased and the relative vol. of the cells increased. L. R. Main

**Dietary protein and blood-clotting function.** I Newton Kugelmass and Emma Louise Hamill. *Am. J. Diseases Children* 41, 18 52(1911); cf. *C. A.* 24, 3517.—Prolonged feeding of a diet rich in protein tends to maintain the blood clotting factors at a high level, thereby increasing the coagulability of the blood. An increase in the production of fibrinogen is induced by injury of the tissues through surgical intervention, and a transient increase by the introduction of heterologous proteins into the vascular system. L. R. Main

**Ossification. I. Callus formation and calcification.** I Newton Kugelmass and Richard N Berg. *Am. J. Diseases Children* 41, 210 18(1911). Bone repair *appears to be a local rather than a systemic process and may be, therefore, retarded or* accelerated by locally applied agents. The degree and rate of calcification in experimentally induced fractures in rabbits are directly proportional to the amt. of available fibrous tissue. The union of the bones may be retarded by soln. of the fibrous tissue by means of the injection of an alk. soln. of trypsin at the site of the fracture. It may be accelerated by the stimulation of the production of fibrous tissue induced by the local injection of tissue fibrinogen. The local production of fibrous tissue does not appear to be affected by a diet high in protein. The Ca content of the blood tends to be higher and the phosphate content lower in the course of normal bone repair. A more rapid rate of calcification is associated with more marked alterations in the Ca and phosphate concns. L. R. Main

**The proteolytic activity of the spleen in disease and hemorrhage.** Arnold Strauss *Beitr. path. Anat.* 48, 251 71(1910). The softening of the pulp tissue of spleens obtained at autopsy is associated with an increased proteolytic activity, which may be measured by the ability to liquefy gelatin or egg white. The optimum activity of the enzymes occurs

at $p_H$ 8 and $p_H$ 5 The enzymic activity is increased with the increase in time after death and is markedly increased in acute septic poisoning and post hemorrhagic swelling It is normal in spleens with chronic septic poisoning, in indurated and atrophied spleens and in those of children under 3–5 yrs The presence of leucocytes appears to be an important factor in the degree of enzyme activity, since there is no proteolytic activity or softening of the pulp in animal spleens which contain no leucocytic enzymes The softening of the adrenals appears to be assocd with a purely autolytic rather than a proteolytic process E. R. Main

**The reactions of tissues and cells at artificial boundaries in the animal body.** K. Akamatsu *Beitr path Anat* 85, 349-70(1930) —The relation between the surfaces of small blocks of gelatin placed in the abdominal cavities of guinea pigs and the surrounding tissues appears to depend upon the concn of H and OH ions within the blocks The acid blocks have a marked tendency to adhere to and unite with the surrounding tissues The alk. blocks have no tendency to unite with the tissues The accumulation of leucocytes at the boundary surfaces and in the interiors is much more marked in the acid blocks The leucocytes in the interior of the alk blocks, although fewer in no., give a stronger test for the presence of oxidase E. R. Main

**The biologic and pathologic significance of copper, zinc and manganese.** Walter Herkel. *Beitr. path Anat* 85, 513-51(1930) —The continued feeding of various salts of Cu to rabbits and rats does not induce cirrhosis of the liver Large amts of the ingested Cu accumulate in the liver, small quantities in the kidneys and very little in the bones The amt. of Cu stored depends upon the amt fed and the duration of the period of feeding and not upon the form in which it is fed The normal liver contains from 6.5 to 36.1 mg of Cu per kg of dry substance The values are doubled in pregnancy and are many times greater in the new born The Cu content of the liver in hemachromatosis is 24–384 mg per kg and is greatly increased in all other organs except the kidneys and bones In cirrhosis without pigmentation the liver contains 67.6–374.9 mg Cu per kg The Zn content of the normal liver is 50–317 mg per kg of dry substance and is not increased in hemachromatosis L. R. Main

**The chemistry of hemosiderin.** Kurt W Schultze *Beitr path Anat* 86, 101–2 (1931) —The detn of the amts of ferric and ferrous ions present in the organs obtained at autopsy is extremely difficult, since the ferric ion is reduced rapidly during the 1st 6 hrs after death and the ferrous ion is then gradually oxidized However, if an appreciable amt. of Fe is present, as in hemosiderosis of the liver, the quantity of free ferric Fe in the liver is much greater than in other organs examd under identical conditions. HCHO and other preservatives of tissues hasten the oxidation of the ferrous ion. Expts in which hemosiderosis is induced in animals by the injection of hemoglobin and distd $H_2O$, while not conclusive, indicate that a large part of the Fe of hemosiderin exists in the ferric state Procedures are described for the extn of the free Fe of tissues by dil *acids with the exclusion of air and for the detn of the total free Fe and the free ferrous* and ferric Fe E. R. Main

**The Hinton glycerol cholesterol reaction for syphilis. Second modification.** Wm A Hinton and Arthur Berk. *New Engl J. Med* 202, 1054–9(1930) —Supplementary procedures for the glycerol cholesterol reaction previously proposed (*C. A.* 24, 3828) are described which involve the use of a cholesterolized beef heart ext and the formation of a characteristic ring instead of a ppt E. R. Main

**Blood cholesterol values in hyperthyroidism and hypothyroidism. Their significance.** Robert L Mason, Hazel M Hunt and Lewis Hurxthal. *New Engl J Med.* 203, 1273–8(1930) —The cholesterol content of the blood tends to become decreased in hyperthyroidism, the lowest values being assocd with severe toxemia It becomes markedly increased in true myxedema E. R. Main

**Studies on anaphylaxis. VIII. The influence exerted by the liver on anaphylactic ictus and on peptone ictus, with particular reference to the experimental method and sources of error.** Alberto Marrassini. *Boll. soc ital biol. sper* 5, 833–7(1930) — Guinea pigs were sensitized to egg albumin and to Witte peptone The test dose was given after 19 days, part of the pigs received this dose in the jugular vein and part in a branch of the mesenteric vein Amts of egg albumin below certain limits when used for the test dose gave very different results with animals of the same weight. The shock varied from 0 to 6 according to the Arloing and Wauthey scale The amt of albumin which might produce a mortal ictus or an ictus of varying intensity even to total absence was about ¹/₄ the dose which produced death with certainty in 250–300-g guinea pigs In guinea pigs 250–350 g or over there was no relation between wt. of the animal and the dose of antigen necessary to produce a shock of equal intensity These facts are ascribed to profound individual differences 0.00150 g albumin almost always

produced death; 0 00175–0 00250 g constantly produced death The results of slight or no shock reported by many authors who injected larger amts of albumin must be accepted with much reserve, the same applies to results obtained with horse serum in doses of 0 05 cc, which corresponds to 0 003625 g protein The results obtained by injecting the test dose into the portal circulation were similar to those obtained when injected into the jugular vein No definite ratio was found between the quantity of peptone necessary to produce sure death and the wt of the animal The weakest dose of peptone which produced a sure violent shock in 250–350 g guinea pigs when injected into the jugular vein, when injected into the portal circulation gave slight or no shock in about ½ the animals PETER MASUCCI

**Alkaline reserve in septic cases.** RODOLFO REDI *Boll soc ital biol sper* 5, 852(1930).—The alk reserve values could not be used as a prognosis either for the duration or course of the disease PETER MASUCCI

**Studies on the acid-base equilibrium of the blood of septics (alkaline reserve, hydremia, glucemia, chloremia and urological examinations).** RODOLFO REDI *Boll soc ital biol sper* 5, 853–4(1930).—The causes which change the acid base equil of the blood of septic patients were investigated The attempt was made to see whether the changes were due to the formation of an excess of acid substances, to a diminution of their neutralization or to their elimination The results lead R to state that there are too many factors to take into account to arrive at any definite conclusion A knowledge of the alk reserve in septic cases is of value only when considered along with other clinical findings PETER MASUCCI

**The adsorption of the virus of chicken sarcoma by hemoglobin** CLAUDIO PULCHER *Boll soc ital biol sper* 5, 888–91(1930).—Llectropos hemoglobin adsorbs the virus, electroneg hemoglobin does not These results are in accord with cataphoresis expts and show that the virus is negatively charged PETER MASUCCI

**The $p_H$ and alkaline reserve of the blood in experimental intestinal occlusion.** M. MAIRANO AND G VECCHI *Boll soc ital biol sper* 5, 912–5(1930), cf. *C A* 24, 5833.—The expti intestinal occlusion obtained by sectioning the intestine provokes a progressive increase of the alk reserve which runs parallel to the clinical picture The increase of the alk. reserve bears no relation to the height of the occlusion The $p_H$ of the blood increases slightly, reaching a max of 7.50–7 55 at the terminal period of the occlusion. PETER MASUCCI

**Uroroseinuria and calcariuria as indices of hepatic insufficiency.** S GULLOTTA *Boll soc ital sper.* 5, 971–3(1930). PETER MASUCCI

**The acid-base equilibrium in dogs after cutting the vagi.** G QUAGLIARIELLO AND E TRIA *Boll. soc. ital. biol sper.* 5, 1016–9(1930).—After cutting both vagus nerves, the changes in the acid base equil of the blood were slight, there was a slight acidosis but this remained within limits compatible with life There was also a slight diminution of blood bicarbonates Marked changes, however, were noted in the urine. The concn of bicarbonates increased and the acidity decreased because of the increase in $NH_3$ PETER MASUCCI

**The influence of protein substances on the production of antibodies.** I. G ASCIONE. *Boll soc. ital biol sper.* 5, 1038–41(1930).—Beef serum albumin injected into rabbits 48 hrs after each injection of typhoid or staphylococcus vaccine does not exert any influence on the production of antityphoid and antistaphylococcic agglutinins The globulin of the same serum injected similarly inhibits the production of antityphoid agglutinins but accelerates the production of antistaphylococcic agglutinins in a concn 3 times greater than the controls II. *Ibid* 1042–4.—Two different strains of paratyphoid A were used The rabbits immunized with bacteria and with lactalbumin yielded a serum with an agglutinating power no different from the controls Similar results were obtained with rabbits immunized with bacteria and serum globulin However, rabbits immunized with bacteria and serum albumin yielded a serum with a concn. of agglutinins 3 times greater than the animals receiving the bacteria alone P M.

**A substance contained in lymph and lymphnodes producing hypoglucemia.** PIO MARFORI. *Arch fisiol* 28, 142–9(1930).—A fistula of the thoracic duct in a dog produces hyperglucemia but not glucosuria Lymph and lymphoganglin compensate this increase of blood sugar. Both have a weak and inconst action on the pancreas of the diabetic dog The action is not due to insulin, but to a hormone antagonistic to adrenaline and acting by reduction of the activity of the vegetative sympathetic system. A. E. M.

**The pituitary factor in arteriosclerosis. Its experimental production in rabbits.** ROBERT C. MOEHLIG AND EUGENE A. OSIUS *Ann Internal Med* 4, 579–92(1930).—Marked production of atheromatous plaques in the rabbit aorta may be produced within

100 days by the feeding of a diet high in cholesterol and the daily injection of posterior lobe pituitary ext JOHN T. MYERS

**Natural bactericidal antibodies: observations on the bactericidal mechanism of normal serum.** T J MACKIE AND H M FINKELSTEIN *J. Hyg* 31, 35–55(1931) —Serum complement has no bactericidal action *per se* An antibody like substance invariably acts as an intermediary agent This sensitizing agent is stable at 55° but labile at 60° to 65° It is resident mainly in the fraction of the serum which is insol in carbonic acid It is present in the serum of young animals before certain other natural antibodies develop The natural bactericidal antibodies are sp for certain bacteria A non sp extracellular substance occurs in bacterial cultures which may neutralize or inhibit these antibodies This substance is liberated in large amts when the culture is heated to 120° It can be removed by repeated washing with saline soln Strains of bacteria vary in their production of this substance. JOHN T. MYERS

**The results of some quantitative experiments on the serum precipitation reaction.** G L TAYLOR *J Hyg* 31, 56–83(1931) —Antigen and antibody react in equiv. proportions, in the serum pptn reaction, to form an antigen-antibody complex which is adsorbent for suitable material in the surrounding medium. Excess of antigen is adsorbed and prevents completion of the reaction. Excess of antibody has no effect. Speed of particulation depends on the amt of antigen antibody complex and adsorbable matter present. There is some evidence that in certain cases the nature and amt of adsorbable matter present may be such as to cause removal of excess antibody from the supernatant liquid In such cases the adsorbable matter, not the antigen-antibody complex, may be adsorbent to the excess of antibody The addn. of adsorbable matter as normal rabbit or guinea-pig serum is a useful method of hastening and facilitating the reading of reactions JOHN T MYERS

**Observations on Salmonella agglutination and related phenomena. The influence of fresh normal serum on agglutination** P BRUCE WHITE *J. Path Bact* 34, 23–37 (1931) —In concns from 1 20 upward normal rat and rabbit sera inhibit sp somatic agglutination of *Salmonella* bacilli with certain partial exception of coliform and proteus bacilli Normal guinea pig serum has similar properties but is much more apt also to have an agglutinative effect (conglutination) Normal serum has little effect on flagella agglutination The inhibiting property disappears rapidly at 55°. Killed cultures, particularly alc. treated ones, are more readily inhibited Hemolytic complement is necessary for this inhibition, but another more stable factor must be present. Inhibition fails if the NaCl concn is more or less than 0 85%. JOHN T. MYERS

**The effect of variations in the media on the growth of normal and malignant tissues in vitro.** F C PYBUS AND H T FAWNS *J Path Bact* 34, 39–44(1931) —Preheating at 55° confers an inhibiting action on normal tissue growth which is not compensated by complement, but favors the growth of carcinoma Pregnant serum has a stimulating effect on tissue growth Embryonic and testis ext stimulates the growth of embryonic tissues, the amt of growth in 24 hrs being double that in control cultures J. T. M.

**Schwartzman's phenomenon of local skin reactivity to bacterial products.** F. M. BURNET *J Path Bact* 34, 45–60(1931) —A substance can be obtained by washing young bacterial cultures with isotonic NaCl soln., which on intradermal injection in rabbits produces a transient modification of the locally infiltrated tissues so that when the same substance is injected intravenously about 24 hrs later an acute purpuric and necrotic reaction appears over the infiltrated area 2 or 3 hrs later. This substance closely resembles bacterial endotoxins Formalin treated exts give typical reactions when used as a skin preparatory agent but will function as the intravenous provocative agent JOHN T. MYERS

**Observations on melanosis coli.** M J STEWART AND ELLA M HICKMAN *J. Path Bact* 34, 61–72(1931) —Melanosis coli is due to the deposition of a melanin like pigment within large mononuclear cells in the mucous membrane of the intestine, limited usually to the large intestine and appendix and ranging in color from gray or buff through dark gray or brown to inky black. Metastasis of the pigment may occur into the submucosa and the mesenteric lymph glands. The most acceptable theory of the mode of formation of this pigment is that of Pick, *i. e.*, that aromatic protein disintegration products are absorbed from the colon and converted into melanin within the connective tissue cells by the action of a tyrosinase-like enzyme. JOHN T. MYERS

**The intermediate zone phenomenon encountered in certain Br. abortus agglutinating sera.** F. W PRIESTLEY *J. Path Bact* 34, 81–9(1931) —The nature of the agent causing inhibition at certain zones is obscure It is pptd from serum with the agglutinin in the globulin fraction and is removed by the homologous organism. An increase in NaCl concn. will remove the zone; this indicates that the zone is due to an in-

sufficient reduction of potential at that point and not to a decrease of cohesive force JOHN T. MYERS

**The hypochlorhydria of asthma in childhood.** GEORGE W BRAY *Quart J. Med* 24, 181–97(1931) —Asthmatic children, in general, show a markedly diminished power of secreting acid gastric juice in response to a test meal Acid therapy should be combined with allergic treatment JOHN T MYERS

**The electrical charge of the virus of foot and mouth disease.** IRMENGARD SICHERT-MODROW *Zentr Bakt Parasitenk.*, I Abt , 119, 12–7(1930) —The virus carries a neg charge It is not known whether this is an actual property of the virus or of some substance which acts as a carrier JOHN T MYERS

**Lipoid antibodies. IV. The origin and proof of syphilitic blood changes** FELIX KLOPSTOCK *Zentr Bakt Parasitenk* , I Abt , 119, 78–84(1930), cf *C A* 22, 3453 — There are lipoid compds in the spirochetes which produce specific antibodies in rabbits and horses The infected human patient acquires the power of combining with these substances during the early course of the disease so that antibodies may not appear till later JOHN T MYERS

**Hypoglucemic intoxication in trypanosomiasis, etc.** KURT SCHERN *Zentr Bakt Parasitenk* , I Abt , 119, 297–302(1931) —In exptl animal trypanosomiasis, liver function is disturbed No yeast-fermentable substance can be extd from the liver Only minimal quantities of sugar remain in the liver and blood JOHN T MYERS

**The influence of bacteriophage on the partial antigens of several microörganisms** MINORU TOYODA *Zentr Bakt Parasitenk* , I Abt , 119, 350–3(1931) —After soln by bacteriophage, the partial antigens remain in the lysate, their structure is not changed appreciably. JOHN T MYERS

**Enzyme studies on the virus of foot and mouth disease.** K POPPE AND G BUSCH *Zentr. Bakt Parasitenk* , I Abt , 119, 398–406(1931) —The virus contained amylase, lipase and oxidase, but catalase, reductase and urease were not found. Virulence increases with the amt of lipase, oxidase and amylase In infected guinea pigs there is an increase of blood amylase but not of catalase JOHN T MYERS

**The true sugar content of skin and of muscle in diabetic and non-diabetic persons.** HARRY C. TRIMBLE AND BENJAMIN W CAREY, JR *J Biol Chem* 90, 655–63(1931) — In non-diabetic individuals the true (fermentable) sugar content of skin and of muscle averaged 56 and 28 mg %, resp , and in diabetics 144 and 51 mg The elevation of blood sugar is thus accompanied by a marked absolute increase of the quantity of sugar in the skin and a much smaller elevation in muscle. In diabetics who had received insulin at short intervals previous to operation, the sugar content of the muscles averaged almost the same as in the group in which externally administered insulin was no longer believed to be exerting an effect. These results are similar to those obtained by Folin, Trimble and Newman (*C. A.* 22, 267) using exptl animals A P. LOTHROP

**The oxidation by potassium ferricyanide of certain constituents of the serum in anemia.** G PAYLING WRIGHT AND BARBARA ARTHUR. *J Biol. Chem* 90, 757–69 (1931) —Unsatd fatty acids are oxidized by $K_3Fe(CN)_6$, and when these substances are present in the blood in any quantity as in anemia, the Haldane method for blood $O_2$ detns is unsatisfactory and recourse must be made to Van Slyke's modification in which the ferricyanide-serum mixts. present a much smaller surface of contact with the $O_2$, which in turn is at a low partial pressure. The progress of an anemia produced by hemorrhage is accompanied by an increase in the I absorption value of the serum fats and by an almost quant similar increase in the oxidizability of the serum by $K_3Fe(CN)_6$ After oxidation of the serum the I absorption values of the serum fats fall The oleic acid present in the serum is probably only in a minor measure responsible for the oxidation reaction with $K_3Fe(CN)_6$, other more highly unsatd fatty acids accounting for a greater part of it A. P. LOTHROP

**The increase in production of tetanic antitoxin by addition of non-specific substances to the antigen.** G. RAMON AND E LEMÉTAYER. *Compt. rend soc. biol.* 106, 71–4 (1931) —The addn. to the antigen of certain non-specific substances, such as alum, $CaCl_2$ and tapioca, exerts considerable stimulation on the development of antitoxic immunity and on the production of sp antitoxin ALBERT L. RAWLINS

**Tests on the relation between the increase of production of antitoxin and the hyperleucocytosis provoked.** V. SORTUZ. *Compt rend. soc. biol.* 106, 77–9(1931).—The production of tetanic antitoxin is greatly increased by the addn. to the antigen of a substance capable of producing at the same time a strong leucocytosis (for example, alum, $CaCl_2$ and tapioca) The antitoxin production is greatest when the leucocytosis reaches its highest level. ALBERT L. RAWLINS

**The ionic equilibrium of serum. Relations between the concentration of the salts**

and the equilibrium of the albumin-globulin system. P Lecomte du Noüy. *Compt. rend soc biol* 106, 85–7(1931) —Results are given which were obtained in studying quantitatively the phenomenon of pptn following the dilu of salt concn by the addn of distd water to normal heated and unheated, serum Albert L Rawlins

Icteric bradycardia with hyperpotassemia. Dumitrescu-Mante, Dulugea and Ionescu Craiova *Compt rend soc biol* 106, 116–7(1931) —Four cases of icteric bradycardia are reported in which the blood modifications were characterized by hyperpotassemia two of the cases being accompanied also by hypercholemia A L R

$p_H$ and antigen of McIntosh in the Bordet-Wassermann reaction. B Zablocki and S Sierakowski *Compt rend soc biol* 106, 129–30(1931) —The action of the antigen of McIntosh is not affected by variations in the $p_H$ between 3 5 and 9 0 When the reaction is acid a cloudiness appears, which diminishes as the soln is made alk. At $p_H$ 3 5 flocculés appear after centrifuging, the clear, supernatant liquid does not give a reaction with the positive serums, on the other hand, the sediment gives a pronounced reaction These flocculés appearing at $p_H$ 3 5 may be divided into large and small flocculés by centrifuging, the latter giving the stronger reaction with serum.
Albert L Rawlins

$p_H$ and the reaction of Kahn. S Sierakowski and B Zablocki. *Compt rend soc biol* 106, 130–1(1931) —The emulsion of the antigen of Kahn, properly mixed with a soln of physiol serum, has a $p_H$ of 5 8–6 5 After acidification, starting from about $p_H$ 5 0 the antigen gives a positive reaction with a negative serum (*i e*, a non specific result) this is explained by the fact that the antigen itself gives a sediment which is insol after neutralization by the serum In this respect the antigen of Kahn differs fundamentally from the antigen of Sachs The antigen of Kahn made alk with NaOH gives sp but more feeble results, thus acting like the antigen of Sachs Acidification or alkalization of the antigen of Kahn has no influence on the final $p_H$ of the reaction, the buffering power of the antigen being quite strong but weak in comparison to the great buffering power of the serum, the mixt. of the antigen and serum causes neutralization. The best results have been obtained with emulsions of Kahn having $p_H$ 6 0–6 5 An antigen giving bad results can be corrected by the addn of 0 5% of AcONa directly to the alc soln of antigen The action of serum on the reaction of Kahn shows positive results in all cases after acidification starting at $p_H$ 5 5, after alkalization to $p_H$ 9 0 more feeble results are obtained with the positive serums, starting with $p_H$ 10 6 all positive serums give negative results Albert L Rawlins

$p_H$ and the reaction of Sachs-Georgi. S Sierakowski and J Melzak. *Compt rend soc biol* 106, 132–3(1931) —See *C A* 25, 739 A L Rawlins

Physicochemical studies in gallstone formation. I. The method of the determination of the streaming potential and the applicability of Schulze-Hardy's rule. Appendix. The relation between the ζ-potential and coagulation. Noboru Furutani Tsukasa Kurokochi and Yoshio Asoda *Japan J Gastroenterol* 2, 148–57 (1930) —An app is described for measuring the e m f set up by the flow of aq solns of electrolytes through a glass capillary under pressure The e m f is proportional to the pressure but independent of the diam and length of the capillary, within the limits of the expts The streaming potential decreases in the order of KCl, $BaCl_2$, $AlCl_3$ and $Th(NO_3)_4$ in the same mol concn (cf *C A* 22, 4345) Lyophobic sols are coagulated by a soln of electrolyte when the streaming potential of the latter becomes sufficiently low This corresponds to a high concn of univalent electrolytes, a lower concn. of bivalent, and an even lower concn. of tervalent and quadrivalent electrolytes Crystal violet behaves like the latter II. The lyotropic series and the influence of acids and alkalies Appendix: The relation between the ζ-potential and adsorption. *Ibid* 158–61 — The streaming potential of cations of the same valence decreases in the order Li, Na K, Rb, $NH_4$ and Cs—and Mg, Ca and Ba, all tested as chlorides The potential of HCl attains a much higher max with increasing concn than any of the salts tested The max potential of NaOH is much higher than that of HCl The order for the adsorption of univalent cations (cf Oden, *C A* 5, 3535) is the same as that for their potential, increasing from Li to Cs III. The influence of anions and halogen group. Appendix: Physicochemical consideration of gallstone formation. *Ibid* 162–5 —The streaming potential decreases in the order $\frac{1}{4}K_4Fe(CN)_6$, $\frac{1}{3}K_3Fe(CN)_6$ $\frac{1}{2}K_2SO_4$ and KCl, as well as I, Br, Cl, combined with either Na or K. An increase in the Ca content of bile may be expected to decrease the stability of the cholesterol sol C T S

Studies in carbohydrate metabolism. II. Glucose-lactic acid cycle in diabetes. Harold E Himwich, Wm H. Chambers, V D Koskoff and L H Nahum *J Biol Chem* 90, 417–26(1931), cf *C A* 23, 4729, 24, 1412 —Analyses for lactic acid and glucose contents of the blood of depancreatized and of phlorizinized dogs indicate that

during exercise, and also in rest, the muscle adds lactic acid to the blood and removes hexose from it, while the liver acts reciprocally In resting depancreatized dogs the muscle adds approx 8 mg % of lactic acid to the blood and removes 17 mg % of hexose; the liver removes 10 mg % of lactic acid and adds 23 mg % hexose Correction for the loss in the lymph and comparison of equal vols of blood show that the liver absorbs the whole of the lactic acid added by the muscle, but the muscle in return absorbs only 13 mg % of the total 21 mg % of hexose added by the liver Most of the remaining hexose is lost in the urine The interdependence of muscle and liver in muscular activity and recovery, both in normal and diabetic animals, is emphasized K V THIMANN

**The acid-base equilibrium of the blood in pathological conditions. I. Changes observed in the toxemias of pregnancy.** EDWARD MUNTWYLER, NATALIE LIMBACH, ARTHUR H BILL AND VICTOR C MYERS *J Biol Chem* 90, 607–17(1931).—In 26 cases of toxemias of pregnancy a lowering of the alk reserve of the plasma, similar to that of normal pregnancy, was observed There was a corresponding decrease in total base from 153 8 to 144 7 millimols per l (cf Oard and Peters, *C A* 23, 2469) The bicarbonate increased considerably *post partum*, and in many cases also the total base The lowering of alk reserve is ascribed to hyperventilation K V THIMANN

**Glucemic curve in malignant tumors, before and after surgical treatment and radium therapy.** G CERUTI AND F BENSO *Arch ital chir* 27, 82–94(1930), *J Am Med Assoc* 96, 149.—Ten days after surgical intervention and after radium therapy there was an approach and later an actual return to the normal values of the glucemic curve R C WILLSON

**Calcium, magnesium, potassium, sodium and chlorine in blood after cranial injuries.** G SICILIANI *Arch ital chir.* 27, 95(1930), *J Am Med Assoc* 96, 149.—Cranial injuries more or less grave (commotio, fracture of the base) cause a const. but transitory disturbance, for not more than 36 hrs., of the electrolytic equil., characterized by a diminution in Ca and an increase in K and P, while the remaining electrolytes behave in an inconst. manner These changes were more pronounced when the trauma affected the area of the base of the cranium. R. C WILLSON

## H—PHARMACOLOGY

A N RICHARDS

**Use of 7% carbon dioxide and 93% oxygen in the treatment of carbon monoxide poisoning.** C. K DRINKER AND J SHAUGHNESSY. *J. Ind Hyg* 11, 301–14(1929).—The treatment of persons suffering from acute CO poisoning is best carried out by the inhalation during the first 5 to 20 min of mixts contg 7% of $CO_2$ and 93% of $O_2$, followed by the usual mixt. contg 5% of $CO_2$ and 95% of $O_2$ B. C. A.

**Solution of dextrose and sodium chloride for obliterating varicose veins.** HOWARD M. KERN *Ann Surgery* 93, 697–706(1931).—A study of 464 cases in which an equal mixt of 50% dextrose and 30% NaCl solns was used almost exclusively. R. B.

**The action of gold preparations in tuberculosis.** FRANZ WIRZ. *Z Tuberk* 65, 489–91(1930).—The author used Aurophos and Lopion in two cases of skin tuberculides originating hematogenously, and there resulted new lesions from this Au treatment. It is, therefore, concluded that the Au prepns are not parasitotropic, and it is suggested that the chemical industries seek new combinatons to overcome this deficiency. H. J CORPER

**An attempt to use leucocytes as a mechanical vehicle for transporting therapeutic agents to the lungs.** PHILIPP SPANIER *Beitr klin Tuberk* 73, 210–31(1929).—S verified the observations of Christeller and Eisner that heterogeneous living leucocytes introduced into the blood stream of an animal mostly are retained in the pulmonary capillary while they pass the capillaries of all the other organs. This idea is utilized for transporting therapeutic agents The leucocytes were obtained from dogs in which sterile turpentine oil abscesses were produced The substances to be phagocyted were introduced either *in vivo* by injecting into a 3-day old abscess and removing the pus one quarter hr after introduction or *in vitro* by shaking the leucocytes at 37° with an equal vol of isotonic soln prepd in 0 85% NaCl and 1.5% Na citrate used in equal amts The suspension was given in 1 cc. amts. to rabbits or dogs intravenously. In these expts. trypan blue, iron prepns., I and contrast media such as $BaSO_4$ were utilized H J CORPER

***Benzene-oil treatment in tuberculosis.*** JONAS KAIRIUKSTIS. *Beitr. klin. Tuberk.* 73, 456–9(1930).—The author used a 30% sterile soln of benzene in olive oil by intramuscular injection in amts of 0 1 to 0 2 cc. This caused a focal reaction in tuberculous individuals which resulted in a favorable action upon the course of the disease The

results in surgical tuberculosis appeared to be better than those in pulmonary tuberculosis. The clinical data are given in summarized form. H. J. CORPER

Therapeutic experiments with ascaridole. JOHANNES ZSCHUCKE. *Arch. Schiffs-Tropen Hyg.* 34, 472–80(1930).—Good results are reported in the treatment of *Necator* and *Ascaris* infections. H. EAGLE

The treatment of children's dysentery with Rivanol. D. TEITEL. *Arch. Schiffs-Tropen Hyg.* 34, 481–6(1930).—Rivanol taken in the mouth in doses of 5 mg. 3–6 times daily has a marked therapeutic effect upon amebic dysentery. If unsuccessful after 5–7 days, it should be supplemented by 2–3 injections of emetin. H. EAGLE

The treatment of surra with benzenearsonic acid "Höchst 4002." OTTO NIESCHULZ AND J. K. WAWO-ROENTOE. *Arch. Schiffs Tropen Hyg.* 34, 662–9(1930).—Unsatisfactory results were obtained in the treatment of experimentally inoculated rats, mice and guinea pigs. H. EAGLE

The chemotherapeutic effect of gold compounds upon mice inoculated with Spirochaeta crocidurae, with particular reference to treatment with mixtures of neoarsphenamine and Solganal. W. MENK. *Arch. Schiffs-Tropen-Hyg.* 35, 97–107(1931).—Solganal is much more effective than neoarsphenamine as a sterilizing agent in inoculated mice. M. recommends the use of a mixt. of the 2 in the treatment of recurrent fever and suggests a possible application in the treatment of syphilis. H. E.

Cholosulin. L. R. GROTE. *Arch. Verdauungskrankh.* 48, 1–24(1930).—Cholosulin (an addn. compd. of insulin with the Na salt of desoxycholic acid) is supposed to be an insulin which can be taken by mouth. G. found it effective in only 2 out of 16 cases of diabetes. H. EAGLE

Can the retention of foods in the human stomach be affected by the administration of various kinds of beer or of their carbon dioxide and bitter contents? A. BICKEL AND F. FLEISCHER. *Arch. Verdauungskrankh.* 48, 28–42(1930).—Beers cause a delayed emptying time of the stomach because of their alc. content, rather than their $CO_2$ or bitters contents. H. EAGLE

The effect of ephedrine upon gastro-intestinal activity. F. TRAUTENBERG. *Arch. Verdauungskrankh.* 48, 69–95(1930).—Ephedrine inhibits the motility of the stomach and intestines for 3–4 hrs., preceded by a short period of excitation (8–10 min.). The gastric acidity is unaffected, but the total $Cl^-$ is increased. Its therapeutic use is indicated in gastric or duodenal ulcer, gastric hypertonicity and hypermotility, spastic obstipation, etc. H. EAGLE

The insulin-sensitivity of nondiabetic humans and its relationship to the vegetative nervous system. ERNST STAMM. *Arch. Verdauungs Krankh.* 48, 104–24(1930).—The intravenous injection of $^1/_{10}$ unit of insulin into normal subjects causes a maximal fall in blood sugar of 26.5 mg. %. In vagotonic subjects, this may be as high as 43.6 mg. %; in hypothyroidism it averages 47.2 mg. %. On the other hand, in subjects with increased sympathetic tone (e. g., with hyperthyroidism) there is less sensitivity to insulin with an av. fall of only 16.9 mg. % under the same conditions. H. EAGLE

The ingestion of vinegar and lemon juice in their relationship to the morphological character of the blood. ADOLF BICKEL AND GERHARD LISS. *Arch. Verdauungs Krankh.* 48, 158–66(1930), cf. *C. A.* 24, 2169.—Continued ingestion has no harmful effect upon the blood picture. H. EAGLE

Excretion of alcohol in gastric juice following the rectal administration of alcohol. ARTHUR LUKAS. *Arch. Verdauungs Krankh.* 48, 332–45(1930). H. EAGLE

Histamine. ANTON KÜPFER. *Klin. Wochschr.* 9, 2137–40(1930), cf. *C. A.* 24, 5378.—The possible role of histamine in intestinal intoxication is discussed. As little as $^1/_2$ mg. injected subcutaneously into humans causes an increased secretion of gastric juice contg. both acid and pepsin. Intravenous injection is effective only if it is given very slowly. In approx. $^1/_3$ the cases which are diagnosed as achylia gastrica, histamine causes an active gastric secretion. It is to be emphasized that a pos. histamine test does not exclude organic gastric lesions, notably cancer, nor does an absence of secretion mean irreparable anatomical damage. This stimulating action of histamine upon gastric secretion is due to a direct action on the secreting cells. Histamine is found in all tissues, and in very high concn. in the lungs, presumably as an intermediary product of metabolism. The close similarity between anaphylactic shock and the pharmacological effects of histamine suggests the etiological role of the latter. H. EAGLE

Chemistry of uroselectan. A. BINZ AND C. RATH. *Klin. Wochschr.* 9, 2297–8(1930).—2 Pyridone-5-arsonic acid was found to be less toxic than any known org. linkage of As, in particular, the arsonic acids of the benzene ring. I introduced instead of the arsonic acid also resulted in a compd. of very slight toxicity; its Na salt was intro-

duced in 1927 as a therapeutic agent ("Selectan") in the treatment of streptococcal mastitis in cows. The Na salt of 1,2-dihydro-5-iodo-2-keto-1 pyridineacetic acid is uroselectan, sol up to 35%, the lethal dose of which is 3.37 g. per kg when injected intravenously into the rat. H. EAGLE

Cholesterol and lecithin in the water and acid-base economy. RUDOLF DEGKWITZ. *Klin. Wochschr.* 9, 2336–44(1930).—Cholesterol and lecithin have antagonistic and mutually neutralizing effects upon the hemolysis of red cells by water, acid or alkali. In general, cholesterol increases the resistance of the cell, possibly because, being a hydrophobic substance, it promotes a protoplasmic change in the nature of a water in oil dispersion, in which effect it would be, and is, aided by $Ca^{++}$ and $Mg^{++}$. Lecithin, on the other hand, being hydrophilic, might promote an oil in water dispersion, which would be aided by $Na^{+}$ and $K^{+}$. Cholesterol injected into rabbits causes a transport of $H_2O$ and $Cl^{-}$ from the tissues into the blood and urine, with polyuria, and very high blood and urine (Cl). Hypercholesterinemia, on the other hand, causes a low plasma and urine $(Cl)^{-}$, and a retention of $H_2O$ and $Cl^{-}$ in the tissues. Paradoxically, the prolonged peroral administration of cholesterol causes water and $Cl^{-}$ retention, and decreased urinary excretion. H. EAGLE

The effect on the experimental animal of injection of a liver extract, prepared according to the method of Gänselen. W. EDERLE AND H. KRETCH. *Klin. Wochschr.* 10, 25–6(1931).—The ext. had a very favorable effect in white rats with a *Bartonella* anemia, whose spleen had been removed. H. EAGLE

Relationships between insulin and adrenaline in the human organism. BERNHARD KUGELMANN. *Klin. Wochschr.* 10, 59–62(1931).—If the blood sugar falls below 60 mg. % following the intravenous injection of insulin, there is a considerable rise in systolic pressure and fall in diastolic pressure, the pulse pressure being doubled or even tripled. As the blood sugar returns to normal, there is a concomitant return of blood pressure to normal values. The administration of glucose prevents the blood pressure change, which is only observed if the blood sugar falls below 60 mg. %. Simultaneous with the rise in pressure there is a moderate leucocytosis, with a particular rise in lymphocytes; and, in patients with an enlarged spleen, there is a marked decrease in its size. Since all three of these phenomena (blood pressure, blood count and splenic changes) are observed following the injection of adrenaline, K. concludes that in insulin hypoglucemia there is a mobilization of adrenaline as a compensatory factor, tending to restore the blood glucose to its normal values. H. EAGLE

Adenosinephosphoric acid and cardiac activity. A contribution to the component of muscle extract which affects the heart. HANS ROTHMANN. *Klin. Wochschr.* 10, 67(1931).—Adenosinephosphoric acid causes slowing of the heart rate, and induces a more regular and stronger action in pathological conditions. Since it can be demonstrated in muscle exts., it is concluded that it is the active constituent in such exts. as regards cardiac function. H. EAGLE

The analysis of the action current curve of the heart into chemical phases. I. Relation between the action current and the formation of lactic acid. RUDOLF SIEGEL AND Z. UNNA. *Klin. Wochschr.* 10, 72–3(1931).—Monoiodoacetic acid is known to prevent the formation of lactic acid in striated muscle. In mice and rabbits small doses cause a change and broadening of the *T*-wave of the electrocardiogram while larger doses cause its complete disappearance without affecting the *Q R S* complex. S. and U. suggest that the *T*-wave and the formation of lactic acid are due to the same process; moreover, that the formation of lactic acid begins 0.05 sec. after the beginning of contraction (*Q R S* complex) and continues through systole. II. Contractions without after-waves in the electrocardiogram. *Ibid.* 171.—After poisoning with $CH_2ICO_2H$, the ventricles continue to contract despite the absence of the *T*-wave in the electrocardiogram. H. EAGLE

The excretion curve of iodine from the blood following the administration of sodium tetraiodophenolphthalein under normal and pathological conditions in the animal experiment. H. EITEL AND A. LOESER. *Klin. Wochschr.* 10, 109–11(1931). H. E.

The locally limited action of hormones, particularly that of pituitrin, upon the water exchange. ARISTID KISS. *Klin. Wochschr.* 10, 152–5(1931).—Pituitrin has an effect upon the connective tissue of the skin, causing an increased water absorption. The degree of its effect depends upon the conditions of the skin, which is apparently under the control of the liver. H. EAGLE

Comparative actions of sympathomimetic compounds: Influence of cocaine and certain related compounds upon the actions of a group of sympathomimetic amines. M. L. TAINTER. *Quart. J. Pharm. Pharmacol.* 3, 584–98(1930); cf. *C. A.* 24, 894.—The cocaine sensitization-desensitization was applied to a group of sympathomimetic

amines Dihydroxyphenylethylamine and dihydroxyphenylpropylamine were sensitized by cocaine and reversed by ergotoxine, and thus were sympathicotropic, in common with the other catechols hitherto studied. The substitution of nitro, chloro or carbethoxy groups in the para position of phenylethylamine or the replacement of the Ph by a thiophene group produced pressor compds which were desensitized by cocaine, and hence were pseudo-sympathicotropic. *p*-Carboxyphenylethylamine, PhI tN and salvamin," a trihydroxy product, were inactive on blood pressure. Psicaine, benzoylpseudotropeine (tropacocaine) and β-eucaine, which are closely related to cocaine chemically, did not reproduce the cocaine sensitization-desensitization. Cyanides, by interfering with the oxidative processes, depressed the response to adrenaline, tyramine and pituitary equally, and therefore did not resemble the cocaine action. Also, smooth muscle depression sufficient to lower the blood pressure, from large doses of papaverine, did not depress the action of these pressor drugs. It therefore seems unlikely that interference with oxidative processes or smooth muscle depression can be essentially involved in the phenomena. Cocaine increased the hyperglucemic responses of rabbits to adrenaline, and decreased those to ephedrine. The typical cocaine sensitization-desensitization phenomena can, therefore, be seen in functions not involving a smooth muscle response. W O E

An unsuccessful abortion attempt or suicide by means of arsenic. A. Sartori. *Chem. Ztg.* 55, 105–6(1931).—Investigation into the death of a pregnant woman at first presented a picture of ergot poisoning. Later a bag contg. a gray powder was found. Analysis showed powd. C and $As_2O_3$. Russell C. Ean

Effect of various concentrations of nicotine in tobacco on the growth and development of fowls. J. E. Hunter and D. E. Haley. Penna. Agr. Expt. Sta., *Bull.* 258, 9(1930). Abstract. *43d Annual Report of the Director.*—When a high nicotine strain of tobacco is used in the feed of chicks, remarkably large amts. of nicotine can be tolerated. By building up a tolerance to tobacco in baby chicks, as much as 1.2% of pulverized tobacco can be included in the ration without noticeable injury. In fact there appears to be a stimulation due to the tobacco and better growth gains are made than by the controls. It is believed that continuous tobacco treatment will effectively control worm infestation. C. R. Fellers

Pharmacological action of irradiated proteins and protein derivatives. P. Holtz. *Arch. ges. Physiol. (Pflugers)* 226, 570–77(1931).—Serum irradiated with ultra violet light has a dilator action on the blood vessels of the frog. Irradiated euglobulin, glycine, leucine, histidine and tyrosine show the same action. The action of the irradiated serum is attributed to HCNO, AcH and imidazole derivs., whose presence in such serum was demonstrated. The stimulating effect of irradiated sera on the intestine was similarly attributed to the presence of histamine or another imidazole deriv. A. G.

The effect of irradiated serum on sugar elimination by the isolated liver of warm-blooded animals. P. Holtz. *Arch. ges. Physiol. (Pflugers)* 226, 578–84(1931).—Irradiated serum markedly affects sugar elimination by the liver of guinea pigs, cats and dogs. In most cases the elimination is reduced. Arthur Grollman

The changes in the stimulation time-tension curves by narcosis, cold and veratrine. Chung Lien Hou. *Arch. ges. Physiol. (Pflugers)* 226, 676–88(1931). A. G.

Mode of action of compounds of insulin with bile acids on subcutaneous administration. R. Stephan. *Deut. med. Wochschr.* 56, 88–91(1930).—Sodium desoxycholate, coupled with insulin, shows the same action when administered subcutaneously as after oral administration. The clinical action of the combination is, however, different from that of insulin. Arthur Grollman

The present status of chemotherapy, particularly in the treatment of tropical diseases. C. Schilling. *Deut. med. Wochschr.* 56, 955–8(1930).—An address dealing with the modern trend of chemotherapeutic research. Arthur Grollman

Cholosulin and the daily blood sugar curve. Richard Kern. *Deut. med. Wochschr.* 56, 1341–2(1930).—Cholosulin, a combination of insulin and the Na salt of desoxycholic acid, produced no change in the blood sugar curves of diabetics. A. G.

The initial insulin hyperglucemia. A. v. Korányi. *Deut. med. Wochschr.* 56, 1683(1930).—The initial hyperglucemia which follows the injection of insulin is attributed to a demobilization of sugar in response to the rapid depletion of the sugar in the muscles. Arthur Grollman

The effect of soporifics on the basal metabolism in Basedow's disease. A. Bornstein. *Deut. med. Wochschr.* 56, 1861–2(1930).—The increased metabolism in thyroid toxicoses is due to nervous stimulation and to an increased metabolic activity on the part of the cells. The former fraction of the metabolic increase is abolished by the use of soporifics, the latter remains unaffected. Arthur Grollman

**Is lactic acid absorbed through the skin?** E E. Bauke. *Deut. med. Wochschr.* 56, 1869-70(1930).—No evidence is available to indicate that lactic acid or other nutrients may be absorbed through the skin Arthur Grollman

**Distribution between blood plasma and red blood corpuscles of some substances used in therapeutics.** R Fabre *Bull soc. chim biol* 12, 954–64(1930), cf *C A.* 25, 1591.—In dog blood, diethylmalonylurea and allylisopropylmalonylurea showed a distribution between red corpuscles and plasma of 6 mg 3 6 mg and 19 1 mg 1 93 mg, resp, per 100 g blood Quinine and hydrastine were about equally distributed between corpuscles and plasma but were retained longer by corpuscles C G King

**Pharmacological influence of the substitution of a methyl group in the β-carbon of methylaminomethyl(*p*-hydroxyphenyl)carbinol.** Raymond-Hamet *Compt rend.* 192, 450-2(1931).—The action of methylaminomethyl(*p*-hydroxyphenyl)carbinol has been studied in double suprarenalectomized dogs which have been treated with cocaine or *yohimbine Its action has been compared with that of p-hydroxyephedrine* and ephedrine The substitution of a methyl group in the β position has endowed the drug with an adrenaline like action, which it lacked G H W Lucas

**Investigation on the pharmacological action of the vessels of the pigeon's wing. I. The influence of the changes in concentration of sodium, calcium and potassium chlorides, as well as in the hydrogen-ion concentration in the perfusing Ringer solution.** Tomonori Manabe *Folia Pharmacol Japon* 11, 225 37, Breviaria 17(1931).—The vessels in the pigeon s wing were perfused with Ringer soln in which the chloride content and $p_H$ were varied Excess NaCl increases persistently the discharged quantity but a large excess causes a decrease The vessels are dilated and the osmotic pressure is increased The decrease in flow is due to a swelling of the endothelium in the small vessels, especially the capillaries The tissues also are affected The addn of $CaCl_2$ causes a dilation of the vessels with small amts and a constriction with larger quantities Absence of $CaCl_2$ in Ringer soln produces a dilation The addn of KCl produces a dilation or a constriction, depending on the quantity Alk Ringer soln causes a dilation, as does a highly acid one G H W Lucas

**The experimental investigation of Panax ginseng. IV. The virulence of some nerve poisons and the poison phenomena brought about in rats fed on Panax ginseng.** Piungki Min. *Folia Pharmacol. Japon* 11, 238–55, Breviaria 18(1931), cf. *C A.* 24, 5869.—The nerve poisons adrenaline, physostigmine and pilocarpine act synergistically, while atropine and adrenaline act antagonistically in ginseng fed rats V. **The comparative study on the chemical constituents and the general action of Panax ginseng and Panax quinquefolius.** *Ibid* 256–60, Breviaria 19(1931).—The chief constituents of each plant were quantitatively prepd Panax ginseng contains more panacene, panax acid, phytosterol and glucoside than *Panax quinquefolius* Alc exts of both plants injected into mice produced tail symptoms (the tail being carried erect), convulsions and death Panax gensing exts were more potent G H W Lucas

**The antiphlogistic action of drugs on inflammation produced by streptococci.** Hirosii Suzuki. *Folia Pharmacol Japon.* 11, 276–86, 287–98, Breviaria 20-1(1931); cf *C A* 25, 740.—Antipyrine, quinine, eryeon, salicylic acid, sinomenine, casein, rabbit serum, streptococcus serum and streptococcus vaccine exert an antiphlogistic action on the inflammation produced by streptococci-salt soln in the rabbit eye The action of antipyrine, quinine, eryeon and sinomenine on inflammation produced by streptococci is weak, while that of salicylic acid, casein, rabbit serum and staphylococcus is scarcely antiphlogistic The action of the drugs is stronger on the inflammation produced by streptococci than on that produced by chem or phys stimulation. Drugs act but slightly on the inflammation produced by cold in the rabbit eye G H W. Lucas

**The pharmacology of benzoylglucuronic acid.** Shinzo Sakata. *Folia Pharmacol. Japon.* 11, 299–321, Breviaria 21-2(1931).—*Warm blooded animals are protected* from poisoning by chloral hydrate, camphor, phenol, naphthol, borneol, antipyretica and morphine by the formation of a conjugated compd with the glucuronic acid in the body. The conjugated glucuronic acid in the urine is thus increased The conjugated acid belongs to the glucoside type, whereas the benzoyl derivs are of the ester type. Phenylglucuronic acid, urochloralic acid and the conjugated ester type await investigation The action of benzoylglucuronic acid was measured on rabbits and toads. On the hearts of these, tonus is increased and contraction height decreased by small doses, large doses cause a fall in tonus The rate is unchanged and the heart stops in diastole The action appears on the muscle itself In small doses the drug causes a dilation of vessels in the rabbit ear and in the frog extremities In large doses a constriction follows It has some diuretic action in rabbits and toads, kidney vessels are dilated. A transient hydremia follows its administration The diuretic action

is present in the toad after the ligature of the kidney portal vessels. Small doses stimulate and toxic doses paralyze isolated rabbit organs. G. H. W. Lucas

A contribution on the pharmacology of phenylpyroracemic acid. Tadashi Iasiki and Hiroto Matsushima. *Folia Pharmacol. Japon.* 11, 261–75; Brevriana 20(1931).—Various amino acids and their intermediate metabolic products possess some influence on certain hormone actions in animal organs. The intermediate product of phenylalanine, phenylpyroracemic acid, was studied. On perfused toad livers, it increased sugar. It produced no action on the pupil. On the surviving rabbit intestine it had a depressing action. On subcutaneous injection into rabbits, it increased blood sugar and was not synergistic with adrenaline. On the isolated hearts of toads and rabbits it had a paralyzing effect, its action being on the muscle itself. G. H. W. Lucas

The relationship between the action of some cardiac tonics on the embryonic chicken heart and its stage of development. Sakuro Kikuiara. *Folia Pharmacol. Japon.* 11, 25–73; Brevriana 22, 3(1931).—The action of coramine, digitalein, cardiazole and adonidin on 2 to 10 day old chicken embryo heart has been followed. A 2 day old embryo is stimulated by these heart tonics. The sensitivity increases up to max. where it remains unchanged for about 10 days. The action of these drugs on the stage of development was also studied. G. H. W. Lucas

The influence of various conditions on the resorption of sodium salicylate from the pleural cavity as well as on the manner of resorption of these drugs. II. Masayoshi Ogawa. *Folia Pharmacol. Japon.* 11, 334–45; Brevriana 23(1931); cf. *C. A.* 25, 1286.—The right lung was inflamed with $AgNO_3$. 0.1 g. Na salicylate per kg. was injected in the pleural cavity and the rate of resorption followed. Relatively slight inflammation resulted in good absorption, but marked inflammation slowed up the rate on account of damage of the capillaries. Respiratory movements facilitated resorption. Secretion of exudate following damage to vessels lowers the concn. of the applied material. III. *Ibid* 346–58; Brevriana 24–5.—The lungs were treated in the normal and in an inflamed condition, and the blood in the lung veins was examd. for Na salicylate. Low-grade inflammation assists resorption, whereas high grade hinders it. A closed pneumothorax hinders resorption. The disturbance in resorption is more marked in the pleura pulmonalis than in the pleura parietalis. G. H. W. Lucas

The relationship between the vomiting-, blood-sugar- and uric-acid-regulating centers from a pharmacological standpoint. II. The influence of emetics on the uric acid excretion. Morimie Mori. *Folia Pharmacol. Japon.* 11, 259–69; Brevriana 25 (1931); cf. *C. A.* 25, 1284.—Comparative expts. were performed by injecting dogs subcutaneously with emetics and following the uric acid excretion. Morphine-HCl was used as a control. Following the injection of apomorphine-HCl, emetine HCl, wine of Sb, $CuSO_4$, and ergcon the uric acid excretion was increased over the control. Na salicylate and antipyrine lowered the temp. and blood sugar stimulated vomiting and promoted the formation of uric acid. The centers regulating vomiting, blood sugar and uric acid are in close relationship with each other. G. H. W. Lucas

Effects of insulin and adrenaline on the blood acetone in fasting children. Leif Salomonsen. *Am. J. Diseases Children* 40, 718–24(1930).—The antiketogenic action of insulin appears to be secondary to the influence of insulin on sugar metabolism. The administration of insulin to children whose blood sugar has been reduced by fasting reduces the concn. of acetone in the blood, the reduction being less marked the lower the sugar concn. The administration of adrenaline increases the concn. of acetone, the increase being more marked the lower the concn. of blood sugar. The injection of adrenaline is usually followed by an increase in the fatty acid content of the blood. E. R. Mars

The effect of phosphorus in rickets. I. Röntgenologic changes in rickets following administration of phosphorus. Edward L. Compere. *Am. J. Diseases Children* 40, 941–67(1930).—The administration of a combination of small quantities of elementary P and cod-liver oil to infants with severe cases of rickets has a much greater therapeutic effect than cod liver oil alone. The administration of P alone is not sufficient to cause the healing of severe cases of rickets. The studies were made during the late fall and winter months. II. The chemical changes in the blood in rickets following administration of phosphorus. *Ibid* 1177–92.—The administration of a combination of cod liver oil and P is followed by a marked increase in the Ca and P contents of the blood serum and in the product of the two. The administration of cod liver oil alone to infants with severe rickets is followed by a slow but definite increase in the product of the Ca and P contents. The administration of P alone causes no significant changes in the Ca or P contents or in the product of the two. The healing of rickets does not appear to be assocd. with changes in the *p*H of the blood serum. E. R. M.

Coffee as an intestinal disinfectant. Ernst G Dressel and Harald Loyde. *Arch Hyg* 104, 144–55(1930) —Broth infusions of finely ground coffee or prepns. from which the caffeine has been removed do not permit the growth of typhus bacilli or cholera vibrio, they inhibit the growth of Flexner bacilli and kill Shiga-Kruse bacilli. Finely ground coffee appears to be a more effective agent in its action against the pathogenic microorganisms of the intestinal tract than the com. prepns. of C
E. R. Main

The blood in experimental benzine poisoning. L P Bayutlova, A S Bzhesslovskaya, N V Lazarev, M P Lyubimova and D L Stalskaya *Arch Hyg* 104, 226–38(1930) —No marked or characteristic chem. or histologic changes appear in the blood of lab animals poisoned with benzine vapor E R Main

Paths of absorption and excretion of sodium tetraiodophenolphthalein. A. J Delario *J Lab Clin Med* 16, 329–40(1931) —Na tetraiodophenolphthalein appears to be absorbed by both the small and large intestines following oral or rectal administration to dogs It leaves the blood within 2 to 4 hrs after intravenous administration. The liver excretes from 60 to 70% of the dye, apparently unchanged, the large intestine about 25% From 5 to 10% is eliminated in the urine partly in an inorg state Some of the dye may be rendered insol. by contact with pancreatic juice or fat present in the small intestine The results are based upon the detn. of I after oxidation of the blood, urine etc. E R Main

The effect of calcium-precipitating substances on the ciliated epithelium of the maxillary sinus. W F Wever. *J Lab Clin. Med* 16, 341–6(1931) —The movement of the cilia of the excised fragments of ciliated epithelium of the maxillary sinuses of rats and rabbits ceases when alizarin, citrate or oxalate solns. are added to the medium in which the tissues are immersed. E. R. Main

Some effects of amytal anesthesia. J M Olmsted and George Gregoss[illegible]. *J. Lab. Clin Med.* 16, 354–61(1931) cf *C A* 25, 140 —The intravenous injection of amytal into dogs is not followed by an increase in the blood sugar content of dogs that have been fed a diet of lean meat. A slight increase may follow if the dogs have been fed a diet rich in carbohydrates. The hyperglycemia which accompanies the administration of morphine is prevented when amytal is injected simultaneously with the morphine. The increase in blood sugar that normally follows a short period of asphyxia is prevented by amytal. In man, the non protein N and urea contents of the blood are markedly increased, the blood pressure is reduced and the heart rate increased after the administration of amytal. The gastric secretion of dogs is inhibited during amytal anesthesia. E R Main

The glycemic reaction with minimum quantities of adrenaline administered intravenously. L. Cannavo. *Boll. soc ital. biol. sper* 5, 810–3(1930) —Small variable doses of adrenaline were injected intravenously into normal persons, and into patients afflicted with various diseases The results showed that the glycemic effect of insulin is variable and is connected with the constitutional state of the subject and the sympathetic-parasympathetic equil. In some individuals there was a fall in blood sugar 5 min. after the injection and then a rise. Adrenaline, when injected intravenously, may cause appreciable changes in the glycemic titer in doses as low as 1/400 mg. Patients with hepatic lesions showed no noticeable difference to the action of adrenaline in contrast to normal or to patients affected with other diseases. Peter Masucci

Qualitative and quantitative studies on the penetration of the lungs by atomized drugs. Pompeo Spoto *Boll. soc ital biol sper* 5, 815–7(1930).—A method is described for studying the penetration of atomized drugs in the lungs of the dog The substances tested were methylene blue, iodized oil colored with Sudan III, and colloidal Ag From the results obtained, it is shown that the penetration of atomized liquids does occur if the mouth is kept open and the nares are closed; the atomized liquids may reach the alveoli of the lungs but only in small amts. and so unequally distributed that parts of the lung are not reached. Peter Masucci

Quantitative studies on the fixing power of the hepatic reticulo-endothelium apparatus. G. Orestano *Boll soc. ital. biol sper* 5, 818–9(1930) —Colloidal $Ag_2S$ was injected intravenously into rabbits. After different intervals of time the animals were killed and the Ag fixed by the liver was detd. After 9 min. 1/4 of the Ag injected was found in the liver With longer intervals after injection, the velocity of fixation diminished, 1/4 was fixed in 2 hrs and about 1/2 after 8 to 10 hrs. PbS gave similar results after 2 hrs 1/4 of the Pb was found in the liver Peter Masucci

The relation between the action on the hemopoietic tissue and fixation of colloidal copper sulfide in the reticulo-endothelial apparatus. Gerlando Lo Cascio. *Boll. soc. ital. biol. sper.* 5, 819–22(1930) —The injection of 10 cc. of an 0.8% soln. of col-

loidal CuS into rabbits resulted in the presence of 23,000 nucleated erythrocytes in 24 hrs. If however, the injection of CuS is preceded by the injection of HgS (0.3 to 1 cc. of 1% soln.) the erythroblastic reaction diminished in proportion to the HgS injected. India ink and lithiocarmine gave similar results but HgS was the substance which produced the most complete, permanent and innocuous block of the reticulo-endothelial app. of the bone marrow, spleen and liver. PETER MASUCCI

**The action of quinine on the reticulo-endothelial system.** A. LEVI AND E. BELLODI. *Boll. soc. ital. biol. sper.* 5, 857-8(1930); cf. *C. A.* 24, 2176.—Quinine in relatively high doses (1.2 mg.) inhibits the development of the reticulo-endothelial system in mice, in smaller doses, (0.5 mg.) equal to those used in inhibiting the development of tumors, it stimulates the growth of this system. PETER MASUCCI

**The resistance of the corpuscles after using antipyretics.** A. LEVI AND R. BASSI. *Boll. soc. ital. biol. sper.* 5, 859-60(1930).—The repeated administration to rabbits of antipyretics (antipyrine, pyramidone, melubrin, cryogenin, maretin) in therapeutic doses (0.50 g.) does not give rise to variations in the resistance of the corpuscles and does not cause hemolysis. Toxic or mortal doses do exert a slight change in resistance. The above antipyretics may therefore, be satisfactorily used in therapy. P. M.

**The neuromuscular junction in curarized frogs and in frogs treated with quinine.** G. M. PICCININI AND C. DELFINI. *Boll. soc. ital. biol. sper.* 5, 861-2(1930).—The gastrocnemius of the normal, of the curarized and of the quinine treated frog when examd. microscopically showed no sp. changes in the terminal motor app. P. M.

**The pharmacodynamic posology of quinine for frogs and the course of the spontaneous and reflex motility.** G. M. PICCININI AND C. DELFINI. *Boll. soc. ital. biol. sper.* 5, 862-6(1930).—Quinine HCl $2H_2O$ was injected into the dorsal lymph sac of (1) hibernating and (2) summer *Ranae esculentae*. Doses of 0.10, 0.08, 0.05, 0.03 g. in weak solns. (1:300, 1:500, 1:1000) injected into frogs of 40, 30, 20, 12 g. were all lethal. The m. l. d. was 0.25 mg. per g. of frog. All the lethal doses produced a depression followed by a general paralysis. Under these conditions weak elec. stimuli applied to the skin contracted the muscles energetically. The reflex motility gradually decreased but lasted up to 24 hrs. Doses approaching the m. l. d. (0.2 to 0.07 mg.) produced the same toxic symptoms which were often preceded by a transitory excitation. The frogs were only apparently dead but within 24 hrs. became normal again. Moderate doses (0.06-0.04 mg.) always produced excitation phenomena of varying duration and intensity. Sub-specific doses of 0.0061-0.04 mg. showed nothing definite but did increase muscular work. The effects of injecting coned. solns. were also investigated and are discussed. PETER MASUCCI

**The action of insulin on the muscle contraction of the frog.** G. BUCCIARDI AND A. DE NIEDERHÄUSERN. *Boll. soc. ital. biol. sper.* 5, 870-2(1930).—Insulin injected into the frog causes an increase in the amplitude of muscle contractions and muscular work. The increase in the capacity for work coincides with a diminution of muscular glycogen. Insulin convulsions cause a diminution of muscle glycogen and a decrease in muscular work. PETER MASUCCI

**Experimental studies on the hypoglucemic action of beer yeast administered enterically.** AURELIO COSTA. *Boll. soc. ital. biol. sper.* 5, 878-81(1930).—Beer yeast administered in 5-g. doses by stomach tube to rabbits, as a general rule, produced slight hyperglucemia. It did retard, however, the hyperglucemic peak usually obtained when glucose is injected intravenously into rabbits. PETER MASUCCI

**The action of insulin on thermoregulation.** GIULIO CERUTI AND ENNIO SAPEGNO. *Boll. soc. ital. biol. sper.* 5, 905-6(1930).—Under the action of insulin, if the dose has been insufficient or due to the peculiar condition of resistance of the individual animal the hypoglucemia does not reach below a certain level, the internal temp. does not vary markedly. However, if the dose has been sufficiently large to produce a marked lowering of blood sugar approaching the convulsive dose (0.06-0.05%) then there is a rapid fall of temp. which is related to the glucemic titer. The fall of temp. is arrested by the injection of glucose. The temp. was detd. by a thermocouple method. PETER MASUCCI

**The mechanism of action of colloidal sulfur.** G. RASTELLI AND A. CASAZZA. *Boll. soc. ital. biol. sper.* 5, 939-42(1930).—Egg albumin and blood serum have the power to transform S into $H_2S$, the greater the dispersion of the S, the less is the reduction to $H_2S$. Colloidal S when injected into the circulation exerts a double action. The portion of the S which exists in the true colloidal state dets. the anaphylactic type of shock, while the portion which exists in a state of flocculation and which is present in all preparations, becomes reduced to $H_2S$ which dets. the toxic effect. P. M.

**Radium emanations and the physiologic action of certain drugs.** P. MASCHERPA

AND G BELLUZZI *Boll soc ital biol sper* 5, 944–6(1930)—The expts. were made on frogs and mice kept in a closed container into which circulated air that had been bubbled through a soln of $RaBr_2$. Morphine-HCl was injected into frogs in 0.01 g. doses and into mice in 0.001 g. doses and strychnine sulfate into frogs in 0.00002 g. doses and into mice in 0.00005 g. doses. It was observed that in the animals treated with the Ra emanations the toxic picture brought on by the 2 alkaloids reached greater degrees of violence and appeared much more rapidly than in the control animals. Often the doses *administered were lethal to the radioactivated animals.* PETER MASUCCI

**Biochemistry of magnesium narcosis.** EMILIO MARTINI *Boll soc ital biol. sper* 5, 946–8(1930)—The narcotic efficiency of Mg salts depends on the alk. reserve of the blood. The higher the alk. reserve, the less is the Mg content, or the greater is the Ca content of blood of the awakened animal. M. makes the deduction that an increase or a diminution of the alk. reserve corresponds to an increase or decrease, resp., of the narcotic efficiency of Mg. PETER MASUCCI

**The action of bulbocapnine, injected intravenously on the local reflexes of posture of man.** U. DEGIACOMO AND A. SEVERINO *Boll soc ital biol sper* 5, 965–6(1930), *cf. C. A. 25*, 742.—*Bulbocapnine injected intravenously into dementia precox and phrenetic patients produced always an initial somnolence phase with a tendency for postural reflexes to become attenuated or to disappear. In the 2nd phase which is of longer duration and more characteristic and which might be called "the catalexis phase,"* the postural reflexes are more or less exaggerated. PETER MASUCCI

**The hypoglucemic action of "bean tea."** G. SORGE *Boll soc ital biol sper* 5, 967–9(1930).—An aq. ext. of the pericarp of beans was made and administered to normal and diabetic subjects. 150 cc. of an infusion from 20 g. of powd. pericarp lowered the blood sugar of fasting normals 15.5–38.6% in 1 hr. and 8.7–26% after 2 hrs. The *same dose of infusion given to diabetics under analogous conditions caused a const.* lowering of blood sugar, 12–29% after 1 hr. and 20.4–37% after 2 hrs. The same dose administered to normal subjects along with 50 g. glucose *per os* or ½ hr. before the injection of 1 mg. adrenaline produced a const. and marked diminution of sugar and prevented the appearance of hyperglucemia. The exts. may be added to small doses of pancreatic hormone in the treatment of diabetics (synergic action). P. M.

**The cure of intestinal lambliasis with naphthalene.** G. SORGE *Boll soc ital biol sper* 5, 969–71(1930).—S. found naphthalene a satisfactory therapeutic agent in the treatment of *Lamblia intestinalis*. The administration of 50 cg. per day in 3 capsules, one after each meal for 6–7 days, is recommended. PETER MASUCCI

**The influence of acetylcholine on insulinemia.** FILIPPO CONDORELLI *Boll soc ital biol sper* 5, 977–9(1930).—C. concludes that insulinemia diminishes after the injection of medium doses of acetylcholine. PETER MASUCCI

**The inability of the bird organism to condense urea with glyceric acid.** G. RUSSO-BIONDI *Boll soc ital biol sper* 5, 980–1(1930).—Neither glyceric acid nor glycerol administered *per os* to chickens or geese caused the slightest increase in the amt. of uric acid excreted, even if simultaneous to the administration of glyceric acid, urea (1–1.5 g.) was injected into the pectoral muscles. The urea injected was found mostly in the excrements, while a small quantity was transformed into $NH_3$. Therefore, the bird organism does not have the capacity to transform urea into uric acid. P. M.

**Relations between glucemia and phosphorus of the blood under the action of uranyl salts and extracts of thyme.** MARIANO MESSINI AND ARISTIDE POLI *Boll soc. ital. biol. sper.* 5, 982–4(1930).—The injection intravenously of uranyl acetate (*0.00012–0.00024 g. equiv. per kg. of rabbit*) *causes a diminution of the blood phosphates* and simultaneously hyperglucemia without glucosuria. This is followed by a second hyperglucemic phase with glucosuria and anuria. The injection of thyme exts. is also followed by a diminution of blood phosphates and hyperglucemia. A lowering of the blood phosphates is apparently followed by an increase in the glucemic titer. P. M.

**The behavior of the phosphates and glucose of the blood in normal dogs and in dogs deficient in adrenaline-producing tissue by the action of cold baths.** IVAN CIACCIO. *Boll soc ital biol sper* 5, 997–1001(1930).—The detns. were made on normal dogs and on dogs from which the suprarenal medulla had been removed. The animals were subjected to a cold bath, 5–7°, for 10–15 min. The results showed that hyperglucemia from cold bears no relation to the hyperfunction of the medulla or to the hypersecretion of adrenaline. There was not always a quant. agreement between glucemia and blood phosphates but in general hyperglucemia coincided with a marked lowering of inorg. P. Instead these showed a behavior analogous to that observed after the *administration of glucose.* PETER MASUCCI

**The behavior of phosphagen and phosphates in muscles after cold baths.** Giuseppe Solarino *Boll soc ital biol sper* 5, 1001–3(1930).—Cold baths caused no variations in the phosphagen or phosphoric acid content of the striated muscles P. M.

**The action of various chemical substances applied directly to the sensomotor cortical centers of the dog.** E. Moracci *Boll soc ital biol sper.* 5, 1003–6(1930).—The purpose was to see if any relation exists between the action of certain salts on the sensomotor cortical centers and the position of the relative ions in the Hofmeister series. The salts studied were $(NH_4)_2SO_4$, $NH_4Cl$, $NH_4NO_3$, $NH_4CNS$, $K_2SO_4$, KCl, $KNO_3$, KCNS, $Na_2SO_4$, NaCl, $NaNO_3$, NaCNS, $Li_2SO_4$, LiCl and $LiNO_3$. In another series $LiClO_3$, LiI, $Li_2CO_3$ and Li lactate were studied. The results indicate that the action of the salts on the cortical centers is not a function of the pptg. power of the salts on colloids. With the exception of $Li_2CO_3$, the Li salts exerted an exciting action. The exciting action of creatine was confirmed. There was an evident analogy between the motor symptoms provoked by Li salts and those induced by creatine. P. M.

**The action of certain chemical substances on the motor activity of the intestine.** R. De Marco *Boll soc ital biol. sper.* 5, 1006–8(1930).—The motor activity was detd. by observing the length of time a small glass marble took to cross an intestinal loop under normal conditions and under the influence of adrenaline, atropine, pilocarpine and nicotine. Adrenaline and atropine prolonged the time, pilocarpine caused no changes, while nicotine shortened the time with respect to the normal conditions. Peter Masucci

**Adrenaline-like substances; their products of oxidation.** Pietro Saccardi *Boll soc ital biol sper* 5, 1010–16(1930).—The substances studied were $(HO)_2C_6H_3COCH_2NEt_2$ (I) and $HOC_6H_4CH_2CH_2NMe_2$ (II). I was oxidized with $Cl_2$ water, dried on the water bath, extd. with alc., and the ext. evapd. to dryness (*A*), dissolved in $H_2O$ (10% soln.) and injected subcutaneously into a guinea pig. The urine from the animal was dark, gave all the oxidation reactions analogous to the adrenaline blacks and gave a neg. Thormählen reaction for melanuria, but the Ehrlic diazo reaction was pos. The urine was therefore alcaptonic and not melanotic. The alc.-insol. fraction (*B*) if treated with NaOH dissolved, and when injected produced the same phenomena of alcaptonuria. On analysis hydroxyhydroquinone was detected. II when oxidized and treated similar to I did not give rise to indole or pyrrole derivs. It was, therefore, not injected. The conclusion is drawn that oxidizability of these adrenaline like substances is directly proportional to the no. of OH groups in the nucleus, and therefore, the more the nucleus is oxidized, the more it is oxidizable. The hypothesis is advanced that tyrosinase acts on adrenaline-like substances giving red and then black derivs. only if at least one H of the amino group is free. Peter Masucci

**Vagus function and adrenal insufficiency.** Gaetano Viale *Arch. fisiol.* 28, 9–24(1930).—In adrenal operated dogs, the vagus function is unchanged, the hemodynamic action of adrenaline is increased and that of choline is decreased. Vagotomy lowers the pressure and the rhythm of the heart. Preventive injections of ergotamine or ergotoxine inhibit the tachycardia caused by vagotomy in normal dogs. Ergotamine, given after vagotomy, causes a decrease of the heart rhythm. Ligation of the adrenals lowers the pressure and retards the rhythm of the heart after vagotomy. Tachycardia caused by vagotomy is due to adrenalinemia. The sympathetic action on the heart is independent from adrenaline. Adrenaline probably exerts a central action on the vagus. A. E. Meyer

**The action of heavy metals on the spinal cord.** Michele Mitolo *Arch. fisiol.* 28, 89–113(1930).—Cu, I e. Au and Sn have a paralyzing effect on the coördinate sensory centers of the posterior cornu of the spinal cord, they are inactive on the motor centers. Mg, Hg and Pb paralyze the motor centers only. Zn produces depression in both centers. Ag, as $AgNO_3$, has an exciting effect on the coördinate sensory centers but is inactive on the motor centers. A. E. Meyer

**Gomether as a general anesthetic.** José R. Ríos. *Semana méd.* (Buenos Aires) 1931, I, 396–7.—A mixt. of 80 cc. $Et_2O$ and 10 cc. gomenol is recommended as an anesthetic in pulmonary lesions. A. E. Meyer

**Insulin in diabetes of children.** Pedro B. Landaburu and Félix Puchulu. *Semana méd.* (Buenos Aires) 1931, I, 446–50.—The daily doses must be divided into 2, 3 or even 4 injections in suitable relation to the meals. A. E. Meyer

**The local application of saturated solutions of magnesium sulfate.** S. Jouan *Semana méd.* (Buenos Aires) 1931, I, 459. cf. *C. A.* 25, 1909.—The effect on tumefactions, purulent inflammations, stings of insects etc., is due to osmotic changes. A summary of the beneficent actions is given. A. E. Meyer

**Cessation of attacks of auricular paroxysmal tachacardia by the use of calcium.**

JOSEPH B. WOLFFE AND SAMUEL BERENT. *Ann. Internal Med.* 4, 705-801(1911). JOHN T. MYERS

**Tribromoethanol anesthesia.** RALPH W. WATKINS AND O. W. MOSHER. *Arch. Surgery* 21, 887-911(1930). When kept at room temp., 3% solns. of tribromoethanol are stable toward hydrolysis for 24-48 hrs. It has practically the same margin of safety as other commonly used anesthetics, *i. e.*, 3/4-4/4 of the fatal dose. With proper precautions, 0.1 g. per kg. body wt. can be safely given. It is useful, given intravenously, in very short operations, as it gives quick pleasant induction and recovery without gastro-intestinal disturbance. JOHN T. MYERS

**The toxicity of atmospheres containing hydrocyanic acid gas.** JOSEPH HANCROFT. *J. Hyg.* 31, 1-31(1911). The sp. power of HCN gas to increase the total ventilation is an important factor in detg. the sp. toxicity of the gas. Man is relatively insusceptible to the inhalation of HCN. The time of exposure sufficient for collapse is about one-third of the fatal period of exposure. The extreme susceptibility of the canary makes it very valuable as an indicator of lethal concns. where a chem. indicator is not available. Pigeons are as good since they vomit at the lethal concn. for the canary, although their lethal concn. is about twice as great. Treatment consists of artificial respiration, and the administration of glucose and nitrites. JOHN T. MYERS

**Experimental dust inhalation in guinea pigs.** P. HAYNES. *J. Hyg.* 31, 96-121(1911). Most inhaled particles contain sol. matter at least to a small extent. The solute may be harmlessly active or toxic. If harmless the cell is stimulated to detach itself from the alveolar wall and to remove the dust. If toxic the solute affects the viability of the phagocyte which becomes less able to detach itself. At the same time the solute diffuses into the neighboring tissues with irritation to them and subsequent fibrosis. The more sol. form of a substance causes the greater damage, hence the solute has much to do with extent of damage. Si is the dust par excellence in predisposing to tuberculosis. The harmful effects of sol. Si may be neutralized by simultaneous administration of basic dusts as $Al(OH)_3$ or $MgCO_3$, although the latter are harmful when inhaled alone. It is suggested that the respective solutes combine to form monosilicates which are harmless. JOHN T. MYERS

**Asbestosis bodies in the sputum; a study of specimens from fifty workers in an asbestos mill.** F. W. HUMSON AND A. BUTLER AND BENACHAN. *J. Path. Bact.* 34, 1-4(1911). The inhalation of asbestos dust in high concns. leads to the appearance of asbestosis bodies in 48 out of 50 workers exam'd. The sputum is always mucoid in character. It may resemble egg albumin. The bodies seem to be the result of deposition on the asbestos fiber of an Fe containing substance elaborated by the cell. No tubercle bacilli were found in any of these cases. JOHN T. MYERS

**Experimental liver necrosis from shale oil.** CYRIL J. POLSON. *J. Path. Bact.* 34, 5-12(1911). —Liver necrosis was produced in rabbits and rats by the intraperitoneal injection of shale oil. By graduating the doses it is possible to produce all stages from acute necrosis to cirrhosis. The poisonous action of the non-carcinogenic residue of shale oil is very slight. The liver was not thus affected in other animals. J. T. M.

**The effect of oils on gastric secretion and motility.** W. MOSHART, ROBERTS (*Univ. Penn.*). *J. Med.* 24, 131-52(1911). —The efficiency of oils in inhibiting gastric secretion appears to bear some relationship to the degree of unsatn. of the constituent fatty acids, less unsatd. oils being more efficient. The relationship between efficiency and sp. gr. and viscosity is less significant. Of related substances, only free fatty acids show inhibitory properties. Oil diminishes the response of the stomach to food or other substances but not to the effect of histamine. Oil inhibits both psychical and chem. stimulation of secretions. Its effect occurs almost entirely after it leaves the stomach. It diminishes the motility of pentobarbital. The effect on gastric motility is not secondary to its effect on secretion. It seems necessary to assume that oil after absorption exerts some restraining influence on the gastric cells and the motility, or that it leads to the formation or the liberation of some substance which acts in a similar manner. JOHN T. MYERS

**Cholagog action of a few derivatives of the aliphatic series of low molecular weight.** KEFENNE CHABROT, R. CHABONNAT, M. MAXIMIN AND R. WATTS. *Compt. rend. soc. biol.* 106, 15-6(1911). A study was made of the effects on the cholagog action caused by substituting various groups and atoms for the Cl and the $CO_2H$ group in $Cl_3CCO_2H$. Conclusions: (1) The cholagog action disappears when the $CO_2H$ group is replaced by an amide, ale or Me group. (2) $BrCH_2CO_2H$ causes an immediate and powerful cholagog action but its toxicity is too great for a prolonged study; glycine in a 2 gr. dose doubled the biliary flow during 1 hr. with a 17.5 kg. dog but was completely inactive in doses of 1 gr. with other dogs; glycolic, cyanoacetic, glyoxalic and malonic acids had no

effect in 1 gr doses with dogs of about 20 kg; hippuric acid had a very distinct action on 2 animals (3) Of the compds in which both groups are replaced at the same time, EtCl is completely inactive but EtBr or EtI increases the cholagog action when large doses are used $CHCl_3$ and $CCl_4$ are completely inactive. ALBERT L. RAWLINS

The cholagog action of chlorine derivatives of acetic acid. ETIENNE CHABROL, R. CHARONNAT, M MAXIMIN AND R WAITZ *Compt rend soc. biol* 106, 17–8(1931) — There is no close relationship between the cholagog action and the no of Cl atoms in the Cl derivs of AcOH AcOH, $ClCH_2CO_2H$, $Cl_2CHCO_2H$ and $Cl_3CCO_2H$ were tested in molecularly equiv doses of their Na salts, the acids represented thus amounted to 0 40, 0 60, 0 80 and 1 0 gr resp AcOH had no cholagog action, $ClCH_2CO_2H$ gave const. results, at least doubling and sometimes quadrupling the flow of bile and at the same time increasing the concn $Cl_2CHCO_2H$ had no action; $Cl_3CCO_2H$ doubled the biliary flow and increased the concn of bile from 2 70 to 3 15 ALBERT L. RAWLINS

Respiratory stimulation by sodium sulfide. C. HEYMANS, JEAN J BOUCKAERT AND L DAUTREBANDE *Compt rend soc biol* 106, 52–4(1931) —Two series of expts. with dogs show that the stimulating action of $Na_2S$ on respiration is largely reflex from the carotid sinus and is only very slightly due to a direct stimulating effect on the respiratory center ALBERT L. RAWLINS

Carotid sinus and respiratory reactions by cyanide. C. HEYMANS, JEAN J. BOUCKAERT AND L DAUTREBANDE *Compt rend soc biol* 106, 54–5(1931) —A series of expts. was performed with dogs in which the cyanide was caused to act solely on the carotid sinus and then solely on the centers. The results show that the inhibitory action of cyanide on respiration is due to the sensitiveness of the carotid sinus to cyanide, and not due to the action of the cyanide on the centers ALBERT L. RAWLINS

The hypoglucemic action of sulfur. Sulfur mineral waters. I. DANIEL AND M. POPESCO BUZEU *Compt rend soc biol* 106, 106–7(1931) —The action of sulfur water on dogs and normal and diabetic patients is contrasted with the action of distd water In all cases where the sulfur mineral water was used there was a pronounced diminution of blood sugar, while distd water had no effect. The authors believe that the hypoglucemic action should be attributed to the colloidal S and $H_2S$ in the water ALBERT L. RAWLINS

The action of commercial glucose, comparatively administered by the digestive and intravenous methods, on the glycogen content of the liver, heart and muscles. D SMICI, M POPESCU AND A CRAIPALEANU *Compt rend soc biol* 106, 112–5(1931) — The glycogen content of the liver, heart and muscles was detd. with 12 rabbits administered com glucose by digestive and intravenous methods following a fast. To increase the liver glycogen the digestive method is more effective than the intravenous while to increase the glycogen content of the muscles, and particularly of the heart, the intravenous method is incomparably superior ALBERT L. RAWLINS

Pharmacodynamic action of hydrogen sulfide introduced into the digestive tract. F KMIETOWICZ *Compt rend soc biol* 106, 126–8(1931) —In a study with dogs the following behavior of $H_2S$ was demonstrated large doses introduced into the intestine first cause an acceleration of respiration and then cessation with death resulting, the blood pressure is raised, the heart rate is lowered, with an increase of amplitude; artificial alkalosis, acidosis and the injection of morphine increase the toxicity of $H_2S$, alkalosis having the greatest effect. The mechanism of the above actions is discussed The absorption of $H_2S$ is greater in the small intestine than in the large intestine $H_2S$ shows analogous but less distinct behavior when introduced by mineral water ALBERT L. RAWLINS

Action of iodine, calcium and magnesium ions on the oscillometric index and arterial pressure in transcerebral dielectrolysis. GEORGES BOURGUIGNON AND SOCRATE ELIOPOULOS. *Compt rend.*, 192, 379–82(1931), *Compt rend soc biol* 106, 454–8 (1931), cf G Bourguignon, *Rev Actinologie* 5, II, 180, March–April 1929 ALBERT L RAWLINS

"Dial" as a surgical anesthetic for neurological operations with observations on the nature of its action. J F. FULTON, E G T. LIDDELL AND D. MCK. RIOCH *J Pharmacol* 40, 423–32(1930) —For cats and dogs 0 5 cc. per kg administered intraperitoneally was sufficient for surgical anesthesia The motor cortex still reacted to elec. stimulation. From this fact, and from other observations (of chop licking, salivation, vomiting, indicating an effect on the medulla, and of absence of excitement and a resemblance to natural sleep) it is suggested the site of action of Dial is in the hypothalamus and medulla C. RIEGEL

The calorigenic action of morphine as revealed by addiction studies. H G BARBOUR, D E GREGG AND L. G HUNTER *J Pharmacol* 40, 433–50(1930) —Three

of 4 dogs after 7–10 weeks on morphine showed a basal metabolism higher than normal, and this high value dropped on withdrawal of the drug Basal N excretion was decreased, although total N output increased Carbohydrate combustion increased, fat combustion decreased It is suggested that narcotic action may be due to inhibitory impulses arising peripherally from the calorigenic stimulation. C. RIEGEL

**The reaction of iodates in vivo.** L. C MAXWELL. *J. Pharmacol.* 40, 451–5 (1930) —Lethal intravenous dose of $NaIO_3$ was 100 mg per kg for rabbits A dose of 75 mg caused appearance of toxic symptoms (convulsions, spastic paralysis, irritation of mucus membranes, albuminuria) The toxicity of the iodate increased in the presence of NaI The toxicity apparently is not due to liberation of I in the tissues C R.

**Urinary sulfur and thiocyanate excretion in cyanide poisoning.** RALPH G. SMITH AND RUSSELL L MALCOLM *J Pharmacol* 40, 457–71(1930) —Rabbits on a const. diet were allowed to breathe HCN fumes for certain periods for a number of days Inorg , and conjugated sulfates, neutral S and thiocyanate excretion in urine were detd Neutral S increased during cyanide administration, the increase being accounted for by excretion of thiocyanate Inorg sulfate decreased in most cases, so that total S was the same, or less An increase in total N caused an increase in N S ratio After intravenous injection of NaCN 61–100% of the cyanide given was recovered in the urine during the 1st three days as thiocyanate Conclusions Increased urinary neutral S is due to detoxication of cyanide rather than depressed oxidation processes Thiocyanate formation is the principal method of cyanide detoxication C R

**Hemoglobin production. II. The relief of anemia, due to milk diet, by feeding amino acids.** DAVID L DRABKIN AND H K. MILLER *J Biol Chem* 90, 531–43 (1931) —The effect of the addn of amino acids relatively free from Fe to anemic rats on a whole-milk diet contg 0.2 mg Fe per day was studied All the prepns were free from Cu and from other heavy metals Alanine, alanine-HCl, histidine-2HCl and HCl alone had no effect on hemoglobin production, indicating that in this type of anemia the relief of achlorhydria is not essential (cf. McLester, *J Am Med Assoc* 95, 719 (1930)) Arginine and Na glutamate rapidly produce continuous hemoglobin regeneration Tryptophan, Na aspartate, pyrrolidonecarboxylic acid and a proline mixt from hydrolyzed gelatin produce a temporary increase in hemoglobin production It is suggested that the effective substances act as a source for the synthesis of pyrrole rings for the heme mol ; the absence of either Fe or of these substances produces anemia. K. V. THIMANN

**A study of electrolyte equilibrium in the blood in experimental acidosis.** HENRY N HARKINS AND A BAIRD HASTINGS. *J. Biol Chem* 90, 565–95(1931) —The effect of injecting 2–3 cc *N* HCl per kg body wt. into dogs was followed by $CO_2$, $p_H$, ion distribution and refractive index measurements The acid caused an anuria so that very little of the excess Cl was excreted The $p_H$ fell to 6 9 and in 2 cases to 6 1. Hyperpnea began 20 sec after the start of the injection, but respiration became normal again in 1 min., while the $p_H$ had not returned to normal in 3 hrs or more The respiratory center was not inactive, as shown by response to maximal elec. stimulus, and hence the $p_H$ is not a respiratory hormone The distribution of $HCO_3$ and Cl ions between cells and plasma was according to the Donnan relation throughout (Van Slyke, Wu and McLean, *C A* 17, 3046), even on the acid side of the isoelectric point of hemoglobin. The refractive index of the serum was increased, and the water content decreased. The water-content of the cells, however, and the Cl contents of both cells and serum were increased. Two expts. on blood *in vitro* gave essentially similar results. K. V. T.

**The comparative effect of strychnine in the normal and dehepatized frog.** J. T. PRIESTLEY. *Proc Staff Meetings Mayo Clin* 6, 71(1931) —Liverless frogs showed a reaction to a given dose of strychnine that was more than twice as severe as that given by normal or splenectomized frogs Partially dehepatized frogs were distinctly more susceptible to strychnine than normal or splenectomized frogs. R. C. WILLSON

β-Phenylethylamines. I. Mescaline and mescaline-like substances (SLOTTA, HELLER) 10. Some synthetic bases similar to ephedrine (CHERBULIEZ, *et al.*) 10.

JOHANNESSOHN, FRITZ. Kinine in de geneeskundige Practijk aan de Hand van de Gegevens der Pharmacologie. Amsterdam: Bureau tot Bevordering van het Kinine-Gebruik. 210 pp.

# 12—FOODS

F C. BLANCK AND H A LEPPER

An outbreak of food poisoning in Staffordshire. I. The clinical manifestations. E S CLAYTON AND V E MILNE *Brit Med. J* 1930, II, 684–5 II. Bacteriological investigation. JOHN MENTON *Ibid* 685–6 —A report is given of a limited outbreak of food poisoning due to eating pie made from pork infected with hog cholera bacillus.
J. B. BROWN

*Use of buffers in determination of color by means of titanium trichloride.* II. O L EVENSON AND R H NAGEL. *Ind Eng Chem., Anal Ed* 3, 167–9(1931). cf *C A* 22, 3780 —Analysis of food colors by titration with $TiCl_3$ is made fairly accurate by the addn of properly chosen buffer catalysts such as Na citrate or bitartrate.
H F. LEUPOLD

The viscosities of alkali solutions of pure wheat flours and their relation to practical baking research. THEODOR BIÉCHY WITH ROBERT MÜLLER, GRAMS AND NÜCHTER *Kolloid Z* 54, 194–210(1931) —The viscosities of 0.05 *N* NaOH solns of wheat flours are const. after 2 hrs and were detd at 20° with a Lawaczeck falling body viscometer A standard comparison may be made by comparing the viscosity of a soln in 0.05 *N* NaOH contg enough flour to contain 1 g of gluten per 100 cc. The gas-holding capacity of dough was detd at 32° with the Tillmann app The following relation was found to hold for the wheat flours tested [Teiggarkraft × standard viscosity]/Bread vol (*100 g flour*) = const., *where Teiggarkraft is the difference* between original and final dough vol.
ARTHUR FLEISCHER

Bakers' yeast. I. Influence of age upon the fermentation time of the yeast. E ROSENBAUM *Z Untersuch Lebensm* 59, 607–12(1930) —The manuf. of yeast cake from beet-sugar molasses is described. Analytical data on 20 samples of yeast are given. The moisture contents as detd by heating 4 hrs at 105–8° were 72–3% High moisture content is assocd with poor keeping quality. Keeping quality was detd by the time required for the cake to soften when heated at 35°, the times varied from 55 to 105 hrs. The N contents varied from 1.81 to 2.52% of the dry substance, corresponding to protein contents of 41.38–57.25% The fermentation time is the time taken by a dough of standard compn pressed into a mold of fixed dimensions to rise 5 times in succession to a height of 7 cm above the mold The sum of the 5 periods, or total fermentation time, showed great variation, 176–271 min The fermentative power of the yeast decreases rapidly on storage, but deterioration is reduced by storage at low temps
C. R. FELLERS

*Development and heat economy of the gas bakery oven.* W. RAISS *Arch Wärmewirt* 11, 381–6(1930) —The development of the various German types of gas ovens for baking bread is discussed A successful gas oven will not imitate the models for solid fuels, but must have a min. of wt. and good insulation
E W. T

Milk considered as a complete and biologically balanced food. RAOUL LECOQ *Bull soc hyg aliment* 18, 481–509(1930) —A review
A PAPINEAU-COUTURE

The pigments of milk. MARTIN LUNDBORG *Biochem Z.* 231, 274–89(1931) —The natural yellow color of butter fat is due to carotene, as can be ascertained by the carotene spectrum of the unchanged fat The tintometric detn of the carotene according to Lovibond is unreliable because of the very min quantities present. More reliable results are obtained from studies on the sapon residue Five cc of a freshly prepd. 20% alc. KOH is used for the sapon. per g fat, and the sapon is carried out for 45 min. over a boiling water bath in an Erlenmeyer flask provided with a long reflux tube. The reaction mixt. is dild with 10 vols. of $H_2O$, and this is then extd 4 times with ¼ its vol. of ether The combined ether exts are dried 2 hrs with anhyd $Na_2SO_4$ *and evapd. at 50–55°, the last stages in vacuo* The residue is transferred *quantitatively* to small measuring cylinders with small quantities of anhyd. chloroform, and the tintometric detns. are made on these solns. For this purpose the chloroform soln is layered over $SbCl_3$ soln., and the contents are carefully mixed and examd in the tintometer Direct extn. of the milk fat is impossible, the extn of the fat with petr ether from milk acidified with lactic or acetic acid is also full of difficulties, since the acid destroys the carotene when the petr ether is evapd.
S MORGULIS

Determination of milk fat. A C. ANDERSON *Z Untersuch Lebensm* 59, 600–2 (1930) —In the detn. of fat in milk which is in an incipient state of decompn., sepn. of the fat as in the Roese-Gottlieb method may lead to low results because of sapon., even if $K_2Cr_2O_7$ has been added as a preservative It is preferable to use the Schmid Bondzynski Ratzlaff method as follows Ten g of milk is mixed with 10 cc. of HCl,

d. 1.19, and boiled for 4–5 min., heat is applied as gently as possible to avoid discoloration After cooling, the mixt is extd with 10 cc of alc, 25 cc of $Et_2O$ and 25 cc of light petroleum as in the Roese Gottlieb method C R. Fellers

**Determination of the milk proteins. III. Proposed modified method for casein.** George M Moir *Analyst* 56, 147–9(1931), cf. *C A.* 25, 1597.—The following modified method is proposed for the detn of casein Dil 10 ml of milk with 50 ml of water which has been heated to 40–42° Add at once 1 5 ml of 1 67 *N* AcOH and stir by rotating the contents of the beaker 4 times against a stirring rod After 20 min add 4 5 ml of 0.25 *N* NaOAc soln and filter after it has stood an hr or more Wash promptly and det the N content of the casein by the Kjeldahl method with Na alizarine sulfonate as indicator in the final titration The directions are given in detail together with several important explanatory notes W T H

**The determination of the calcium, magnesium and acid-soluble phosphorus of milk by means of trichloroacetic acid filtrates.** George P. Sanders *J Biol Chem* 90, 747–56(1931).—The proteins of milk can be completely pptd by mixing 4 vols of 10% $CCl_3CO_2H$ with 1 vol of milk The filtrate can be used for the detn of Ca and Mg with a high degree of accuracy, and 1 working day is saved in the prepn. of samples The procedure should also be of value in studying P combinations in milk with particular reference to casein and lipide P In several milk samples 68 4 to 81 9% of the P was found to be acid sol. There was no definite correlation between the amt of acid insol. P and the casein content, but in general milk high in casein was high in acid-insol P A P Lothrop

**Determination of the volatile fatty acids in the milks of the cow, goat and sheep.** Vittorio Borra *Pediatria rivista* 39, 102–9(1931).—In the course of his investigations on the origin of the anemia resulting from the use of goat milk, B made comparative analyses on the quantity of volatile fatty acids present in the milks of cows, sheep and goats The Reichert-Meissl no for the milks of the goat, cow and sheep was 7.72, 3 58 and 2 55, resp., while the Polenske no was 3 76, 1 49 and 0 87, resp G S

**Simple calculation of the limit of value of the microscopical examination of milk for tubercle bacilli.** *D R. Wood Analyst 56, 179–80(1931); cf. C. A. 24, 5387.*—Without concn. (and the concn methods are not really successful) from 10 to 500 bacilli per cc. can be detected by microscopical examn If cases are excluded in which there is a bulky deposit, characteristic of tubercular mastitis complicated by streptococcal mastitis, and if the attention is confined to milk giving a normal deposit of not more than 2 5 cc. in a vol of 100 cc., the microscopic detection is limited to the detection of not less than 10–50 bacilli per cc. and is, therefore, less than 1/500 as sensitive as the biological method. W. T. H.

**Crystallization of lactose in sweetened condensed milk.** B. Segal. *J. S African Chem. Inst* 13, 33–40(1930).—The texture of sweetened condensed milk is a function of the size of the lactose crystals In the cooling of condensed milk during manuf the immediate production of a large no of crystal nuclei, rather than the growth of crystals around a small no of centers, should be the aim B. C. A.

**Studies on the use of dry skim milk in manufacturing ice cream.** C. D Dahle and J. I. Keith *Ice Cream Trade J.* 27, No 1, 33–5(1931).—When dry skim milk of good quality was used in place of condensed skim milk in ice cream mixes contg cream and milk, the resulting ice cream scored as high as the condensed skim milk controls. When dry skim milk was used in conjunction with butter, the score of the ice cream was lower than when cream was used Mixes contg. butter and skim milk powder yielded the desired overrun more slowly than mixes contg. cream and powder From the standpoint of flavor, texture and body dry skim milk of good quality can be successfully used as a substitute for condensed skim milk in mixes contg. cream and fluid milk as a source of fat One half lb of dry skim milk can be successfully used in one gallon ice cream mix under the conditions mentioned. A. H. Johnson

**The causes and prevention of cream feathering.** F. J. Doan. *Creamery and Milk Plant Monthly* 20, No 1, 33–8(1931).—Fresh unhomogenized table cream rarely exhibits feathering in coffee. Creams which have become acid on account of fermentation and homogenized creams are susceptible to feathering. The feathering of homogenized creams was shown to be due to fat clumping. Homogenization of cream in such a way as to prevent fat clumping reduced the tendency to feather Cream for prepg. homogenized table cream should be fresh, of low acidity, and should be pasteurized at 160–62°F. for 30 min. or, if a flash method is used, at a temp. of 175°F. The cream should then be homogenized at the same temp. If single-stage homogenization is used, the cream should be rerun at once while hot at about 1000 lb. pressure. When a two-stage machine is used, the pressure on the second valve should not be in

excess of the pressure on the first If feathering cannot be prevented by these procedures certain salts such as Na citrate, $NaHCO_3$ and $Na_2HPO_4$ may be added The amt of these salts to be used varies but 0 025 to 0 10% will usually be sufficient. The salt should be added prior to homogenization A H. Johnson

**The hygienic supervision of butter.** A. D'Ambrosio *Ind olii minerali e grassi* 10, 169–71(1930) cf *C A* 24, 5888.—On 114 samples of butter taken between December and April when the cows were fed with dry hay, only 8 had the value of the sol volatile acids under 26 Feed, such as grass, richer in volatile acids, produced butter richer in these The stage of lactation has an effect on the production of rich milks After the period of the colostrum, the quantity of the volatile fatty acids decreases from a very high figure to normal Other conditions, such as estrus, weaning of the calf etc., affect the compn of the milk Many controlled samples of butter gave the const. limits Zeiss refractometer reading at 35° 43 2–49 5, sol volatile acids no. 20 8–35 15 insol volatile acids no 1 1–3 0 R. Sansone

**New methods of analysis of oils and fats, with particular reference to butter analysis.** S Fachini and G Dorta *Atti III congresso naz chim pura applicata* 1930, 683–7.—Three and a half g of butter is melted and filtered, then the sapon no., sol fatty acids, fixed fatty acids, I no., mol wt and *n* of fixed fatty acids are detd., and the fixed fatty acids are sepd into a group contg caprylic, capric and oleic (linoleic) acids not pptd from soln in acetone by KOH and a group contg lauric, myristic, palmitic and stearic acids pptd from soln in acetone by KOH The I no., mol wt. and *n* of the first group are calcd From the I no the content of caprylic and capric acids and the av. mol wt of these 2 acids in the mixt. can be calcd The *n* of the first group, for all grades of butter tested, was 1 4510–1 4500 at 25°, palm oil gives 1 4391–1 4380 E M S

**Analysis and composition of vegetable parchment used for packing dairy products.** Paul Arup *Analyst* 56, 149–61(1931).—The following detns were carried out on 41 com samples of parchment paper, water, ash, water sol ext., reducing material such as dextrose, bursting strength (wet and dry), wt. per ream and power to support mold growth The methods used are described and the results tabulated As a result of these detns the conclusions drawn are The moisture content should not exceed 10% The bursting strength, as detd by the Ashcroft tester, should be at least 25 lb per sq in for parchments weighing 25 lb per ream and 18 lb per sq in for material weighing 18 lb per ream The strength immediately after being wetted should be at least 33% of the strength of the unwetted material. The ash should not exceed 0 45% and the water sol ext. 1 30% The percentages of reducers in the water sol. ext. were calcd as a guide for the detection of added sugar Certain standards adopted by Germany (8% of ext. and 3% of ash) are considered too high, being due probably to the addn of sugar and salt. An unduly high content of ext renders the paper particularly susceptible to attack by mold. The water sol ext from genuine parchment consists of the decompn products of lignocellulose and can be characterized by methods of Cross and Bevan W T. H

**Fatty acids and component glycerides of Indian ghee.** R Bhattacharya and T P Hilditch *Analyst* 56, 161–70(1931).—Ghee is clarified butter or cream used in India in place of butter which, because of climatic conditions, is not suited to Indian methods of cooking To prep ghee, the thick scum that forms on boiled milk when it is allowed to stand in a warm place is skimmed off, mashed and churned with added cold water toward the end The resulting buttermilk is removed, and the residual fat is heated gently in an open pan, strained and stored Two samples of cow ghee and 2 of buffalo ghee were analyzed, one sample from a stall fed animal and the other from a pastured one in each case The butter fat content of the cow ghee was similar to that of ordinary butter The Reichert Meissl values and the % of butyric acid were toward the lower values obtained by Hilditch and Sleightholme in butter from New Zealand cows, but the oleic acid content was normal. The stearic acid content is higher in the fat from the stall fed cow than from the pastured animal, and the palmitic acid value is normal for butter fat or beef tallow The corresponding specimens of buffalo ghee were not very different, although there is distinctly more butyric acid which corresponds to somewhat higher Reichert Meissl and Kirschner values The most apparent difference lies in the increased content of stearic acid and the presence of arachidic acid Broadly speaking, it would appear that the main characteristics of the fatty acids in a fat are fairly well defined for a given species of animal, subject to minor variations due to varying climatic and feeding conditions With respect to the glyceride structure of the ghee, it is of the mixed heterogeneous ' type There is no evidence of segregation of any fatty acid into a simple triglyceride, and all the satd fatty acids are found, in more or less the same ratio, in each part of the fat. It

is doubtful whether triolein is present in appreciable amt., and the tripalmitin or tristearin present must be small if any. The 4 fats studied were of first quality, comparable in flavor and odor to the best butter fats. W. T. H

**The botany and chemistry of the soy bean.** W Kirde and B Rewald *Landw. Vers Sta* 110, 291-304(1930) —Seven samples of soy bean raised in Germany analyzed N 5.97-6.62, protein 36.59-41.37, fat 11.07-17.39 and phosphatides 1.02-2.58%. These figures are reduced to a basis of 12% $H_2O$ John R Hill

**Determination of moisture in soy beans.** L. Jolson *Mém. Unir. Etat Extrême-Orient* 13, No. 6, 1-23(1929), *Chimie & industrie* 25, 145(1931) From a study of drying at 100-5° and at 120-60°, of distn in presence of xylene, and of the effects of the fineness of grinding, wt of samples and temp and time of drying J concludes that all 3 methods give satisfactory results provided the conditions are properly selected and strictly adhered to He recommends grinding to pass a 1.5-2.5-mm mesh sieve and drying 5 g for 20 min at 130° Drying at 100-5° requires 5-8 hrs and should not be continued to const wt A Papineau Couture

**Mineral, nitrogen and fat content of some varieties of mature bean seed and of string beans.** J S McHargue and W R Roy *J. Nutrition* 3, 479-81(1931).—Twelve samples were analyzed for protein, fat, etc., as well as for mineral content Both string beans and ripe beans are very rich in mineral constituents and S It is probable that the curative property of beans for beri beri is assocd with their relatively high mineral content C R Fellers

**Carbohydrates of the lotus rhizome.** Taizo Takahashi and Hatsunao Yokoyama. *J. Agr. Chem. Soc. Japan* 6, 870-2(1930) —The lotus rhizome is a common food in Japan Most of the sugar fraction was non reducing sugar From the hot ale ext of the rhizome powder sucrose was isolated Raffinose, galactose and galactane could not be detected The polysaccharides were mostly starch and cellulose Y K

**Vitamin B content of raw and canned beef.** Yosuo Umesuo Imp Zootech. Expt. Sta (Japan), *Bull* 25, 12 pp (1930) —For normal growth of rats, the min daily requirement of vitamin B is supplied by an ale ext of 20 g raw or 40 g canned beef The vitamin B content of canned beef is not diminished during storage for 4-5 years K Kitsuta

**Detection of the onset of decomposition in meat by the content of ammonia in the form of salts.** F. M Litterscheid *Z. Untersuch. Lebensm.* 59, 599-600(1930).—The effect of $NH_3$ gas from a leaky $NH_3$ system for cold storage on the appearance and quality of meat is described $NH_3$ contamination may be detected by testing the rinsing water with Nessler's soln In conducting the Glassmann-Rochwarger test (*C. A.* 24, 3083) for incipient putrefaction and for the detection of $NH_3$ in flesh, L. recommends that the outer and inner portions of the meat be examd. separately to det. whether the meat has been exposed to $NH_3$ gas or has been dressed with $NH_4$ salts as preservatives C. R Fellers

**Citrus fruit production in the Lower Rio Grande Valley of Texas.** Hamilton P. Traub and W. H Friend Texas Agr Expt Sta., *Bull* 419, 60 pp (1930) —Very complete pomological, phys and chem data for grapefruit, oranges, lemons, kumquats, tangerines, etc., are given For grapefruit, total sol. solids range from 8.3 to 10.5%, total sugars from 5.8 to 7.0, total acidity as citric from 0.96 to 1.4, fat from 3.1 to 3.3, protein from 0.42 to 0.53 and ash from 0.19 to 3.0 C. R Fellers

**Acid to sugar ratio in oranges.** D J. R van Wijk. *J. S. African Chem. Inst.* 13, 52-8(1930) —Examn of 3 typical varieties of oranges shows that maturity as commonly judged from the ratio, acid degrees Brix of the juice, is unsatisfactory. A better basis of comparison is the ratio acid "caled sugar" (where caled sugar = degrees Brix − acid − 1.75) The value 1.75 represents the contribution of extraneous matter, other than acid and sugar, to the d. of the juice and is fairly const for all samples examd. B. C. A

**Banana—a challenge to chemical investigation.** H von Loesecke *J. Chem. Education* 7, 1537-43(1930) —Bananas soften on ripening because of the change of protopectin into pectin When overripe the pectin has changed to acids Ethylene has little effect on ripening bananas except on "dormant fruit" Banana vinegar compares *favorably with* cider vinegar Ripe banana flour has some therapeutic value Bananas are rich in vitamin A and C and also contain B, G and E Ann Nicholson Hird

**Effect of solid carbon dioxide upon transportation diseases.** Charles Brooks. *Phytopathology* 21, 103(1931) —It is possible by the use of solid $CO_2$ to secure a $CO_2$ content of the atm of a car within 30-60 min which will check rotting and softening of warm fruit as much as would a 30-40° drop in temp It is essential that the gas escape within the next 18-24 hrs. or injury to flavor may result, especially with peaches,

red raspberries and strawberries Dewberries, blackberries, cherries and plums are more resistant to injury Grapes, sweet corn, peas and beans offer the greatest promise of beneficial effects without harm to the product JOSEPH S CALDWELL

Photoactivity of honey. J STITZ *Z. Untersuch Lebensm.* 59, 606-7(1931); cf *C A* 23, 2223 —The possibility of Ra in the ash of honey was investigated by placing the ash as well as natural honey in both glass and quartz containers and subjecting them for 30 days to contact with photographic plates Other samples were irradiated with ultra violet light and Röntgen rays and similarly exposed All results were neg for Ra C. R FELLERS

*A rapid method for the determination of crude fiber.* U. H. PUHAVEN AND E S TOMULA *Acta Chem Fennica* 3, 85-9(1930) —The Weede method consisted in treating 3 g of the crude fiber with ether to remove fats, boiling for ½ hour with 200 cc of 1.25% $H_2SO_4$, filtering and washing until wash water was neutral The residue was boiled for ½ hour with 1.25% *KOH*, washed, dried and ignited The process took several days due to the colloidal nature of the soln obtained and the difficulty in filtration If the vol fell below 172-181 cc. on boiling, the analysis showed 23.64% crude fiber (theoretical 26.08%), while if the vol was 223-227 cc., the result was 26.53% A later method involved the direct neutralization of the acid with KOH so that a large excess of KOH was present during the second boiling The results were always high The proposed method was to reflux 3 g of finely ground fiber with 50 cc. of 5% $H_2SO_4$ and 150 cc of $H_2O$ for ½ hr The flask was allowed to cool somewhat and 20 cc. of 28% KOH was added with a pipet. After refluxing ½ hr., cooling, filtering on asbestos, washing with hot $H_2O$, with 1.25% acid, again with hot $H_2O$, and finally with alc and ether or acetone, the residue was dried at 105° and ignited S A KARJALA

New procedure in the chemical investigation of fodder and foodstuffs. J. KÖNIG, F BARTSCHAT AND B STEMPEL. *Z Untersuch Lebensm* 59, 564-72(1930) —The deficiencies in the normal methods of recording the constituents of foodstuffs are enumerated, and a systematic scheme is presented for analysis and sepn. into the following groups water content, fat ($Et_2O$ ext.), crude protein (amide + pure protein, both $H_2O$-sol., and sol or insol in 2% HCl), water sol carbohydrates (acid as lactic acid + sugar reducing powers before and after inversion + dextrin + residue), starch, protocellulose and hemicellulose (including hemipentosans); α-cellulose and α lignin including α-pentosans, insol lignin, cutin and suberin, mineral matter ($H_2O$-sol., and sol or insol in 2% HCl) The results of analyses of wheat, flour and bran are tabulated as examples C. R. FELLERS

A new method for the "sand determination" in the presence of silicic acid in feed stuffs W. LEPPER. *Landw Vers Sta.* 110, 305-11(1930) —Five g of the substance is ashed over a small flame. Twenty cc NaOH (15%) is added to the ash in a Pt or porcelain dish which is covered with a watch glass and heated on a water bath for ½ hour It is then washed into a beaker, dild to 400 cc., and 100 cc HCl (1·1) is added to it The mixt is stirred and filtered and the ashed residue is the "sand" JOHN R HILL

Report on the work of the laboratories of the Central Experiment Station on feeding I. Bioenergetics laboratory. J LEFÈVRE AND A AUGUET. *Bull soc hyg aliment* 18, 328-39(1930) II. Biological chemistry laboratory. M JAVILLIER *Ibid* 339-43 III. Physiological laboratory. L RANDOIN. *Ibid* 369-89 IV. Laboratory and experiment station for investigations on livestock feeding J. ALQUIER. *Ibid* 390-435 —A review of the investigations carried out to date in the various labs., the results of which have already been reported to the Fr. Dept of Agr A P.-C.

Fodder and quality of milk in meadow fertilization with calcium cyanamide. L. HERMANN *Milchwirtschaft Forsch* 9, 142-60(1929) —In a study on feeding fodder from land fertilized by Ca cyanamide the changes in acidity, density and fat content were observed GEORGE R. GREENBANK

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Determination of nitrite and sulfite in the presence of one another in meat products (SZABÓ) 7. Vitamins and palm oil in margarine (EPSTEIN) 27. Determination of Ca, Mg and P in feedstuffs (MORRIS, *et al.*) 7. Determination of cholesterol and lecithin Evaluation of egg products (THIELMANS, *et al.*) 11B. Treatment of canning wastes (ANON.) 14. Organic peroxide for oxidizing or decoloring (of cereals, cereal products, etc.) (U S pat. 1,793,917) 27. Waterproof fibrous products for making milk bottles, etc. (U. S. pat. 1,793,839) 23. Apparatus and procedure for spray desiccation of milk (U. S pat. 1,794,978) 1. Obtaining protein material from seeds (U. S pat. 1,794,105) 27.

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Fumigating flour mills with nicotine vapors. BRABENDER ELEKTROMASCHINEN

Ges Brit. 337,311, March 1, 1929 A web of paper impregnated with nicotine is heated (as by passing it between elec heaters which are at a temp of 300–350°) without causing ignition but with carbonizing of the paper App is described.

Bread. Standard Brands, Inc. Brit. 337,930, Oct. 11, 1929 A small quantity of urea (suitably with conjoint use of urease if desired, which enables a lesser proportion of urea to be employed) is mixed with the flour, yeast and other ingredients, and corn sugar, pure maltose and other sugars can be used in doughs contg urea, with production of a satisfactory crust color A small quantity of a slightly sol acid substance such as mucic acid (with or without an admixture of acid Ca phosphate) may be added to counteract the effect of liberated $NH_3$ on the $p_H$ of the mixt. The urea, urease and mucic acid may be preliminarily distributed in a filler such as flour, sugar or corn starch or soy-bean meal (which when used as a filler supplies urease)

Diastase baking powder. Carl H Meyer Swiss 141,861, Feb 4, 1929 Malt flour is mixed with powd. dextrose, preferably maize dextrose

Milk sterilizer. Bergedorfer Eisenwerk A -G Astra-Werke Ger 517,217, July 11, 1929

Apparatus for sterilizing milk and similar treatments. Bergedorfer Eisenwerk A -G Brit. 338,422, Jan 9, 1929 Structural features.

Apparatus for pasteurizing milk, etc. Isaac E Colvin, Grant N Manison and Hugo G Walters (to Pfaudler Co ) U S 1,794,670, March 3 Structural features

Apparatus for pasteurizing milk. Cornelius Mortensen U S 1,793 631, Feb 24 Structural features of an app with jacketed tubes

Apparatus for drying milk, etc. Hans Lüber Ger 514,785, Jan 11, 1928 App with roller driers for milk and colloidal liquids is described

Thin brittle shell material for encasing ice cream, etc. Willis D. Thompson (one-third to Carl H Crawford) U S 1,794,741, March 3 A compn., which is brittle when chilled to below 22°, is formed of a suitably selected asphalt mixed with over 3 times as much paraffin and with a small proportion of stearin

Butter. E. G. N Salenius and E S Salenius Brit. 337,778, May 7, 1929 Whole milk or cream, during its passage from a centrifugal drum, is subjected to a vacuum of different degrees in different parts of the app (various details of which are described) Cf. *C. A.* 25, 546

Purifying butter, margarine and other fatty materials. R. Bendlin and O. Urbasch Brit 338,053, Jan 9, 1929 Cleansing and working is effected by extrusion of the material into vermicelli-like threads which are immediately broken up by a jet of water, and the material is then passed to a settling vat and afterward is centrifuged The washing may be repeated and alk or acid solns. used if necessary. The procedure may be applied to removal of excess of salt which has been added to butter as a preservative App. and various details of procedure are described.

Preserving meat by brine injections. G Beisser. Brit. 338,011, July 29, 1929 Various details of app. and procedure are described relating to injection of brines such as those contg NaCl, sugar and water in specified proportions into the vascular tracts of meat carcasses such as those of pigs

Meat-curing composition. Ernest H Wright. U. S. 1,792,561, Feb. 17. A meat-curing material is obtained by distg. hard wood at a temp of about 28–70° and discharging to the atm the gases released at these temps., and then gradually increasing the temp to about 480° and condensing the vapors evolved at these higher temps. App is described Cf *C. A.* 24, 2513.

Apparatus for sterilizing fruit juices. Bernhard Hug Swiss 143,205, Nov. 18, 1929 Addn to 133,461 (*C. A* 24, 443). The juices are heated by immersed electrodes.

*Treatment of fruits and vegetables. F Kidd and C. West. Brit 337,422, July* 31, 1929 For storage, transport or ripening, fruits or vegetables are placed in chambers of metal, glass or other materials provided with apertures covered with permeable material such as rubberized fabric of such character as to control the diffusion and dependent concn. of gases such as O, $CO_2$ and $C_2H_4$ in contact with the fruits or vegetables.

Preparing fresh fruit such as citrus fruits for market. Ernest M. Brogden and Miles L. Trowbridge (to Brogdex Co ) U. S 1,795,275, March 3. For prevention of blue-mold decay, the fresh fruit is treated with a warm aq mold-inhibiting soln. of an alk. hydroxide (such as a 2% NaOH soln ) having a degree of alkalinity at least as high as that equiv. to 2 oz of $Na_2CO_3$ per gal., and sufficient amt. of the soln. is allowed to dry on the fruit to exert a decay preventing action Cf *C. A.* 24, 174.

Cellulosic coatings on articles such as fruits and vegetables. George W. Beadle (to Cellacote Co ). U. S. 1,794,751, March 3 A liquid hydrated cellulose prepn. such as cellulose xanthate soln is applied successively to different portions of the arti-

cle completely to cover it, and the article is then treated successively with a soln. of a neutral salt such as $(NH_4)_2SO_4$ and an acid soln. such as $H_2SO_4$ soln. and is washed and dried. App. is described. Cf. *C. A.* 24, 2292.

**Preventing blue mold of fruits such as citrus fruits.** Ernest M. Brogden and Miles L. Trowbridge (to Brogdex Co.). U. S. 1,791,346, Feb. 24. In prepg. fruit for the market it is treated with a warm aq. mold inhibiting soln. such as $Na_2CO_3$ of a degree of alkalinity at least as high as that of a soln. of $Na_2CO_3$ 2 oz. per gal. of water. Cf. *C. A.* 24, 901.

**Apparatus (with a plurality of superposed conduits) for roasting coffee, cereals, etc.** Wm. L. Phillips and James R. Neal (to Maxwell House Products Co.). U. S. 1,793,000, Feb. 17. Structural features.

**Purine bases from cacao, etc.** C. F. Boehringer & Soehne. Brit. 338,057, Jan. 7, 1930. Natural materials such as cacao are extd. with liquid $SO_2$ (suitably in a rotatable pressure vessel at a temp. of about 45°), and by filtering and cooling an ext. as thus prepd. a soln. of theobromine and caffeine and a layer of sepd. fat are obtained. The extn. may be repeated several times (preferably at higher temp., such as 100–105°). Tea dust may be similarly extd. for obtaining caffeine and theophylline, and mention is also made of the extn. of ground cacao shells. The material may be preliminarily treated with an alk. soln. Cf. *C. A.* 25, 775.

**Irradiating chocolate with ultra-violet.** Ernst Oppenheim. Swiss 141,862, April 9, 1929.

## 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**Technology and industrial research.** O. Manfred. *Caoutchouc & gutta-percha* 28, 15875–6(1931).—A general discussion is given of the importance of research as evidenced by various cases which are cited. C. C. Davis

**Our foreign trade in chemicals in 1930.** Otto Wilson. *Ind. Eng. Chem.* 23, 430–4(1931). C. G.

**American Society for Testing Materials, Standards.** 1930, two parts, 2214 pp.—*Standard specifications* are given for open hearth C-steel rails; manuf. of open hearth steel girder rails; splice bars of various types of C steel, track bolts and spikes of various kinds of steel; steel screw spikes and tie plates, structural steel of various types, and uses; rivet steel for boilers and for ships, boiler and firebox steel, steel plates of structural and of flange quality for forge welding, billet-steel and rail-steel concrete reenforcement bars; cold-drawn steel wire for concrete reenforcement; com. hot rolled bar steels; com. cold finished bar steels and shafting, C steel bars for railway springs with and without special Si requirements; C-steel bars for vehicle and general purpose springs; silico-Mn steel and chrome-V-steel bars for railway springs; helical springs and elliptical springs for railways, C-steel and alloy steel forgings and blooms, billets and slabs for forgings, quenched and tempered C-steel and alloy-steel forgings for locomotives and cars, C steel car and tender axles, cold rolled steel axles, wrought solid C-steel wheels for railways, steel tires and castings, C-steel castings for railroads; lap-welded and seamless steel and lap-welded Fe boiler tubes, welded and seamless steel pipe; C, high speed, and alloy tool steel, C steel castings for valves, flanges and fittings for high temp. service, alloy-steel bolting material for high temp. service; forged or rolled steel pipe flanges and lap-welded and seamless steel pipe for high temp. service, Zn coatings on structural steel shapes, plates and bars and their products; Zn-coated (galvanized) sheets, telephone and telegraph line wire, tie wires, fencing, barb wire and steel wire strand; welded wrought Fe pipe, staybolt, engine-bolt and extra refined wrought Fe bars, hollow rolled staybolt Fe, common Fe bars, wrought Fe plates, wrought Fe rolled or forged blooms and forgings for locomotives and cars; Fe and steel chain, foundry pig Fe, cast Fe pipe and special castings, soil pipe and fittings, locomotive cylinders, and wheels, malleable castings, gray-Fe castings; the arbitration test bar and tension test specimen for cast-Fe, W powder, spiegeleisen, ferro-Mn, ferro-Si, ferro-Cr, ferro-V, wire bars, cakes, slabs, billets, ingots and ingot bars of lake Cu and of electrolytic Cu, slab Zn, rolled Zn; pig Pb, Ni, Al for use in the manuf. of Fe and steel, Al ingots for remelting, Al sheet, phosphor Sn, phosphor Cu, silicon Cu, hot rolled Cu rods for wire drawing, Cu wire of various kinds, bare Cu cable, bronze trolley wire, an alloy of Cu 88, Sn 10 and Zn 2%; sand castings of an alloy of Cu 88, Sn 8 and Zn 4%, bronze bearing metal; bronze castings, compn. brass or ounce-metal sand castings, yellow brass sand castings, Mn bronze

*Tentative specifications* are given for: steel track spikes, open hearth Fe plates, steel marine boiler plates, cold rolled strip steel, heat-treated C-steel helical springs; C-steel *locomotive forgings, elec cast steel stud link anchor chain*, austenitic Mn steel castings, black and hot dipped Zn coated welded and seamless steel pipe, Zn coated chain link galvanized fence fabric, chilled tread cast Fe wheels, fire refined Cu other than lake, Al alloy (duralumin) sheet, Al Mn alloy sheet, Al base casting alloys *in ingot form, Al base and Mg base alloy castings, sand castings of an alloy of* Cu 80, Sn 10 and Pb 10%, Cu base alloys in ingot form, seamless Cu tubing, tests for compressive strength of portland cement mortars, high early strength portland cement, sand for use in lime plaster, gypsum sheathing board, concrete aggregates, *building brick and pipe, fire tests of building construction and materials, boiled linseed* oil, tung oil, soy-bean oil, petroleum spirits, glazier's putty, dry-bleached and orange shellacs, Al bronze and Au bronze powders, toxic ingredients in anti fouling paints, sol nitrocellulose, synthetic AmOAc, AmOH and I t lactate, I'tOAc, BuOAc, BuOH, Bu propionate com sizes of *broken stone, broken slag, sand and gravel for* highway construction, broken stone for waterbound and bituminous concrete bases, $CaCl_2$ for dust prevention, asphalt cement of various penetrations and for various uses, high- and low C tar cements for use cold in repair work asphalt filler for brick pavements mineral filler for sheet asphalt and *bituminous* concrete pavements, timber piles, wooden boxes of various constructions, asphalt for roof coverings rubber insulating tape insulated wire and cable, specifications and test methods for asbestos tape for elec purposes rubber lined cotton fire hose, steam hose, tolerances and test-methods for rayon and for knit goods, tests for Cuban (jute) raw sugar bags, chafer fire fabrics, thermometers for Engler viscometers *Tentative methods* are given for chem analysis of Al, light Al alloys, rubber products and metallic materials for elec heating, accelerated life test for metallic materials for elec heating, test for thermo elec. power, flexure tests of concrete, testing brick for compression, flexure and absorption, tests for resistance of fire clay brick to thermal spalling action, tests for alky. or acidity, for bleeding, for hygroscopic moisture and for oil absorption of pigments, sampling and testing shellac, lacquer solvents and diluents, detn of $Me_2CO$ ext in dry lampblack and bone black, test for detn of polishing lubricant in Al powder for paints; sampling petroleum and petroleum products, tests for color of lubricating oils and of petrolatum by means of the Union Colorimeter, test for color of refined petroleum oil by means of the Saybolt Chromometer, tests for dilu of crankcase oil, for distn of crude petroleum, for expressible oil and moisture in paraffin waxes, for neutralization no of petroleum products and lubricants, for penetration of greases and petrolatum, for pptn no. of lubricating oils, and for vapor pressure of natural gasoline, test for gr of petroleum and its products by means of the hydrometer, test for S in motor fuels, naphthas and illuminating oils, tests for abrasion of gravel, for consistency of portland cement concrete, for ductility of bituminous materials and for residue of specified penetration; testing bituminous emulsions, test for size of anthracite; test for the detn of the sp gr, 38°/15.5°, of creosote fractions, test for coarse particles in bituminous materials by means of elutriation; testing asphalt roll roofing surfaced with talc or mineral granules, likewise asphalt shingles surfaced with mineral granules, analysis of roofing felt for fiber compn; compression testing of natural building stone; test for absorption and apparent sp gr of natural building stone, test for water absorption of slate, flexure testing of natural building stone and of slate; test for detg the insulating qualities of slate, testing insulating varnishes, cable splicing and pothead compds, insulating paper, laminated sheet insulating materials, and varnished cloths and tapes; testing sheet and tape insulating materials for dielec strength; testing elec insulating materials for power factor and dielec const at frequencies of 100–1500 kilocycles; test for comparing the thermal conductivities of solid elec insulating materials, testing insulating materials for resistance to impact, test for resistivity of insulating materials, test for hardness of soft rubber; testing grease wool, etc., for scoured content, identification of textile fibers and their detn in mixed goods; tension testing and compression testing of metallic materials *Tentative recommended practice* is given for: bituminous paving plant inspection, thermal analysis of steel *Tentative definitions* are given for: terms relating to magnetic testing, to the gypsum industry, to refractories, to petroleum, to timber preservatives, to textile materials and to methods of testing; the terms aggregate, coke and screen (sieve). *Tentative rules* are given for inspection of concrete and reinforced concrete work. *Tentative revisions* are given of standard specifications for steel track spikes, structural steel *for ships, alloy-steel* bolting material for high-temp service, high-test gray-Fe castings, chilled cast-Fe wheels, bronze bearing metal in ingot form, various types of condenser

tubes and ferrule stocks, portland-cement, hydrated lime for structural purposes, cement-concrete sewer pipe, broken slag for waterbound base and wearing course, shovel run or crusher run broken slag for waterbound base, block for various types of granite pavement, rubber pump valves, and tolerance and test methods for cotton fabrics of standard methods of test for magnetic properties of Fe and steel, chem. analyses of Mn bronze, test for softening point of fire-clay brick, making and storing specimens of concrete in the field, testing woven textile fabrics, sampling and analysis of creosote oil, test for distn. of creosote oil, testing elec. insulating oils and testing rubber products, of standard definitions of the term sand, of terms relating to the gypsum industry, refractories, paint specifications, coal and coke, textile materials and methods of testing G. G.

Standards and specifications for nonmetallic minerals and their products. John O. Cannon Jr. and A. S. McAllister. Bureau of Standards, *Miscellaneous Pub.* No. 110, 68 pp. (1930).—Standards and specifications are given for coal and coke, coal-tar products and bituminous materials, charcoal, petroleum and its products, fuel and illuminating oils, lubricating and insulating oils and greases; asphalt and other bituminous materials, stone and stone manufactures, sand, gravel and slag, sand lime brick, gypsum and other plasters, magnesite, cement and concrete, lime, construction work, flat glass, glass containers, table glassware, lighting globes and shades, lenses, chem. glassware, mirrors, clay, china and porcelain ware, earthenware and stoneware, bricks and tiles, natural and artificial abrasives, asbestos, chalk, mica, rare minerals, precious stones and imitations, S, magnesia, salt; graphite, fluorspar and cryolite, feldspar, silica. G. G.

Specifications and materials control for aircraft construction. H. A. Bakers. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 109–15 (1930). E. H.

The relative merits of gas, oil and electricity for industrial purposes. P. Hobkinson. *Gas World* 94, Ind. Gas Suppl. 3 (1931).—The subject is discussed from the viewpoint of the furnace engineer. F. H. Bergem

Wooden barrels in the chemical industry. H. Louis F. Hoke. *Chem. Markets* 23, 285–8 (1931), cf. *C. A.* 25, 1003. E. H.

Research in drying. M. Lurje. *Arch. Warmewirt.* 12, 21–3 (1931).—L. gives very brief descriptions of the drying investigation of various German drier constructors, and of the Moscow drying lab. Ernest W. Thiele

The process of evaporation. A. V. Blom. *Farben-Ztg.* 36, 573–5 (1931).—The phys. laws governing evapn. are discussed. For single and mixed solvents, the rates of evapn. are expressed by the equations, $y = \alpha t^{\beta}$ and $y = \int_0^t \beta' \alpha y dt$, resp., in which $y$ = amt. of liquid evapd. in time $t$, $a$, the original amt. of liquid, $\alpha$, $\beta$ and $\alpha$, consts. which depend upon the conditions of evapn. The value of $\alpha$ is independent of the presence or absence of non volatile matter. G. G. Sward

Industrial poisoning with aniline and similar substances. Angelo Bonanno. *Deut. Z. ges. gerichl. Med.* 16, 242–5 (1931).—Cases are described of poisoning with aniline, nitro- and dinitrobenzene, nitrochloro- and dinitrochlorobenzene, phenylhydrazine and phenetidine and benzene. Frances Krasnow

Poisoning with dilute tin chloride solution. R. Zeynek and H. Wahlsch. *Deut. Z. ges. gerichl. Med.* 16, 194–9 (1931). Frances Krasnow

Carbon monoxide poisoning. H. Hye. *Deut. Z. ges. gerichl. Med.* 16, 72–88 (1931).—Case report. Discussion. Frances Krasnow

Observations of carbon dioxide poisonings in the disaster at Neurode. G. W. Parade. *Deut. med. Wochnschr.* 56, 1385–8 (1930).—Clinical observations were made after the mine disaster at Neurode. Arthur Grollman

Comparison of heat-insulating materials for industrial furnaces and boilers. Victor Paschkis. *Arch. Warmewirt.* 12, 9–11 (1931).—If $k$ is the heat cond. of any substance, and $p$ its price per unit vol., then for an infinite flat plate the most economical material (other things equal) is that which has the lowest value of $kp$. For actual solid bodies, especially furnaces of small dimensions, a higher power of $k$ is required. In continuous use, $k^2p$ does well, in most cases $k^3p$ is still better as a discriminating quantity. Ernest W. Thiele

Rosin in cable-impregnating compounds. J. P. Millwood. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 325–31 (1930).—Saturants used to impregnate the paper windings around the Cu conductor of a cable have usually contained rosin or rosin oil or both, dissolved in petroleum oils or greases. The rosin serves to improve consistency and tack of the compd., secures more complete and lasting impregnation and better retention of the saturant, prevents "bleeding" when the ends are cut, prevents move-

ment of the saturant within the cable, and diminishes ionization troubles. The use of rosin however serves to limit the operating voltage and current loading of the cable owing to its low dielec. strength and high dielec. loss of rosin, causing the cable to become and remain hot when heavily loaded. When processed and blended with the proper oils, however, this effect is minimized. The use of rosin has been found to result in the formation of small, rather than large voids within the saturant. Small voids are preferred, because gas contained in them is less apt to ionize than gas in larger voids. Properties which rosin, to be used in cables, should possess are: (1) dryness, (2) absence of oxidized rosin, (3) freedom from dirt, turpentine and abnormally hard rosin, (4) constancy of the above and other properties. H. K. Sanderson

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Paraguita, a new insulating material for submarine cables (Kraus) 30. Final report of I. N. M. representative on the sieves and sieves committee of the British Engineering Standards Association (Dunsheath, Spilsbury) 2. Thermal properties of compressed liquid water (Keenan) 2. Some final values for the properties of saturated and superheated water (Keyes, Smith) 2. Some additional volume data for superheated steam (Smith, Keyes) 2. The higher alcohols of the paraffin series [as emulsifying agents] (Schwarz) 10. Treating fibrous materials with rubber, etc., [for making insulation, etc.] (Bull. pat. 317,750) 23. Apparatus for "neutralizing" poisonous gases (U. S. pat. 1,793,913) 1.

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**Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1930.** Vol. XV. London: Society of Chemical Industry. 903 pp. 12s. 6d. Reviewed in *Chem. Trade J.* 88, 201 (1931).

**Bassett, Henry N.** The Chemical Technology of Steam-Raising Plant. London: Edward Arnold and Co. 240 pp. 12s. 6d.

**Chemical Manufacturers' Directory of England, Wales and Scotland, 1931.** London: Simpkin Marshall, Ltd. 201 pp. 4s. 6d. Reviewed in *Chem. Trade J.* 89, 202 (1931).

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**Larson, Emil R., and Cox, William J.** Properties and Mechanics of Materials. New York: J. Wiley & Sons, Inc. 351 pp. $4.50.

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**López Peláez, Pedro.** Tratado completo de guerra química. Material, empleo, defensa y protección. Madrid: Agencia Española de Librería. 281 pp. Ptas. 8.50.

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**Separating liquids.** A. G. FÜR STICKSTOFFDÜNGER. Swiss 142,333, Oct. 20, 1929. Addn. to 131,651 (*C. A.* 24, 1051). App. is described for sepg. liquids lighter than water, *e. g.*, CCl$_4$ from waste water.

**Filtering alkaline liquids.** ALUMINIUM INDUSTRIE A.-G. Brit. 333,859, Jan. 17, 1929. See Ger. 502,130 (*C. A.* 24, 4870).

**Clarifying suspensions.** ISIDOR TRAUBE. Ger. 517,055, Feb. 22, 1925. The settling of suspensions is accelerated by treating them in turn with a plant ext. such as carrageen moss and a salt of Ca or Sr, particularly CaSO$_4$. The treatment of mud is referred to.

**Distillation of volatile substances.** I. G. FARBENIND. A.-G. (Hans Franzen, inventor). Ger. 514,740, Feb. 9, 1928. In the sepn. of volatile substances from non- or difficultly volatile substances by distn. with a liquid whose b. p. lies below the distn. temp., part of the liquid is added, while the other part forms a heat insulating layer between the liquid being distd. and the liquid about to be added. App. is described. The method is useful for refining oils and fats.

**Solvents for cellulose esters and ethers, resins, fats, waxes and rubber.** DEUTSCHE HYDRIERWERKE A.-G. Ger. 517,307, Nov. 27, 1929. Esters of cyclopentanone carboxylic acid with monobasic alcs. are used, alone or with other solvents, etc. The esters may be prepd. by treating esters of simple acid with Na(H).

**Mixing materials for cement, pigment, fertilizer, acid phosphate or dye manufacture, etc.** J. H. Mennow (to Fuller Co.). Brit. 329,124, Oct. 3, 1929. In prepg. materials, as for cement manuf., blending is effected by passing the material from a mill preferably to a hopper of "silos" or bins (a thin layer being successively added to the contents

of each of these) and by suitable withdrawal and redistribution of the material Various details of app arrangement are described

Projecting hydrolyzable fluids such as titanium chloride into contact with air. JOHN T REMEY U S 1,792,929, Feb 17 The fluid is discharged into the air (by a device which is described) simultaneously with a surrounding sheath of another nonreactive fluid such as dry air, $CO_2$ or $CCl_4$ in order to avoid clogging of the exit nozzle

Gas filters for breathing purposes. GERHARD K. E H STAUFF (to Otto H Drager) U S 1,792 939, Feb 17 Filters for removing $NH_3$ and $H_2S$ are formed with $Cu_2Cl_2$ on a solid carrier substance such as activated charcoal treated with Pb nitrate soln

Absorbent for ammonia in refrigerating apparatus. RALPH M BUFFINGTON (to Frigidaire Corp) U S 1,792 628, Feb 17 $SrCl_2$ and $NH_4NO_3$ are used together Cf *C A* 25, 1926

Condenser (suitable for refrigerating apparatus). ROLLIN M. HYDE (to McCord Radiator & Mfg Co) U S 1,794 092, March 3

Forming sheet insulating material such as wall board comprising a filter cake and associated deposit. FRANK W YOUNG U. S 1,794,433, March 3 Materials such as fibrous pulps may be used and app and various details of manuf are described

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Sterilization of drinking waters at Saigon and at Cholon. J GUILLERM *Arch inst Pasteur Indochine* 1929, No 10, 36–55, *Chimie & industrie* 25, 69(1931)—A description of the water supply its treatment and control The water, which is obtained from an underground sheet which is imperfectly protected from contamination by an overlying layer of clay of varying thickness and insufficient impermeability, is rendered perfectly safe by chlorination with bleaching powder at a cost of 0 0008 franc per m³ Sterilization is controlled by counts of the aerobic and anaerobic bacteria, test for (and count of, if present) indole-forming *B coli* and identification of other species of bacteria and protozoa A PATINEAU COUTURE

St. Louis has model water system. L A DAY. *Water Works Eng* 83, 731–2, 819–24(1930). *cf C A* 24, 5899—This well-illustrated article with diagrams and statistics gives detailed descriptions of the equipment, treatment, operation and maintenance of the Chain of Rocks and the Howard Bend purification plants and their systems of distribution C. H BADGER

New York to rebuild century-old Croton Aqueduct as a safety measure. WM W BRUSH *Water Works Eng* 83, 736–8, 851(1930)—A brief history of the old Croton Aqueduct is given and its present condition discussed The daily demand on the municipal water system within the city is 900 m g d., while at times outside communities need 30 m g d The yearly growth of demand will average 30 m g d The present sources of supply are the Catskill system delivering 600 m g d, the New Croton Aqueduct, 280 m g d, and local sources of Long Island and Richmond, 120 m g d To avoid a possible water shortage, since a new large source of supply will not become available for at least 6 or 7 years, the weak sections of the old Croton Aqueduct will be rebuilt so that its present delivery of 40 to 45 m g d can be doubled The probable cost will be between 1 and 2 million dollars and the work will be finished in 1931 C. H B

Toronto constructing $14,000,000 tunnel. EARLE W GAGE *Water Works Eng* 83, 654(1930)—The new filtered water tunnel, across the city, will follow the shore-line of Lake Ontario It will be 7 ft in diam for more than 5 miles and 6 ft in diam for nearly 4½ miles The first section will deliver 90 m g d into the heart of the city and 50 m g d will be received at its western end In addn, 60 m g d will go directly into the city mains from high lift pumps at Victoria Park A pure water reservoir here will hold 12,000 000 gal and a new service reservoir in the northern part of the city will contain 50,000,000 gal C H BADGER

Observations of water supplies of London and Paris. EDWARD BARTOW *J Am Water Works Assoc* 23, 267–71(1931)—In one of the plants visited excess lime treatment was used and the plant operation included lime recovery and removal of tastes and odors by activated C In others compressed air for filter washing and ozone for purification were considered novelties. D K FRENCH

Unusual construction problems met in two Far Eastern water works. M. E. BARNES *Water Works Eng* 83, 625–6, 658–61(1930)—Engineering difficulties in the

Far East are discussed. Every building in Bangkok, located 40 km. from the sea on the Menam Chao Phya River, is built on mud. This river carries enormous loads of silt and directly receives the sewage of Bangkok via its many canals and the pollution of many thousands who live in house-boats. Its chief objection as a source of water supply is that the water is made brackish from the flow of sea water past Bangkok upstream in the dry season. The water supply is taken from a natural reservoir created out of a branch stream 41 km. above Bangkok. A canal, policed to prevent diversion and pollution, carries the water to a modern water works erected on the outskirts of Bangkok. This plant contains sedimentation tanks, Jewell filters and equipment for distribution at an equalized pressure. It has proved its value in cholera outbreaks. By a suitably placed dam, a large catchment area located in that part of the Federated Malay States adjacent to the Island of Singapore was drawn upon for impounding purposes.

C. H. BADGER

Increasing supply of mountain city uncovers some unique problems. GEORGE D. NORCOM. *Water Works Eng.* 83, 629–30(1930).—The water consumption of Bluefield, W. Va., has averaged about 1.2 m. g. d. Because of an 18 months' drought in 1925–6 the supply became inadequate. Since then the storage water capacity has been increased an addnl. 127 m. g. by construction of a dam and reservoir at the mouth of Horton Hollow. This reservoir now receives also the Gravity Springs supply which formerly was usually improperly chlorinated because of its remoteness and fed directly into the mains. The reservoir supply now flows by gravity to the Ada filtration plant, which also treats water obtained from a 45-m. g. earth reservoir supplied by Ada Spring. The treatment consists of aeration, coagulation, sedimentation, rapid sand filtration and chlorination. Ada Spring is unusual because of its size and flow, which has varied from 0.175 m. g. d. to over 30 m. g. d. Provision was made against leakage through the soft limestone rock on which the new Horton dam was built by cleaning and grouting all weak spots in the rock and forcing cement grout into deep holes drilled into the rock to fill seams and crevasses. The Beaver-Pond Bailey supply, which also was formerly chlorinated and pumped directly into the mains, has been retained as an auxiliary source in case of interruption to the Ada-Horton development. Daily chem. and bacterial tests are made for the control of purification.

C. H. BADGER

*Water differences—geographically speaking.* C. C. HUMPHREYS. *Southwest Water Works J.* 12, No. 11, 15(1931).—H. discusses unusual water conditions and turbidity, acid, Fe and phenol at Pittsburg, Pa., and algae at Ithaca. At Tampa, Fla., 300 p. p. m. color is removed by $SO_2$ and $Cl_2$.

O. M. SMITH

How the planets affect our water supply. CALEB M. SAVILLE. *Water Works Eng.* 83, 735, 847–8(1930).—A general discussion is given of the long-period studies of climatology and meteorology. There is a greater tendency for rain in the quarter after full moon, especially with the moon in perigee, than with it in apogee. While the correlation between tree growth, as shown by tree rings, *e. g.*, the giant Sequoia, and climatic cycles seems to be definitely established, that between sun spot phenomena and terrestrial climate has not as yet been accepted.

C. H. BADGER

Waterworks intakes and the screening of water. JOHN W. CUNNINGHAM. *J. Am. Water Works Assoc.* 23, 258–66(1931).—The paper applies principally to flowing streams. For effective screening the design and arrangement of the intake are of great importance. Racks—intake screens—(2 to 4 meshes per in.) and fine screens (8 meshes per in. or finer) are considered with reference to their best selection and location. Some reference is made to cleaning.

D. K. FRENCH

Water purification for color removal. A. S. BEHRMAN, R. H. KEAN AND H. GUSTAFSON. *Paper Trade J.* 92, No. 8, 121–3(1931).—Modern methods of color removal are briefly reviewed, and results are given of an investigation into the nature of the coloring matter in water and new methods of removal based thereon. It was found that: (1) The particles of coloring matter are negatively charged. (2) The particles of coloring matter are of a colloidal nature, though some of them may approach mol. dimensions and consequently be in true soln. (3) The coloring matter in surface waters is essentially org. in nature. (4) In many cases the color deepens considerably with increase in $p_H$ of the water, particularly when passing from acid to alk. conditions. (5) The color is destroyed to a considerable, but variable, extent by chlorination. The excess Cl must be removed after destruction of the color in order to prevent corrosion; and with all the waters tested it was found that dechlorination by filtration through granular hydrodarco removed not only the Cl, but also the whole of the residual color. Filtration through hydrodarco, without previous chlorination, removed all or nearly all the color; but owing to the necessity of revivification, it is usually more economical to remove as much color as possible by coagulation and filtration under carefully controlled

ρH conditions followed by chlorination and then dechlorination if necessary An attempt is being made to find a method of revivification that will be so simple as to make it practical and economical to decolorize the water directly by treating with hydrodarco, without preliminary coagulation, filtration or chlorination A P.-C

Treatment of water for ice manufacture. DANA BURNS, JR. Univ. Ill. Eng. Expt Sta., *Bull* No 219, 114 pp (1930) —This work done in cooperation with the Utilities Research Commission embraced a study of methods for producing clear ice from natural waters high in dissolved salts, particularly $Na_2CO_3$ and $NaHCO_3$. With neutralization of the water with alum or $H_2SO_4$ to convert the carbonates to the less troublesome sulfates and with the use of a specially designed ice can providing ample and effective air agitation, a marketable ice fairly free from opaque zones was produced If however, the core water reaches a critical concn of salts it must be replaced with a new supply A second line of attack involved the utilization of the exchange properties of Mg zeolite to replace Na salts in the water with the equiv Mg compds Subsequent liming, followed by alum or acid treatment, produced from $NaHCO_3$ water supplies one from which satisfactory ice could be made H L. OLIN

Galvanized iron pipes for city water supply. J DE GRAAFF *Verslag Mededeel betreffende Volksgezondheid*, July 1930, 8 pp —The requirements for galvanized iron piping are discussed It should be nonporous A test for porosity of the Zn coating is to pour a 10% gelatin soln with 1% $K_4Fe(CN)_6$ on a part of the inside of the pipe which has been cut in half After 24 hrs at room temp blue spots in the solidified gelatin indicate breaks in the coating The thickness of the Zn layer should be sufficient It is detd by dissolving the Zn in HCl (d = 1.2) to which 20 g $Sb_2O_3$ per l has been added This acid does not attack Fe A simple app for the detn is described a 2- to 3-cm Cu tube, 3 cm long, is filed off to fit the inside of half of the galvanized pipe Proper sealing is obtained by pouring asphalt around the Cu pipe Acid is poured in through a funnel in one hole of a double bore stopper closing the Cu pipe, $H_2$ evolved escapes through the other hole and is collected and measured in a bottle. A min. of 600 g Zn per sq m of galvanized surface (one side) is required. The Pb content of the Zn used should be less than 0.5%. On the nature of the water depends whether the Zn will be effective in reducing corrosion If the water causes a $CaCO_3$ deposit after some time, the corrosion chances will be diminished If no $CaCO_3$ is deposited, the Zn will dissolve in time and corrosion take its course From an example is shown that in water of low hardness as much as 3.9 mg Zn per l is present after standing 1 night in galvanized piping Water left for 36 hrs in a new pipe even had 7 mg per l Zn gives at best a temporary protection B. J. C. VAN DER HORVEN

Subsoil management, particularly from the viewpoint of water mains. BRABANT, MOYAERTS, *et al* *L'eau* 24, No 1, 5–8(1931) C. R. FELLERS

Why water mains break. FRANK A. MCINNES. *Water Works Eng* 83, 579–80, 589(1930) —Rigid bearing, or uneven settlement of the supporting ground, electrolysis, earthquake, frost, effect of salt marsh land and abnormal chem character of the pipe itself are some causes given for the fracture of cast iron pipes C. H BADGER

Iodine content of Lettish waters in relation to the improvement of crops. J. KUPCIS *Acta Univ Latviensis Kim Fakultat Serija* 1, 425–48, 449–53(in German) (1930) —K. gives complete analyses for 61 samples of Lettish waters and discusses the sources of the I in the various samples. He discusses the need of I in growing crops and points out various causes for the decrease in the amt. of available I. C. J WEST

Detailed instructions for the performance of the dissolved oxygen and biochemical oxygen demand tests. EMERY J THERIAULT *U. S Pub Health Repts Suppl. No* 90, 34 pp (1931). J A KENNEDY

Method of determination of the chlorine demand of any water. D K. PATTILLO AND F D WEST *Paper Mill* 54, No 5, 4(1931) —Cl demand is defined as the amt. of Cl that will combine chemically, or possibly biologically or bacteriologically, with any given water, white water or sewage to so change the state of oxidizable matter that it will not require addnl O The method consists essentially in titrating 500 cc. of the sample with hypochlorite soln contg 0.0001 g available Cl per cc until a blue color is obtained with iodized starch soln used as outside indicator, adding a further slight excess of Cl and then detg the residual Cl with a standard colorimetric Cl testing outfit A. PAPINEAU-COUTURE

Early use of chlorine. WM. BOBY. *J. Am Water Works Assoc* 23, 283–4(1931) — A paper published earlier is discussed The equipment used as well as the results obtained in the first Belgium installation in 1902 are described. The process employed was invented by Dr Maurice Duyk, official chemist to the Belgian Govt D K. F.

Progress in superchlorination treatment for taste prevention at Toronto, Ontario.

N J Howard. *J. Am Water Works Assoc* 23, 387–95(1931) —See *C A* 24, 4878. G. G

Preammoniation of the filtered water supply of Cleveland, Ohio. J W Ellms. *J Am Water Works Assoc* 23, 400–7(1931) —See *C A* 24, 4878 G G

Eijkman test for the bacteriological examination of water. Mario Magalhaes. *Arch hyg Rio de Janeiro* 4, No 2(1930), *U S Pub Health Eng Abstracts* 11, W. 19(Feb 21, 1931) —Eijkman's method employs a glucose peptone medium, to which the water under examn is added in the ratio of 1 8 and incubation carried out at 46°. In 18–24 hrs a distinction can be made between *B coli* from cold- or warm blooded animals In addn to being selective for *B coli*, it inhibits common water organisms and bears a correlation with the tests of indole production, the citrate and uric acid reaction, and may thus prevent contamination of water when *B coli* are of non human or cold-blooded origin C R Fellers

Dental deficiencies and drinking water. R W Kehr. *J Am. Water Works Assoc* 23, 214–29(1931) —A dental defect, known generally as mottled enamel, is described, and the location of communities in which it is found is mapped It is thought to be due in some way to the drinking water used by the victims No explanation can be given at the present time D K French

Lead poisoning from drinking water in Leipzig. Kruse and M Fischer *Deut med Wochschr* 56, 1814–8(1930) —A clinical account is given of a recent epidemic Arthur Grollman

Water supply of a steel plant. T J McLoughlin *Proc Eng Soc West Penn* 46, 295–305(1930) —Extremely large vols of water are necessary, one ton of steel requiring 14,000 to 17,000 gallons water The main intake of a steel plant is one of the most vital spots. Extreme care is exercised to prevent injury by floating débris and ice Modern variable speed traveling screens insure freedom from floating material Much of the water in an iron region, especially the Pittsburgh district, periodically contains considerable free $H_2SO_4$ A considerable portion of the water must be neutralized with milk of lime to prevent corrosion of the distribution system Boiler-feed water usually is treated river water A few of the smaller plants use a hot lime-soda process; some use a continuous cold lime-soda treatment; a few are zeolite plants, but by far the most use *an intermittent lime-soda process followed by filtration. Internal treatment is* rapidly becoming recognized as an economical and effective method of scale prevention Wayne L Denman

Softening a well-water supply. N. T. Veatch, Jr., and B. L. Ulrich. *J. Am Water Works Assoc* 23, 272–5(1931) —The Manhattan, Kans , supply is softened by lime and alum. With chem softening alone a hardness of 463 p p m. was reduced to 165 p p. m With recarbonation in addn this was lowered to 124 p p m D. K. F.

Water supply for high-pressure boilers. Chas R. Hazen. *Pulp Paper Mag Can* 31, 195–8(1931) —The formation and effects of scale and the factors favoring corrosion are briefly reviewed, and the usual processes of water softening are outlined They do not furnish a water suitable for the very exacting requirements of high-pressure boilers. The prime essential of such boilers is clean evapg surfaces; this can be obtained by the properly controlled addn of $NaH_2PO_4$, either in the boiler or before feeding, and with or without a preliminary softening treatment according to the nature of the raw water A. Papineau Couture

Boiler-scale prevention by the use of trisodium phosphate in modern boiler management. Paul Koeppel. *Chem.-Ztg* 55, 58–9(1931) —$Na_3PO_4$ is the ideal softener for use in modern high pressure boilers It is inexpensive and efficient and requires no special equipment to add the softener Contact during only 1 hour at 70° is required to cause pptn of the Ca and Mg salts C R Fellers

Developments in the treatment of acid mine drainage. Lewis V. Carpenter and Alfred H Davidson *Bull West Va Univ Sci Assoc* 2, No 4, 50–7(1930) —The acidity from coal mine drainage has created a serious problem in West Va The amt of drainage is approx 25% of the rainfall. Ordinarily the flow of mine drainage will be 1000 gal per day per acre of coal exhausted and is independent of the nature of the season. *The acidity cannot be predicted, as often one mine will* give an alk drainage, while another nearby will be highly acid The conversion of S to acid is rapid and is hard to explain by the chem process of oxidation Some hold that the action of anaerobic bacteria is responsible Treatment has consisted of the addn of powd lime, limy marl, limestone and magnesite, but is not used to much extent practically. The Kaplan-Reger process is said to remove all chemicals in the water, forming a blue pigment, but little is known about it *Very little is known concerning the details for proper disposal* by dilution. On a cost comparison basis, limestone is the cheapest. If allowance is

made for capitalized cost of the plant, drying of sludge and no return for sale of sludge, the total cost per 1000 gal is $0.90. At this cost the process is not feasible. To be successful, the process must allow disposal of the by products. WAYNE L. DENMAN

Eliminating odors and nuisances about the sewage-disposal plant. F. R. HASSLER. *Southwest Water Works J.* 12, No. 10, 17(1931).—The use at Perry, Okla., of $NH_3$ 3 to 7 lbs. per million gals. together with an av. of 25 lbs. of $Cl_2$ in domestic sewage preceding digestion in sep. sludge digestion tanks removed $H_2S$ odor and produced a stable effluent. O. M. SMITH

Reclamation of treated sewage. R. F. GOUDEY. *J. Am. Water Works Assoc.* 23, 230–40(1931).—By reclamation is meant treatment of such a high grade of efficiency that the water as well as the solids can represent credits in water supply economy. In Southern California this need of reclamation is of the utmost importance. While some work has already been done, much more is necessary before all its difficulties are overcome. D. K. FRENCH

Digestion of sewage solids at high temperature. THEO. F. DOZOIS. *Munic. Sanitation* 2, 121–4(1931).—Samples of fresh sewage solids seeded with ripe sludge were digested at the thermophilic temp. of 55° and at room temp. Detns. of the nature and quantity of gas evolved, $p_H$, dry solids, ash, volatile matter and no. of bacteria were made upon duplicate samples. Thirty days was the optimum digestion period. From 18% to 20% more gas was evolved from solids digested at thermophilic temps. than at room temp. $CO_2$, O, $CH_4$ and N were present. The $CH_4$ and $CO_2$ contents fluctuated inversely. Gas produced in either case was 65–75% combustible. A $p_H$ of 7.3 was the optimum for digestion at thermophilic temps. Total bacteria present and solid detns. show little difference under the 2 conditions. GILBERT L. KELSO

Utilization of sewage gas. H. F. KEISEL. *Monats-Bull. Schweiz. Ver. Gas-Wasserfach* 10, 293–8(1930).—Sewage gas from settling tanks of the city of Zurich (700,000 $m^3$ annually) contained 66% of very pure $CH_4$ (30% $CO_2$, $N_2$ and a trace of $H_2S$). Possibilities for the utilization of $CH_4$, chlorination, oxidation, conversion into fuel oil, etc., are considered in the light of recent patent literature. K. H. ENGEL

The mechanism of the activated-sludge process of sewage disposal. E. C. C. BALY. *J. Soc. Chem. Ind.* 50, 22–6T(1931).—The sign of the elec. charge on sewage colloids can be detd. by flocculation of suspensions of fine powders of known charge and by means of cataphoresis. Both methods indicate that sewage colloids behave as if they were electropositive when the $p_H$ is less than 8.3 and electronegative when it is over 8.3. Sewage colloids have an isoelec. point at about $p_H$ 4.6 which shifts toward the side of greater $p_H$ in the presence of electrolytes. The colloids in ordinary sewage with $p_H$ 7.4 are therefore electronegative. The bacteria of sewage carry an electronegative charge, and when their concn. is sufficient they are flocculated by electropositive colloids. When their concn. is insufficient they exist as bacteria and colloid complexes, when the colloids are electropositive. The success of the activated-sludge process is due to the much enhanced charge on the bacteria when in their state of max. activity. The necessity for this max. activity would disappear if the colloids were electropositive and operation of the process is proposed at $p_H$ 5.8–6.0. W. H. BOYNTON

Advantage of sludge circulation and vacuum degasification as applied at the Cleburne plant. CLYDE C. HAYES AND CHESTER COHEN. *Proc. 12th Texas Water Works Short Course* 1930, 161–6. *U. S. Pub. Health Eng. Abstracts* 11, S, 20–1(Feb. 14, 1931). cf. *C. A.* 24, 3301.—The Cleburne plant consists of a grit chamber, Imhoff tank with central gas vent, dosing chamber and Miller siphon and a sprinkling filter unit. Inadequate sludge digestion capacity, 0.5 cu. ft. per capita, foaming difficulties, odor troubles, filter bed clogging and inadequate purification of the effluent were some of the difficulties of operation formerly. Some of the theories advanced for the present hastened digestion with degasification and sludge circulation are. (1) That through the circulation of the digested sludge the end products which are inhibitory to bacterial life and are produced through decompn., are effectively removed in the form of gases distributed through the tank liquor. (2) thorough and continuous mixing of the ripe and fresh solids aids in speeding digestion and maintaining a desirable H ion concn. and secures a thorough mixing of the bacterial flora of the sludge, (3) the entrained gases are more easily liberated through the stirring action and more quickly carried off through the vacuum maintained on the gas vents, (4) the reduction of the gas concn. in the top area of the gas vent through the use of the vacuum system decreases pressure of the gas through the entire body of the liquid, (5) the maintenance of the vacuum on the gas vents serves to further increase the efficiency of the Imhoff slot, and thus tends to prevent belching of solids upward into the sedimentation compartment, (6) the scum and foam which usually accumulate on the top of the gas vents can be mechanically drawn off, at

least partially digested, which saves addnl. labor cost incidental to this process; (7) in spite of the reduced sludge-digestion capacity the tanks are producing a fairly well digested sludge which can be discharged on drying beds, without any fear of odor nuisance or fly breeding. While economic use of captured gas is not considered, as the primary function of the plant is sewage purification, a 4-hp. gas engine can be successfully operated from the sewage gas. Complete details of plant operation are given with description of plant units. Conclusions. The vacuum system of degasification and sludge circulation demonstrated the following advantages: (1) Continuous circulation of the *digesting sludge is advantageous in hastening the process of org. decompn.* (2) the circulation of the sludge through the use of the vacuum pump is most economical and satisfactory. (3) the putrefactive odor from the Imhoff tank is entirely controllable, (4) foaming difficulties are avoided, (5) labor cost for scum removal and gas vent control is practically eliminated, (6) the reduced size of tank made possible through this vacuum system and sludge circulation will decrease the cost of Imhoff tank construction, greatly simplify and reduce operating expenses and minimize legal complaints. C. R. Fellers.

**The role of protozoa in activated sludge.** Robert Cramer. *Ind. Eng. Chem.* 23, 309–13(1931). cf. *C. A.* 24, 2819.—Clarification of sewage can be accomplished by aeration if aerobic bacterial life, live protozoa and oxygen in soln. are present. The biochem. nature of the process is indicated. Material decompd. by aerobic and anaerobic bacterial life in sewage would remain in a colloidal, non settlable state if the protozoa did not resynthesize it. F. W. Tanner.

**Lagooning sludge.** Edgar Wiebner. *Proc. 12th Texas Water-Works Short School* 1930, 153–6. *U. S. Pub. Health Eng. Abstracts* 11, 8, 18(Feb. 14, 1931).—The sewage-disposal plant at Dallas, Texas, lagoons the sludge drawn from the digestion chambers of the Imhoff tanks as well as scum from gas vents and skimmings from the surface of the flow chambers or settling basin. During extended rainy weather the sludge beds were filled and the digestion compartments became overloaded, and, when accompanied by foaming, became large septic tanks. The difficulty was remedied by running the excess sludge into a shallow slough or lagoon nearby. No odors came from the lagoon. The yield of wet sludge per million gals. was 7.6–8.0. C. R. Fellers.

**Determination of carbon in sewage and industrial wastes.** F. W. Mohlman and G. P. Edwards. *Ind. Eng. Chem., Anal. Ed.* 3, 119–23(1931).—The C detn. of Friedemann and Kendall (*C. A.* 23, 2733) has been applied to domestic sewage and trade waste and can be completed in 3 hrs. *Results with carbohydrates, soap and amino compds.* indicate satisfactory accuracy for the purpose. When org. C/total N on raw sewage, corn products, stockyards and tannery wastes is 3.90–12.7, org. C/biochem. O demand is 0.55–0.65. This indicates a relation between org. C and 5 day $O_2$ demand and supports the theory that the first stage of the $O_2$ demand curve is a C oxidation. An activated-sludge effluent is in a different stage of oxidation and cannot be directly compared, the corresponding org. C/biochem. O demand being 4.1. Foster Dee Snell.

**Fundamentals of public health law.** James E. Bauman. *U. S. Pub. Health Repts.* 46, 631–41(1931). J. A. Kennedy.

**Emergency sanitary measures following a flood disaster.** Paul S. Fox. *Am. J. Pub. Health* 21, 294–6(1931).—F. details his experiences following the floods which occurred on the Rio Grande in New Mexico in Aug. and Sept., 1929. J. A. K.

**Amelioration of atmospheric pollution.** Howard W. Green. *Am. J. Pub. Health* 21, 237–41(1931). J. A. Kennedy.

**Legal aspects of water pollution.** Leo T. Parker. *Munic. Sanitation* 2, 129–31 (1931). G. L. Kelso.

**Precautions needed in the ammonia-chlorine treatment of swimming pools. A preliminary study.** Lyle L. Jenne and Henry R. Welsford. *Ind. Eng. Chem.* 23, 32–4(1931).—The use of chloramine for sterilization makes possible a high residual Cl content without the unpleasant taste, odor or irritating effects of free Cl. With the recirculation of swimming pool water as generally practiced, the $NH_4$ content is cumulative and reduction to $NO_3^-$ occurs in certain concns. These products interfere with the color test for available Cl. Use of an antichlor will destroy chloramine. Excess color formed under such conditions should be ignored when considering Cl values for sterilization. The apparent fallacy of this treatment should not outweigh its advantages. Edward S. Hopkins.

**Creoline as a larvicide.** Duren. *Ann. soc. belge méd. trop.* 8, 23–5(1928); *U. S. Pub. Health Eng. Abstracts* 11, Ma, 2(Feb. 14, 1931).—Lab. expts. made with heavy tar oil showed 200 p. p. m. was the min. effective dosage to prevent mosquito breeding

The oil must be applied every 10 days It is of particular value in shallow pools rather than in deep water C. R. FELLERS

Progress in the treatment and disposal of human wastes. R. E. MCDONNELL. *Munic Sanitation* 2, 114-8(1931) G. L. KELSO

Treating of canning wastes. ANON N. Y. State Dept. Health, Div. Sanitation, *Bull* (unnumbered) 1930, 100 pp; *U. S. Pub. Health Eng. Abstracts* 11, S. 19-20(Feb 14, 1931)—*Analytical data are tabulated in 28 tables* Suggested treatment plant designs are given. Conclusions Screening through wire screens having 20 to 40 meshes to the in. is a necessary preliminary treatment in all cases and adequate treatment when the final dilu. is greater than 1 to 100 Forty sq. ft. of effective screen area is necessary for a 2 line cannery discharging 100 000 gal. of wastes per working day of 12 hrs. About 50 cu. ft. of screenings are produced per 100,000 gal. of wastes treated Trickling filters are very effective in the treatment of screened canning wastes when the rate of filtration is less than 0.5 million gal. per day throughout the working day, and this treatment is adequate when a final dilu. is greater than 1 to 5 Rates of filtration of 2 million gal. per day throughout the working day are sufficient when the final dilu. is greater than 1 to 20, provided serious pooling is prevented through the periodic application of lime to the applied wastes to prevent the prolific growth of fungi on the filter Chem. pptn. of canning wastes with 7-10 lb. of lime and 3-5 lb. of $FeSO_4$ per 1000 gal. of wastes is sufficient treatment when the final dilu. is greater than 1 to 25 Although the cost of constructing chem. pptn. equipment may be less than that of trickling filters, nevertheless the cost and difficulty of operation, cost of chemicals and the less satisfactory effluent justify the use of trickling filters in most cases. Final chlorination of filtered or coagulated and pptd. canning wastes modifies the org. matter and is equiv. to the removal of about 30% of the residual unstable org. matter Final chlorination, therefore, permits of the discharge of filtered canning wastes into streams with final dilns. as low as 1 to 3, provided the rates of filtration of 0.5 million gal. per day are used. Final chlorination of filtered or coagulated canning wastes also materially reduces or entirely suppresses the fungus growths in the streams receiving the effluent, thus eliminating an objectionable result of pollution The required dose varies from 8 to 20 p. p. m. Cl, depending upon the degree of preliminary treatment of the wastes to assure a residual of at least 0.5 p. p. m. in the effluent. Every effort should be made to reduce the water consumption of canneries and to prevent the wastage of the product so as to reduce the strength and quantity of wastes to be disposed of The relatively high cost of treating these wastes, which are 5-15 times as concd. as raw domestic sewage, makes it very desirable that efforts be made to recover by-products from the wastes and thereby reduce the net cost of their disposal. C. R. FELLERS

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Treatment of tannery wastes (ANON) 29. Corrosion of steel water pipes by stray electric currents (ROTHE) 9. Titrimetric determination of small quantities of $NH_3$. With particular attention to water analysis (HAGEN) 7. *Supplying artificially* ionized O for ventilation (U. S. pat. 1,793,799) 4.

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KLUT, HARTWIG Untersuchung des Wassers an Ort und Stelle. 6th ed. Berlin: J. Springer 180 pp. M. 7.80

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Apparatus suitable for filtering water through sand, etc. HAROLD D. ELFRETH (to Cochrane Corp.) U. S. 1,794,841, March 3 Structural features.

Softening water with base-exchange material. GEORGE BORROWMAN U. S. 1,793,670, Feb. 24 The water is percolated through a granular bed comprising lignite or brown coal contg. an exchangeable alkali metal until the latter is "more or less exhausted," and the bed is then revivified by percolating a NaCl soln. through it and washing it, and is then further used for water purification.

Base-exchange compounds. GENERAL ZEOLITE CO. Brit. 337,768, July 27, 1929 Reaction is effected between an alk. metal silicate, an alk. compd. of an amphoteric hydroxide and a non-alk. compd. of an amphoteric hydroxide, to form a gel including substantially the whole reaction mixt., *e. g.*, a soln. of Al sulfate contg. added $H_2SO_4$ is mixed with a Na silicate soln. *and a soln. of Na aluminate is added. An acid or caustic* alkali or both may be added to the reaction mixt. and the use of Na zincate and other materials is also mentioned. The gel may be dried and washed. Cf. *C. A.* 24, 909

Water-softening apparatus. WALTER H. GREEN (to International Filter Co.). U. S. 1,794,765, March 3 Various structural details are described of an app. operating with a layer of zeolitic material superposed on a layer of non-zeolitic material such as gravel.

Domestic water vessels containing base-exchange material for softening water placed in them. E. Barne and Establissements Perrier & Pare. Brit. 338,021, Dec. 2, 1929. Various modifications are described of an app. of the general character of that described in Brit. 293,004 (C. A. 23, 1978).

Apparatus for purifying boiler feed water by sedimentation, etc. Edward J. Brock. U. S. 1,794,355-6, March 3. Various structural details are described.

Preventing furring. Jean Schonherr. Swiss 141,897, May 24, 1930. Furring is prevented in water heaters by addn. of $H_2CrO_4$ and a colloid. In the example, an appropriate amt. of $H_2CrO_4$ and colloidal $SiO_2$ is added. C. C. A. 25, 780.

Preventing furring in boilers. Furt Hackenbruch. Ger. 514,515, Dec. 8, 1928. Colloids are added to the water which is then made to deposit its fur, by heating under pressure, before admission into the boilers.

Distributor box for sewage-disposal system. John F. Harris. U. S. 1,793,153, March 3.

Settling tank for removing sludge from sewage. Gustav R. Roper (to Chain Belt Co.). U. S. 1,793,145, March 3.

Apparatus for conditioning air with water sprays, etc. A. T. Lewis, H. P. Gant and R. R. Tallarsko. Brit. 338,018, Nov. 28, 1929. Structural features.

Treating waste liquors to remove sulfide sulfur. Cottrell Ltd., R. S. Jones and S. Pearson. Brit. 337,533, Sept. 23, 1929. The liquor is first treated with acid until neutral or very slightly acid, in the presence of the $SO_3$ radical, as by the use together of $ZnSO_4$ or $MgSO_4$, $NaHSO_3$ and $H_2SO_4$, and on removing the materials part of the S settles out. The remaining liquor is then treated with caustic alkali in the presence of a Zn or Mg salt until it is alk. to phenolphthalein, when $Zn(OH)_2$ or $Mg(OH)_2$ and the rest of the S settle out.

Recovering oil from waste water. Etablissements Cattelan. Swiss 141,939, Sept. 4, 1929. App. for the sepn. of $C_6H_6$ oil and petroleum from waste water, including a revolving drum with internal compartments, is described.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. Skinner and M. S. Anderson

Summary of results of German soil analyses up to 1929. Lemmermann. *Z. Pflanzenernähr. Düngung u. Bodenk.* 9B, 337–9(1930).—The degree of soil acidity and the $P_2O_5$ and $K_2O$ contents are given in tabular form. H. B. Sims

The temperature correction in the hydrometer method of mechanical analysis of soils. Charles Richter. *Soil Science* 31, 83–92(1931).—A study is made of factors affecting the mech. analyses of soils by use of a hydrometer. Soil suspensions of a particular soil at different concns. but at the same temp. will not give identical results when the temp.-correction factor of 0.35 is applied at all concns. Concordant results are obtained only when the correction applied is considerably smaller at the lower range of the hydrometer than at the higher range. A sliding-scale correction table is suggested. M. S. Anderson

Variation of the colloidal material extracted from the soils of the Miami, Chester and Cecil series. R. S. Holmes and Glen Edgington. U. S. Dept. Agr., *Tech. Bull.* 219, 1–23(1930).—A specially designed agitator is described in which the soil suspensions were prepd. A 75% sepn. of the colloidal material from these suspensions was obtained by means of a supercentrifuge. The colloids derived from the various samples of each series show a marked constancy, but they show an equally marked divergence between the different series. The largest amt. of colloidal matter is found in the B horizon. The H ion concn. is on the acid side in all but 1 horizon. With few exceptions the org. matter, S and P are most abundant in the A horizon. $SiO_2$ increases with depth in most of the Chester profiles, whereas the reverse is true for the Miami and Cecil series. The active base constituents vary in the Miami profiles in the reverse order to their variations in the Chester and Cecil profiles. The $Fe_2O_3$ content is higher in the lower horizons of all 3 profiles. The relative constancy in compn. of the colloids of each series is cited and discussed. The colloids of the different soil series are, in general, very different. If the series are arranged in the order of the $SiO_2$:$R_2O_3$ ratio the order becomes Miami, Leonardtown, Chester and Cecil. This order also generally holds for the 4 major constituents if the reciprocal character of the relation is kept in mind. Combined $H_2O$ varies inversely with the $SiO_2$:$R_2O_3$ ratio. The univalent and bivalent bases do not follow this ratio very closely. J. R. Adams

Interaction between ammonia and soils, as a new method of characterizing soil colloids. AMAR NATH PURI *Soil Science* 31, 93–7(1931).—Soils react very slowly with bases. Equil. conditions can be reached quickly only when a large excess of alkali is added and the excess removed by leaching or by pptn. as some insol. compn. Completely unsatd. soils will combine with an amt. of $NH_3$ which may be considered equiv. to the base-exchange capacity. The method used for $NH_3$ adsorption consists of placing the H satd. soil in a flat dish in a vacuum desiccator over *N* $NH_4OH$ for 2 days. The dish is then removed and placed over 90% $H_2SO_4$ in vacuum for 48 hrs. The $NH_3$ retained is detd. by distn. with lime. The $p_H$ values of soils contg. $CaCO_3$ are about the same after dil. acid treatment and subsequent $NH_3$ satn. as for the soil in the natural condition. M. S. ANDERSON

Investigations on the organic matter of soils. Their determination and their importance as nitrogen reserves. VINCENT, HERVIAUX AND GAUDIN *Ann. sci. agron.* 47, 654–71(1930).—*Humic materials extd. from a soil vary with the chem. nature* of the alk. solvents, their concn., the temp. and the reaction time. The concn. of the alk. soln. used affects the concn. of the humus. High alk. concns. break down humic material and too weak solns. produce variable results. The humic materials and humus reduce 0.1 *N* K permanganate solns. in a fairly const. manner. The combinations of N *and their probable role in soil fertility are summarized.* The necessity of stating precisely in soil analyses, the existing humic and N combinations is emphasized. The detection and detn. of humic materials are essential. The humate solns. obtained were analyzed for total and sol. humic materials by oxidation by K permanganate. If it is wished to study the ammonification of sol. org. materials, the extn. in the cold for a protracted time with a weak, alk. soln. is *preferable*. It is advised that 20 g. of finely ground, decalcified soil be agitated mechanically for 2 hrs. with 500 cc. of 1% soda soln. followed by 24 hrs. standing with occasional shaking by hand. F. W. MARSH

Some methods for detecting differences in soil organic matter. EDMUND C. SHOREY U. S. Dept. Agr., *Tech. Bull.* 211, 1–25(1930).—The dark color of the alk. exts. of soils is not due to the absorption of O during the process of extn., and such color cannot be considered an indication of the presence of phenolic compds. Differences in the shades of color of humus exts. are proof of differences in the kind of org. matter, but a comparison of the depth of color of the exts. cannot be used as a measure of the quantity of org. matter present. The N in the various fractions of an alk. ext. of a soil and the quantity of O absorbed when air is passed through the ext. vary with the soil. The presence of 2 classes of org. nitrogenous compds. in soils is indicated. These are chitin and its deriv., glucosamine, and some member of the indole group. The results of acid hydrolysis of soils from a N standpoint and the use of alc., water and alternate alc. and water extn. are discussed as means of showing differences in soil org. matter. The formation of arophenine when some soils are heated with $PhNH_2$ is described, and this formation is suggested as a means of showing the presence or absence of some as yet unknown org. soil constituents. A short discussion of a no. of general reactions that may be applied to soil exts. or fractions, such as the pyrrole and fluorescin reactions, are presented. W. H. ROSS

The replaceable cations in the soil and the plant. K. K. GEDROIZ. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 464–75(1930).—A chernozem soil was satd. *with the* cations, Mg, Ba, Mn, Co, Ni, Cu and H. It was used in pot expts.—700 g. per pot—on mustard with a complete fertilizer and without. No crop was obtained with any one of the enumerated cations. In another series of expts., with the same soils, 10 g. $CaCO_3$ was added, and the exptl. plant was oats. No crop was obtained from Ba, Ni and Co soils. A small crop was obtained with the Cu soil (0.39 g. *of dry matter* against 5.4 g. on the regular chernozem soil with $CaCO_3$), a slightly better crop—1.56 g.—from the Mg soil, and 1.6 g. from the Mn soil. The H soil gave a normal crop. The next series of expts. was conducted with solid satd. with Mg, Ca, Sr, Cd, $Fe^{++}$ and $Fe^{+++}$, Al and H. All pots received a complete fertilizer and one series received also an addn. of 10 g. $CaCO_3$. Without $CaCO_3$ no crop was obtained from the Cd and $Fe^{+++}$ soils, some small yield was obtained from the Mg, Al and H soils. The Sr soil gave just as good a crop as the soil satd. with Ca, which in turn gave just as good a crop as the chernozem. Apparently Sr can replace Ca in the nutrition of plants. The pots which also received $CaCO_3$ gave a crop with all the cations, except Cd. The crops on the $Fe^{++}$ and $Fe^{+++}$ soils were small, and on the Al and Mg soils they comprised 50% of the normal. Thus the Ca cation is one of the most important exchange cations from the standpoint of plant nutrition. From earlier expts. G. cites the effect of a K-satd. soil. Without Ca the K was not available. On H-satd. soils only $CaCO_3$ brought about a normal crop, addns. of $CaSO_4$ had no effect. This is due to the acid reaction produced by the

formation of $H_2SO_4$. It was also found that part of the Ca may easily be substituted by Mg without any ill effects. J. S. Joffe

Determination of the percentage base saturation of soils and its value in different soils at definite $p_H$ values. W. H. Pierre and G. D. Scarseth. *Soil Science* 31, 99–114 (1931).—A comparison is made of the base satn. of soils when detd. by the $Ba(OH)_2$–$NH_4Cl$ method and by the $Ba(OAc)_2$–$NH_4Cl$ method. The $Ba(OH)_2$–$NH_4Cl$ method gives appreciably higher total exchange capacities than does $Ba(OAc)_2$. Soils that have been limed show much smaller differences by the 2 methods. Soils of various origins at like $p_H$ values may show considerable differences in percentage satn. In general, highly weathered soils such as those from the Piedmont Plateau and of the Coastal Plains have a lower degree of satn. than do those from the Coastal Plain Black Belt and the Glacial and Loessial Province. There appears to be no relation between org. matter content of soils or the nature of the bases present in the exchange complex and the percentage base satn. at like $p_H$ values. The avidity or strength of acids present varies with different soils. In general, highly weathered soils have weaker acids than the less weathered ones. There is a good correlation between the avidity of soil acids and the percentage of base satn. of soils at $p_H$ 4.80. M. S. Anderson

The buffer capacity of soils, methods of determining it and its practical value. P. Kuchinskii. *Ann. Inst. Sci. Agr. Lenin Gorky-Gorki* 9, 77–104 (1929).—K. detd. by the method of Jensen the buffer capacity of the loess like soil in the vicinity of Gorki. The effect of microrelief on the buffer capacity and the variations in the profile were studied. At the same time the exchangeable bases were detd. by the Kappen method as well as by the hydrolytic acidity. The illuviation horizons had the highest buffer capacity, the eluviation horizons, the lowest. When the clay (particles <0.01 mm.) was removed, the buffer capacity was practically zero. The humus portion of the soil is high in buffer capacity. With the increase in buffer capacity the base-exchange capacity is increased. The higher the buffer capacity the higher the fertility of the soil. On the slopes the buffer capacity is low; in the depressions it is high. There is a correlation between buffer capacity and hydrolytic acidity. J. S. Joffe

Soil acidity and its practical significance. I. de V. Malherbe. *S. African J. Sci.* 27, 253–69 (1930) (in S. African Dutch).—The causes and effects of soil acidity are reviewed. Exchange acidity is detd. according to Daikuhara (*C. A.* 9, 500) with methyl red (or phenolphthalein) as indicator (cf. also Gov *et al.*, *C. A.* 24, 5004), the method consists in shaking 100 g. soil with 250 cc. *N* KCl soln. for 1 hr., filtering and titrating with 0.1 *N* NaOH. Comparative results of this acidity with $p_H$ are given for several soils. The hydrolytic acidity (Kapper, Bodenacidität, Berlin 1929) is detd. by titration after shaking with $Ca(AcO)_2$; it is always higher than the exchange acidity. A table for some 150 S. African soils of different natures gives % rock (>0.04 mm.), % clay + humus, $p_H$ and both acidity values. Of the total, 30% is in the neutral class ($p_H$ >5.99) and does not need lime. Thirty-five % is weakly acid (5.50 to 5.99) and needs slight lime addn. if sandy. The exchange acidity is a good indication for this need, it is higher for the humus soil than for the clay soil because of buffer effects. The same holds for the stronger acid soil groups (19% of 5.00 to 5.49 $p_H$). As a rule lime is always required for soils with more than 2 cc. acidity. Special cases of fertilization are discussed. The type of crop grown is a decisive factor in the matter of liming, the most acid-sensitive crops are corn, barley, sugar beet, cabbage, beans, peas and lucerne. The amt. of lime required for improvement of the soil is discussed and methods for calcn. are given. Many references are included. B. J. C. van der Hoeven

Active soil acidity and crop yields. I. T. Solnatov. *Ann. Inst. Sci. Agr. Lenin Gorky-Gorki* 9, 141–65 (1929).—From a series of field expts. in various rotations the relation between the $p_H$ of the soil and its crop response has been established; for rye 5.94 ± 0.014, for oats 6.05 ± 0.090 and for potatoes 5.92 ± 0.13. J. S. Joffe

The potassium thiocyanate method for determining soil acidity. Yutaka Kaiosuita. *J. Imp. Agr. Expt. Sta.* (Japan) 1, 55–8 (1930); cf. *C. A.* 16, 136.—Treatment of soil with an alc. soln. of KCNS produces a red color if the soil is more acid than $p_H$ 6.88, and the depth of color is proportional to the acidity of the soil. At the same $p_H$ values, the color increases with exchangeable acidity, since this is accompanied by increase in $Al_2O_3$ and $Fe_2O_3$ and decrease in CaO and MgO brought into exchange. The exchangeable $Fe^{+++}$ of soils is therefore considered responsible for a part of the exchange acidity. K. Kitsuta

Change in soil acidity. E. Paasch. *Z. Pflanzenernähr. Düngung u. Bodenk.* 9B, 309–26 (1930).—On limed soils green manuring lowered the $p_H$ about 0.6–1.0. Physiologically acid and alk. reacting fertilizers increase acidity less. Barn manure did not produce increased acidity. H. B. Sims

**Colorimetric determination of $p_H$ values in alkaline soils.** P. KAMERMAN *J. S. African Chem Inst* 13, 59–63(1930) —Colorimetric methods for detg $p_H$ values gave unsatisfactory results Discrepancies are probably due to hydrolytic effects brought about by the increased water soil ratio necessitated by the prepn of a filtered soil ext B C A

**Production of soil carbon dioxide.** TH. OEHLER *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 415–21(1930) —Forced ventilation of soil in pots produced larger amts of $CO_2$ than was in soils not so treated Increased $CO_2$ production resulted in better plant growth Aeration of soils by tile drainage may result in greater production of $CO_2$ through the decompn of soil org matter and thus increase crop yields H B S

**Temperature variation of cultivated soils.** OTTO HEUSER. *Z. Pflanzenernähr Dungung u Bodenk* 9B, 252–67(1930) —Soil temp at various depths has an important influence on plant growth The change in soil temp at the surface, at depths of 5, 17 5 and 30 cm with respect to air temp from January to July, is reported. During July the temp of the surface and 5 cm depth was slightly higher than the av. air temp *At 17 5 cm depth the temp is nearly equal to the av daily temp, except when rapid* changes in air temp take place At 30 cm depth the temp is a little lower Variation in daily soil temp is also caused by rain, liming of soil, cultivation and covering with straw and paper H B SIEMS

**Organic compounds associated with base-exchange reactions in soils.** W. T. MCGEORGE Ariz Agr Expt Sta, *Tech Bull* 31, 215–51(1931), cf. *C. A.* 25, 161 — The arid soils of the Southwest contain only small quantities of org matter. The compn and reactions of this org matter were investigated *Lignin* and lignin like substances are the most abundant and active base-exchange agents in arid soils The exchange capacity of the lignin present in soils is not a const quantity but varies in different soils The same is true for ligno-humates, although the range of variation is not so great The aq.-alkali sol ligno-humate has a much higher exchange capacity than the alc.-alkali sol lignin Leaching the lignin and ligno humate with $H_2O$ increases the exchange capacity, probably by hydrolysis The quantity of lignin extd from soils by alc. alkali represents a comparatively small percentage of that actually present. Max soly may be obtained by digesting with aq alkali at increased pressures *Titration of lignic acid (H-satd lignin) and ligno-humic acid (H-satd ligno-humate)* with KOH and $Ba(OH)_2$ indicates that the lignin mol is dibasic, and ligno humate tetrabasic The absorption of the base of an acetate by lignin is equal to that required as hydroxide to neutralize the H satd salt Ionization of the acid and basic salts of lignin and ligno-humates was detd by measuring the cond. of their resp solns at several dilns The Na and K org complexes show rather high ionization, while those of Ca, Ba and H are very low The effect of a common ion on ionization and base exchange in org matter was studied The influence of a common ion upon replacement by another base is appreciable, but, except for Ca, it is less outstanding than in inorg zeolites Xylan exhibits, to a slight degree, the property of base replacement, but this is not of sufficient magnitude to account for the greater exchange capacity of the ligno-humate *as compared with lignin. Synthetic humus, prepd from xylan or cellulose, like that* prepd from sucrose, yielded materials with rather high base-exchange capacities Xylan, lignin and ligno-humate absorbed color from basic fuchsin soln, and this color was replaceable by the base of a neutral salt soln Green manure, from ground dry alfalfa, shows an appreciable base-exchange capacity, a large part of which is not easily destroyed by digestion with $H_2O_2$ The base-exchange capacity of ground alfalfa was increased 4 fold by spontaneous decompn. Just as with soils, the extn. of ground alfalfa with alc or aq NaOH yields a lignin of high base-exchange capacity The lignin content of org matter and highly org soils is a linear function of the base-exchange capacity, while there is no relationship between hemicellulose or cellulose and the exchange capacity The exchange capacity of the org fraction increases as the org matter *passes through successive stages of decompn. in the soil* A bibliography is appended C R FELLERS

**The exchangeable bases in Malmesbury slate soils.** M H SLABBER. *S African J Sci* 27, 270–9(1930) (in S Afr Dutch) —Loam soil samples from the Malmesbury and Stellenbosch districts were studied, they are of slate origin. Top soil (9" deep) and the next layer (18" deep) were used The Kelley method was used for detn of exchangeable base (Kelley and Brown, *C. A.* 20, 2382) The results are tabulated for Ca Mg, K and Na and include $p_H$ The av is 5 8 mg equiv total exchangeable base for hill soils, it is 3 5 mg equiv for lower grounds These low figures are due more to the colloidal condition of the soils than to an unsatd condition, the low humus content is significant. The relative ratios of the bases are discussed, in the low grounds Na and

K predominate. Even if more K is available for plant food, the condition of with high univalent ion content is generally unfavorable, the clay fraction i flocculated The exchangeable base content of the soils studied is only an av. of the total base present in them, a figure lower than customary B J C v

**Behavior of water in a drained field.** Jon Rotiip *Z Pflanzenernähr* u *Bodenk* 9B, 512 18(1930) —In certain drained soils 26–29% of the total prec *was found in the drainage water* H B

**Further studies on the relationship between the concentration of the soil** and the physicochemical properties of the leaf-tissue fluids of cotton. J Harris and Truman A Pascor *J Agr Research* 41, 767–88(1930) —The general a pos correlation between the salinity of the soil and the osmotic c measured in terms of f p depression sp elec cond , Cl content and sulfate co the leaf tissue fluids of both Pima Egyptian and Lone Star upland cotton The tion between the elec resistance of the soil and the concn of all solutes of the le fluids, as measured by f p depression is higher in both the upland and Egypti ties than the correlation between the salinity of the soil and the cond of th fluids In general the correlation between the analytically detd concn of th studied in the soils and the total solutes of the tissue fluids, measured in terms of concn , is higher than that between these ions and the various measures of el content of the tissue fluids In the upland variety the correlations between resistance and total solutes of the tissue fluids are higher than those between s ance and the chlorides of the tissue fluids while the reverse is true with the I variety *In the Egyptian variety* the correlations between soil resistance a solutes are higher than those between soil resistance and tissue fluid sulfate This is not as marked and may be reversed in the upland type J R *A*

**The determination of assimilable nitrogen in soils by the growth of grasses** hold Wagner. *Wiss Arch Landw*, Abt A, *Pflanze* 5, 160 200(1930) —The N method for detg P and K is extended to the detn of assimilable N in soils and fe Westerwold Raygrass was found to give the best index of the N content of the to utilize the N supplied in any of the common fertilizers W Gordon

***Soil nitrates as a guide to the nitrogen needs of vegetable crops.*** *H D* Ohio Agr. Expt. Sta , *Bimonthly Bull.* 149, 57–8(Mar -Apr 1931) —The nitrate plate test of Morgan (*C A.* 24, *3072*) was used to advantage in testing N defici soils cropped to various vegetables *For good crop growth the soil should conta* more p. p m of nitrates Fresh strawy manure usually tested 5–7 p p m of A concn of 60 p p m. did not injure spinach N is often not liberated from rich greenhouse soils fast enough for tomato and cucumber production, the crop ing from N hunger The remedy is the application of $NaNO_3$ C. R. *Fr*

***Determination of plant-food content in soils by the citric acid and other m*** J Hasenbäumer and R Balks *Z Pflanzenernähr. Düngung u Bodenk* 9 73(1930) —The citric acid method for detg the available $P_2O_5$ and $K_2O$ of th practically as good as the biological methods No method is without objecti chem detns have the advantage that they can be carried out quickly. Each however, gives an indication in regard to the deficiency, medium content and ab of phosphate and potash of the soils H. B.

**Permeability of iodine in some economic plants.** R. C. Malhotra *Pro* 12, 1–22(1931) —Soil was analyzed for I Portions were then treated with amts of that element and used for growing a variety of plants Carrots take most, tomatoes the least There is no relation between the amt stored by t and the amt. added to the soil Root crops take up more than leaf crops localized chiefly in the roots A soil *p*H of 6 is the optimum Seventy-two re are appended B. A

**The nutrition of seedlings and the effect on root formation of cereals.** K *Z. Pflanzenernähr. Düngung u Bodenk* 9B, 433–66(1930).—During the germin seed, enzymes change carbohydrates, fats and proteins into water sol com After enzymic splitting of the large mols , oxidative enzymes then change the into smaller mols with the loss of $CO_2$ If the moisture content of the soil is ins for germination, enzyme activity may still proceed with the evolution of ap amts of $CO_2$, thus decreasing the total solids in the seed Under these condi resultant seedling may be greatly weakened. Growth of seedlings may be p if the seed is moistened (*35–40%* $H_2O$ content) from 2 to 3 days in a satd. atm at *To prevent the action of oxidative enzymes, the seed is best stored in a vacuu* seed is best moistened by a fine spray and not by dipping it in water to prevent

of water sol substances Seed thus treated gives a better root system and a larger crop yield H B Siems

**Crop rotation.** F Münter *Z. Pflanzenernähr Düngung u Bodenk* 9B, 529–52 (1930).—The total plant food and the ratio N $P_2O_5$ $K_2O$, representing the plant food removed by different field crops, were not const for the same plant, but depended on weather conditions, tillage, shading soil conditions and insect injury Beets removed the most plant food, nearly twice as much as rye and barley Potatoes and oats followed beets in amt of removal Wheat extd less $K_2O$ Leguminous plants removed practically as much $P_2O_5$ and $K_2O$ as potatoes and oats H B Siems

**A mathematical study of the decrease of crop yields.** J Dudley Greaves *Soil Science* 31, 115–22(1931).—Further study of an equation developed for the study of crop yields tends toward the establishment of the 2 assumptions on which the formula was based The rate of increase of crop yield with increase of the deficient element is *proportional to the magnitude of the deficiency of* the limiting nutrient from an optimum concn The time rate of depletion of a deficient element, provided none is added from an outside source, is proportional to the product of the soils content of the deficient element and crop yield M S Anderson

**Chemical and microbiological study of Lufkin fine sandy loam in relation to productiveness.** E B Reynolds Texas Agr Expt Sta., *Bull* 421, 5–30(1931).—In field expts the nitrifying power of the soil was correlated positively and significantly with the yields of cotton and corn The nitrifying capacity was a better index of soil productivity than any other method studied The nitrifying power of the soil was also positively correlated with the total N, total $P_2O_5$ and available $P_2O_5$ of the soil The nitrifying capacity of the soil in the lab was not affected by the season Continuous cropping of the soil to corn lowered the nitrifying capacity The application of nitrogenous materials, cottonseed meal and manure, and also $P_2O_5$ as superphosphate or rock phosphate, increased both nitrate production and nitrifying capacity Liming greatly increased nitrate production C R Fellers

**Influence of various non-nitrogenous compounds on the growth of certain bacteria *in soils of low productivity.*** *H J.* Conn and Mary A Darrow *N Y. Agr Expt* Sta., *Tech Bull* 172, 3–40(1930).—Two soils of low fertility were sterilized and inoculated with *B globiforme* Conn and with 2 related species This organism has N requirements similar to those of green plants, and it was believed that the test might show why the N in these unproductive soils was not available to plants The bacteria did not grow in the soils unless $NH_4$ salts, nitrates or other forms of readily available N were added The addn to the soils of the hydroxides, sulfates, carbonates or phosphates of the strong alkali metals also made the N of the soil available for the bacteria It is probable that the cause of the unavailability of the N is adsorption by soil colloids In this case the bacteria acted like green plants C R Fellers

**The influence of inorganic iodine compounds on the metabolism of some important soil bacteria.** Helmut Karnail. *Zentr. Bakt Parasitenk*, Abt II, 82, 494–518 (1931).—As much as 1 g per l of KI, $KIO_3$, NaI or $NaIO_3$ decreased the production of $CO_2$ Concns of I salts below that gave slight increases of $CO_2$ The respiration rate was slightly decreased, iodate having a greater effect than iodide. I salt concns between 1 and 10 g per l inhibited denitrification Below that there was little effect The results for N fixation and urea destruction were similar. John T Myers

**Presence of Azotobacter and absence of Thiobacillus thioöxidans in peat soils** C E Skinner and I J Nygard *Ecology* 11, 558–61(1930).—*Azotobacter* is active in peat soils only at $p_H > 5.9$ *A chroöcoccum* was found in the more basic soils and *A Beijerinckii* in those approaching the acid limit *Thiobacillus thioöxidans* was not found in peat except where S had previously been used as a fertilizer B C A.

**The determination of the potassium needs of the soil by Aspergillus niger.** H Niklas and H Poschenrieder, with the collaboration of G Vilsmeier. *Wiss Arch Landw*, Abt. A, *Pflanze* 5, 152–65(1930); cf *C A.* 24, 5915.—Ten soils of different types were investigated as to their $P_2O_5$ and $K_2O$ content by the Neubauer method, and by the *Aspergillus niger* method, and the yields of various crops grown on these soils were detd (1) without fertilization, (2) with fertilizer deficient in (*a*) N, (*b*) $H_3PO_4$ and (*c*) K, and (3) with complete fertilization The results obtained from the *Aspergillus niger* method are to be published later with the crop yields reported in this article.

W Gordon Rose

**Potash content of Pfalz soils and conclusions in regard to fertilizer recommendations.** M Kling and O Engels *Z. Pflanzenernähr Düngung u Bodenk* 9B, 409–16 (1930).—The root sol. $K_2O$ in various soils was detd by the Neubauer method Tentative "limiting values" of mg of $K_2O$ per 100 g dry soil are given as follows for grain 30,

vegetables and clover 30, grapes 50, tobacco 50, pastures and meadow grasses 30 In many cases the crop yield could be increased by adding potash to the soil, although the soil contained more than the "limiting value" of potash H. B Siems

**Nature of the yield curve [of plants] with increasing applications of potash.** H Wiessmann and K Naumann *Landw Jahrb* 72, 105–23(1930) —The yield curve of oats and rye grass with increasing supplies of potash approximated to the logarithmic type of Mitscherlich (cf *C A* 24, 2824) Later sowing of the seed caused slight increases in the "effect factor" of potash The mean values of the "effect factor" of potash with rye grass and with oats were similar, but with the former crop there was a slightly decreased value with the higher applications of potash In general values of the "effect factors" for potash were slightly smaller than those of Mitscherlich B C A

**Utilization of increasing amounts of potash on the crop yield of several varieties of barley.** H Liesegang *Z Pflanzenernähr Düngung u Bodenk* 9B, 397–409(1930) — Four varieties of barley grown in pots varied in their ability to utilize increasing amts of potash as shown by crop yields, although the amt. absorbed under the same conditions was practically equal. H B. Siems

**The effect of sodium nitrate and ammonium sulfate on the availability of soil potash and soil phosphoric acid.** M Gracanin *Z Pflanzenernahr Düngung u Bodenk* 9B, 300–9(1930) —The amt. of phosphate and potash absorbed by plants from the soil as measured by the Neubauer seedling method is increased noticeably when $(NH_4)_2SO_4$ is added to the soil On extremely acid or alk. soils this effect was not noticeable and in some cases was neg $NaNO_3$ caused an increase in absorption of $P_2O_5$ by plants from all soils except one with a $p_H$ 8 35 The increase in the absorption of potash did not parallel the $P_2O_5$ absorption in all cases. H B Siems

**Remarks concerning A. Nemecs treatise "The evaluation of the results of soil analyses with respect to the need of phosphate fertilization."** M v. Wrangell. *Wiss Arch Landw*, Abt. A. *Pflanze* 4, 635–40(1930) —Polemic Cf N (*C A* 25, 1935) and *Deut. landw Presse* 57, No 23(1930) W Gordon Rose

**The determination of soluble soil phosphates.** B Dirks and F Scheffer. *Wiss Arch. Landw*, Abt. A. *Pflanze* 4, 641–51(1930) —A discussion is given of the methods available for the prepn of a soln contg the easily sol soil phosphates and of the factors that must be considered in detg the amt. of phosphate that must be supplied for various crops W Gordon Rose

**The mechanical analysis of finely divided natural phosphates.** Lyle T. Alexander and K. D Jacob. U. S Dept. Agr., *Tech Bull* 212, 1–24(1930) —The pipet method for the mech. analysis of soils (*C A* 24, 1452) was successfully applied to the analysis of finely divided natural phosphates. For the analysis of phosphates, pretreatment of the sample with $H_2O_2$ to remove org matter is omitted The sp gr. of the original samples and the mech. fractions of the various types of phosphate rock produced in the U. S. do not vary sufficiently to preclude the use of an av sp gr of 3 0 in calcg. the settling velocities of phosphate particles by means of Stokes formula. An exptl study of the settling velocities of 5-$\mu$ phosphate particles at various temps showed that the rate of fall is considerably slower than the theoretical rate calcd. by means of the customary form of Stokes formula, this is due apparently to the irregular shape of the phosphate particles. The particle-shape factor in Stokes formula as applied to natural phosphates was found to be 0 154 Results obtained by the pipet method, as modified for the analysis of finely divided phosphates, were in excellent agreement with those obtained when 800-g samples of the phosphates were sepd. into mech. fractions by sedimentation in water regardless of any theoretical considerations, the progress and efficiency of the sepn being detd. solely by microscopical examn of the fractions. The possibility of utilizing the pipet method in the mech. analysis of ground limestone and marls is pointed out. W H Ross

**Behavior of tricalcium phosphate in cultivated soils.** H. Danneel and K. W. Fröhlich. *Landw. Jahrb* 72, 51–8(1930) —$Ca_3(PO_4)_2$ does not dissolve in water in the mol form The ratio $CaO$ $P_2O_5$ in soln. varied from 1 1 1 at dilns. of 1 in 200 to 1 2 6 at dilns. of 1 in 50,000 The bearing of this on the compn and soly of naturally occurring phosphates is discussed. B. C. A.

**Technical problems of the superphosphate industry.** Bruno Waeser. *Metallbörse* 21, 75–6, 123–4, 173–4(1931) —If crude phosphate meal is stirred with sufficient dil. $H_2SO_4$ to form $CaHPO_4$ and convert $CaCO_3$, $Fe_2O_3$ and $Al_2O_3$ into sulfates, a part of the impurities is sepd. in the acid filtrate and the residue contains $CaHPO_4$, $CaSO_4$ and undecompd $CaF_2$ and silicic acid $CaHPO_4$ is then changed to $CaH_4(PO_4)_2$ with more $H_2SO_4$. The prepn. of $H_2O$-free $CaH_4(PO_4)_2$ is technically possible by the treat-

(1930).—A humus-contg. product sold under the trade name "Humunit" was found practically valueless from the standpoint of crop production. H. B. Sprks

The solubility of water-insoluble phosphates in silicic acid. W Oest. *Centr. Zuckerind* 39, 67(1931).—A discussion of the effect of Thomas' slag meal (fertilizer) J. F Leete

Decomposition of organic fertilizers. II. Relations between the chemical composition and decomposition. Shigeki Onodi and Shushi Yoshii. *J. Ag. Chem. Soc. Japan.* 6, 917–28(1930).—Soy-bean oil cake, rape-seed oil cake, *Astragalus sinicus*, Saatwicken, rice straw, herring cake and bone fertilizer were analyzed. Seventy-five g of these org. substances mixed with 1.5 kg. soil were kept in the pots (the area is 1/50000 *tan*) under the condition that max. moisture content is 50% and temp. 25°. The decompn. velocity was rapid during the first 17 days. The ether ext. is easily decomposed. The decompn. of an aq. ext., especially of reducing sugars and org. N compds., is generally easy. Water-sol. ash of animal origin becomes insol. with greater difficulty than does that of plant origin. The decompns. of cellulose and hemicellulose are, resp., 70–80% and 60–70% in the presence of abundant N. The decompn. of org. N is under 60%. This may be due to absorption by microorganisms. The decompn. of lignin is difficult. Y Kiyara

Effect of barn manure on soil conditions. S. Gov. *Z. Pflanzenernähr. Düngung u. Bodenk.* 9B, 481–7(1930).—Soils to which barn manure was applied showed, after a year, a slight increase in hydrolytic soil acidity. Manured plots usually showed, after removal of the crop, more residual root-sol. $P_2O_5$ and K₂O than did the check plots as shown by the Neubauer seedling method. Although the manure added more N than the plants absorbed, there was a definite loss of N as shown by König's method. H. B. Sprks

The influence of drying manure on the nitrogen losses and on crop yields. I. P. Mamchenkov and I F Romashkevich. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 294–7(1930).—Manure was taken to the field and either plowed under immediately or after 1, 2 and 5 days. The manure which was not to be plowed under immediately was placed in the field either in piles or scattered. It was found that the manure became almost air-dry. Analyses showed that the manure in the piles lost more N than the scattered manure. In the scattered manure the losses consisted primarily of $NH_3$, which escapes during the first 2 days. Expts. with oats have shown that the manure which was allowed to dry out in the field was slightly inferior. In pot expts. both fresh and dried manure gave the same results. When lime was added to the manures the dry manure was not so effective. J. S. Joffe

A comparison of the various methods of storing manure. L P Mamchenkov. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 284–91(1930).—Three methods were tried: (1) loose throwing together of manure, (2) compacting, (3) the Krantz method (*cf. C. A.* 21, 3463). In all cases the manure was cow manure with the addn. of 12% fresh horse manure. The various batches were kept in specially prepd. pits. In the 1st case the manure was piled up loosely 1.25 m. deep and kept that way. For the Krantz method the manure was piled up to 1 m., allowed to heat up to 55° and then compacted. After that another layer 1 m. deep was placed and again allowed to heat up to 55° and compacted. Two series were run: one with straw, the other with peat-moss as bedding. Detns. were made for $NH_3$ N on a water ext., then the manure was treated with MgO to det. the combined N. Besides that, a sep. sample was treated with 0.05 *N* HCl and the ext. distd. over for total $NH_3$. In the fresh manure there was found, on the basis of 100 parts of abs. dry wt., 2.7% total N, of which 1.773% was protein N, 0.818% $NH_3$ N and the rest other forms. This was for the manure with straw. For the manure with peat the following was found: total N 3.3, protein N 1.877 and $NH_3$ N 1.248%. After 4 months the pits were opened and analyses made on the manure batches. The loosely packed manure lost 27.3% dry matter with the straw and 23.0% with the peat, the compacted, 9.9% and 3.4%; the Krantz manure, 21.0% and 10.2%. The N losses were: with method (1) 36.7% with the straw and 34.66% with the peat; method (2) 12.59% and 25.94%, method (3) 26.3% and 19.0%. The distribution of the forms of N in the manure kept by the 3 methods was: in (1) total N 2.35 with the straw and 2.8 with the peat, protein N 1.752 and 2.296, free $NH_3$ and $(NH_4)_2CO_3$ N 0.345 and 0.152, combined $NH_3$ N 0.152 and 0.164, $NO_2$ N 0.0015 and 0.009; in (2) total N 2.62 and 2.53, protein N 1.698 and 1.222, free $NH_3$ and $(NH_4)_2CO_3$ N 0.308 and 0.436, $NO_2$ N 0.0016 and 0.0022; in (3) total N 2.520 and 2.97, protein N 1.587 and 1.824, free $NH_3$ and $(NH_4)_2CO_3$ N 0.415 and 0.829, combined $NH_3$ N 0.434 and 0.208, $NO_2$ N 0.0018 and 0.0018. Thus in the loosely packed and Krantz manure there is a transformation of mineral N into protein N, but there is a greater loss of N. Pot expts. (5 kg

of soil per pot) were conducted with the variously stored manures on oats $NaNO_3$ was used as the check pot All received similar amts of P and K It was found that $NaNO_3$ gave better results than did the manures The mineral N from the manure is immediately available, whereas the protein N is not. It is concluded that the system of packing down the manure is the best one, since it preserves the mineral forms of N

J S JOFFE

The use of excess molasses H CLAASSEN. *Deut Zuckerind* 55, 1377–8(1930) — The author discusses the use of beet molasses as *fertilizer* and recommends further experimentation J. F. LEETE

Floating factories. H HAUPTVOGEL. *Chem-Ztg* 53, 786–7, 806–7(1929) —A detailed, illustrated description is given of vessels equipped to catch and prep fish and produce *fertilizer* from the waste The modern, floating *whale oil* plants are described briefly E M. SYMMES

Organic fertilizers for oats and flax. Z. V. LOGVINOVA AND A. P. SHCHERBAKOV. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 476–82(1930) —N sources from meat scrap, horn meal, horn shavings, burned horn meal, blood meal, slime from intestines feathers and down, oil meal, tobacco dust and wool combings were compared in pot expts with $NaNO_3$ and $(NH_4)_2SO_4$ on oats and flax Two sets of pots with 4 5 kg of soil were set up One set received 0 5 g N, the other, 1 0 g All pots received P in the form of $Na_2HPO_4$ and K in the form of $K_2SO_4$ The results with the oats were: the slime gave almost as good results as the mineral forms of N. The meat scrap, horn meal, horn shavings, burned horn, blood meal, feathers and down and oil meal fell behind the mineral N when 0 5 g of N was added With the double quantity of N these materials were just as efficient as the mineral N. The dried blood, tobacco dust and wool combings were far behind the mineral N even when 1 0 g of N was added The residual effects of the various org forms of N on the succeeding crop were far superior to those of the mineral N. With flax the 0 5 g of org N was just as good as the mineral N, with the 1 0 g quantity the org N was superior to the mineral forms of N. The second crop on the flax pots was oats, and since the flax did not utilize the mineral N, it was effective on the oats giving higher yields than the residual org N The quality of the flax was also better with the org forms of N J. S. JOFFE

Fertilizing tomatoes, sweet potatoes and muskmelons in a three-year rotation. J W LLOYD Ill Agr Expt. Sta., *Bull* 364, 18 pp (1931) —Field expts continued for 6 years showed that P is especially important in the production of tomatoes. The most efficient form of P was steamed bone meal K decreased the yield of melons and was of little or no benefit to tomatoes or sweet corn Corn N in the form of $NaNO_3$ or dried blood increased the yield of tomatoes but decreased the yields of melons and corn. $(NH_4)_2SO_4$ decreased the yields of all crops. Dried poultry manure increased the yields of tomatoes and corn Limestone, when used with manure, increased the yields of tomatoes sweet corn and melons, 7, 14 and 25%, resp., as compared with the use of manure alone For a 3 year rotation of melons, tomatoes and corn, limestone and manure should be added the first year, steamed bone and dried blood the second year, and no fertilizer is required for the third year C. R FELLERS

Fertilizing of mildewed vines. HENRI ASTRUC. *Prog agr vit* 94, 499–502(1930) — A recommends treating vine maladies brought on by a wet season by judicious fertilizing He favors mixts of org and chem fertilizers rather than only the easily sol chem. fertilizers which are rapidly removed from the root zones Such mixts should furnish nourishment during the entire vegetating season A N excess should be avoided, as this overstimulates foliage production and thus encourages mildew growth F. W. MARSH

Use of manganese in vegetable greenhouses. I C. HOFFMAN Ohio Agr Expt Sta., *Bimonthly Bull* 149, 58–62(Mar.–Apr., 1931) —See *C A* 24, 5102 C. R. FELLERS

Results obtained by two winter sprayings and one spring spraying on the vegetation of trees and the quality of fruits. L. CHASSET. *Prog agr vit* 94, 502–5(1930).—These 3 treatments produced the best results The first winter spraying was with a mixt. of anthracene oil, formol and schist oil, followed a few days later by lime sulfur In the spring a Cu arsenical spray was used. F W. MARSH

Solubility of Bordeaux. GEO L HOCKENYOS *Phytopathology* 21, 231–4(1931).— The colorimetric method of Callan and Henderson (cf. *C A* 24, 312) for detecting Cu, which is sensitive to 1 part in 25,000,000, is applied to the detn of the percentage of Cu in a series of Bordeaux mixts. contg various ratios of Cu to hydrated lime When the Cu Ca ratio was 1 0 169, 0 04% Cu was present in soln.; with a ratio of 1 0 27 it fell to 0 00009%; with a ratio of 1 0 67 the sol Cu was found to be 0 00013%, and it remained

at this level when the ratio was made 1 1 or 1 2. The detn. is made by adding to 17.5 cc. of the soln to be tested 0.5 cc. $NH_4OH$ and 2 cc. 1% Na diethylthiocarbonate and comparing in a Duboscq colorimeter with 2 cc. 0.0002 *N* $CuSO_4$ soln diluted to 17.5 cc and similarly treated. JOSEPH S. CALDWELL.

**Factors influencing the character of Bordeaux mixture.** W. NEWTON, F. B. JOHNSTON AND C. YARWOOD. *Proc. Can. Phytopath. Soc.* 1929, 21–6(1930). *Rev. Applied Mycol.* 10, 118.—The ideal spray is probably obtained when the solids are in a state of max. dispersion. Best results and slowest settling is obtained when the reacting solns. are as cold as possible, when the $CuSO_4$ soln. is poured slowly into the lime suspension rather than conversely and when the $CuSO_4$ is as dil. and the lime suspension as concd. as practicable. Addn. of Na silicate, fresh skim milk, various ales., wheat flour, whale oil soap, various washing soaps, agar, alkali, or sodium resin soap failed to improve the Bordeaux mixt., while 0.15 to 0.5% Ca caseinate, 0.5% gelatin, Crystal White brand soap, or potassium resin soap did improve the Bordeaux somewhat. ODEN E. SHEPPARD.

**Analysis of commercial lime-sulfur materials.** TETSUNOSUKE ONODE. *J. Imp. Agr. Expt. Sta.* (Japan) 1, 89–90(1929).—High sp. gr. of lime-sulfur soln. does not always indicate high sulfide-S content. The quality should be detd. by detn. of active-S content and not by sp. gr. K. KITSUTA.

**Determination of barium fluosilicate spray residue.** R. H. CARTER. *Ind. Eng. Chem., Anal. Ed.* 3, 146–7(1931).—The apples are washed by immersion for 30 sec. in a boiling 3% NaOH soln. and rinsed with slightly acidulated $H_2O$. The rinsings and washing soln. are cooled, made strongly acid with HCl and rapidly filtered. The filtrate is then made strongly alk. with NaOH, and the Ba is pptd. as $BaSO_4$ with an excess of $H_2SO_4$. The $BaSO_4$ is then calcd. to Ba fluosilicate. This method is fairly rapid and gives reproducible results which are sufficiently accurate for comparative work. J. R. ADAMS.

**Tests of treatments against the apple worm.** PEYRIÈRE. *Prog. agr. rur.* 95, 81–3 (1931).—The treatment of apple trees with Cu-arsenical sprays 3 times during the progress of flower formation proved effective. F. W. MARSH.

**The fungicidal action of ultra-violet radiation.** W. A. R. DILLON WESTON AND E. T. HALNAN. *Phytopathology* 20, 959–65(1930).—The work in part parallels that of Fulton (cf. *C. A.* 24, 1926). Cultures on potato agar were irradiated for varying periods with a quartz Hg-vapor (Alpine sun) lamp through covers of Vita or Sanalux glass. The effect was to inhibit the growth of the mycelium, and when radiation ceased, growth was renewed at a rate proportional to the time and distance of the previous radiation. Under weaker dosage, growth of the mycelium at the surface ceased but persisted deep in the medium. Concordant results were obtained with 12–14 species. J. S. C.

**Physical and chemical action of ultra-violet rays on sublimed sulfur.** FOWLES DIXON. *Prog. Agr. rur.* 95, 155–8(1931).—Expts. showed that ultra-violet rays did not effect the retrogradation of sublimed S. The reason for the action of S on oidium is discussed. F. W. MARSH.

**The relation of pentathionic acid and its constituents to the toxicity of sulfur fungicides.** O. NEAL LEMING. *Phytopathology* 21, 131–2(1931).—At summer temps. over 10% of the S on a dusted surface may pass off within 2 weeks. S vapor is not toxic to fungus spores. $H_2S$ is present only in traces and is non toxic in those concns. Pentathionic acid is present in concns. toxic to fungus spores, and its formation is enhanced by mild oxidizing agents and possibly by $H_2S$. It is stable in both acid and weak alk. solns., but toxic only in the former. It is not sufficiently volatile in dil. solns. to be toxic at a distance. The toxic action is governed by the condition of the fungus rather than by that of the pentathionate ion. JOSEPH S. CALDWELL.

**Sulfuring apricots.** GEO. QUINN, C. G. SAVAGE, A. V. LYON AND W. R. JEWELL. *J. Dept. Agr. S. Australia* 34, 513–4(1931).—The authors, serving as a comm., recommend in detail a procedure for sulfuring fruits. M. S. ANDERSON.

**Fumigating tomato houses with hydrocyanic acid gas to destroy white fly (Trialeurodes vaporariorum).** GEO. QUINN. *J. Dept. Agr. S. Australia* 34, 519–20(1931).—A detailed procedure is given for the use of HCN as a fumigant. M. S. ANDERSON.

**Mercury in the disinfection of seeds.** VITTORIO CASTELLI. *Industria chimica* 5, 1474–82(1930). cf. *C. A.* 25, 1942.—The various Hg compds. previously studied are compared, and the conclusion is that *Dry Tox* is the most efficient, both as an insecticide and in the promotion of germination. A. W. CONTIERI.

**Disinfection experiments on cotton seeds with the dusts Tillantin R and ceresan.** F. FORSTENEICHNER. *Nachr. über Schädlingsbekämpf.* 5, 136–47(1930). *Rev. Applied*

*Mycol* 10, 103.—Excellent control of a species of *Rhizoctonia* and the facultative parasites accompanying it was obtained by use of Tillantin R and ceresan at the rate of 1 kg per 100 kg seed. Ceresan is most effective. The cotton seedlings are infected commonly by this species in the Adana region of Turkey. ODEN E. SHEPPARD

Contribution to the problem of cereal rust control by chemical methods. G. GASSNER AND W. STRAIB. *Phytopath. Z.* 2, 361–76(1930); *Rev. Applied Mycol.* 10, 88–9.—S with and without an equal admixt. of kaolin, 1% Bordeaux, 1% Cu chloride, Ca cyanamide mixed with kaolin, basic slag and calcined lime dusts and kainite were used in the control of brown and yellow rust (*Puccinia triticina* and *P. glumarum*) on Heine's Kolben and Dickkopf wheat and of *P. dispersa* (*P. secalina*) on Petkus winter rye. Ca cyanamide mixed with large quantities (up to 90%) of kaolin gave very excellent protection, and G. and S. consider its use on a large scale. S and Bordeaux gave very good control, but the others gave little control, while Cu chloride caused much leaf burning, and $NaNO_3$ actually increased the rusts. ODEN E. SHEPPARD

The treatment of the rot of wheat (1929–1930). G. ARNAUD AND MISS GAUDINEAU. *Compt. rend. acad. agr. France* 16, 1029–35(1930); cf. *C. A.* 24, 4577.—Among the anticryptogamic chemicals a 5% $CuSO_4$ soln. is very satisfactory. The use of the $CuSO_4$ soln. is followed by a dusting of the grains with CaO which in turn is followed by a thorough washing with $H_2O$. The Bordeaux mixt.-casein prepn. has given some excellent results, and in many cases treatment with formol has been very efficacious. J. R. ADAMS

*Effect of some factors influencing disease conditions of potatoes.* H. REILING. *Z. Pflanzenernähr. Düngung u. Bodenk.* 9B, 393–7(1930).—Potato scab occcurs principally on alk. soils. Acid soils usually produce potatoes free from scab, but tubers and the plant itself may become infected with *Rhizoctonia solani*, particularly during drought. Lack of potash in the soil may produce brown rings in the tuber and on the surface. H. B. SIEMS

The leaf diagnosis of the potato. I. HENRI LAGATU AND LOUIS MAUMÉ. *Ann. sci. agron.* 47, 595–653(1930).—The chem. state of a leaf taken from a conveniently located place at a particular moment is called "the leaf diagnosis at a given instant." "The annual leaf diagnosis" is the series of chem. states of the leaf revealed by the analyses at different periods during the entire growing cycle. The results of this method are compared with indications furnished by the yields and by observations on developments. The percentages of potash, N, acid phosphate and lime detn. by the leaf diagnosis method on samples harvested on 5 dates in May and June from plots differently fertilized showed clear variations. Plots similarly fertilized gave concordant results. A definite relation is established between the leaf diagnosis results and the fertilizers used. In general, N and acid phosphate in the leaf decreased with plant age, while lime increased. Comparisons of diagrams for N and potash show a rise of the N curve, or a lowering of that for potash or the two displacements together. Conclusion: N was needed for potatoes, but not acid phosphate or potash. In another expt. an excess of N in certain complete fertilizers was observed. Results of the study of the effect of the conditions of the cultivation media on the plant and on the leaf composition are considered. F. W. MARSH

Effect of seed-potato treatment on yield and rhizoctonosis in Florida from 1924 to 1929. L. O. GRATZ. *Fla. Agr. Expt. Sta., Bull. 220, 5–30(1930).*—*Numerous field* expts. conducted over a period of 6 years show no yield increases and pos. indications of definite injury from the use of *org. Hg compds.* for seed potato treatment. The use of $HgCl_2$, hot $CH_2O$ or org. mercurials is not justified under Fla. conditions. Ninety two references are appended. C. R. FELLERS

Increased yields from spraying and dusting late potatoes. J. E. HOWITT. *Proc. Can. Phytopath. Soc.* 1929, 19–20(1930); *Rev. Applied Mycol.* 10, 125–6.—In 1928 potato plots treated with liquid Bordeaux (4–8–40) yielded 291 bushels per acre, plots dusted with copper lime yielded 255.5 bushels and control plots 194.5 bushels, while in 1929 the corresponding figures were 235, 193 and 156. In 1928 the beneficial effect was probably due to the preventive action of the fungicides on late blight and rot, and in 1929 the beneficial effect was correlated with tip burn. ODEN E. SHEPPARD

The control of oidium leaf disease. R. K. S. MURRAY. *Trop. Agr.* (Ceylon) 75, 294–302(1930).—S dusting is a quick and effective means of controlling oidium leaf disease. JOHN O. HARDESTY

Observations concerning the development and struggle against mildew in 1930 in the Isere. L. ROUGIER. *Prog. agr. vit.* 94, 566–9(1930).—Cu was found to be the best remedy for use against this parasite. F. W. MARSH

Copper and mildew. JAQUES LUGAN. *Prog. agr. vit.* 94, 452–3(1930).—L. dis-

agrees with Villedieu (*C. A.* 25, 372) in certain conclusions concerning the use of ammoniacal fertilizers for grapevines and of Cu as a mildew combatant. F. W. MARSH

**The effect of boron on powdery mildew and spot blotch of barley.** FRANK M. EATON *Phytopathology* 20, 967–72(1930).—Barley was grown in pans of quartz sand, so arranged as to be flushed daily with nutrient solns. In crops grown during the summer, the plants receiving no B were heavily infested with mildew but were free of spot blotch, those receiving 5–25 p. p. m. of B were free of mildew but showed heavy infestation with spot blotch. In winter plantings, mildew was present in all the beds, most abundantly in those receiving no B, and decreased in amt. with increase in B applied. Spot blotch did not appear in the B free bed but was abundant in all those receiving B. On wheat, powdery mildew was present irrespective of the amt. of B supplied. The B content of the summer-grown plants ranged from 57 p. p. m. dry weight on the B-free cultures to 1349 p. p. m. in those receiving 25 p. p. m. of B in the culture soln.

JOSEPH S. CALDWELL

**Lessening of growth of rice plants.** MIRANDA LANZA. *Boll. lab. sper. fitopatol.* (Torino) 8, No. 1, 6–9(1931).—The observed disease is due to fungous parasites which winter on the seeds. They may be destroyed by immersion for 24 hrs. in 0.2% Kalimat (a mixt. of formaldehyde and phenol). G. A. BRAVO

**Sugar beet root-rot control.** H. C. YOUNG. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 148, 15–8(Jan.–Feb., 1931).—Field expts. showed that the application of 500 lb. of NaCl per acre often materially increased the stand of beets, and no injury to the crop was recorded on any plot. C. R. FELLERS

**Use of oxides of unsaturated hydrocarbons for the eradication of barberries and other pests.** R. B. HARVEY. *Phytopathology* 21, 126(1931).—Ethylene oxide and propylene oxide have been used for killing gooseberries or barberries. A depth charge is injected beneath the plant by means of a prod rod or "gopher stick" provided with a measuring chamber and connected directly with the gas tank, or a soln. of ethylene oxide in water can be injected from a knapsack sprayer. The stems blacken and the leaves fall off, the plants dying in 1–2 weeks. JOSEPH S. CALDWELL

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Pyrethrum (ZOCHAREWICZ) 17. Fodder and quality of milk in meadow fertilization with $CaCN_2$ (HERMANN) 12. A brief history of the world's phosphate rock production (GRAY) 18. Tung-oil tree (NEWELL, *et al.*) 26. Mineralogical study of the soil of the Vercelli district (REPOSSI) 8. Lignin, humic acid and humin (FUCHS) 10. Influence of fertilizer treatment on the vitamin A content of spinach (HONEYWELL, DUTCHER) 11E. I content of Lettish waters in relation to the improvement of crops (KUPCIS) 14. Cyanamides [fertilizer] (Brit. pat. 338,023) 18. Discharge device [apparatus for atomizing insecticides with $CO_2$] (U. S. pat. 1,794,185) 1.

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**Handbuch der Pflanzenernährung und Düngerlehre.** Edited by FRANZ HONCAMP. Band II. Düngemittel und Düngung. Contributions by Ernst Hugo Birei, Hand Brenck, R. Demoll, *et al.* Berlin: J. Springer. 919 pp. M. 86, linen, M. 89.80.

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**Fertilizer.** OTTO RIPKE (to I. G. Farbenind. A.-G.). U. S. 1,793,133, Feb. 17. $NH_4CNS$ is heated (suitably at a temp. of about 300°) until evolution of gases has ceased.

**Fertilizers.** A. HOLZ and T. VAN D. BERDELL. *Brit. 337,402, July 30, 1929.* Tri Ca phosphate is decompd. with mixed $H_2SO_4$ and HCl, and the insol. $CaSO_4$ is sepd. from the sol. $H_3PO_4$ and $CaCl_2$. The $CaSO_4$ is treated with a K compd. such as KOH in the presence of $CO_2$ (preferably under pressure and heat) or $K_2CO_3$ to form $K_2SO_4$ and $CaCO_3$. The $CaCO_3$ is sepd. and is added to the soln. contg. $H_3PO_4$ and $CaCl_2$ in the presence of $Ca(OH)_2$ to ppt. di-Ca phosphate, which is then sepd. and mixed with the $K_2SO_4$ soln., and the mixt. is spray-desiccated to produce a granular product. Various auxiliary procedures are described.

**Fertilizer.** A. HOLZ and T. VAN D. BERDELL. Brit. 337,415, July 30, 1929. A mixed fertilizer free from chlorides is prepd. by treating KCl with $H_2SO_4$ to form $KHSO_4$ and HCl gas, expelling the HCl (preferably at a temp. well below 200°) and then treating the $KHSO_4$ with $NH_3$ to form K and $NH_4$ sulfates. The HCl is passed into an aq. suspension of rock phosphate to form $CaCl_2$ and $H_3PO_4$, insol. solids are sepd. and sufficient $Ca(OH)_2$ is added to ppt. di-Ca phosphate, which is then sepd. and dried (preferably at a temp. not much above 100°) and mixed with the K and $NH_4$ sulfates. Various details and slight modifications of procedure are described.

Fertilizers. I G Farbenind A.-G (Ernst Jänecke, inventor). Ger. 514,509, Nov 20, 1929 Nitrogenous fertilizers are prepd. by leading gases contg $N_2O_4$ into a soln of $NH_4$ salt in coned. $H_2SO_4$ and $HNO_3$, and working the product up into a nitrate- and sulfate-contg product. In the example, $N_2O_4$ is led into a soln. of $(NH_4)_2SO_4$ in 50% $HNO_3$ to give the fertilizer $(NH_4)_2SO_4 \cdot NO_2$.

Fertilizers. N V Maatschappij tot Exploitatie van Veredplingsprocédés. (Paul Erasmus, *inventor*) Ger 514,510, Nov. 7, 1928 Carbohydrates of vegetable origin such as peat, lignite, sugar, cellulose, wood, etc., are heated to about 300° with $NH_3$ under pressure to form a nitrogenous fertilizer. Examples are given.

Fertilizers. Kunstdünger-Patent-Verwertungs A G Swiss 141,328, Oct. 16, 1928. See Brit. 310,276 (*C. A.* 24, 679)

Fertilizers. Société d'Études chimiques pour l'industrie Swiss 140,729, Nov 20, 1929 A nitrogenous fertilizer contg $CaCN_2$ is produced by the action of $NH_3$ on $CaCO_3$ in a current of mixed H and N at 500–1000°. Cf *C. A.* 25, 707.

Fertilizer and sodium bicarbonate. Soc. chimique de la grande paroisse azote et produits chimique Brit 338,007, Jan 11, 1929 The process for producing a composite fertilizer and $NaHCO_3$ by double decompn of $NaNO_3$ and KCl and treatment of the mixt produced with $NH_3$, $CO_2$ and water, as described in Brit. 331,451 (*C. A.* 25, 165), is modified by effecting the double decompn. reaction of $NaNO_3$ with the KCl in the mother liquors of the process, as by introducing these materials into the soln. at that point of the manuf at which the pptn. and sepn of $NaHCO_3$ have been effected

Rendering insoluble phosphates available for fertilizer. Hans Lehrecke U. S. 1,795,173, March 3 Material such as mineral phosphate is heated to about 1000–1400° with such quantities of C and silica-contg addns. that part of the total P content of the initial material is liberated in accord with the equation: $P_2O_5 + 5C = P_2 + 5CO$ and that in the calcined residue contg the remaining P there is a proportion of $P_2O_5$ about 0.9–1.1, $SiO_2$ about 0.9–1.1 and CaO about 4.8–5.2 mols.

Treating phosphate rock. Kunstdünger-Patent-Verwertungs A.-G Brit. 338,079, March 7, 1929. In leaching phosphate rock with $HNO_3$ and $K_2SO_4$, a part of the soln of $H_3PO_4$ and $KNO_3$ from a previous operation (partly freed from $KNO_3$ by cooling and crystn.) is used as a diluent, thus preventing the pptn of $CaSO_4$ contg a high percentage of K. Various details of treatment for prepg *fertilizer* are described, which may include addn of $NH_3$.

Superphosphates. Francesco C. Palazzo and Fortunato Palazzo Swiss 141,501, Nov 3, 1928 Superphosphates with 42–51% of $P_2O_5$ capable of assimilation are obtained by repeatedly extg a superphosphate contg 14–17% $P_2O_5$ capable of assimilation with half its weight of water, pptg the $H_3PO_4$ by milk of lime and adding the $CaHPO_4$ to other exts contg free $H_3PO_4$. Cf *C. A.* 24, 680

Superphosphates Francesco C. Palazzo Swiss 142,459, Sept. 27, 1928 Phosphates with a content of 42–45% assimilable $P_2O_5$ are prepd by kneading coned. $H_3PO_4$ (*e. g.*, obtained by working up phosphorites) with pure pptd. $CaHPO_4$ at 40–50° for about 2 hrs. The mixt. is vacuum dried and powd.

Superphosphate chambers. D. Wellisch Brit. 338,075, Jan 31, 1930 Various different constructions are described designed so that the reaction mass and its support are moved in relation to that part of the chamber which contains the charging device. One form comprises a cylindrical chamber mounted for rotation around a vertical axis and which, after initial charging, is adapted for continuous operation. Knives or compressed air may be used to break up the mass

Apparatus for leaching out raw materials. Kunstdünger-Patent-Verwertungs A.-G Swiss 141,300, Oct. 16, 1928 Raw material is placed in a succession of tanks of which each is lower than the preceding one, and the acid solvent from the bottom of one tank is led to the top of the next higher tank, while the overflow of the higher tank drips into the top of the lower tank The method is suitable for the prepn. of *artificial fertilizer* contg sulfates, carbonates, etc.

Jacketed sectional drying apparatus for preparing fish meal. Harold S Rowton and Volkmar W Hanig U S 1,793,638, Feb 24 Structural features.

Forcing plants. Farbsalz G m b H Ger. 517,115, Nov 25, 1928 Unstable cyanides giving rise to HCN and another forcing agent, *e. g.*, $NH_3$ or $C_2H_2$, are used $Ca(CNNH_2)_2$ and crude $Ca(CN)_2$ contg free $CaC_2$ are suitable, the former being obtained by prepg. $Ca(CN)_2$ in liquid $NH_3$.

Insecticide. Hans Wescue, Karl Brodersen and Werner Ext (to Winthrop Chemical Co) U. S. 1,794,046, Feb 24 An aromatic monothiocyanate such as benzene thiocyanate is used as an active constituent of prepns. such as powders or solns

Applying insecticides and fungicides to growing plants, etc. Joseph D. Neuls.

U. S. 1,702,860, Feb. 17. A porous carrier such as sawdust or pumice impregnat with a mineral oil is subjected to simultaneous distn. and incomplete combustion, and t vapors thus produced are projected on trees or plants or other articles for their insec cidal and fungicidal effect. App. is described.

**Seed-goods protection.** VERFIN FÜR CHEMISCHE UND METALLURGISCHE PRODUTION. Ger. 514,681, July 2, 1921. A prepn. for protecting seed goods from vegetal and animal blight contains sol. complex compds. or mixts. of nuclear metallized aroma compds., with org. substitution products of $NH_3$. In the example, HgO is dissolved $H_2SO_4$ and heated with cresol on a water bath. NaOH is added, and the ppt. dissolv in piperidine. Or pyridine and KCNS is heated with a Cu salt and the product mix with ethylene diamine.

**Seed-disinfectant composition.** FORREST J. FUNK (to E. I. du Pont de Nemou & Co.). U. S. 1,703,680, Feb. 24. $HgCl_2$ is used in admixt. with a finely divided m terial such as bentonite to form a prepn. capable of producing relatively stable a substantially homogeneous suspensions with water.

**Seed-disinfecting composition.** FORREST J. FUNK (to E. I. du Pont de Nemou & Co.). U. S. 1,703,922, Feb. 24. Mercurized *o*-chlorophenol and mercurized *o*-nitr phenol are used with bentonite. Other similar mixts. also are described.

**Facilitating germination of seeds.** WARREN THOMAS STEAD CO. Brit. 337,601, No 15, 1928. See U. S. 1,750,188 (*C. A.* 24, 3077).

## 16 THE FERMENTATION INDUSTRIES

C. N. FREY.

**Annual analytical report.** B. LAMER. *Z. Spiritusind.* 53, 281–2(1930).—Rep on the activity of the technical scientific laboratories of the German alcohol manufacturers' association and the association of potato dryers. S. J.

**Are asbestos-slate-lined fermentation tanks suitable for fermentation?** W. KI *Z. Spiritusind.* 53, 268(1930). The answer is in the negative. S. J.

**Absolute alcohol.** F. WAGNER. *Z. Spiritusind.* 53, 260–1(1930).—A brief revie S. J.

**Improvements in the manufacture of absolute alcohol.** H. GUINOT. *Chim & industrie* 25, 26–32(1931).—A description is given of the evolution of so called azi tropic methods, which now permit of the production of pure abs. alc. directly fr fermented worts by the use of the standard equipment at present used for the produ tion of rectified 96% EtOH and at but slightly higher cost. A. PAPINEAU COUTURE

**New process of drying potatoes and the manufacture of alcohol therefrom.** LÜDER. *Z. Spiritusind.* 53, 231–3(1930), cf. *C. A.* 25, 1327.—An economic discu sion. S. J.

**Evaluation of potato flakes according to their yield of alcohol.** B. LAMER. *Spiritusind.* 53, 274–5(1930).—There is no relationship between moisture content potato flakes and yield of alc. It is necessary to score the sample for outside appearan color, odor, uniformity, development of bacteria, moisture content, yield of alc., a starch value. Correct evaluation can be computed with these results on hand. S. J.

**Composition of compressed and dried potato crumbs.** B. LAMER. *Z. Spiritusi* 53, 284(1930).—The composition of potato juice was given in an earlier paper (*C. A.* 1327). The analytical results show that the pressed and dried potato crumbs cont about 40–50% of the ash usually present in potato flakes. The same relation found for protein. S. J.

**Effects of mashing methods and souring on potato flakes.** B. LAMER AND W. KI *Z. Spiritusind.* 53, 267–8(1930).—Two different processes were tried. The necess proportion of malt was added in 2 portions in 1 expt. and mashed in one operation another expt. The yield of alc. was smaller and the steam consumption was grea in case the malt was added in 2 portions, provided the mash was vigorously stirred a not allowed to form lumps. Artificial souring diminished the yield of alc. S. J.

**Addition of ammonium salts to vinegar.** C. AINSWORTH MITCHELL. *Analyst* 178–9(1931).—Analyses show that the practice has been revived of adding $NH_4$ s to artificial vinegar to make it contain as much N as when made from malted or malted grain. W. T. H.

**Studies on the biochemistry of zinc. Zinc and yeast fermentation.** AS ZLAT OFF, M. ANDREITSCHEWA AND D. KALTSCHEWA. *Biochem. Z.* 231, 123–31(1931) Studies made on *Saccharomyces ellipsoidens* show that $Zn(NO_3)_2$ and $ZnSO_4$ have

and Seusslitz A Heiduschka and C Pyriki *Z Untersuch Lebensm.* 59, 613–5 (1930), cf *C A* 24, 1699.—The range in d of the must was 60 7–88 4° Oechsle, titratable acids were 4 4–12 8 g per l, and mineral constituents 2 64–5 04 g per l The d averaged 4 2° higher than the av for 1928 C R Fellers

Chianti and its wines. Luigi Ricasoli *Atti III congresso naz chim pura applicata* 1930, 285–91.—Descriptive C M Symmes

A new category of abnormal wines. Charles Bertin *Prog agr vit* 94, 564–6 (1930).—It is noted that certain normal wines do not correspond to the enological laws concerning the relative amts of alc and acid that should be present F W M.

The influence of adjuncts on the composition of beer. E Jalowetz *Brau- und Malzindustrie* 24, 1–2(1931).—A discussion S Lauter

The formation of layers in beer in storage vats E Jalowetz *Brau- und Malzindustrie* 24, 21–5(1931).—W Kusenak (*Tagesztg Brauerei* 27, No 175, 28, No 110) found that layers are formed in beer kept in storage after 4–5 weeks the layers differ in $CO_2$, ext and albumin content, viscosity acidity and *p*H value J 's investigations agreed fairly well with K 's findings Methods are given for maintaining uniform compn in stored beer S Lauter

Preventing the "turning" of beer. J Raux *Brasserie & malterie* 20, 342–5, 359–62(1931).—An address A Papineau-Couture

The extractives of whiskey. Wm Partridge *Analyst* 56, 177–8(1931).—The U S Pharmacopoeia states that whisky should not leave more than 0 1 g of solids when 20 cc is evapd Various English books state that whisky should not contain more than 1/4 as much solids, which is probably attributable to a statement made in 1879 in Allen's *Commercial Organic Analysis* which does not hold true with respect to the whisky of today W T H

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Simple universal thermostat for laboratory fermentations (Fink) 1. [Fermentation] of the aqueous extracts from olives (Ciusa, *et al*) 27. Detection of iso-PrOH in brandy and spirits (Reif) 7. Model experiments for the theory of alcoholic fermentation (Oille, Coutsicos) 10. Peroxidase preparations (Brit pat 337,405) 11A.

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Tate, Francis G H Alcoholometry: An account of the British Method of Alcoholic Strength Determination, with an historical introduction written by the author in collaboration with George H. Gabb London H. M Stationery Office. 93 pp 5s., net. Reviewed in *Nature* 127, 398(1031)

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Device for atomizing fatty substances on fermenting liquid to keep down foam. Arne Boye. U. S 1,792,963, Feb 17 Structural features of a device designed to operate automatically according to the amt of foam formed

Testing saturation of barley, etc. W & T Avery, Ltd., W A Benton and P. E Goff. Brit 338,282, Sept 26, 1929 For detg the degree of satn of material, such as that of barley during steeping prior to malting a sample is centrifuged for a definite time, weighed, re-immersed, re centrifuged and re weighed, and these operations are repeated until 2 consecutive weighings are the same (indicating that satn has been attained) App is described

Extracting the bouquet from wines and spirits. Otto Fodor. Ger. 517,061, May 7, 1927. The constituents imparting the bouquet to wines and spirits are obtained practically free from EtOH by treating the beverages, or the mashes from which they are prepd., with adsorbents such as active charcoal or silica gel after or while reducing the alc content, *e g*, by distn The adsorption may be assisted by adding a little fatty or paraffin oil to the beverage The bouquet substances may be recovered from the adsorbent by extn and isolated by evapn of the ext., and the beverage may be reconstituted by dilg the bouquet substances with EtOH and $H_2O$ Examples are given

Yeast. C. Langemeyer Brit 337,047, Oct 24, 1928 A yeast obtained by an otherwise usual process is treated with a small quantity of K salts and albuminous substances, such as KCl or $K_2SO_4$ and albuminous substances derived from peanut meal, malt germ, lupins or yeast-press liquor, allowed to stand for several hrs and then pressed Use may be made of a mixt of peanut meal, yeast and malt germ, digested with $H_2SO_4$, $H_3PO_4$ or lactic acid, with addn of a small quantity of dextrose

Hydrolyzed protein products. Charles N. Frey (to Standard Brands, Inc) U. S 1,794,370, March 3 See Can 308,910 (*C A* 25, 1922).

# 17—PHARMACEUTICAL CHEMISTRY

W O EMERY

"Enfleurage" of jasmin. TRABAUD *Parfumerie moderne* Jan., 1930, *Maslobono Zhirovoe Delo* 1930, No. 2, 84–5.—In the enfleurage or extn. by fat a high percentage of indole is obtained whereby the glucosides are split. Methyl anthranilate is also obtained; it is absent in the oil from flowers. These constituents improve the odor. *One thousand kg. of flowers yields on extn. by fats 5–6 kg. of an ointment which contains 25–28% of a* pure flower oil or about 1.2–1.6 kg. while the usual extn. yields 1.3–1.4 kg. of an absolute essence, the latter contg. about 30–40% pure flower oil. The enfleurage method produces a yield 2–2.5 higher than the ordinary extn. methods. Flowers *left after enfleurage* upon being extd. produce more oil but of a *different character.* A. A. BOEHTLINGK

*Mechanical processes for lemon essence extraction.* FRANCESCO LA FACE. *Boll staz sper ind essenze* 5, 129–37, 149–79, 178–91, 212–8, 234–43(1930).—The commonly employed processes for the extn. of the essence from lemon peel are: sponge process (I), mech. rasure processes with the Cannavò (II), Speciale (III) and Calabrese (IV) *machines, mech. pressing processes with Peratoner* (V) and Bennet (VI) machines and a few others. Analyses were made on the samples of each of these essences with the Wilson and Young method. With the IV method there is a max. loss of essence that remains in the fruits (30.5–46%), with the I an av. of 27.5%, and with the II and III a min. loss of *10–11%. The characters of the various types of essence,* the working costs and the total yields are very different. I and VI give a yellow essence, V colorless, the others green, the III essence contains 4–4.9% of fixed residue and the V only 0.3–0.65%. The mech. processes give an essence of grass odor but less odorous (the citral loss may be 25% in regard to *the citral content of the sponge essence*). *Among* the causes that may lower the citral content, the most important are the fermentations, therefore it is better to sterilize the extn. water by boiling or by adding Na benzoate.

G. A. BRAVO

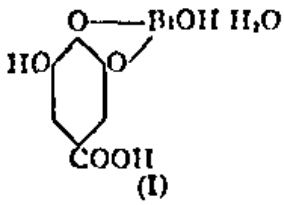
Colorimetric determination of adrenaline. ITALO SANSONI *Officina* 3, 323–34 (1930).—*Adrenaline* can be detd. colorimetrically in pharmaceutical solns. by using standard pyrocatechol solns. with one of the following procedures. (A) Prep. standard solns. with increasing quantities of pyrocatechol, add 5 cc. of 40% Na acetate soln. and 4 drops of 1% $FeCl_3$ to 5 cc. of each standard and of sample. Compare the *resulting colors in test tubes or in the colorimeter in the ordinary way. Since the standard* 0.08% pyrocatechol soln. and the 0.1% adrenaline soln. give identical colors, the adrenaline content of the unknown soln. can be easily calcd. (B) To 2.5 cc. of each standard (prepd. with pyrocatechol) and of sample add 2 cc. of Folin reagent (10 g. Na tungstate, *8 cc. of* 85% $H_3PO_4$ and 75 cc. $H_2O$ *are heated for 2 hrs. with a reflux condenser,* and, after cooling, dild. to 100 cc. and filtered if necessary), 5 cc. of water and 4 cc. of 20% $Na_2CO_3$ soln., keep all the liquids for ½ hr. at 30° and then compare. The standard 0.14% pyrocatechol soln. and the 0.1% adrenaline soln. give identical colors. (C) *To 5 cc. of each standard (prepd. with pyrocatechol) and of sample add 2 cc. sulfanilic* acid (4 g. acid and 90 cc. of 37% HCl dild. to 1000 cc.), 0.5 cc. *of* 1% $NaNO_2$ soln. *and* 1 cc. of 28% $NH_4OH$ and then compare. This reaction is the easiest and the most sensitive. The standards have good keeping qualities and give identical colors with *adrenaline solns. of the same concn. The ordinary stabilizers added to the pharmaceuti*cal solns. of adrenaline (chloretone, physiol. NaCl soln., etc.) *do not interfere.*

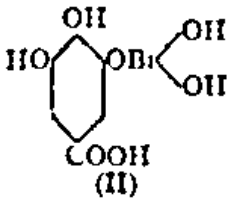
G. A. BRAVO

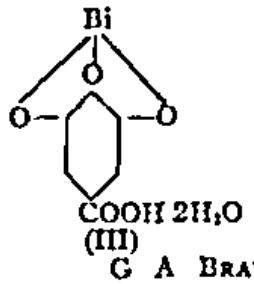
The methods of titrating the alkaloids in the Solanaceae. ENRICO DE CECCO *Officina* 3, 335–42(1930).—The Italian Pharm., 5th Ed., suggests titrating the alkaloids in the drugs by the method of titrating the alkaloids *in the drug exts. With this pro*cedure, great errors may result from the decompn. of the alkaloids in aq. soln. and from the desiccation of the residues. Comparative expts. were made with German, English and U. S. P. on stramonium and belladonna. The U. S. P. method is the best, but the results are more accurate and very *concordant if 0.01 N solns. are used instead of 0.1 N* solns. in the titrations.

G. A. BRAVO

The constitution of dermatol. ANTONIO GRIPPA *Officina* 3, 343–51(1930).—G. *did not succeed in prepg. the Me, Ac and Bz derivs. of dermatol, therefore the hydroxyl* groups do not exist free in the mol., *and the constitutions I (cf. Prunier, J. de pharm.* 2, 498 (1901)) and II (cf. Bietrix, *Bull. soc. chim.* 1, 692 (1893)) are not exact. Moreover, dermatol, when heated at 110°, loses 2 mols. of $H_2O$. The constitution III (cf. Cazeneuve, *Bull. soc. chim.* 1, 852 (1893)) is proposed for dermatol, as prepd. by the method of the Italian Pharm., 5th Ed.


(I)


(II)


(III)

G A Bravo

**Extraction of orange oil** F J de Villiers *J S African Chem Inst* 13, 48–52 (1930).—Steam distn of orange peel causes some decompn of the essential oil unless carried out in high vacuum. Alc proved the best solvent for extn, the peel being rasped under alc and prolonged contact being avoided. Addn of water to the ext. causes the sepn of a fine emulsion difficult to sep directly by centrifuging. The particles of the emulsion are negatively charged and sepn is effected by the addn of electrolytes. The absorption of ions by the emulsion was in the order Fe > Ca > Na, but the most effective coagulant was the H ion. B C. A.

**Scheme for the microchemical identification of alkaloids.** J F. H. Amelink. *Pharm Weekblad* 68, 159–85(1931).—The scheme consists in treating the sample with a series of alkaloidal reagents and noting the character and microscopic appearance of the reaction products. The reagents employed are $PtCl_4$, $PtCl_4$ + NaI, $AuCl_3$, $AuCl_3$ + NaBr, $HgCl_2$, $K_4Fe(CN)_6$, $K_3Fe(CN)_6$, Dragendorff's reagent ($K_2BiI_4$), KOH and picrolonic acid. The microtechnic for extn, filtration and sublimation of the alkaloid is described in some detail. The reactions are tabulated and a large no of drawings are given showing the typical cryst forms of the reaction products. In some cases the alkaloid can be identified by a single reaction, but usually 2 or more reactions are required for identification. In special cases it is desirable to make confirmatory tests by specific reactions. The table gives 78 substances, mostly alkaloids, but includes also other products commonly classed with the alkaloids, *e. g.*, caffeine, cantharidin, santonin, simple bases, *e. g.*, betaine, choline, synthetic medicinals, *e. g.*, PhNHAc antipyrine, urotropine. *Ibid* 211–6. The reactions are discussed in detail as applied to *percaine*, α butoxy γ (diethylaminoethylcarboxamido)quinoline, and *diocaine*, di-*N,N'*-(*p*-alkoxyphenyl)acetamidine, 2 local anesthetics included in the above table. A W. Dox

**Production of new disinfection preparations of thymol and carvacrol. I. Production of thymol and carvacrol.** C Philipp and Pi Kuhn *Pharm Presse, Wiss.-prakt. Heft* 1931, 19.—A brief survey of the principles upon which the prepn of cymene, thymol, carvacrol and mono- and dichlorocarvacrol is based. **II. Disinfectant action of thymol and carvacrol preparations.** Pi Kuhn *Ibid.*—The results obtained in a series of expts on the disinfectant action of thymol, carvacrol and their Cl substitution products are reported. The most valuable of the products tested proved to be chlorocarvacrol (carvasept) which can be usefully employed where phenol and thymol are indicated. Its advantages lie in a higher disinfectant power, lower toxicity than PhOH and thymol, slight soly in $H_2O$ with resultant slow resorption and good compatibility. W. O. E.

**Content of mydriatic alkaloids of sun- and shade-dried Solanaceae drugs (Atropa, Hyoscyamus and Datura species).** Clemer. Kopp *Pharm. Zentralhalle* 72, 113–6 (1931).—Expts show that the alkaloidal content of *Belladonna* and of *Hyoscyamus* is not materially affected by the manner of drying, whether in the sun or shade; with *Datura*, however, the amt of alkaloids in shade dried material is about 10% greater than in that dried in the sun. W. O. E.

**Scientific pharmacy. XVII. Production of organotherapeutic preparations.** Rapp. *Pharm Ztg* 76, 260–1(1931); cf *C A* 25, 380.—A discussion of the various glands, their importance in pharmacy and methods of prepn and evaluation. W. O. E.

**Alcohol number of the D.A.-B.VI.** F Grap *Pharm Ztg.* 76, 261–2(1931).—A critical examn of the official Ger method showing that correct results are obtainable only by a thermometric check of the distn, and not by distg off as prescribed, 13 and 11 cc. W. O. E.

**Evaluation of flores cinae D.A.-B.VI.** W Brandrup *Pharm. Ztg* 76, 262 (1931).—The official provisional test prescribed for this drug is often inadequate in its evaluation. The following is suggested: on about 2 g of the powd sample in a filter pour about 5 cc. of $CHCl_3$ and evap the filtrate to dryness in a porcelain dish. The residue, moistened with alc. KOH, should yield an orange to red color. W. O. E.

Extraction of ergot by the methods of D.A.-B VI and U. S. P. X, with notes on ammoniated tincture of ergot, B. P. FRANK WOKES AND G. K. FLETCHER. *Quart. J. Pharm. Pharmacol.* 3, 599–625(1930).—A study has been made of the methods of preparing liquid ext. of ergot prescribed in the Ger. and U. S. pharmacopeias. The Ger. method is on the whole less efficient than the Am. method but the difference is much smaller than appeared from the work of Linnell and Randle. In the percolation of ergot with neutral 90% alc. as in the Ger. process, the ext. efficiency is greatly affected by the degree of acidity of the ergot, because of the phosphate and other buffering substances contained therein. With the more acid ergots (*p*H below 5.5) neutral alc. may ext. the ergotoxine almost completely as it is extd. by acidified alc. (contg. 2% concd. HCl or 1% tartaric acid). With the less acid ergots (*p*H above 6.0) neutral alc. may ext. less than 0.5 the amt. of ergotoxine taken out by the acidified alc. Ammoniated alc., as in ammoniated tincture of ergot B. P., gives similar results to neutral alc. Whatever process of extn. is used the buffering substances exert considerable influence on the *p*H of ext. of ergot, both during extn. and in the completed product. If this *p*H is to be maintained at the optimum point for extn. and stability, as suggested by American workers it will not be sufficient to employ a fixed proportion of acid, but control will be necessary by means of *p*H detns. The defatting of ergot increases the efficiency of extn. of both neutral and acidified alc. Complete removal of fat, without loss of ergotoxine, is very difficult to secure, and so-called "defatted" ergot may still contain a considerable proportion of fat. The concn. of dil. exts. of ergot should be carried out *in vacuo* below 37° with min. exposure to air. If these precautions are taken, concn. may be continued down to a soft ext. with the loss of less than 0.5 the activity, and it should be possible to obtain from an av. sample of Spanish or Portuguese ergot a soft ext. contg. from 0.5 to 1.0% ergotoxine. The variation in potency of com. soft exts. suggests that sufficient care is not taken in their manuf. In the Ger. pharmacopeial process for concg. the dil. percolate, a considerable amt. of activity may be lost in the pptn. and neutralization with $Na_2CO_3$, and the U. S. P. method of concg. down to a soft ext. appears to give better results. W. O. E.

Biological standardization of tincture of aconite, B. P. F. J. DYER. *Quart. J. Pharm. Pharmacol.* 3, 626–36(1930).—Six tinctures of aconite were bought directly from different mfg. houses and examd. for their toxicity on rats and mice. Detns. were also made of the amt. of $Et_2O$-sol. alkaloid, and of total solids present in each. The examn. on rats revealed only quant. differences between the different tinctures, while that on mice was complicated by the emergence of qual. differences as well. The toxicities of the different tinctures both on rats and mice varied very widely, and the relative values as detd. on rats were found to be very similar to the relative amts. of $Et_2O$-sol. alkaloids present. *Conclusions.*—There is no uniformity in the toxicity of different samples of tincture of aconite sold as "B. P." at the present time. The figures obtained for the % of $Et_2O$-sol. alkaloids were either correct or they were incorrect. If correct, then there is no need for a toxicity test of tincture of aconite, because a detn. of the $Et_2O$-sol. alkaloids gives a parallel result. If, however, these figures were correct, then at least 4 of the 6 tinctures purchased did not comply with the B. P. If not correct then it may be supposed that all the tinctures complied with the B. P., and the wide variation in toxicity of the different tinctures means that a toxicity test is required. W. O. E.

(Tobacco) smoking, nicotine limits and the determination of nicotine by the method of Pfyl and Schmitt. FR. BOLM. *Z. Untersuch. Lebensm.* 59, 602–7(1930).—Aside from minor modifications, the method of Pfyl and Schmitt (*C. A.* 22, 1214) was found entirely satisfactory, and the observations on the influence of rate, intermittency, etc., of the smoking on the nicotine content of the smoke, were confirmed. Several samples of nicotine-free tobacco and cigarets were examd. for nicotine content. None of the methods used in fixing the nicotine in the tobacco gave a nicotine-free smoke, hence the detn. of total nicotine in the tobacco is in itself sufficient in judging the tobacco. C. R. FELLERS

Ethereal oil from Podocarpus macrophylla, Don. I. KITSUJI NISHIDA AND HIDETAKE UOTA. *J. Agr. Chem. Soc. Japan* 6, 1078–86(1930). *Bull. Agr. Chem. Soc. Japan* 6, 82–3(1930).—By the distn. of the leaves 0.049% of ethereal oil was obtained. α-Pinene, camphene, β-pinene and cadinene were proved to exist in the vacuum distn. fractions. Caryophyllene and sylvestrene were not detected. Y. KIHARA

A method for the germicidal assay of soaps. H. C. HAMILTON AND FRED THISTLETHWAITE. *J. Lab. Clin. Med.* 16, 391–6(1931).—A method is described in which the skin of guinea pigs is used as a field for the testing of disinfectants commonly used on the skin. EtOH applied before making injections is ineffective in any concn. A 0.5%

soln. of PhOH or tincture of I, in a 33% soln is effective Toilet or washing soaps are wholly ineffective A soap base in which $HgI_2$ is properly incorporated in a concn of 1% is effective E. R. MAIN

Pyrethrum. ED ZACHAREWICZ *Prog Agr vit* 94, 569–70(1930).—Directions are given for cultivating the plant. The application of superphosphate is important as it increases the content of the plant's active principle, *oleoresin* F W MARSH

The antiseptic power of uroselectan. G. DELEPIANE *Boll soc. ital biol sper.* 5, 822–4(1930).—Although uroselectan has feeble antiseptic power *in vitro* in the concn used clinically (4–6% in pyelographic tests), it definitely inhibits the growth of *B. coli* in the urine PETER MASUCCI

The determination of some medical products by mercurimetry. AL IONESCO-MATIU AND A POPESCO *Bull sci pharmacol* 38, 71–6(1931), cf *C A* 24, 5428.—From a soln of about 1% *sparteine* mix 1 to 4 cc. with 5 cc of the reagent of Mayer-Valzer Centrifugalize and wash the ppt. with 1% $H_2SO_4$ Dissolve in 5 cc. sulfonitric reagent, applying moderate heat, add 5 cc more and 6 cc. $H_2O$, boil and, after cooling, destroy the nitrous vapors with $KMnO_4$. Ppt the Hg with Na nitroprussiate (10% soln) and add 0 1 *N* NaCl until the turbidity disappears One cc NaCl soln is equiv to 0 01423 g of sparteine sulfate For the detn of *novocaine*, 1–5 cc of a 1% soln is taken The method is the same as described, but 25 cc. $H_2SO_4$-$HNO_3$ is used The factor per cc NaCl soln is 0 02 The same method is used for stovaine-HCl (factor 0 0155) and for *plasmochine* soln (factor 0 00926) With plasmochine tablets, 5 are dissolved in 10 cc. $H_2O$ and 10 drops of $H_2SO_4$, filtered, brought to the vol. of 25 cc. and 5 cc. is employed for the detn In plasmochine dragées, the substance is detd together with quinine, the factor for the latter being 0 0066 A E MEYER

Some new color reactions of adrenaline. MARCEL PAGET *Bull sci pharmacol* 38, 77–8(1931), cf *C A* 25, 532.—NaBrO reagent, dilu 1 100, produces in a soln. of adrenaline of a concn higher than 1 1000 a color between a pale violet to intense red A violet coloration is still observed to a dilu of 1 100,000 Adrenalone gives a yellow color The classification of adrenaline reactions in correspondence with the mol groups involved is shortly discussed A E MEYER

A new method of determination of cocaine and its salts. JUAN A. SÁNCHEZ. *Semana méd* (Buenos Aires) 1931, I, 487–9.—After sapon of the cocaine, the $PhCO_2H$ is detd Boil 0 1 g cocaine-HCl with 5 cc neutral EtOH and 10 cc 0.1 *N* NaOH for 15 min After cooling add 10 cc $H_2O$ and titrate with 0 1 *N* $H_2SO_4$ using phenolphthalein as indicator The factor is 0 03755 when cocaine base is used and half that much when its salts are analyzed A. E. MEYER

Studies in tobacco chemistry. IV. Methods of tobacco smoke analysis. N. J GAVRILOV AND A W. KOPERINA *Biochem Z.* 231, 25–32(1931), cf. *C. A.* 24, 882.—An app. is described for absorbing all the products formed in glowing tobacco. The analyses of total N, nicotine N and $NH_3$ N vary only 3–4% S MORGULIS

Experiments on Cymbopogon nardus Rendle and on Cymbopogon martini Stapf, var. Sofia. FRANCESCO BRUNO *Parfums de France* 9, 8–14(1931).—*C. nardus*, planted in Italy (Palermo) on March 15, 1926, had grown to an av height of 80 cm. on Aug. 1, it was cut and distd on Aug 1 and on Oct. 1, yielding 14 6 and 14 2 tons of leaves (total 28 8) per ha., which gave 0 5% and 0 4% of oil, equiv. to 73 kg and 56 5 kg., or a total of 129 5 kg. per ha for the 2 cuttings The corresponding yields for 1927 (cuttings on July 26 and Oct 12) were: 28 3 and 17 1 tons, 0 535 and 0 362%, 151 4 and 61.8 kg per ha. Analysis of this oil in the Schimmel lab. gave: $d_{15}$ 0 8933, $\alpha$ (100 mm tube) −2°11′, $n_{20}$ 1 4720, acid no. 0 9, ester no 58 8, Ac no 259–5 (= 83 6% esters), sol in 1 or more vol of 80% alc. Analysis of the oil distd in 1928 gave: $d_{15}$ 0 8926, $\alpha$ + 1°, total geraniol 84 67%, aldehydes (citral + citronellal by Schimmel's phenylhydrazine method) 44 10%, free geraniol 30 62%, other alcs 9 95%, citronellal (Dupont and Labaune method) 33 10%, citral and other aldehydes (by difference) 11%, sol in 1 3 vol. of 80% alc and in 14 vol of 70% alc. Leaves harvested during the cold season (Dec. 18) yielded 0.25% oil (as compared with 0 535% from the July harvest) which gave the following results on analysis: $d_{15}$ 0 872, $\alpha$ +1°, total geraniol 70.36%, free geraniol 32 6%, aldehydes (citral + citronellal by Schimmel's phenylhydrazine method) 52 5%, citronellal (Dupont and Labaune) 27.34%, citral and other aldehydes (by difference) 24 5%, sol in 1 vol. of 80% alc. and in 12 vol of 70% alc. A portion of this same harvesting was allowed to dry till it had lost 72% in wt. The dried leaves gave the same yield of oil as the fresh leaves. The drying of the leaves had the following effects on the compn. of the oil (1) Total geraniol remained at 70 36%. (2) Free geraniol fell from 32 4% to 2 4%. (3) Citronellal increased from 27.34% to 44 79% (4) Citral and other aldehydes fell from 24 5% to 10 21% A further har-

$N_2As_2$ which is insol in water but sol in MeOH, EtOH and acetone is obtained by a process described in detail and is suitable for combating syphilis and sleeping sickness

Iodinated, acetylated condensation products of the di(aminobenzyl) derivatives of methylenedigualacol with terpin hydrate. SAMUEL L. SUMMERS. U. S. 1,793,028, Feb 17 Products insol in water but sol in alc. and which may be used as antiseptic, antineuralgic, antitubercular and anticatarrhal remedies are described with details of manuf

Neutral calcium salt of inositolhexaphosphoric acid. "CRISTALLO" A.-G Swiss 141,522, Dec. 8, 1928 Vegetable matter rich in inositolhexaphosphoric acid and its salts are extd with water and the neutral Ca salt pptd from the ext by addn of $CaCO_3$ The Ca salt is filtered off and used in therapy The remaining liquid is rich in vitamins which are unaffected by the presence of the carbonates, and can also be used for medicinal purposes

Granular anhydrous citric acid. RICHARD PASTERNACK and FRANKLIN G BREMER (to Charles Pfizer & Co.) U S 1,792,657, Feb 17 Citric acid is dehydrated by drying at temps of 35–50°, in order to obtain a product suitable for tablets, effervescent salt compns., etc.

Isolation of scillarene A from squills. CHEM FAB VORM SANDOZ. Swiss 142,364, Feb 19, 1929 Addn to 134,217 (*C. A.* 24, 1706). The cryst. almost $H_2O$-insol ext. from squills, which has a strong action on the heart and contains glucoside and tannoid, is extd with water and the insol part added to a mixt. of water and org solvent This is treated with a tannin pptg agent to remove the tannin and scillarene A is obtained from the filtrate

Anti-syphilis preparation. SALO BERGEL. Ger 502,655, Feb 19, 1925 Virulent syphilis spirochetes are killed, dissolved in lecithin emulsion and the resulting prepn injected into the pleural or abdominal cavities or in the ear veins of animals. The blood, abdominal and pleural exudations, lymphatic glands, milk, thyrus and ovaries are then extd. with glycerol and soda or dil acid soln. to obtain the anti syphilis prepn

"Cancer remedy" H LEITNER. Brit 337,797, July 8, 1929 Gall bladders of animals are extd with alc., ether or other solvent and the ext. is evapd to dryness, and the resulting product is preferably dissolved in an aq soln. of KCl or other suitable K compd and used for injection into the affected part.

Vaccines. PHILALETHES KUHN Ger. 517,204, Feb 12, 1929 The usual bacteria are cultivated on nutrient mediums which are inoculated also with filtrates from cultures of the known ameboid forms. The coccoid growths so obtained are killed or enfeebled by the action of heat or disinfectants

Treating blood, bandages, etc., to prevent bacterial decomposition I G FARBENIND A G Brit. 337,473, May 1, 1929 The materials are treated with small addns. of substances such as methylenebis 2,4-dichlorophenol, the condensation products of formaldehyde with 2 mol. proportions of *p*- or *m*-chlorophenol, the condensation products from *p*-chlorobenzaldehyde or *p*-diethylaminobenzaldehyde and 2 mol proportions of *p*-chlorophenol, a product obtained by treating the condensation product of cyclohexanone and 2 mol proportions of phenol with a glacial HOAc soln of Br or with a K bromate-bromide soln., or a product obtained by heating 2,6-dimethylol-4-chlorophenol with 4-chlorophenol in the presence of 50% $H_2SO_4$.

Filter for essences, etc. MARINO PISANI Swiss 142,143, July 29, 1929 The filter is particularly suitable for removing particles of water contained in the essence, etc.

Medicating tobacco with iodine. FRANK P. STRICKLER U S 1,793,723, Feb 24 I is first converted into a fluid state, as by vaporization or dissolving in alc. and is caused to crystallize in contact with tobacco to render the latter suitable for use as a therapeutic source of I

Tobacco smoke treatment. H PÄFFGEN. Brit. 338,006, Nov 19, 1929 Poisonous constituents of tobacco smoke such as nicotine, pyridine and "benzole" are sepd by passing the smoke through a dry absorption medium such as activated C or silica gel which has been previously satd with a volatile substance of suitable character to prevent absorption of aroma imparting substances also (as by use of smoke from combustion of nicotine free tobacco waste, peppermint oil, NaOH, $Na_2CO_3$, sucrose, NaCl, tannic or barbituric acid, $O_2$ or Na hyposulfite, or by merely leaving 20–25% of water in silica gel if this is used)

# 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The concentration of weak nitric acid. G. PAYRAS. *Rev. gén. mat. plastiques* 6, 147–51(1930).—A description is given of the Chem. Construction Co.'s Fr. pat. 656,108 (*C. A.* 23, 4026). A. PAPINEAU COUTURE

Vanadium as a catalyst for sulfuric acid manufacture in America. ENSIO ALHOPURO. *Acta Chemica Fennica* 3, 112–4(1930).—The characteristics of V catalysts now used in plant operation are given. The best results are obtained by the Selden V mass and the new converter developed by A. O. Jaeger, which give as high as 98% conversion. In present-day plant operation V gives a higher av. conversion than Pt, because Pt is contaminated with traces of As and Cl. The price of Pt is 184–253 times the price of V, but the high return value of Pt catalysts and the high price of licenses for V catalysts make this proportion lower. $H_2SO_4$ plants which were operated or built in 1929 and which use the Selden converter system have a total capacity of more than 300,000 tons of $H_2SO_4$ per year. The total production of $H_2SO_4$ by the contact process in the U. S. during the same year was 1,870,000 tons as 100% acid. S. A. KARJALA

Potash. GEO. W. STOCKING. *Chem. Markets* 28, 247–52(1931).—The industry in Germany is described. E. H.

A study of the properties of polyhalite pertaining to the extraction of potash. VI. Experiments on the production of potassium chloride by the evaporation of leach liquors from decomposition of uncalcined polyhalite by boiling saturated sodium chloride solutions. H. H. STORCH AND F. FRAAS. Bur. Mines, *Repts. of Investigations* 3062, 7 pp. (1931). cf. *C. A.* 25, 1338.—Evapn. of 90% of the $H_2O$, interspersed with 3 crystn. steps, will yield 78% of the $K_2O$ as crude KCl, the bulk of the impurities being NaCl. This product may be refined readily by recrystn. to produce pure KCl. A preliminary estimate indicates about $20 a ton as the cost of production at the plant. A. H. E.

The acids and acid salts which contaminate cream of tartar. FILIPPO PERCIABOSCO. *Atti III congresso naz. chim. pura applicata* 1930, 520–5.—Some cream of tartar contains appreciable quantities of $Ca(C_4H_5O_6)_2$ instead of KCl. E. M. S.

Quinquennial review of the mineral production of India for the years 1924 to 1928. Phosphates. E. H. PASCOE. *Records Geol. Survey India* 64, 413–21(1930).—Apatite is known in many parts of India, some deposits assaying 20–25% $P_2O_5$. Nodular deposits of lime phosphate also occur. ALDEN H. EMERY

A brief history of the world's phosphate rock production. A. N. GRAY. *Superphosphate* 4, 25–46(1931).—Historical notes relating to the discovery of phosphate deposits and the early production of phosphate rock in all parts of the world are given. The world's annual production of phosphate rock by countries is given for the years 1847 to 1929. K. D. JACOB

Dehydration of salts of phosphoric acid. S. S. DRAGUNOV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 409–16(1930).—Graphs show the transformations of the salts of Na, K and Ca or phosphoric acid upon drying. From these it is possible to judge the % of pyro- and meta-modifications formed, as well as the speed of the transformations at various temps. With the loss of $H_2O$ of crystn. $CaHPO_4.2H_2O$ becomes less sol. in citrate soln. At 100° only 4% of the $H_2O$ of crystn. was lost in 1.5 hrs. At 150° 19% was lost in 20 min. It is important not to dry phosphate very much above 100° for any period of time (not more than 30–50 min. at 100°). Ca metaphosphate, insol. in acid, can be hydrated in the autoclave at high pressures and brought back to the sol. state. J. S. JOFFE

Utilization of the gases obtained in the process of volatilizing phosphorus and the production of soluble phosphates. A. P. DINAEV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 397–409(1930).—The relation of $H_2O$ and O from the air to the system: P, $PH_3$, CO, H, in which a reaction of selective oxidation of generator gas takes place was investigated. A modification of the app. used by Britske and Pestov (cf. *C. A.* 24, 208) was necessary. A description and drawing of the new app. are given. The exptl. data obtained show that the oxidation of P with $H_2O$ over CaO at a temp. from 550° to 930° is completed to phosphoric acid at fairly rapid velocity of the gas stream. Very little $PH_3$ is found in the gases, and the sum of CO + H is not decreased. The materials used for oxidation contained no phosphates. In the oxidation of the gases with air no excess of O was necessary in the process, except what was needed for the oxidation of P. At the lower limits of temp. no O is used up by the CO. The generator gases used in this manner can be used again for heating or other purposes. After

the process was worked out with lime, NaCl was tried On account of the volatilization of the NaCl and even the Na phosphates formed, it was necessary to keep the temp between 400° and 500°. With $H_2O$ no oxidation of P took place, but with O it did, and the generator gases were free from P, but slightly diluted with N. J S J.

Calcium arsenate. Economic data regarding its development in Mexico. PABLO HOPE Y HOPE *Rev quim* 6, No 2, 11-9(1930); cf *C. A.* 25, 1039 —$As_2O_3$ can be obtained from smelters in Mexico, but is unprofitable. If made into $Ca_3(AsO_4)_2$ 2,200 000 kg could be used on cotton fields in Mexico E. M SYMMES

Magnesium compounds (other than magnesite). PAUL M TYLER. Bur Mines, *Information Circ* 6406, 19 pp (1931), cf *C. A.* 25, 561 —Properties, uses, methods of production, domestic and foreign production, imports, exports, prices and manufacturers of $MgCO_3$, $MgSO_4$, calcined magnesia and $MgCl_2$ are discussed A H E

Separation of the constituents of sylvinite in the form of carbonates. EDOUARD URBAIN *Compt rend* 192, 232-3(1931) —Almost complete pptn of K in the form of acid carbonate of K and Mg may be obtained, and the Cl of KCl may be removed in the form of NaCl, by using $NaHCO_3$, according to the reaction, $MgCO_3 + NaHCO_3 + KCl = MgCO_3KHCO_3 + NaCl$ This reaction may be applied to com sepn. of K and Na in the mixt. of chlorides known as sylvinite, which is a most important mineral in potash mines After sepn of the solid phase the soln is treated to recover $NaHCO_3$. The cycle of operations permits quant. recovery of $K_2CO_3$ and $Na_2CO_3$ from sylvinite. ALICE W EPPERSON

The economic significance of zirconium and its compounds. J F CORRIGAN *Ind Chemist* 7, 97-100(1931) E H

Extraction of beryllium, cesium and rubidium from beryl. C JAMES, H C. FOGG AND E D COLCHLIN *Ind Eng Chem* 23, 318-20(1931) —The finely ground mineral is fused with CaO, and the resulting slag is ground, decompd. with $H_2SO_4$ and heated to dehydrate the $SiO_2$. The mass is stirred with hot water and the filtrate is concd. to ppt. out K, Cs and Rb alums The remaining $Al_2(SO_4)_3$ is removed as $NH_4$ alum, and the Fe, after oxidation, is pptd. with dil. $NH_4OH$, the last traces being removed by $H_2S$ under slight pressure The Be is then pptd as the basic carbonate by the addn. of $(NH_4)_2CO_3$. The method can be adapted to the extn. of Be from other silicate minerals K D JACOB

Activated carbons. G SIMONIN *Caoutchouc & gutta-percha* 26, 14,357-9, 14,468-70, 14,516-9, 14 551-3, 14,594-5, 14 632-6 14,701-2 14 742-4, 14,788, 14,821(1929); 27, 14,860-8, 14,903-4, 14,949-1, 14,983-5, 15 022 3, 15,064-5(1930) —After the important phys. properties of activated carbons are described it is shown that the activity does not depend to any appreciable extent upon the nature of the gas from which the vapor is removed. If care is taken to avoid too high temps, it is possible to recover MeOH, EtOH, AcMe, $Et_2O$, EtOAc and $CS_2$ unaltered from activated carbons in which they have been adsorbed from air The most rapid method for expelling the adsorbed vapors from carbons, without chem. alteration, is by treatment with steam. Below 120 the steam may be adsorbed to some extent, but above this temp it is possible practically to avoid such adsorption. Investigations of the tarry matter retained by the carbons after removal of $C_6H_6$ from coal gas showed that surprisingly little real tar was present, probably because of rapid resinification of the major portion of such small quantities as may be present in the gas, by contact with the charcoal. Inactivation of carbons in the removal of $C_6H_6$ by coal gas is attributed to the effect of S, which converts the active C mols into $CS_2$ Reactivation by calcination before and after treatment with HCl is explained tentatively by the decompn. of the $CS_2$ by Fe naturally present. The acid not only decomposes the FeS formed in the first calcination but brings about a uniform and intimate dispersion of the regenerated Fe salt in readiness for the second calcination. Similarly, it is possible to remove the inactivating S and so to revivify the C by impregnation with $FeCl_3$ soln., followed by heating, *e. g.*, for 2 hrs at 900° B C. A.

A western nitrogen-fixation plant. G N WESTBY *Ind Eng Chem.* 22, 1099-1103(1930) —A description is given of the unique plant of the American Nitrogen Products Co., which was destroyed by fire in 1927 Nitrites were manufactured by the arc process and the details of operation are described. The final product contained 96.5-99.0% $NaNO_2$ J. R. ADAMS

The synthesis of ammonia from its elements in electric discharges. M. ALSPELD AND E WILHELMY *Ann Physik* 8, 89-123(1931) —The yield of $NH_3$ obtained by passing a 3 1 $H_2$ $N_2$ gas through a silent discharge in a Siemens tube has been detd. at temps. of 25° to 300° The rate of reaction increases slowly with the temp up to 130° and rapidly from there to 300° The sudden change in temp coeff at about the crit.

temp of $NH_3$ is tentatively explained as due to a sudden decrease in the no of $NH_3$ mols adsorbed at such points on the surface of the Siemens tube as to inhibit $NH_3$ formation. Townsend, corona, glow and arc discharges were compared as regards their effectiveness in synthesizing $NH_3$ in a stream of $H_2$-$N_2$ gas passed through them. $NH_3$ was detd in all cases by titration In the Townsend discharge no $NH_3$ was obtained In the neg corona the yield of $NH_3$ was const from 300 to 780 mm. pressure at a given c d in the glow discharge at pressures below 300 mm it increased linearly with decreasing pressure At 760-mm pressure, $NH_3$ formation in a corona discharge increased linearly with the current until an arc was formed; it then decreased markedly In the glow discharge the most rapid rate of synthesis occurred in the cathode region, the pos column was less active Fe, Cu and W as cathode materials all produced about the same yield of $NH_3$. Pt cathodes were 30% more effective, possibly because of some synthesis occurring on the Pt between H atoms and $N_2$ mols In the neg glow, the yield of $NH_3$ increased linearly with the current and for a given c d increased with the rate of gas passage it decreased slightly as the cathode temp was increased In the anomalous cathode fall, the yield of $NH_3$ per unit current was greater than in the normal cathode fall The max rate of $NH_3$ synthesis was found in a gas mixt. contg 60% $N_2$ and 40% $H_2$ At the same compn a min in the cathode fall was noted P. H EMMETT

The use of pyrethrin against bed bugs. ALBERT GUILLAUME *Bull sci. pharmacol* 38, 80–4(1931).—A concd soln of pyrethrins in MeOH dild. with 25 parts of $H_2O$ proved to be a very effective spray against bed bugs The eggs are not destroyed For the extinction, the buildings must be treated 3 times a year in March–April, in July and in August–September A E. MEYER

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Utilization of the aqueous extracts from olives [recovery of KCl] (CIUSA) 27. $NaHCO_3$ (Brit. pat. 338,007) 15. Apparatus for catalysis [in oxidation of $NH_3$] (Swiss pat. 141,303) 1.

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Nitric and sulfuric acids. I G FARBENIND A.-G Brit. 337,406, June 13, 1929. In simultaneous production of $HNO_3$ and $H_2SO_4$ by scrubbing gas mixts contg N and S oxides with sulfuric or nitrosylsulfuric acid, as described in Brit. 301,232 (*C. A.* 23, 4026), a sufficient proportion of N oxides is present that all the $SO_2$ is converted into $H_2SO_4$ or nitrosylsulfuric acid or a mixt. of $H_2SO_4$ and $HNO_3$ Various details of procedure are described

Sulfurous acid. SOC. ANON. POUR L'IND. CHIM. A BÂLE. Swiss 142,731, May 15, 1929. Concd $H_2SO_3$ is prepd from gases contg $SO_2$ by absorbing the $SO_2$ by water and aromatic amines, driving off the $SO_2$ by heating and reabsorbing in water

Phosphoric acid. KUNSTDÜNGER-PATENT-VERWERTUNGS A.-G. Swiss 141,866, Apr 3, 1929. $H_3PO_4$ soln is obtained by causing mineral acid to react with crude phosphates and pptg the Ca of the crude phosphate by sulfate ions Examples are given. Cf. *C. A* 24, 471

Ammonia synthesis. LOUIS C. JONES (to Chemical Engineering Corp.). U. S. 1,794,903, March 3 The mixt. of H and N for $NH_3$ synthesis is purified by circulating the gases under pressure in contact with a catalyst and introducing $CO_2$ into the circulating system after compression and before catalysis, to react with gases and convert impurities in the system into solid products, which latter with $CO_2$ are simultaneously removed (suitably as $(NH_4)_2CO_3$ deposited on Raschig rings) while maintaining a continuous circulation of the gases under pressure through the system as the gases pass to the catalyst. Cf *C. A.* 24, 4123

Ammonia synthesis. HERBERT A. HUMPHREY (to Atmospheric Nitrogen Corp.). U. S 1,794,231, Feb. 24. Solid carbonaceous fuel is burned in the presence of steam, the gaseous products are subjected to catalytic action to cause reaction of CO with $H_2O$ to form a volume of H substantially equal to that of the CO, a proportion of 3·1 between the H and N is established, O compds. are removed from the gas mixt. and the latter is catalyzed to convert part of the gases into $NH_3$, the $NH_3$ is sepd. and unconverted gas is returned to the $NH_3$-forming catalyst through a closed, periodically bled, circulatory system The air and steam used with the fuel in the first step of the process are highly preheated and a temp. of about 1300° is maintained in the gasification zone. The resulting gaseous products are withdrawn from the burning fuel and heat from them is transferred to the entering air and steam while contact of the gaseous products with colder solid fuel is prevented. A substantially $CH_4$-free gas is thus produced which lengthens the periods between the bleedings required.

Ammonia-air mixture. HARRY PAULING. Ger. 491,961, Oct. 16, 1926. A homo-

geneous $NH_3$-air mixt. is obtained by absorbing the $NH_3$ in a circulating water current and then blowing air through the soln. App. is described. Cf. *C. A.* 25, 1041.

**Catalytic apparatus suitable for ammonia oxidation.** C. Toniolo and "Azogeno" (Società anon. per la fabricazione dell'ammoniaca sintetica e prodotti derivati). Brit. 337,680, July 25, 1929. In app. comprising a plurality of superposed layers of Pt or other suitable metallic gauze, the layers first impinged upon by the reaction gases are of coarser mesh than the subsequent layers which are less subject to attack by the gases. Various details of construction are given.

**Working up mixtures containing carbon dioxide and ammonia.** I. G. Farbenind. A.-G. (Ernst Janecke and Erich Rahlfs, inventors). Ger. 514,893, Nov. 6, 1929. Mixts. contg. $CO_2$ and $NH_3$ or their compds., especially the mixt. resulting from the prepn. of urea from $NH_2COONH_4$, are prepared by treating the mixt. with liquid $NH_3$. Thus, a mixt. of urea, $NH_2COONH_4$ and water is washed with liquid $NH_3$ at −36°, giving a soln. of urea and water in $NH_3$ and a pure $NH_2COONH_4$ residue. The urea is then recovered by evapn.

**Apparatus for production of ammonium salts.** "Montecatini" Società generale per l'industria mineraria ed agricola. Swiss 142,051, June 7, 1929. See Brit. 313,446 (*C. A.* 24, 1186).

**Cyanamides.** N. Caro and A. R. Frank. Brit. 338,023, Dec. 6, 1928. In prepg. cyanamides of Ca or Mg or both by reaction of the corresponding carbonates and $NH_3$ as described in Brit. 279,811 (*C. A.* 22, 3024), the removal of the water produced in the reaction is accelerated by substances such as C, carbonaceous materials or $P_2O_5$ which are preferably mixed or briquetted with the starting materials. When C or carbonaceous materials are thus used, oxides or compds. forming oxides on heating may be substituted for the carbonates, and when $P_2O_5$ is used a composite *fertilizer* is obtained. Cf. *C. A.* 25, 1041.

**Phosphates and hydrogen.** Bayerische Stickstoff Werke A.-G. (Vladimir N. Ipat'ev, Nikodem Caro and Albert R. Frank, inventors.) Ger. 514,890, Mar. 27, 1928. See Brit. 308,684 (*C. A.* 24, 472).

**Nitrogen oxides, etc.** N. Caro and A. R. Frank. Brit. 337,847, Aug. 13, 1929. $N_2O_4$ or $HNO_3$ in concd. form is obtained from mixts. contg. N oxides, O and water vapor (such as products of $NH_3$ oxidation) by a 3-phase process in which part only of the water is first removed without much oxidation, residual water is sepd. after or during oxidation (which is promoted by lowering the temp.) as a tetroxide contg. $HNO_3$ of low water vapor pressure, while in the third phase the gas may be cooled or treated with substances which lower the vapor pressure of the tetroxide or have absorbing properties. Numerous details of procedure are given.

**Precipitating metals as sulfides.** Niels C. Christensen. U. S. 1,793,906, Feb. 24. Solns. of metals, the sulfides of which are sol. in such solns. if slightly acid, *e. g.*, solns. contg. Zn, Fe and Mn, are treated simultaneously with $CaCO_3$ and $H_2S$ to ppt. the metal sulfides and form $CO_2$ and the latter is used for treating a $Ca(SH)_2$ soln. to form $H_2S$ and $CaCO_3$ for further use in the process to ppt. addnl. metal.

**Purifying zinc salt solutions.** I. G. Farbenind. A.-G. Brit. 337,822, Aug. 8, 1929. Solns. obtained from chlorinated burnt pyrites are freed from Fe by oxidizing the latter with an alk. earth chlorate such as $Ca(ClO_3)_2$ and then pptg. with quicklime. Cu is first removed by addn. of Fe.

**Ammonium sulfate.** Union chimique belge, Soc. anon. Brit. 338,373, May 17, 1929. In prepg. $(NH_4)_2SO_4$ as described in Brit. 307,037 (*C. A.* 23, 5281), with pptn. of the sulfate as crystals by addn. of $NH_3$, the pptn. is localized in a part of the app. in which the ammoniacal soln. is mixed with a large quantity of cooler satd. soln., and a portion of this soln. is continuously circulated through a cooler so as to withdraw the heat caused by the soln. of the $NH_3$. Various details of app. are described. Cf. *C. A.* 24, 715.

**Decomposing ammonium sulfate.** Wilhelm Bertelsmann and Alfred C. Becker. Ger. 517,495, Apr. 8, 1928. The thermal decompn. of $(NH_4)_2SO_4$ to $NH_3$ and $NH_4HSO_4$ is effected in vessels made of $SiO_2$. Shallow vessels are preferred. The temp. should be maintained above the m. p. of the sulfate melt. Addnl. details are given.

**Barium aluminate.** Kali Chemie A.-G. (Fritz Rothe and Hans Brenek, inventors). Ger. 514,891, July 31, 1926. Aluminiferous material is heated with $BaSO_4$ to a temp. of at least 1000° in a current of steam and oxidizing or indifferent gas. Heavy spar may be used as the starting material in such amt. that besides the $Ba_3(AlO_3)_2$ formed, there is also produced silicates of the types $BaSiO_3$ or $Ba_2SiO_4$ or the corresponding Ti compds. In an example, 100 parts of heavy spar contg. 92.63% $BaSO_4$ and

3.72% $SiO_2$ are mixed with 56 parts bauxite contg. 52.86% $Al_2O_3$, 2.71% $SiO_2$ and 2.84% $TiO_2$. The mixt. is then heated to 1200° in the presence of steam and air, producing $Ba_3(AlO_3)_2$ and $BaSiO_3$. Other examples are given.

Barium carbide. International Industrial & Chemical Co., Ltd. Brit. 338,003, Nov. 21, 1928. See Fr. 682,479 (*C. A.* 24, 4362).

Calcium nitrate. Appareils et Evaporateurs Kestner. Ger. 514,589, Mar. 21, 1928. In the prepn. of $Ca(NO_3)_2$ from $CaCO_3$ and $HNO_3$, the $CaCO_3$ is loaded into a tower mixed with granular substance not acted on by the $HNO_3$, to ensure a passage for the acid through the mass. App. is described. Cf. *C. A.* 24, 5442.

Calcium oxide. Consortium für Elektrochemische Industrie G. m. b. H. Ger. 514,715, July 19, 1927. CaO prepd. by heating $Ca(OH)_2$ to 600–800° in a gas current, can be used as a dehydrating agent for liquids or molten substances by mixing therewith. Thus, 95% alc., if heated with CaO prepd. as above, reaches a purity of 99.6% in about 15 min. Other examples describe the dehydration of Na alcoholates by CaO as thus prepd.

Siliceous calcium oxide compounds. Friedrich Pistor. Ger. 514,742, Aug. 7, 1927. Sol. dry compds. are obtained by adding CaO to cored solns. of siliceous substances. Thus, burned lime is added to Na or K water glass. The products are used in the cold cement dyeing and artificial mass industries.

Dicalcium phosphate. Erich Thilo and Adolf Heicke. Ger. 517,181, Feb. 12, 1928. See Fr. 677,191 (*C. A.* 24, 3091).

Solid carbon dioxide. Akt. Ges. der Maschinenfabriken Escher, Wyss & Cie. Swiss 141,303, Oct. 19, 1929. Liquid $CO_2$ under pressure is allowed to expand in stages. Cf. *C. A.* 24, 4362, 4363.

Solid carbon dioxide. Midden-Europeesche Octrooimaatschappij. Ger. 514,717, Sept. 4, 1928. App. for suddenly allowing liquid $CO_2$ under pressure to expand to form $CO_2$ snow, and for allowing further reduction of pressure to form $CO_2$ ice is described. Cf. *C. A.* 24, 1474.

Carbon dioxide from limestone. P. Brotherhood, Ltd., H. M. Dunkerley and Carbon Dioxide Co., Ltd. Brit. 338,309, Nov. 19, 1929. Limestone from a crusher is placed in retorts fed with steam from a boiler which is heated by waste heat from the retort furnace, and the mixt. of steam and $CO_2$ from the retort is used to work a prime mover, exhaust steam is condensed, and the $CO_2$ is collected. App. is described.

Carbon disulfide. Eberhard Legeler and Hermann Kob (to I. G. Farbenind. A.-G.). U. S. 1,793,181, Feb. 17. Various details are described of app. comprising an elongated main retort adapted to contain a charge of C, at least one elongated supplementary retort positioned along and in contact with the main retort in the same heating chamber, and a device for introducing liquid S at one end of the supplementary retort and for leading superheated S vapors from the opposite end of this retort into the main retort.

Carbon disulfide. Eberhard Legeler and Eugen Fischer (to I. G. Farbenind. A. G.). U. S. 1,795,132, March 3. See Brit. 333,090 (*C. A.* 25, 564).

Carbon disulfide. Chem. Fab. Kalk G. m. b. H. and Hermann Oehms. Ger. 517,337, July 9, 1929. $CS_2$ is prepd. by leading a mixt. of $H_2S$ and $CO_2$, with or without inert gases such as N, over glowing C. The initial gas may be obtained from coal distn. gases by washing with water. Cf. *C. A.* 24, 2555.

Iron-free chromic chloride from ferrochromium. I. G. Farbenind. A.-G. (Johannes Brode and Carl Wurster, inventors). Ger. 514,571, Sept. 11, 1925. Granulated Fe-Cr is heated to 500–600° in a heat insulated container in a current of Cl and the temp. maintained at such a value that the $FeCl_3$ formed subl. mates, leaving $CrCl_3$. An example is given.

Magnesium carbonate; ammonium sulfate and chloride. Kali Chemie A.-G. Ger. 517,496, Oct. 17, 1928. The manuf. of $MgCO_3 3H_2O$ and $(NH_4)_2SO_4$ by treating a soln. of $MgSO_4$ with $(NH_4)_2CO_3$ is effected in two stages, the first stage involving the reaction $MgSO_4 + 2(NH_4)_2CO_3 \longrightarrow (NH_4)_2SO_4 + (NH_4)_2CO_3MgCO_3 4H_2O$. The double salt is filtered off and treated with a soln. of $MgSO_4$ to effect the reaction $(NH_4)_2CO_3MgCO_3 4H_2O + MgSO_4 \longrightarrow 2MgCO_3 3H_2O + (NH_4)_2SO_4$. $MgCl_2$ may be treated similarly, with production of $NH_4Cl$. The products are purer than those obtained when the reaction is effected in one stage. An example is given.

Magnesium sulfate. Emilio Rodolfo. Swiss 142,436, May 16, 1929. $MgSO_4$ is recovered from the waste water of artificial silk manuf. by addn. of $Ca(OH)_2$ which causes pptn. of $CaSO_4$, $Mg(OH)_2$ and $Zn(OH)_2$. The ppt. is sepd., suspended in water, and treated with $CO_2$, to ppt. $MgSO_4$. $Na_2SO_4$ may also be recovered from the residual liquid.

Magnesium sulfate solution. KALI CHEMIE A.-G. Ger. 514,590, Nov. 30, 1929. Hot highly concd $MgSO_4$ soln is prepd by forming an unsatd soln. of the salt from natural kieserite and satg with anhyd kieserite.

Potassium, calcium and magnesium sulfates from materials such as polyhalite. EUGENE P SCHOCH. U S 1,794,552, March 3. Ore such as polyhalite is dehydrated by heating $K_2SO_4$ and $MgSO_4$ are extd with hot water, undissolved $CaSO_4$ is sepd from the soln. $K_2SO_4$ is crystd from the soln and sepd and the soln is further treated for recovery of $MgSO_4$. U S 1,794,553 relates to a similar process. Numerous details of procedure are given.

Potassium and magnesium sulfates from polyhalite. EUGENE P SCHOCH. U. S 1,794,551, March 3. After dehydrating polyhalite to remove its $H_2O$ of crystn., the material is extd with hot water to produce solns contg over 5% of anhyd salts.

Potassium nitrate. FÉLIX JOURDAN. Swiss 141,306, Mar 30, 1929. $KNO_3$, with $Al(NO_3)_3$, $Fe(NO_3)_3$, etc., is obtained by treating leucite with a mixt. of N-O vapor, $HNO_3$ vapor and water vapor.

Sodium carbonate. W MANN. Brit 337,401, July 30, 1929. Finely cryst. soda is made by mixing, in an edge runner mill, finely ground Solvay soda with a suitable proportion of water.

Sodium sulfide. WOLF J MÜLLER and FRIEDRICH KLEMA. Ger. 514,954, May 15, 1928. See Austrian 116,564 (*C. A.* 24, 2844).

Titanium dioxide. SIMON J. LUBOWSKY. U. S 1,793,501, Feb 24. A finely ground mixt of rutile and magnesia is heated to form a Mg titanate, followed by acidification with $H_2SO_4$, chilling the soln to deposit $MgSO_4$, removal of the mother liquor and heating it to a high temp to produce metatitanic acid by hydrolysis with regeneration of $H_2SO_4$, and the metatitanic acid is washed and calcined.

Zinc carbonate and oxide. I. G. FARBENIND A.-G. Brit 337,792, Aug 7, 1929. A soln of a Zn salt such as $ZnCl_2$, of a concn less than 1.5 *N*, is added in slight excess to an alkali metal carbonate soln. of a max concn of 1.5 *N* at a temp of 60–70°, the $ZnCO_3$ ppt formed is filtered off, washed, dried, ground to pass through a wire sieve of 350 mesh per linear in. and then calcined below redness (suitably at 350°).

Crystals of materials such as metals or salts. PERCY W BRIDGMAN. U. S 1,793,672, Feb 24. A seed crystal is placed adjacent molten substance and a portion of the seed crystal is melted and the surface of solidification is advanced from the seed crystal into the substance. An app is described.

Borax crystallization. ROBERT B PEET (to American Potash & Chemical Corp.). U S 1,792,863, Feb 17. An emulsion colloid such as oleic acid is added to an aq. soln which ppts substantially only borax on cooling and the soln is cooled while being agitated, to ppt. borax. The added colloid prevents aggregation of the pptd borax crystals.

Treating crude sylvinitic potash salts containing kieserite. THEODOR THORSSELL and AUGUST KRISTENSSON. U S 1,794,259, Feb 24. The kieserite in the crude material is hydrated and the salts are treated with an ammoniacal soln of $NH_4Cl$, the $K_2SO_4$ contg $Na_2SO_4$ is removed and the mother liquor is treated with $CO_2$ for pptn of Mg $NH_4$ carbonate. The mother liquor remaining is cooled to remove a portion of the $NH_4Cl$ present and the liquor still remaining is treated with $CO_2$ to ppt $NaHCO_3$. U S 1,794,260 describes a process for the production of $K_2CO_3$ from crude sylvinitic salts, with simultaneous production of $Na_2CO_3$, by treating the crude salt with $NH_4$ carbamate in substantially anhyd liquid $NH_3$, coverting the resulting K and Na carbamates into the bicarbonates by treatment with water, sepg the bicarbonates from each other and from assocd impurities (suitably by known methods) and converting the bicarbonates into carbonates.

Concentrating phosphate-bearing material such as phosphate rock. WM TROTTER and ELTOFT W WILKINSON (to Minerals Separation North American Corp.). U S 1,795,100, March 3. The material is deslimed and then agitated and aerated in the form of a pulp with oil such as pine oil and a compd such as Na oleate adapted to control selective oiling of the phosphate so as to effect froth flotation concn.

Purifying graphite. E RABETRANO. Brit 337,738, Nov 9, 1928. Graphite in minerals of low C content is sepd from materials such as silica, silicates or Fe oxides by fractional pptn in a liquid contg a colloid (such as water with an addn of dextrin, alumina, saponin, gelatin or K silicate), with subsequent treatment of the graphite by electroösmotic action in a vessel in which the settlement of all suspended particles is retarded either mechanically (as by an agitating propeller with upward thrust) or by the presence of a colloid or by both methods. App and various details of procedure are described.

**Gold and silver solutions.** A. Mozer Brit. 338,383, Jan. 7, 1929. Solns. of Au and Ag, suitable for use in refining the metals electrolytically, for treating ores or for electrolytic or other gilding and silvering processes, are prepd by treating the metal with a soln of I in salts such as alkali or alk. earth metal iodides, sulfites or thiosulfates forming complex compds with Au and Ag iodides. Chloride or bromides also may be added, and in some instances a cleansing agent such as Vienna lime may be added to form a pasty compn.

**Hydrogen for use in catalytic synthesis.** Luigi Casale. U. S. 1,793,677, Feb. 24. CO is produced from $CO_2$, O and a carbonaceous fuel contg. S, and the CO is subsequently converted by the action of steam in the presence of a catalyst to produce a mixt. of $CO_2$ and H and the $CO_2$ is finally removed. In this procedure the conversion of the $CO_2$ into CO is effected at a temp. (suitably 1000° or higher) high enough to effect the oxidation of any contained S into $SO_2$ and the latter is removed from the CO before its further treatment.

**Sulfur.** Werschen Weissenfelser Braunkohlen A.-G. Ger. 514,570, May 8, 1928. S is prepd. from gases contg. $H_2S$ by leading it over a contact agent of large surface in which excess of $SO_2$ has been adsorbed. The $SO_2$ oxidizes the $H_2S$ with liberation of S.

**Sulfur from ammonium sulfide solutions.** I. G. Farbenind. A.-G. Brit. 337,395, July 29, 1929. Decompn. of $NH_4$ sulfide solns. at temps. above the m. p. of S is effected in the presence of adsorbent substances such as silica gel, $Al(OH)_3$, $Mg(OH)_2$, $Zn(OH)_2$, ZnS or other finely pulverized substances or raw cellulose fiber (suitably countercurrentwise with steam under 1.5 atm. pressure).

**Active carbon.** I. G. Farbenind. A.-G. (Ludwig Klebert, inventor). Ger. 517,428, Feb. 22, 1928. Subdivided wood is stirred for some time with a hot soln. of an activating agent, *e. g.*, $ZnCl_2$ or $H_3PO_4$ or boiled with the soln., and the mixt. is then dried and heated as usual. The wood may first be swollen with hot water. Cf. *C. A.* 25, 1045.

**Activating carbon.** I. G. Farbenind. A.-G. (Heinz Thienemann and Julius Drucker, inventors). Ger. 517,316, Mar. 12, 1926. In activating C by means of superheated steam or $CO_2$, an activating vessel having a wall permeable to gases is used and the activating agent is caused to diffuse therethrough. Thus, activation may be effected in a permeable chamotte tube, mounted concentrically in an iron tube, into which the activating agent is introduced.

**Reactivation of activated carbon after use.** C. H. Lander, F. S. Sinnatt, J. G. King and W. E. Bakes. Brit. 337,348 July 23, 1929. After employment for absorption of S compds. such as $H_2S$ and $CS_2$, reactivation is effected by heating and treatment with a basic substance such as $NH_3$, aniline, pyridine or quinoline (which may be used with superheated steam and a small proportion of air).

**Carriers for catalysts.** Imperial Chemical Industries, Ltd., F. A. F. Crawford and W. A. P. Challenor. Brit. 337,761, May 3, 1929. Catalysts for $SO_2$ production and other uses, such as Pt, V and Cr compds., are used on a carrier produced by incorporating "guhr" with a soln. of a sol. silicate, pptg. gelatinous silicic acid from the soln. as by the action of an acid or of $(NH_4)_2CO_3$ and drying to obtain a hard porous mass.

**Pressed condensation products.** Soc. anon. pour l'ind. chim. à Bâle. Swiss 142,936, Oct. 23, 1928. Filling material, aromatic amines, aldehydes and acid are intimately mixed to form a condensation product which is treated with an acid fixing agent. *The product is dried and pressed. Thus, $PhNH_2$, $CH_2O$ and HCl are mixed into an* aq. suspension of asbestos. NaOH is added and the resulting mass dried, and pressure-molded to the desired shapes. Other examples are given.

**Condensation products of fatty acids with polyalkylene-polyamines.** I. G. Farbenind. A.-G. Brit. 337,368, July 26, 1929. Fatty acids such as palmitic or oleic acids or their esters such as fatty oils or fats are condensed with diethylenetriamine, triethylenetetramine or a higher polyethylenepolyamine or polyalkylenepolyamine or mixts. of such compds. If not sol., the products may be alkylated and *they may be used as wetting, emulsifying, foaming and washing agents* and are stable in acid, neutral and alk. solns. Several examples are given.

**Condensation products of urea and formaldehyde.** Martin Luther, Wilhelm Pungs, Robert Griessbach and Claus Heuck (to I. G. Farbenind. A.-G.). U. S. 1,794,084, Feb. 24. $SO_2$ is used for hardening viscous completely condensed condensation products of urea and $CH_2O$.

**Polymerized vinyl alcohol-aldehyde condensation products.** I. G. Farbenind. A.-G. Brit. 337,806, Aug. 6, 1929. Condensation products of rubber-like, plastic

and elastic or hard and brittle character are made by treating polymerized vinyl ales. (which may be produced by saponification of polymerized vinyl esters) with aliphatic aldehydes such as formaldehyde or acetaldehyde, in the presence of acid catalysts such as HCl and $H_2SO_4$. Several examples with details of procedure are given, and products obtained may be formed into sheets films, threads, etc

Objects of albuminous material. International Kunsthoorn Industrie N. V. Ger. 514,771, Aug. 3, 1929. Objects of insol. albuminous material of a casein character especially animal casein, are formed by molding the objects from pure casein, subjecting them to a $CH_2O$ bath without allowing them to harden throughout, drying the surface at 100° and molding to final form by cold pressure

Impregnating compositions, adhesives. I. G. Farbenind. A.-G. (Wilhelm Pungs, inventor). Ger. 517,279, Dec. 9, 1926. A mixt. of stearin pitch or like fatty pitch and vegetable or animal oils is heated with S or other sulfurizing agent, e. g., $S_2Cl_2$, and before, during or after this treatment a product obtained by extg. tar with a partial solvent, e. g., EtOH, is added to the mixt., heating being continued until the product has the desired consistency. Asphalt, tar, pitch, resins or fillers may be added to the mixt. or to the product. The animal or vegetable oils may be preliminarily oxidized or polymerized. Examples are given

Fly and caterpillar adhesives. Bernhard Fibes (Viktor Scholz, inventor). Ger. 514,727, May 23, 1925. Adhesive material for catching flies and caterpillars consists of a 1–15% soln. of cellulose esters or celluloid waste products in castor oil. Odorants, coloring matter or filling agents may be added

Pencils, crayons and chalks. A. Pischel and P. Pischel. Brit. 337,633, Nov. 27, 1929. A sulfonated oil such as Turkey red oil is added to the mixt. used, before baking it.

Material for magnet cores, loading coils, etc. General Elec. Co., Ltd., and G. R. Polgreen. Brit. 338,321, Oct. 24, 1929. Powd. magnetic material such as an alloy of about 80% Ni and 20% Fe (which may be prepd. as described in Brit. 327,865 (*C. A.* 24, 5015)) is heated in a soln. formed of chromic anhydride and a halogen acid or halogen salt such as NaCl, preferably washed, and subjected to high pressure. Powd. refractory material such as ball clay, MgO or $Al_2O_3$ may be added to reduce the permeability of the core and increase the insulating of the core particles, and the cores after being formed under high pressure may be heat treated to develop their final permeability and hysteretic value (suitably at 500–600°). If desired, sol. matter may be left on the material until after the pressing and dissolved out after the heat treatment by a prolonged washing

Wax emulsions. C. H. Thompson and W. J. McGivern. Brit. 338,176, July 9, 1929. Emulsions, suitable for use in *polishing compns., soaps, for waterproofing fabrics* and in the manuf. of *lubricating greases*, are made by adding soap to melted mineral *or other non saponifiable wax such as paraffin or ceresin, and other materials such as* albumin, casein, glue or china clay or amino compds. such as triethanolamine also may be added as may also waterproofing agents such as varnish, linseed oil, shellac, rubber, silicates, etc.

Wetting agents. I. G. Farbenind. A.-G. Brit. 337,774, April 27, 1929. In a process generally similar to that described in Brit. 306,116 (*C. A.* 23, 4082), no excess of high mol. org. acids is used for the condensation process, and the resulting esters, amides or ester amides are converted into salts with acids (suitably either before or after treatment with alkylating or oxyalkylating agents). Numerous details and examples are given

Water-soluble cleansing agents. Johann Tengler. Swiss 142,691, June 5, 1929. Raw material capable of swelling is heated in an autoclave with caustic alkali, sulfonated oil or resin and hydrocarbons. Thus, starch is heated with NaOH, sulfonated castor oil and $CCl_4$. $C_6H_6$ may be added. The product is a good fat and grease solvent.

Detergent for removing tar, etc. J. H. Wylie. Brit. 338,167, Aug. 14, 1929. A mixt. comprising benzene, turpentine, oil of citronella and olive oil is used for removing tar from, and cleansing, surfaces such as coachwork, fabrics, leather or metal surfaces

Composition for removing grease and tar from lacquered surfaces. John W. Meyer. U. S. 1,795,134, March 3. Spirits of camphor 1, "citronella" 1 and kerosene 12 parts are heated together, mixed with separately melted paraffin 2 parts, and the mixt. is cooled

Composition for removing paint. N. C. W. Paint & Varnish Remover Co., Ltd., and T. K. Bonnar. Brit. 337,944, Oct. 19, 1929. A paint remover is prepd. by cover-

ing quicklime with soft soap and water, stirring the mixt and then successively adding $Na_2CO_3$, $NH_4$ carbonate and $Na_2S_2O_3$

Removing paint from painted surfaces. J H Gravell Brit 337,461, Aug 2, 1929 See U S. 1,744,463 (*C A* 24, 1478)

Cleaning agent for type metal. Erwin Hofmann Ger 514,726, Jan 3, 1928 The prepn consists of a reducing mixt of wood charcoal borax and earth alkali sulfide (except MgS) Molten colophony, $NH_4Cl$, NaOH and $Na_2CO_3$ may also be added

Smoothing etched printing cylinders. Conzett & Huber Swiss 141,344, June 25, 1929 Etched Cu cylinders are coated with an anti-etching prepn., which is wiped off so as to remain only in the depressions, and the cylinder is subjected to the action of an etching agent till the depressions disappear

Removing the raised parts of etched copper printing cylinders. Conzett & Huber Swiss 142,182, July 4, 1929 The cylinders are given a coating of a non-conductor of electricity which is mechanically wiped off, so that the raised parts are bared and the depressed parts covered The cylinder is next placed as anode in a galvanic bath till the raised parts disappear The cylinder is then removed and mechanically smoothed and polished

Offset printing for copying documents, etc. W L Lawrence Brit 337,455, Aug 2, 1929 An original is prepd with an aniline or other copying ink, an impression from this is taken onto a rubber or rubber surfaced member previously treated with glycerol or the like and transfer to blank sheets is effected The glycerol may be mixed with an aq or alc soap soln

*Waterproof coatings containing rubber latex.* Paul Meyersberg Swiss 142,172, Aug 15, 1928 A coating for materials contains natural or artificial rubber latex in a stable semi pptd thickened state This state may be produced by addn of weak org acid Alkali and saponifiable oils and fats may be present In an example, the mixt. contains latex 65, concd NaOH 1, pptd chalk 20, castor oil 5, PhOH 0 5, colophony 4 5 and rapeseed oil 4% Cf *C A* 24, 2900

Waterproofing coating suitable for use on gas or oil pipes, etc. Lester Kirschbraun (to Flintkote Co ). U S. 1,794,522, March 3 A surface such as metal pipe to be protected from corrosion is treated with an aq bitumen pitch type dispersion, the coating is allowed to dry and form a film, and over this is applied an aq slurry of hydraulic cementitious material which is permitted to dry and form an outer protecting coating.

Wood effects on metal panels. Herman C. Miller (to United Metal Products Co ). U. S. 1,794,528, March 3 A design is etched on a metal surface such as Cu or brass and the crevices and recesses in the etched surface are filled with a plastic mineral inlay such as a mixt. of whiting, graphite, varnish, lime, white lead, bronze and Al powder, water, $Pb_3O_4$ and oil and the inlay is baked, then ground flush with the normal surface of the metal, colored with a "chemical coloring" and the surface of the inlay is grained in imitation of wood grain

Use of rubber and cork together in forming surfacings for power pulleys. Charles R. Griffith. U. S 1,793,927, Feb 24 Various details are described, involving the use of granular cork embedded in a lesser wt of rubber

Material for gramophone records. A. O Thomae Brit 337,437, July 1, 1929. A raw record material comprises gelatinized cellulose acetate with camphor or camphor substitute material, dried at 40–80°, the drying time being about 24 hrs for each 0 1 mm thickness Various details of manuf. are described

Material for sound records. H T. Beans (to Durium Products Corp.) Brit. 337,796, April 2, 1929 A core such as cardboard made from rag stock is coated with a resorcinolformaldehyde condensation product in which a plasticizer such as glycerol is incorporated to avoid brittleness Various details of manuf. are described

Material for playing-cards. Harry L. Potts U. S 1,794,866, March 3 Cards are *formed with a woven textile center fabric, an opaque phenolic* condensation product on both sides of the fabric and in its interstices, and a layer of white phenolic condensation product over both sides of the opaque compn.

Dust bag material for suction cleaners. Hoover Co Brit. 338,253, Sept. 6, 1929. Material such as porous paper formed from pure manilla hemp fiber is strengthened by application of a resin and plasticizer such as a vinyl synthetic resin dissolved in ethylene dichloride or other solvent with dibutyl phthalate.

Preserving and improving gut for tennis rackets, etc., by treatment with synthetic resins. E S Barralet. Brit. 338,223, Aug. 20, 1929 Either phenol formaldehyde condensation products or those from glycerol and phthalic anhydride may be used Various details and examples of treatment are given

Fire extinguishers I G Farbenind A.-G (August Ruppert, inventor). Ger. 514,925, Sept. 21, 1928 The formation of $COCl_2$ in fire extinguishing by the aid of $CCl_4$ is diminished by adding $NH_3$ and aryl- or alkyl phosphates to the extinguishing agent. Tricresylphosphate is mentioned in examples Cf *C. A.* 25, 1348

Apparatus for producing fire-extinguishing foam from water and foam-forming powdered materials. Hans Burmeister (to Pyrene Minimax Corp.) U. S. 1,792,810, Feb 17 Structural features

Fire-extinguishing compositions. David J Block (to Du Gas Fire Extinguisher Corp.) U S. 1,793,420, Feb 17 See Brit 319,372 (*C. A* 24, 2564)

Fire-extinguishing composition. Lodias J Du Gas (to Du Gas Fire Extinguisher Corp.) U S. 1,792,826, Feb 17 $NaHCO_3$ is used with smaller quantities of $CaCl_2$, Na borate, NaCl and a filler such as infusorial earth, asbestos dust, silica or ash.

Fire-extinguishing system suitable for use with carbon dioxide. Swingspout Measure Co Brit 338,197, Aug 15, 1929 Structural features.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G E Barton, C. H Kerr

The employment of boric oxide in the glass industry. F H Zschacke *Glashütte* 59, 846–9, *Chem Zentr* 1930, I, 879—$B_2O_3$ shortens the duration of fusion and clarification, improves the resistance against hydrolysis, the workability in the blowing process and the behavior with regard to expansion, strength and hardness The quantity added should not be excessive. G Schwoch

The structure of chilled glass. P. Lazarev and S Lisnyanskaya *Compt rend acad sci U R S S* Ser A, 1929, 107–8, *Chem Zentr.* 1930, I, 630—The decrease in d of chilled glass is studied from the surface to the center When plates of chilled borax glass were ground so as to remove 58%, the sp gr of the remaining part of the glass fell from 2.286 to 2.280 and $n$ fell from 1.5170 to 1.5158 When 90% by wt. was removed, $n$ became 1.5151. The examn in polarized light yielded characteristic interference figures, which give a good illustration of the decrease in hardness. No change in sp gr (2.284) was observed when the borax glass was cooled slowly G Schwoch

Optical properties of didymium glass. E J Moore, H S Lein and D E Sharp *Glass Ind* 12, 49–51(1931)—This glass is composed of approx 49.5% $SiO_2$, 14.0% $K_2O$, 6.0% $Na_2O$, 20.5% $B_2O_3$, and 10.0% impure com didymium oxide It has a high constringence, $n$ of 1.53, and a sharp absorption band, but it does not show anomalous dispersion. H F. Kriege

The silvering of glass. Donald E Sharp *Glass Ind* 11, 273–6(1930)—Although a wide range of formulas may be used, each one is successful only when followed very closely. An ammoniacal Ag soln is mixed with some reducing soln such as sugar, glucose, Rochelle salts, etc. Improper cleaning of the glass and excess $NH_3$ in the Ag soln are the most common causes of failure After cleaning, the glass surface should be treated with dil $SnCl_2$ soln and rinsed with $H_2O$ H F. Kriege

Crystal modes of the technical calcium sodium silicate devitrification and their interpretation. Hans Jebsen Marwedel. *Sprechsaal* 62, 715–7, 735–9, 753–6, 773–6, 791–3, *Chem Zentr* 1930, I, 878–9, cf *C A* 23, 2003—The forces active in the crystallization process surpass the "crystallizing ability" by the amt due to the inhibition on account of the internal friction. This more comprehensive term is called "crystallizing tendency" Many photographs of cristobalite and wollastonite crystals are given. The crystal modes are influenced by external factors, therefore they vary extensively It is shown by means of crystals of an org glass that the directed crystn forces of the skeletons can be altered by external factors In this case the arrangement of the crystal pattern assumes a medium position The modes of devitrification make it possible to draw important conclusions with regard to errors in the manuf., which otherwise can be detected only by difficult and time-consuming investigations It was found that the cristobalite crystals in the glass are subject to an unexplained torsion force which is perhaps to be attributed to an unhomogeneous melt. The hexagonal star-shaped crystals hitherto described in the literature as tridymite are cristobalite crystals. The surroundings of the crystals are so strongly altered by the formation of crystals that this secondary glass seps another phase The wollastonite-cristobalite paragenesis thus found was followed and interpreted through all steps Thus by crystn the glass

is fractionated into residual glasses, each of which assumes a new position in the equil. diagram G SCHWOCH

Quinquennial review of the mineral production of India for the years 1924 to 1928. Clays. E L G CLEGG *Records Geol Survey India* 64, 371–9(1930) —India produces china clay, fire clays, fuller's earth and clay for pottery, tile, etc. A H. EMERY

The electrical dewatering of clay suspensions. CARL E CURTIS. *J Am Ceram Soc.* 14, 219–63(1931) —A history and full review are given of much previous work. Dewatering by electrophoresis is generally not more efficient than by using the filter-press, but on very fine-grained clays it is superior Data and bibliographies are given, also a short biography of Count Schwerin C H. KERR

Manufacture of magnesia and magnesite brick. FRIEDRICH REINHART *Tonind.-Ztg* 55, 94–7(1931) —Recent German and foreign patents are reviewed ROBERT FULTON FERGUSON

Effects of autoclave treatments on ceramic bodies and clays. H H. HOLSCHER. *J. Am Ceram Soc.* 14, 207–18(1931) —Porous ceramic bodies increase in vol and wt. in autoclave treatment with steam pressure of 150 lb per sq in The change is rapid at first but tapers off with increasing time Typical American and English china clays also increase in vol, but ball clays do not Prolonged drying treatments after the autoclave test also were studied Data indicate that the vol changes are not necessarily caused by rehydration of the clay within the body Bodies contg clay, feldspar and flint show a greater vol increase than do the pure clay constituents The compn of the body is more important than the absorption in detg the reaction to autoclave treatment C H KERR

The ceramic industry of Ontario. ROBERT J MONTGOMERY *Ann Rept Ont Dept Mines* 39, Pt. IV, 196 pp (1930) —The compn and properties of clay, and the manuf of clay products are discussed, and a geological description of Ontario clays, and brief descriptions of all ceramic plants in Ontario are given The latter produce chiefly heavy clay products, but lesser quantities of refractories, pottery, floor tile, elec. porcelain, glass and enameled Fe ALDEN H. EMERY

Tests on ceramic materials O KALLAUNER *1st Communications New Intern Assoc. for Testing of Materials B*, 263–77(1930) —A standard procedure is proposed comprising specifications for the prepn of samples, mech analysis, tests for fireproof qualities and tests on the prepd. material with regard to its applicability for prepn. as a plastic mass and on the test pieces made from such a mass The latter tests comprise the detn of the amt. of water necessary to work up the sample of earth into the plastic mass, the forming of the test pieces and the detn. of their properties after drying and burning The following properties are detd behavior while working up to the plastic mass, shrinkage on drying, tendency to form blisters, bending strength, loss of wt. after burning, color, ring, shrinkage on burning, capacity to absorb water and sp. gr., E J C.

Aging and non-aging ceramic bodies. FELIX SINGER. *Keram. Rund* 38, 167–71, 183–7, 216–22(1930) —The failure of porcelain after repeated heating and cooling is due to differential thermal expansion either of (1) the constituents of the body itself, (2) the old constituents and the new, produced by gradual crystn of the glass in the body, or (3) the body and the glaze Disruption due to dissimilar expansibilities of glaze and body may be avoided by using glazes with high elastic limits and high strength. The most satisfactory porcelain for general purposes is one composed of a homogeneous, unstrained glass contg many very fine mullite crystals Steatite porcelain is superior to ordinary porcelain in resistance to aging and in all other important properties except thermal expansion, because it consists of a single constituent. H INSLEY

The influence of time on the maturing temperature of whiteware bodies. I. F. H NORTON AND F B HODGDON *J Am Ceram Soc* 14, 177–91(1931).—Six typical com bodies showed similar shrinkage and porosity curves for different firing times, but the longer the time the lower the curve was shifted on the temp scale In all cases the usual log law relating temp with rate of reaction applied The const., however, was not the same for all bodies II. CHARLES F NORTON, JR *Ibid* 192–206 —With samples that showed the same degree of maturity by phys. tests, the long-fired, low-temp samples showed more quartz soln as well as more mullite development than samples fired more quickly at higher temps. C. H. KERR

The origin of pin holes in cast ware. GERHARD BUDEWIG *Keram Rund* 38, 215–6(1930) —An important cause of "pin holes" is the high viscosity of slips which does not permit the release of air bubbles introduced during blunging A simple pipet viscometer is adequate for plant measurement of viscosity, a relative value for viscosity being obtained by the ratio of discharge time for the slip to the discharge time for pure

Thermostatic control of temperatures in glass kilns, etc. PILKINGTON BROS., LTD., and P. M. HOGG. Brit. 337,803, Aug. 2, 1929. Variations in cond. of the material being heated are utilized for temp. regulation by an elec. system, various details of which are described.

Apparatus for "frosting" glass articles such as bulbs. JAMES BAILEY (to Corning Glass Works). U. S. 1,793,893, Feb. 24. Treating fluid is supplied under atm. pressure to a partially exhausted chamber, over openings in which the articles to be treated are supported. Various structural details are described.

Glass for use as a light filter. F. WEIDERT (to Deutsche Gasglühlicht-Auer Ges.). Brit. 338,334, Dec. 15, 1928. Glass colored with neodymium oxide is used for light filters for accentuating color contrasts. Ce oxide may be added to absorb ultra violet rays, or Cr oxide or Pr oxide may be used to make green more pronounced in appearance. The glass may be used for spectacle lenses or otherwise for filtering or special illuminating effects.

Glass permeable to ultra-violet rays. FRITZ WOLLNER, RICHARD WOLLNER and FERDINAND NIKOLAI. Austrian 120,674, Oct. 15, 1929. Fr. 691,805, Mar. 12, 1930. Glass is rendered permeable to ultra violet rays by reducing the $Fe_2O_3$ present in the mixt. or in the melt to the metallic state. This may be effected by addn. of Al, Si, Mn, Zn or Ca.

Apparatus and procedure for uniting components of "safety glass" assemblies by heat and pressures. DUPONT VISCOLOID CO. Brit. 337,547, Oct. 27, 1928.

Drying clay ware, etc., in tunnel kilns. FRANK M. HARTFORD (to Harrop Ceramic Service Co.). U. S. 1,793,086, Feb. 17. Various details of app., humidity and temp. regulation are described.

Composite brick. EDWIN M. WYATT (to American Face Brick Research Corp.). U. S. 1,794,572, March 3. A building brick is formed with a burned facing section of argillaceous material and a concrete backing section formed of an aggregate of prepd. burned argillaceous particles and a cementitious binder, this binder serving also to unite the 2 sections.

Decorating bricks, flower pots, etc. A. F. BERRY. Brit. 338,147, Aug. 8, 1929. Articles of clay or composite material such as concrete are decorated by facing them with irregular fragments of stone, granite chippings or the like, suitably after initial application of a thin moist layer of portland cement, or by pressing into the surface of a green molded brick.

Apparatus for screening potters' slip and other viscous materials. MASCHINENFABRIK VORM. G. DORST A.-G. Brit. 337,371, Nov. 20, 1928. Structural features.

Tunnel drier for pottery. MÖLLER & PFEIFER. Ger. 517,167, Jan. 20, 1927.

Magnetic separator for treating porcelain sludges, etc. MAGNET-WERK GES. EISENACH SPEZIALFABRIK FÜR ELEKTROMAGNETAPPARATE. Brit. 337,759, April 5, 1929. Structural features.

Refractory materials. METALLGES. A.-G. Brit. 337,605, Nov. 7, 1929. Mg silicate materials such as olivine, serpentine or talc contg. Fe are heated, without fusion, with substances rich in Mg, such as MgO or magnesite, in an oxidizing atm. for the conversion of the Fe present into Mg ferrite and of the free $SiO_2$ into Mg orthosilicate. Materials contg. Ni, Mn, Cr and Al may be similarly treated, and numerous details and examples are given.

Vitreous material suitable for casting or hot pressing in molds. PERCY B. CROSSLEY (to Mycalex (Parent) Co., Ltd.). U. S. 1,795,200, March 3. A mixt. formed of colloidal mica, colloidal asbestos, refractory ceramic material such as porcelain or glass infusible below 900°, and metallic flux material such as PbO and $H_3BO_3$ fusible below 700° is molded and vitrified. Cf. *C. A.* 25, 573.

Tile-glazing apparatus. GEORGE F. WILDE and BENNET K. ESKESEN. U. S. 1,792,788, Feb. 17. Structural features.

Muffle furnace for enameling sheet-iron ware. MANFRED WEISS STAHL- UND METALLWERKE A.-G. Swiss 141,563, May 21, 1929.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

The testing of cements by means of earth-moist and plastic mortars. J. P. LOEVENTHAL. *1st Communications New Intern. Assoc. for Testing of Materials B*, 204–9(1930).—In earlier comparative investigations carried out by the Danish state testing house the Swiss prism method and the common hammer method were used, in continuation,

a series of tests was made dealing with mortars of portland cement, aluminous cement and a Danish pozzuolana cement (Moler cement) The test pieces were made in compact molds and were of consistencies ranging from earth moist to fluid They were tested after 7 and 28 days It was shown that at both times the strength curves of the portland and Moler cements were quite similar, although there was no proportionality. In contrast with this, mortars of aluminous cement of low water content showed an increase in strength between 7 and 28 days, while mortars of high water content showed a fall in strength The various methods of testing are discussed. F J. C.

Some properties of high-alumina cements from six countries. P H Bates. *1st Communications New Intern Assoc for Testing of Materials B*, 210–8(1930) —High-alumina cements (ciment fondu) manufd in 6 different countries were examd for their properties by chem , petrographic and phys methods The phys. characteristics were detd by strengths in the form of 1 3 standard Ottawa sand tensile briquets and 2-inch compression cubes Concrete was also tested in the form of 6 × 12 in cylinders made from a 1 2 4 mix of gravel The chem analyses showed the cements were rather widely different from one another The petrographic examn showed that the alumina was largely present either as $CaO\ Al_2O_3$ or as the unstable form of $5\ CaO\ 3Al_2O_3$ The wide variation in compn and the difference in constitution did not result in as great a difference in phys properties as would be expected The effect of the heat generated during the setting of the cement and the effect of the amt of mixing water used were also studied Increased temps during setting resulted in decreased strength Increased amts of mixing water resulted also in marked decrease in strength L J C

Hydraulic additions and trass-portland cement. S I Drezhnin *1st Communications New Intern Assoc for Testing of Materials B*, 221–37(1930) —Volcanic tuff from the Crimea and diatomaceous earth from tested sources, when ground to the fineness of portland cement and added to portland cement clinker, give pozzuolana portland cement which, when used in hydraulic structures, is more resistant to sea water and acid water than is portland cement mortar. Its mech strength after 2 months' hardening in water is equal to that of ordinary portland cement mortar without hydraulic addn , the same quantity of sand being used The best methods for rapidly detg the degree of activity of the hydraulic addn are to est the amt. of lime it absorbs and to compare the strength of mortars, with and without such addn , under the conditions afforded by accelerated hardening of the test pieces at 80°. The best method for detg the optimum addn of hydraulic material is the above-mentioned accelerated or thermal method. Pozzuolana portland cement produces a more voluminous paste than ordinary portland for the same quantity of sand E. J C

Fine grinding of cement. Ernst Rissel. *Zement* 19, 1079–80(1930) —The water permeability of concrete is more greatly affected by changes in the fineness of cement than is the compressive strength The grading of the finer fractions of the cement also has a definite bearing on its ability to make concrete impervious H F K

Mill temperatures and the setting time of cements. K. Koyanagi *Zement* 19, 988–9(1930), cf *C A* 24, 5452 —Cements high in $SO_3$ were found to set rapidly under high mill temps while those of low $SO_3$ content were not affected H F Kriegb

Portland cement materials in Arkansas. W. R. Spencer. Univ. Arkansas, *Eng Expt Sta Bull* No 6, 27 pp (1929) E H

Investigation of portland cement and its constituents by means of vapor-pressure measurements. F Krausz and G Jörns. *Zement* 19, 1054–5(1930) —The use of a micro-tensi-eudiometer is proposed to follow the formation of cryst. or colloidal phases in the hydration of cements H F Kriegb

Free lime in portland cement and soundness G Haegermann *Zement* 19, 982–4(1930) —Under a range of burning temps of 1225–1475° the free lime in 12 cements was found to vary irregularly with temp from 0 24 to 1 85% In general, cements were sound in cold $H_2O$ when they contained up to 4% free lime, while 1–2% was the upper limit when subjected to the boiling test H F Kriegb

Free lime, soundness and strength (of cement). A Guttmann *Zement* 19, 1078(1930) —G 's investigations confirm those of Haegermann (cf preceding abstr ) in regard to the content of free lime and soundness in cements Further G found a definite increase in tensile strength with a decrease in the free CaO present in the cement. H. F Kriegb

Action of gypsum, swelling and hydration. P. Tippmann *Zement* 19, 1030–5, 1056–60, 1080–6, 1106–12(1930) —The properties of gypsum, raw and in its various phases of dehydration, are discussed in relation to their effects on cement Numerous photomicrographs are given showing the cryst. products of the hydration and hardening stages of cements and other materials H F. Kriegb

**Quicker tests of cement and concrete.** H KRÜGER. *1st Communications New Intern Assoc for Testing of Materials B*, 114–8(1930).—Preliminary tests made to investigate whether it might be possible to decide quickly (in 1 or 2 days instead of 28 days) whether a cement is fit for delivery showed that there probably is a fairly good concordance between the normal crushing strength of cubes after 28 days' combined air and water-curing and after a few hours' steam hardening. The method may be of some use also for quicker testing of concrete, but has not yet been satisfactorily developed. E. J. C.

**Compression, tension and bending tests, cement and concrete.** A. T. GOLDBECK. *1st Communications New Intern. Assoc for Testing of Materials B*, 61–6(1930). E. J. C.

**Cement, concrete and reënforced concrete—laboratory tests and control and practice on the building site.** A. HASCH. *1st Communications Ass. Intern. Assoc for Testing of Materials B*, 91–9(1930) (in German), cf. *C. A.* 24, 3874.—An attempt is made to consider briefly, from the present day standpoint, the relative merits of ordinary and high-strength mortars and concrete, and tests to which these materials should be subjected in the lab. and on the building site. The essential point is organization of control tests on the site, combined with chem. lab. tests, because samples taken before building is started are of no value. The theory of probability is applied to results of static tests. E. M. SYMMES.

**Resistance of concrete pipes to corrosion by water.** J. O. ROOS. *1st Communications New Intern. Assoc for Testing of Materials B*, 111–8(1930).—In Sweden decompn. of concrete pipes is due mostly to the external action of $H_2O$ percolating through the pipe wall and extg. lime from the cement. Pure $H_2O$ has a high disintegrating effect, a water contg. 0.30–80 mg. per l. of $CO_2$ increases and lime hardness decreases the corrosion. To be durable, concrete pipes must be impermeable to water. E. M. S.

**Slag concrete.** I. BENTKOVSKII. *1st Communications New Intern. Assoc for Testing of Materials B*, 238–43(1930) (in German).—Tests were made by the Institute of Metals, Leningrad, to use a particular slag for concrete. E. M. SYMMES.

**Resistance of concrete to chemical attack.** K. MANDL. *1st Communications New Intern. Assoc for Testing of Materials B*, 149–56(1930).—In Austria the deterioration of concrete due to injurious influences is relatively slight. The most prominent instance is the destruction of a pillar of a new dwelling house in Vienna, which was definitely found to be due to the action of gypsum. It is especially noteworthy that this damage was not due to sulfate-contg. ground water, but to surface water that had percolated through the slag-contg. bottom layer, from which it dissolved the sulfate, and then was forced to pass through the concrete pillar, because the slag deposit was laid on material impermeable to water. Several cases of deterioration of the sewer system of Vienna by sulfate-contg. water are also reported. Results of an investigation into the action of nitrites on concrete have been published in part, but it is not yet possible to draw conclusions from this work. E. J. C.

**The compactness of concrete and its resistance to chemical action.** A. POULSEN. *1st Communications New Intern. Assoc for Testing of Materials B*, 157–61(1930).—Even the best concrete is destroyed by the reaction of its free lime with the $MgSO_4$ contained in sea water. Rich mixts. soon show cracks of their own accord. The application of a protective coating to large masses of concrete employed in marine work is, of course, impossible. To neutralize the excess lime it is necessary to add to the cement pozzuolana contg. in sufficient quantity the necessary hydraulic constituents (*e. g.*, $SiO_2$ sol. in alkalies). The cement with hydraulic admixts. thus obtained should be submitted to lab. tests. In Denmark, the Danish diatomaceous earth, Mo Ler, which contains about 60% of sol. $SiO_2$, has been used with considerable success for the past 20 years. E. J. C.

**Evaluation of shrinkage data on light-weight concrete.** A. HUMMEL. *Zement* 19, 1062–6(1930).—While light-weight concretes have greater vol. changes than do concretes contg. the usual mineral aggregates over the same humidity ranges, these vol. fluctuations need not imply greater danger of crack formation. H. F. KRIEGER.

**Method of disintegrating hardened concrete for the determination of the original ingredients.** R. LOMAN. *1st Communications New Intern. Assoc for Testing of Materials B*, 167–79(1930).—It is possible to disintegrate the concrete satisfactorily without smashing up the aggregate by heating for a time to 800–900° and cooling by suddenly quenching in water. The aggregate is sepd. from the cement and can be sieved, it is almost completely recovered, but has generally become a little finer as a result of the ignition and embrittlement on quenching. This increase in fineness is revealed by the sieving. The proportion of cement can be estd. by various methods. Expt. has proved, however, that the most rapid method and the one that gives the most reliable results

con t t in heating to 800–900° (which removes combined water and $CO_2$) and then cooling in a space free from water vapor and $CO_2$. The wt. obtained is that of the original cement less its loss on ignition. The method is of sufficient accuracy for tech nical work. E. J. C.

Deterioration of concrete in hydraulic structures. A. Ekwall. *1st Communications New Intern. Assoc. for Testing of Materials B*, 102–6(1930). cf. *C. A.* 23, 5558.—Inspections of hydraulic structures in Sweden 10 years ago showed some defects in the concrete and continued observations proved that the concrete in some cases was subject to an increasing deterioration, apparently due to the quality of the concrete materials, to the methods of making concrete or to the conditions to which the concrete was exposed. The aim of these investigations was to ascertain the causes of such increasing deterioration. It had been observed that deterioration occurred only in structures exposed to water on one side and was caused by the soly. of the lime and the decompn. of other chem. combinations in the hydrated cement. Particular attention was therefore directed to the soly. of the cement and the aggressiveness of the water. Practical expts. were made at the same time with concrete slabs exposed to low water pressure during several years. It was proved that Swedish natural waters need not be considered aggressive in this respect. The importance of using sand relatively free from org. substances was impressively established. Leaner mixts. than 1:4.5 should not be used for concrete exposed to water pressure from one side. Replacing cement by an admixt. of 10% lime or 5% $CaCl_2$ improved the watertightness, while 25% trass or slate powder gave practically no improvement. E. J. C.

Natural and artificial stone—mineralogical and petrographic properties. Methods of testing. L. Finckh. *1st Communications New Intern. Assoc. for Testing of Materials B*, 21–4(1930). E. J. C.

Coöperation of the mineralogist and petrographer in judging natural and artificial building stone and road stone. P. Niggli. *1st Communications New Intern. Assoc. for Testing of Materials B*, 1–9(1930).—The mineralogist should conduct the sampling of the material so as to provide a typical sample for investigation, and thoroughly describe it from the mineralogical standpoint as to its chem. nature, durability, structure and texture. After the tech. tests, he should evaluate the behavior of the material mineralogically and relate it with the properties found. The mineralogical petrographic methods can be conducted with min. quantities of material and are therefore particularly suited for control expts. It is thus important to elucidate experimentally the relation between tech. behavior and the nature of the material, so that tech. tests can be more and more replaced by mineralogical examn. E. J. C.

The application of mineralogical and petrographic knowledge in the testing of nonmetallic inorganic materials. R. Grengg. *1st Communications New Intern. Assoc. for Testing of Materials B*, 13–20(1930). E. J. C.

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Structure of weather resisting rocks (van der Veen) 8. Siliceous CaO compounds [for use in cold cement industry] (Ger. pat. 514,742) 18. Decorating bricks, flower pots etc. (Brit. pat. 338,147) 19. Rubber compositions [for expansion joints, wall and roof coverings, etc.] (Brit. pat. 338,247) 30. Producing carbide-forming metals [with cement as a by product] (U. S. pat. 1,794,401) 4. Forming sheet insulating material such as wallboard (U. S. pat. 1,794,433) 13.

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Concrete Year Book, 1931. A Handbook, Directory and Catalogue of Concrete, 8th year. Edited by O. Faber and H. L. Childe. London: Concrete Publications, Ltd. 3s. 6d., net.

Hertel, Paul. Einfluss der Verwendung von Edelrusschlag auf die Güte und die Kosten von Beton. Charlottenburg: Zementverlag. 64 pp. M. 2.

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Cement. Perrin & Tuscher. Swiss 141,823, April 25, 1929. The cement contains essentially blast furnace slag, lime and bauxite. Gypsum may also be added.

Portland cement. Andrew Lundteigen and Guy O. Gardner (to Ash Grove Lime & Portland Cement Co.). U. S. 1,794,526, March 3. A quick-hardening cement is made by adding, to a clinker formed from argillaceous and calcareous materials, gypsum and a mixt. of $CaCl_2$ and NaCl sufficient to act as accelerators for hardening the final product, and grinding the aggregate thus formed with a lubricant such as Al stearate so that at least 78% passes a 200-mesh screen.

Chlorine-treated cement. Hans M. Olson. U. S. 1,792,755, Feb. 17. Cl gas is directly mixed with hydraulic cement during its grinding in order to facilitate obtainment of rapid set and early strength.

**Apparatus for testing cement, etc.** W. D Williams. Brit 337,780, Aug. 2, 1929. Various details of app. are described suitable for use in boiling substances for testing as in the Le Chatelier test for cement, boiling cement pats, testing porosity or permeability of cement disks, etc

**Cement-coloring and hardening composition.** Maximilian Toch (to Standard Varnish Works) U S 1,793,143, Feb 17 A material for coloring and hardening portland cement comprises a dry mixt including a coloring material resistant to portland cement such as Fe oxide, Cr oxide, $MnO_2$ or lampblack together with $CaCl_2$ and a colloidally pptd material such as Al silicate, $BaSO_4$ or Ca aluminate

**Feeding cement material to kilns** Poul T Lindhard (to F L Smidth & Co) U S 1,793,499 Feb 24 Slurry is delivered to a kiln as an atomized spray cone, dust is sepd from the kiln gases and this dust is returned to the kiln at a point where the cone of atomized slurry substantially fills the diam of the kiln App is described

**Rotary kiln (with slack chain groups in its interior) suitable for burning cement-forming slurry** Johan S Lasting (to F L Smidth & Co) U S 1,793,471, Feb 24

**Rotary kiln suitable for cement manufacture, etc.** Haavard Kronstad (to Bessemer Cement Corp) U S 1,793,408, Feb 17

**Concretes and mortars.** J W Battersby Brit 338,212, Aug 27, 1929 A waterproof product is prepd by adding a powder of colloidally readily sol water-contg alkali silicate 2–5% to portland cement or lime concrete or mortar prior to mixing with water (preferably to the cement clinker before grinding it) The initial set period may be controlled by varying the amt of water in the silicate (which may be 10–30%) For some purposes such as sealing porous places in floors a much larger proportion of silicate powder may be added

**Apparatus for molding concrete blocks.** Favre & Cie Zellenbetonfabrik Wallisellen Swiss 142,088, May 15, 1929

**Bituminous paving materials.** Edwin C Wallace U S 1,793,345, Feb 17 Bituminous paving compns workable at atm temp are prepd by coating heated particles of mineral matter with heated bituminous cement in sufficient quantity to cause agglomeration when the mass becomes chilled and, before chilling, adding to the mass cold, non-coherent, non hydroscopic material comprising mineral particles coated with bituminous cement, proportioned to render the entire mass granular and friable but capable of consolidation by the application of pressure alone Cf *C. A.* 25, 793

**Bituminous compositions for roads, etc.** F A Hill. Brit 338,206, Aug 16, 1929 A cold-lay compn suitable for surfacing roads, canal beds, etc. and which is stable when stored in hermetic containers) is made by mixing at a temp of 100° or higher, asphalt, bitumen, tar, pitch or asphaltic petroleum residues with a fuel oil or petroleum product from which all the lighter portions including the illuminating oils have been distd. The material may be used in the proportions of 35–55 and 65–45%, resp

**Bituminous coating compositions.** I. G Farbenind A.-G Brit. 337,521, Sept. 4, 1929. Products for covering roads, lining vessels, etc., are made by incorporating bituminous materials such as natural or artificial bitumens, mineral or brown coal tars or their distn products with synthetic polymerization products of diolefins such as those of butadienes, which incorporation may be effected in the presence of a diluent such as benzene or cyclohexanol, and if desired with emulsification with water effected by a suitable emulsifying agent Various details and examples are given

**Bituminous pavements.** John Radcliffe (to Colprovia, Ltd) U S reissue 17,985 March 3 Reissue of original pat. No 1,655,240 (*C. A.* 22, 1026)

**Road-surfacing materials** I G Farbenind A.-G Brit 337,928, Oct 12, 1928 Slippery deposits on roads are removed by use of org solvents or their aq solns or emulsions to dissolve the oils and fats or swell the rubber in the deposits, followed by brushing and washing with water. Various examples of solvents and emulsions are given.

**Rubber-surfaced paving blocks.** Edwin C. Wallace U S 1,794,220, Feb. 24. Structural features

**Glass paving blocks.** Pierre Noel. U S 1,795,229, March 3 Structural features.

**Material suitable for expansion joints.** Albert C. Fischer (to Philip Carey Mfg Co). U. S 1,793,439, Feb 17. Sheets are formed with a waterproof ductile binder such as blown asphalt having mixed with it flat and relatively thin strips of fibrous roofing scrap. Cf *C. A.* 24, 2574, 4608.

**Artificial stone.** Jerre Haggard U S 1,793,172, Feb 17. A vesicular aggregate such as cinders or basalt is used with granulated gypsite and hydrated lime.

**Artificial marble residues.** ALEXANDER STAFCE Ger 514,710, Nov. 19, 1927. The residues from the manuf of artificial marble contg MgO cement are ground and all sol constituents removed by lixiviation with water The residue is then used as *flux for portland cement mortar*

**Porous building material** ERIK C BAYER U S 1,794,272, Feb 24 A tenacious foam which may be formed from resin soap, gelatin and water is mixed with mortar and the material is formed and cured under high steam pressure Cf *C. A.* 24, 4134

**Waterproof sheet material for building construction.** F RUPIN and H KOLLBRUNNER Brit 338,403 Dec 13 1928 Corrugated cardboard layers are superposed with the corrugations of adjacent layers at right angles to each other, fastened together by threads or wires or the like without adhesive, dried at 60–70°, impregnated with coal tar pitch or the like and pressed

**Fireproofing binder for use with fibrous material** CHARLES H BROWN. U S. 1,793,357 Feb 17 A compn suitable for use with fiber in making wall board, etc., consists solely of $NH_4$ phosphate $H_3BO_3$, dextrin and water, with a greater proportion of $NH_4$ phosphate than of $H_3BO_3$ and a greater proportion of dextrin than of $NH_4$ phosphate

**Roofing material.** RALPH F DRAKE (to Anaconda Sales Co) U S 1,794,449, March 3 Crushed and graded elec cond material such as crushed coke substantially free from dust is applied as a layer to the surface of material such as asphalted roofing felt so as to form an irregular surface, and a cond powder such as graphite is applied over this surface so as to fill interstices between the granules, and a metal such as Cu is applied as an electrodeposited layer over the cond material

**Plaster** V LEFEBURE Brit 337,926, Oct 10, 1929 Anhydrite is mixed with plaster of Paris or "any standard plaster" such as Keenes cement, and the anhydrite may be "accelerated" as described in Brit 236,695 (*C. A.* 20, 1310) and Brit 317,672 (*C. A.* 24, 2267), and by varying the relative proportions of the ingredients, the setting time may be varied upward from an almost instantaneous set as desired Various details and examples are given

**Plaster.** FOSTER D SNELL. U S 1,792,661, Feb 17 A plaster of "retarded suction" comprises a calcareous binder such as slaked lime, a filler such as sand, together with water, and a "minimal" quantity of dispersed lime soap present to the extent of only about 0.16 lb per cu yard

**Plasterboard** HAROLD L LEVIN (to Flintkote Co) U S. 1,793,810, Feb 24 See Brit 319,213 (*C. A.* 24, 2573)

**Kiln suitable for drying lumber** ALBERT ARMSTRONG U S 1,793,892, Feb 24

**Preserving wood** I G FARBENIND A.-G (Wilhelm Bonrath, Wilhelm Schepss and Karl Taube inventors) Ger 517,207, Feb 10, 1928 The wood is treated with compds in which Hg is linked by at least one of its valencies to an unsubstituted or neutrally substituted hydrocarbon radical Phenylmercuric acetate and ethylmercuric bromide are suitable The compds may be used in soln in an org solvent, or in aq emulsion or soln and their soly in water may be increased by addn of alk compds. Examples are given Cf *C. A.* 25, 1056

**Treating wood** ADOLF KISTNER, JR Ger 514,980, Nov 24, 1929 Wood surfaces are protected by an elastic waterproof layer of bitumen admixed with fine wood meal

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Pulverized fuel** ANON *Fuel Economist, Pulverized Fuel Suppl* 1–72, Oct., 1930.—An illustrated review of plant and equipment, some notable British installations and use in Lancashire boilers in the metallurgical industries, and in marine practice

LESLIE B. BRAGG

**The use of sugar for motor fuel** K. ŠANDERA AND J. ZEMAN *Z. Zuckerind. Tschechoslovak. Rep.* 55, 172–4 (1930).—See *C. A.* 25, 576

J. F. LEETE

**Tests on agglomeration of combustibles.** M. G. LEVI, C. PADOVANI AND F. CARDIA *Atti III congresso naz. chim. pura applicata* 1930, 753–66.—Briquetting tests were made on lignite, anthracite, semicoke, peat and mixts. of these with sulfite tar, mineral oil, linseed oil and mixts. of these Resistance to fracture and atmospheric effects were detd

E. M. SYMMES

**Determination of moisture in combustibles.** C. PADOVANI AND C. SINIRAMED

*Atti III congresso naz chim pura applicata* 1930, 778–81.—Combustibles may oxidize during the detn of moisture (*Compt rend 7 congresso chim ind* Oct., 1927). All coals, heated to 60–70° in a current of $N_2$ free from $O_2$, evolve small quantities of $CO_2$. A method was developed to det simultaneously the loss of wt of the coal by heating at 100° in a current of $N_2$ and increase in wt of a $CaCl_2$ tube. Loss of wt of the coal is greater than increase in wt of the $CaCl_2$ tube. E. M. Symmes

**Incomplete combustion: its importance, recognition and prevention.** E. W. B. Dunning. *Gas J* 193, 271–6, *Gas World* 94, 127–30(1931).—A review is given of the fundamental principles of combustion together with the physiol effects of the products of complete and incomplete combustion. The importance of CO in incomplete combustion is emphasized. It is the only gas that can be present in sufficient concn to be dangerous in the flue products from gas-consuming appliances. The combustion characteristics of various types of gas appliances are reviewed and the amt of CO to be expected is shown to be below any figure at which adverse physiol effects can occur. The products of combustion of town gas can be and should be harmless. When this is not the case the cause can be traced to the various factors in the design of the gas appliances. The degree of incompleteness of combustion is detd by the analysis of the flue gases for CO. The estn of the products of incomplete combustion offers some difficulty because of the small concn in which they are present and special methods must be used. The CuCl method is not suitable for detg CO. The preferred method, which is very sensitive, is the oxidation of CO with $I_2O_5$, according to the following equation $I_2O_5 + 5\,CO = I_2 + 5\,CO_2$. A train of app for this method is described and illustrated. An accuracy of 2–3 parts of CO per million of flue gases can be obtained. F. H. Bergeim

**The problem of lignite in Italy.** Aldo Rigé. *Chim ind agr biol* 7, 17–27 (1931).—Lignite was found in small quantities in every Italian Province, but mostly in Tuscany. The Valdarno lignite contains moisture 51.8, volatile matter 25.35, ash 6.60, fixed C 15.25%, and has a heating value of 7063 cal. (on dry basis). The gas obtained by distn has a heating value of 5592–6192 cal., the coke is of bad quality, but a very good coke is obtained by mixing the lignite with 25–30% of ordinary coal. The Piedmont lignite has: moisture 10–13, volatile matter 30–36, fixed C 34–45, ash 12–13%. The xyloid lignite from Spoleto has: moisture 35–45, volatile matter 30–45, ash 8–18, fixed C 27–38%, heating value 3–4000 cal. and the gas obtained by distn contains: $CO_2$ 12–14, $O_2$ 0.2–0.7, $H_2$ 25–29, CO 11–14, $CH_4$ 2–5, N 34–40% and has a heating value of 1050–1350 cal. G. A. Bravo

**The torbanites of South Africa.** E. H. Cunningham Craig. *J. Inst. Petroleum Tech* 16, 620–5(1930).—See *C. A.* 24, 2860. Emma E. Crandal

**Some modern ideas on coal.** F. V. Tidswell. *Colliery Guardian* 140, 1651–4, 1744–6, 1845–6(1930).—A detailed summation is given of the present state of our knowledge of the structure and compn of coal. E. M. Symmes

**The classification of Roumanian coals.** I. Blum. *Bul chim soc română stiinte* 31, No. 4/6, 3–11(1931).—The basis for the classification of coals is clarified. The geologic age is not a sufficient criterion for the purpose. Physico-chem and petrographic characteristics of the coal must also be considered. The decisive factors in detg the chem age of coal are (1) elementary compn., (2) behavior on distn and (3) resistance to action of certain solvents. The later coals contain less C and more O, have a lower calorific value, and give off more gas (largely $CO_2$) and at a lower temp than the earlier ones. In consideration of these ideas Lupeni coal, usually considered a superior lignite, should be classified as bituminous. Channing Wilson

**The role of the components of Roumanian fossil coals in the composition of the gas distilled from them up to 500°.** I. Blum. *Bul chim soc română stiinte* 31, No. 4/6, 13–9(1931).—Four Roumanian coals and lignites were extd with solvents, and the residues from each extn submitted to distn. Bitumen was removed from the original coal by extn with a benzene-alc mixt., lignin by extn with $H_2SO_4$ in an autoclave, and humic acids with $NH_4$ soln. at 90°. No cellulose was found in the coals examd. The residues richer in humic acids and lignin gave more gas on distn. Unsatd hydrocarbons were less in residues after extn of bitumen. CO and $CO_2$ were found in larger quantities in gas obtained from residues rich in lignin, and especially humic acids. The gas from the carbonaceous residues after all three extns contained a larger percentage of $CH_4$. Channing Wilson

**The coal industry of South Africa.** T. Coulter. *J. Chem. Met. Mining Soc. S. Africa* 30, 348(1930); cf. *C. A.* 24, 4374, 5133, 25, 570.—Discussion. A. H. E.

**Washability studies of the Black Creek bed at the Bradford Mine, Dixiana, Ala.** B. M. Bird, B. W. Gandrud and C. B. Barmore. Bur. Mines, *Repl. of Investigations*

3083, 12 pp (1931) —The prepn of a washed coal contg less than 2% ash should be practicable with a comparatively simple washing system The coal contains a large proportion of fine sizes due to friability There are only small quantities of flaky impurities The coarse and fine sizes should be separately washed A H E

A contribution to the coal-dust problem. I. Mathematical treatment of the free fall of dust particles. II. Deposition of dust particles from a horizontal gas stream. III Centrifugal separation of dust from gases. Fr Prockat *Glaser's Ann* 106, 73–9, 93–7 151–4, 107, 38–45, 47–54(1930) —A formula for free fall of dust particles is derived, which is superior to that of Stokes, and agrees with the data within 10% Mathematical formulas are derived for horizontal settling chambers and centrifugal separators which are in agreement with data from exptl equipment L W T. C.

Determination of sulfur in coal, gas and purifying material. J H Steinkamp *Gas Age Record* 67, 53–4(1931) —The Parr $KClO_3$ method for coal is briefly described A method for gas, of burning the gas, oxidizing the $SO_2$ in 3% soln of $H_2O_2$ and titrating with 0 1 *N* KOH is described For S in purifying material, the material is extd with $CS_2$, tarry matter being removed by passage of the $CS_2$ through a tube filled with activated coal The $CS_2$ is evapd in a crystg dish which is placed in a drying oven at 50° for one hr , leaving pure S, which is weighed Leslie B. Bragg

The assay of coal for gas manufacture. J. G King *Gas Eng* 48, 75–7(1931); cf *C A* 24, 944 —A modification of the Gray-King Method (*C. A.* 23, 5026) for the assay of coal is described, making it suitable for application to coals used in gas manuf The volatile products of carbonization are passed through a cracking zone in which the temp is controllable The probable yields of products are calcd from the assay yields by suitable factors obtained by comparing the yields obtained from a certain no of typical coals The correlation of assay and plant yields is more difficult with vertical retorts than horizontal retorts, although it is satisfactory in both cases Channing Wilson

Midwest coals in gas-producer practice. O L. Scales. *Blast Furnace Steel Plant* 19, 252–4(1931) —While there is no advantage in the use of midwestern coals from the standpoints of operation, of more satisfactory railroad service or of improvement in the product, good midwestern coal is considered, at present prices, more economical for gas producers than eastern coal. H. C. Parish

Variations in the evolution of gases on preheating coals having reached different stages of evolution. M Legrave *Chimie & industrie* 25, 18–21(1931), cf *C. A* 24, 710 —Twelve coals (all but 1 from the Liège coal fields), selected so as to have comparable contents of vitrain and durain, were treated under exactly the same conditions by the same operator, as follows volatile matter was detd as usual, a 2nd portion was heated 30 min at 400°, allowed to cool, and volatile matter was then detd in the usual way Similar tests were carried out on 4 samples of vitrain which were sepd from the coals and which contained 10 2%, 12, 15 and 29% volatile matter, resp Two samples of fusain, with 8 5 and 17% volatile matter, resp , both gave approx 40% volatile after preheating The facts that the curve for the whole coal crosses the volatile-content axis at about 15–8% volatile matter, which is approx the crit volatile content sepg coking from non-coking coals that the general trend of the vitrain curve is similar to that of the whole coal but the total evolution of gases is considerably smaller, and that the preheating treatment completely destroys the coking properties of coal, suggest that a study of the chem changes undergone by vitrain carried out on carefully selected coals representing the various stages of the evolution of coal might yield valuable information on its role in the coking of coal A Papineau Couture

Protection of working people and of the neighborhood in the firing of pulverized coal. W Weitfeldt *Zentr Gewerbehyg Unfallverhütung* 17, 142–7(1930) —Four dangers exist dust, poisonous gases, explosions and fire Inhalation of dust is less dangerous than CO and other gases, which occur from excessive pressure due to blockage Fat coal is the most dangerous from an explosion standpoint Coal of 50% ash is particularly free from risk. Conditions causing fire and explosion are described George R. Greenbank

An investigation into the health of employees in gas-making plants. F. R. Kerr. Commonwealth of Australia Dept Health, *Bull* No 7; *Bull. Hyg* 6, 27(1931).— Three hundred and seventy workers in gas plants were subjected to radiant heat, fumes and coal dust They were divided into 3 groups according to Schneider's fatigue test, pulse rate and blood pressure Only 105 fell into the last group which gave the poorest test There seemed to be no ill effects of the work. Eight cases showed 5% or more carbohemoglobin, 1 case showed 15%, but no increase in red blood cells K recom-

mends appliances for administering O and $CO_2$ mixts in acute cases of gassing
GEORGE R. GREENBANK

**Purification of town gas by means of oxide of iron.** J DRYVERMAN *Gas J.* 193, 97–100(1931).—The principal factors governing the use of iron oxide for the purification of gas are (1) the activity of the oxide for the absorption of $H_2S$, (2) the phys state of the oxide, (3) the concn of the $H_2S$ in the gas (4) the velocity of the gas, (5) the time factor for chem reaction and (6) the design and economical no of boxes In practice iron oxide is used either in the form of a slurry by mixing with water and circulating through tower scrubbers or as a relatively dry spongy mass standing on grids in covered purifier boxes through which the gas is passed The dry method is the most commonly used The suitability of various forms of iron oxide is discussed When the dry method is used the oxide is usually mixed with sawdust, shavings, grain husks, cut-up straw, tan bark or old oxide Details are given on the operation of an iron oxide purifier at Mortlake (Australia)
P. H. BRODRIM

**The utilization of butano-air gas in domestic appliances.** G. L. BRENNAN AND L. H. WRIGHT *Gas Age Record* 67, 37–41, 60(1931) LESLIE H. BRAGG

**The tetralin process (for avoiding naphthalene stoppages in gas mains).** GEORG WASSERMANN *Gas u. Wasserfach* 74, 151–6(1931), cf. *C. A.* 24, 5464, 5978.—Two methods for introducing tetralin into gas mains are given (1) by elec heating to vaporize the tetralin and (2) cold atomization These methods are illustrated and discussed The formula for the amt of tetralin to be vaporized into the main per day is $x = 5m(A + 8)/100{,}000$, where $x$ is the kg of tetralin per day, $m$ is the vol of gas in cu m per day, and $A$ is the naphthalene content of the gas in g per 100 cu m Users of tetralin are warned as to its inflammable nature Precautions are given
R. W. RYAN

**Distant pressure control (in the distribution of gas).** H. C. WIDLAKE *Gas J.* 193, 91–7(1931).—The object of a distant pressure indicator is to furnish at the works a continuous indication of the pressure prevailing at some selected point on a distant district W describes an instrument of his own design for this purpose It is of the proportionate current type, *i. e.*, it maintains in its circuits a current of electricity which at all times is directly proportional to the pressure prevailing at the distant point It consists of 2 parts (*a*) the transmitter hoisted at some distant key point, and (*b*) the indicator which is installed at the works A sketch is given which shows in detail the construction of the app
P. H. BRODRIM

**Steam generation in gas works practice.** W. GREGSON *Gas J.* 193, 215–6(1931).—It is general practice to provide for all gas works power requirements with steam The av gas works requires 800–1200 lb. of steam per ton of coal carbonized, for power and process requirements Steam can be generated in 2 ways (1) by utilizing surplus heat from the retorts, (2) by firing boilers with coke breeze The first method is most commonly used in modern works Any well run gas works can be self contained on "waste heat" steam alone for ordinary requirements. Coke breeze should only be used on the works when special steam requirements demand an excess over normal figures
P. H. BRODRIM

**Cheaper gas with off-peak electric power.** PAUL MCMICHAEL. *Gas Age Record* 67, 1–5, 10(1931).—A central station can reduce the cost of generating electric energy to satisfy steady load by operating continuously at a rate approaching that of max efficiency and selling any surplus energy for the cost of the fuel required for its generation. This surplus energy may be used to produce H and O for chem and metallurgical processes Pending a development of demand for this H and O the gases can be used by a gas company whenever the cost of off peak power is no more than 1.90 mills per kw. hr. a. c. The O may be used to manufacture oil gas with which to enrich blue gas even when the off peak energy cost exceeds 2.50 mills per kw. hr. a. c. H might be used for some process such as $NH_3$ synthesis pending development of a demand by chem. or metallurgical industries
LESLIE H. BRAGG

**Italian natural gas.** M. G. LEVI AND C. PADOVANI *Atti III congresso naz. chim. pura applicata* 1930, 698–717.—The sources which contain definite, appreciable quantities of hydrocarbons higher than $CH_4$ are not more than 20, all in mountains or hills It is probable that all, or almost all, of the Appenine sources contain small quantities of higher hydrocarbons There is no great difference in the compn of gas from mountains and of gas from plains, except that the latter contains more $CO_2$ and $N_2$
F. M. SYMMES

**Cleaning stack gases.** JOHN B. C. KERSHAW. *Elec. World* 97, 542–6(1931).—London power stations are washing the plant gases to eliminate dust and noxious gases Three essentials for success of the treatment of flue gas are (1) the placing of sprays

along the first flue to increase the humidity of the gases, with surfaces of Fe to assist in converting $SO_2$ to $SO_3$, (2) the provision of further sprays and of wetted contact surfaces in the second flue to continue the conversion and to effect the soln. of $SO_3$ and its elimination from the waste gases, and (3) the provision of further surfaces moistened with alkali for the total elimination of S from the gas. The Battersea power station is planned to fulfil the conditions named. The plan permits the use of an overall figure of 25 tons of water per ton of coal, and the time of contact allowed for ranges from a min. of 23 secs. to a max. of 44 secs. Corrugated plates of (*a*) Staybrite steel, (*b*) calorized steel, (*c*) a Si Al alloy, and (*d*) tinned iron are being tried out to secure the necessary catalytic action. A close-grain cast iron or a Si-cast iron will be used for all pipe work and an alloy of Si and Cu or of cast Fe and Monel metal will be used for the circulating pumps and other machinery in contact with the wash water, and sprays of the centrifugal type will be constructed of a Si Cu alloy. Cost estimates for gas washing (3½c per ton of coal burned) are considered high. Results of exptl. trials of gas washing at Grove Road station of the London Power Co. in 1930 are tabulated.
W. H. Boynton

Automatic seal for water-gas plants. J. H. Wainwright. *Gas World* 94, 56–7 (1931).—The differences between the ordinary method of water gas manuf. and the back run process are pointed out and the automatic seal box of the latter process is described in detail.
F. H. Bergeim

The coal water-gas plant at Planen. Müller. *Gas u. Wasserfach* 74, 173–8 (1931).—This water gas plant uses a "high pressure" water gas generator with a revolving grate and a distn. chamber in the upper part of the generator, a carburetor for cracking the vapors of the low temp. tar and a superheater. This gas had a heating value of 370 B. t. u. per cu. ft. and a sp. gr. (air) of 0.56. The yield was 25.4 cu. ft. of gas per lb. of coal. The cycle, analysis of the gas and some operating details are given. Although the plant has only been in operation a short time, it appears to have been successful.
R. W. Ryan

Graphical determination of the calorific value of coal gas. A. Allison. *Gas Engr.* 48, 41–2(1931).—The construction of nomographs for the detn. of the calorific value of coal gas is described.
Channing Wilson

Distribution experiences with dry coal gas. J. W. Harrison. *Gas Age-Record* 67, 121–4, 130(1931).—Troubles from dust, varying gravity, naphthalene stoppages and gum formation, following a change from satd. water gas to partially satd. coke-oven gas with water gas addn. for peak loads, are discussed. Steam injection and oil fogging have been tried with partial success.
Leslie B. Bragg

Nature and properties of certain hydrocarbons in coal gas and their effect on meter leathers. R. S. Andrews. *Gas J.* 193, 158–59, 212–3(1931).—Unsatd. hydrocarbons occurring in the light oil content of carbureted water gas, particularly styrene and indene, polymerize in the presence of $O_2$ to gums and resins and deposit on the meter leathers and moving parts with detrimental results. These unsatd. hydrocarbons owe their origin to imperfect cracking due to the low temp. in the carburetor. Analytical data are given on the compn. of vertical retort gas, horizontal retort gas and carbureted water gas and also on light oils scrubbed from these gases. The tests show that of the 3 gases tested horizontal retort gas is by far the least damaging to meters and carbureted water gas the most damaging. The horizontal retort gas is the lowest in light oil and this light oil is the lowest in unsatd. hydrocarbons. Meter troubles have been accentuated by the presence of large percentages of continuous vertical retort gas. Methods of preventing meter troubles are, (*a*) efficient methods of washing and condensation, (*b*) avoiding low temp. in retorts, (*c*) maintaining low content of O in gas, (*d*) addn. of blue water gas, (*e*) introduction of semi-chrome-tanned leather diaphragms, (*f*) correct selection of leather dressing, and (*g*) selection of a suitable position (where there is a min. temp. variation) for the consumers meter.
F. H. Bergeim

Determination of tar fog in coal gas with glass filters. Horst Brückner. *Gas u. Wasserfach* 74, 183–4(1931).—A very effective analytical filter for detg. tar fog in gas is illustrated. The filter consists of 2 fritted glass filters in a large tube, constricted at both ends. The inlet may be partly filled with cotton to remove larger particles and the other end of the filter tube is connected to the gas meter. Most of the tar fog is caught by the cotton and the first glass filter. The gas flow is stopped when a brown coloration first appears on the second fritted filter. Directions are given for carrying out accurate tar fog detns.
R. W. Ryan

The determination of the heating value of coke-oven gas with Junker's gas calorimeter. Hubert Grewe. *Arch. Eisenhüttenw.* 4, 75–85(1930).—A gas calorimeter with attachments for air moistening and gas-cooling is described.
H. S. van Klooster

zontal retort in the vertical retort and in the coke oven are, resp., benzene 61.2, 32.5, [illegible] toluene 14.9, 14.0, 15.0 xylene (and light naphtha) 9.7, 21.4, 10.0, heavy naphtha [illegible].0 paraffins 1.6, 15.3 — loss on washing 7.1, 13.4, 5.3 The compn. of the crude benzene varies with the time of carbonization when only one system of carbonization is used. A silica regenerative coke oven battery gave crude benzene of the following compns. when operated under the carbonizing times of 29.5 hrs. and 16.2 hrs., resp.: benzene 42.9, 62.0 toluene 20.4, 17.9 solvent naphtha 6.8, 5.3, paraffins up to 140° 1.1, 0.1 $CS_2$ 0.1, 0.1 washing loss 8.5, 3.1 and benzene residues 7.1, 5.2 Other important factors besides time which influence the compn. of crude benzene are (1) type and size of oven (2) carbonizing temp., (3) uniformity of heating, (4) the degree to which the oven is filled with the charge, (5) class of coal, (6) moisture in the coal and (7) operation of the oven. Figures are given showing the absorption efficiencies of benzene in gas oil at varying temps. F. H. Bergeim

The refining of motor benzene by means of silica gel. R. C. Geddes *Gas World* 94 (Coking Section 9–12(1931)) The silica gel process gives a greatly increased yield over the usual $H_2SO_4$ refining process. Where 72% is the normal yield in the old type of plant employing a once running still for refractionating the crude recovered benzene silica gel gives 85%. In a modern plant with efficient stripping stills, and the primary once running still eliminated, where 86% is being obtained, the yield with the silica-gel process is 91%. The following data give a comparison of the results of the $H_2SO_4$ and the silica gel processes. By starting in each case with crude benzene of the following % compn.: diolefins 1, olefins 10 and aromatics 89 the resultant benzene refined with strong $H_2SO_4$ is diolefins 0, olefins 0 and aromatics 89 parts. With dil. $H_2SO_4$ and with silica gel the resp. figures are 0.25, 2.5, 89 and 0, 9.5 and 89. The high yield in the silica gel process is due to the retention of the stable unsatd. compds. which are not only not harmful to motor benzene but also have a definite antiknock value. In the silica gel process the polymerization of the undesirable unsatd. compds. is started by the treatment with dil. $H_2SO_4$. The polymerization is accelerated by the catalytic action of silica gel at 150°. A unit wt. of silica gel will treat 1500 times its wt. of oil before activation becomes necessary. The general layout of a silica gel refining plant is given. F. H. Bergeim

Construction of waterless gas holders. L. Hartley *Gas World* 94, 61–2(1931). — A review is given of the structural features of waterless gas holders. F. H. Bergeim

Measurement of the amount of dust and tar in generator gas. Gustav Neumann and Franz Strauper *Arch. Eisenhüttenw.* 4, 151–4(1930). — An *app.* was developed for the detn. of dust and tar in generator gas, which is suitable for the collection of the coarse and fine dust coming from the generators over longer periods of time. The 2 main parts are the collection chambers, also serving as cooling chambers, and the filters. A tube of NCT steel proved suitable as a collection tube. Cotton was used as a filter material. An av. analysis of the gas showed the presence of 8.65 g. of dust, of 11.35 g. of tar and of 55.80 g. per cu. m. of dry gas. Leopold Pessel

The free carbon in coal tar. J. Marcusson *Chem.-Ztg.* 54, 795–6(1930). — Tars from a vertical still and from a horizontal still are compared. The amt. insol. in $C_6H_6$ was 7 and 24%, resp. The benzene sol. part contained 8.6 and 0.5% of hydroxy acid, 7.3 and 16.3% of pyridine-sol. resins, 18.4 and 52% of pyridine insol. resins and 0 and 51.2% coke, resp. A. L. Henne

Extraction of bases from primary tar by water of condensation. A. Travers and Franquin *Compt. rend.* 191, 951–2(1930). — Detn. of the amt. of pyridine bases in the water of condensation from tar is difficult because their concn. is only about 0.1% and $NH_3$ is present in 6–7 times as high a concn. Extn. of the bases by an org. solvent, *e. g.*, PhH, takes up about 90% of the phenols present in the water and a considerable proportion of the bases but complete extn. is impossible because an equil. is established between the aq. and the hydrocarbon phases. The presence of the pyridine bases improves the extn. of phenols on account of the formation of addn. compds. The best lab. procedure is to sep. the phenols by distg. from 30% NaOH, wash the distillate which contains all the $NH_3$ and bases 5 times with 50% of its vol. of $Et_2O$, distil off the $Et_2O$ at 0°, remove the $NH_3$ from the residue by blowing $CO_2$-free air through at 0°, then add 40% NaOH soln. and read volumetrically the amt. of base liberated. Applied to the PhH used in extg. phenols, this method shows 7–8 g. of bases per L. of PhH. C. H. Peet

Determination of phenols in primary tars. I. Ubaldini and O. Mochi *Atti III congresso naz. chim. pura applicata* 1930, 782–91. — Detn. of phenols in tars may give results varying from 30 to 20% phenols. An improved method is to put 20 g. of tar in a vacuum walled vessel, add 10 cc. of NaOH soln., d. 1.332, the tar and NaOH soln.

being at the same temp before mixing The 2 are mixed, stirred with a glass rod and the max temp reached during the reaction is observed with a thermometer reading to 0.1° The max temp is reached a very few sec after mixing and lasts long enough for reading Dividing the rise in temp by 0.12 gives directly the % of phenols present I. M. SYMMES

**Production of hydrocarbons from phenolic tars** C PADOVANI AND I DE BARTHOLOMAEIS *Atti III congresso naz chim pura applicata* 1930, 792-810.—It was possible to convert into hydrocarbons the primary lignite tar fraction passing over at 200-300° and sol in boiling soda soln by heating to 750-800° in an atm of $H_2$ and nascent H formed by the action of water in Fe The best results were obtained with 100 g of phenols heated for 2 hrs at 780° in a tube 3 m long in the presence of water vapor and $H_2$ forming 30-40 g of dephenolated oil b below 200°, about half of which was pure $C_6H_6$ This yield can be increased by increasing the size of the tube and thus the contact surface I. M. SYMMES

**Investigations on commercial primary lignite tar from Valdarno** M G LEVI C PADOVANI AND I UBALDINI *Atti III congresso naz chim pura applicata* 1930, 767-77 Total analyses and fractional distn of lignite tars are shown I. M. SYMMES

**Coking and decomposition heats of coal** III ERNST TERRES AND KARL VOITURET *Gas u Wasserfach* 74, 98-101, 122-8, 148-54, 178-82(1931). cf C A 22, 3015 A new method has been devised for detg heats of coking of coal with greater accuracy than heretofore by altering the method of operating the calorimeter This new method is based on the fact that the heat content of the empty system is a straight line function of temp between 100 and 1100° and is independent of the heating time or amt of heat applied The heat of coking is the difference between the total amt of heat supplied to the system and the heat taken by the calorimeter up to the shut off point, less the heat content of the system at the given temp The heat content of the gaseous products need be known only for calcg the heat of decompn Heat of coking curves are shown for 15 coals over the range from 100 to 1200° These curves vary widely with the various coals, and no relation can be found between the curves and analytical data for the coal The heat of coking of a given coal is reduced by storage and this decrease is somewhat proportional to time of storage Heats of coking and heats of decompn of 30 coals at 1000° are plotted against each other and fall on a smooth curve, permitting the estn of the heat of decompn of a coal when the heat of coking is known The max heat of decompn of any coal is +50 kg cal/kg while many coals show neg heats of decompn The heat of coking of "pure" coal was shown to be 325 kg cal per kg This investigation is being continued in the hope of applying the results to the coking process R. W. RYAN

**Coking a banded bituminous coal.** C P LINN *Iron Coal Trades Rev* 121, 949-50 (1930); 122, 3, *Gas World* 94, Coking Section, 2-5(1931) See C A 25, 1650 LESLIE B. BRAGG

**Coke-oven operation and maintenance.** F J PFLUKE *Am Gas J* 134, No 2, 41-4, No 3, 37-41, No 4, 75-8(1931), cf C A 25, 1361 F. H.

**The formation of fractures in coke.** R G DAVIS AND R V WHEELER *Gas World* 94, 16-7(1931).—Carbonization results confirm Thau's previous work that cracks appear near the walls of the oven shortly after the start of the coking process rather than at a later stage, a short time before the carbonization is completed J. H. BERGIUS

**Coke for domestic fires.** H J HODSMAN *Gas World* 94, Coking Section, 23-4 (1931).—A review is given of the progress of coking technology F. H. BERGIUS

**Continuous verticals.** W A CURRIE *Gas J* 193, 280-1, *Gas World* 94-5 (1931).—The effects of temp, rate of carbonization and coal size on the products of carbonization are discussed. A high temp is favorable to a large throughput, and gives a high yield in therms per retort A formula is given for the calcn of the optimum throughput of coal based on the free space in the charge and the swelling power of the coal J. H. BERGIUS

**Circulating-stream coke ovens.** O PISCHER *Stahl u Eisen* 50, 701-7(1930).—This type of coke oven has twin flues, and a portion of the burnt gases is drawn by suction back into the incoming stream of heating gas and air so as to retard the combustion, avoid overheating and regulate the heat flow from gas to coking retort A furnace of this kind is described and illustrated diagrammatically, and a brief account is given of its operation B. C. A.

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Some additional volume data for superheated steam (SMITH, KRUPS) 2. The relative merits of gas, oil and electricity for industrial purposes (HOPKINSON) 13. Miner-

alogy of the coal fields (BELLIERE) 8 Automatic analyzers of gas mixtures based upon thermal conductivity of gases and their industrial uses (I F JROBERVILLE) 1. Lignin, humic acid and humin (FUCHS) 10 Utilization of sewage gas (KUISEL) 14 Chemical properties and examination of tar and pitches (BOCKSHAMMER) 22. Automatic gas-analysis apparatus (Brit pat 337,802) 1 Recovery of oils from mixtures such as destructive hydrogenization products of brown coal (U S pat 1,794,845) 2. Freeing tars from suspended solids (Brit pat 338,154) 22 Destructive hydrogenation (Brit pats 337,671 and 338,150) 22 Fuel from petroleum distillation residue (U S pat 1,793,014) 22

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Von den Kohlen und den Mineralölen, 1930 Bd. III. Ein Jahrbuch für Chemie und Technik des Brennstoffe und Mineralole Edited by Fachgruppe für Brennstoff- und Mineralol Chemie der Vereines Deutscher Chemiker Berlin Verlag Chemie 238 pp M 17

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**Fuel, etc.** TROCKNUNGS VERSCHWELUNGS, UND VERGASUNGS G M B H Ger 482,559, Feb 3, 1928 Material to be treated thermally in dust form, *e g*, coal dust, is prevented from mixing with gaseous products by elec cohesion

**Fuel briquets** DONALD S ANDREWS U S 1,793,833, Feb 24 In making fuel briquets with an anthracite base, culm 85–90, asphalt 5–10 and pulverized bituminous coal about 5% are used together The asphalt is rendered freely fluent by heating, the culm is heated to about the same temp and mixed with the asphalt and the bituminous coal is then added and intermixed

**Fuel briquets** HANS HERTIG Swiss 142,960, April 17, 1930 Briquets are made by mixing sawdust with 8–30% of adhesive substance (*e g*, water glass soln) and pressed

**Pressing fuel briquets.** FIRMA CARL STILL Ger 514,888, Sept 3, 1929

**Carbonizing fuel briquets** MAUREL INVESTMENT CORP Brit 337,600, Oct 31, 1929 Briquets of ground coal and a hydrocarbon binder are passed through a liquid seal into a distg zone where they are heated solely by indirect heat, and then through a second liquid seal and into a hardening zone and finally into a vertical retort. Various details of app and operation are described Cf *C A* 25, 192

**Distilling and gasifying solid fuels.** METALLGES A.-G Brit 337,721, May 2, 1929 Gasification and distn of solid fuel are effected as it passes through a vertical shaft comprising a drying zone, distg zone, gasifying zone and cooling zone Steam is superheated by heat from preheated refractory bodies and is introduced below the gasifying zone Gases for heating the fuel are passed through the app countercurrent wise and tar or heavy or light oils may be mixed with the gases to increase the heating value of the gases produced, or O may be added to the gas or steam supplied to the app Various details of construction and operation of the app are described

**Catalytic treatment of volatile engine fuels** FERNAND C F PORTAIL (to Soc. anon le carbone) U S 1,795,037, March 3 Air and fuel are brought into contact with very active porous C at a temp of 300–400°, in order to facilitate subsequent complete combustion with addnl air App is described

**Destructive hydrogenation** N V DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Brit 338,192, Aug 14, 1929 Hydrogenation under pressure of such materials as tar, petroleum products and residues, lignite and cellulose is effected with a catalyst consisting of a Mo compd carried on adsorbent material such as adsorption charcoal or finely divided coal In prepg the catalyst, an aq soln of $NH_4$ molybdate, acidified with $H_2SO_4$ may be treated with $H_2S$ to form a blue colloidal soln to which "Carboraffin" or finely divided brown coal is then added, followed by filtration, washing and drying first at ordinary temp and then at 50–60° Various examples with details of the hydrogenation of brown coal and gas oil are given Cf *C A* 25, 1362

**Fuels from coal and oil** TRENT PROCESS CORP Brit 337,920, Oct 20, 1928 In a process involving coal and oil amalgamation, as generally described in Brit 228,862 (*C A* 19, 3011) and Brit 262,302 (*C A* 21, 3733), the amalgamation is first effected with a light oil such as "navy fuel oil" and the process then completed by addn of a heavy oil (suitably with intermediate removal of ash content and change of water) Proportions used may be coal 85, light oil 5.0–7.5 and heavy oil 10–7.5% Cf *C A* 24, 1735

**Decomposing coal** DEUTSCHE BERGIN A G FÜR KOHLE- UND ERDÖLCHEMIE (Wolf Grote, inventor) Ger 517,317, July 12, 1928 In the destructive hydrogenation of coal at a high temp and pressure, the production of coke like and asphaltic products is hindered by addn of a mixt of $Fe_2O_3$ 75–60 with $Na_2CO_3$ 25–40 parts, with or with-

out a little alk earth carbonate About 10 parts of the mixt may be added to 140 parts of coal

**Apparatus for pneumatic separation of solids of different densities as in purifying coal.** J F C FRIEND Brit 337 458, Aug 2, 1929 Structural features

**Furnace for coking coal and heating a boiler or the like by the heat developed in coking.** T KOMATSU Brit 338,435, Feb 6, 1929 Structural features

**Retort for destructive distillation of coal or lignite.** H HARDY Brit. 338,047, Jan 3, 1929 A drum is provided with a hollow shaft for admission of heating gases and evacuation of combustion products The drum contains combustion chambers, distn chambers and gas outlet chambers, and progressive heating is provided either by rotation of the retort on the hollow shaft or by rotation of the latter while the retort is stationary Various structural details are described

**Plate drier for lignite** 'EINTRACHT' BRAUNKOHLENWERKE UND BRIKETFABRIKEN and MAX MAYER Ger 514,711, Feb 7, 1929

**Smoke consumers** GEORG KORNECK Ger 514,975, April 15, 1926 Addn to 500,932 (*C A* 24, 4670) App for burning the smoke and flue gases in furnace plant is described

**Condenser suitable for steam condensation.** PELLE ANDERSSON (to Allis Chalmers Mfg Co) U S 1,792,796, Feb 17

**Combustible gas containing hydrogen and carbon monoxide.** HERBERT A HUMPHREY (to Atmospheric Nitrogen Corp) U S 1,794,232, Feb 24 In a continuous-gas-producing process a mixt comprising steam and O, preheated to above 1000°, is passed into and through a gasification chamber and finely divided solid fuel is fed into the chamber to contact and react with the preheated mixt and to generate gas at such a high temp that CO and H substantially free from $CH_4$ or other hydrocarbons and $CO_2$ are produced, the hot generated gas is led into and through a second preheating stage and from the latter combustible gas is withdrawn A reversal of flow of the mixt contg. steam and O is effected whenever its temp immediately prior to its contact with the fuel tends to fall materially below 1000° and (irrespective of the direction of gas flow) the particles of solid fuel are maintained in suspension in a relatively large mass of enveloping gas in the reaction chamber App is described

**Gas from coal distillation.** I G FARBENIND A G Brit 338,153, May 14, 1929. Bituminous coal is distd by heating it in granular or finely divided form in a heat accumulator which is periodically heated to about 900°, residual coke may be gasified and the producer or water gas passed through the heat accumulator to heat it Various details of app and operation are described

**Dry purifier for coal gas, etc** FRANCKE WERKE A G Ger 517,320, Aug 24, 1928 Structural features are described

**Fuel gas.** MATHILDE LOTZ NÉE BLICKLE, AUGUSTE LOTZ, ARTHUR LOTZ, MATHILDE SPANKE NÉE LOTZ, MARIA KOWSKY NÉE LOTZ, ROBERT LOTZ and WALTER LOTZ Ger 517,414, Apr 22, 1928 Addn to 513,233 (*C A* 25, 1364) When using coal that shrinks only slightly or not at all on gasification, the method of Ger 513,233 is modified by gasifying the coal so that a layer of partly gasified coal is obtained on a layer of coke Steam is then led into the coke layer, the water gas so produced passing through the upper layer

**Gas mixtures.** GIULIO NATTA Swiss 141,827, Mar 7, 1929 A gas mixt of CO, H and $CO_2$ contg at least twice as much H as oxide of C, is obtained by passing an O and steam current (contg at least twice as much steam as O) over C at about 700° and not over 750° Cf *C A* 24, 5765

**Mixed water gas and coal gas** EDWARD A DIETERLE U S 1,792,632, Feb 17 A hot bed of solid carbonaceous fuel is intermittently blasted with air, and steam is intermittently passed through it upwardly Powd carbonaceous material is intermittently introduced above the hot fuel by causing the powd material to pass downwardly through a vertically disposed retort positioned above the fuel bed and externally heated by the rising hot gases which are generated to effect distn of the powd material before it encounters the hot fuel and the generated blue water gas, the resulting gases and entrained vapors are subjected to further fixing by passing them through vertically arranged elongated heated passages above the main fuel bed and around the retort App is described Cf *C A* 24, 949

**Water gas** I G FARBENIND A G (Fritz Winkler and Rudolf Augsten, inventors) Ger 517,469, Feb 22, 1928 Addn to 437,970 For the continuous manuf of water gas from granular fuel, which may contain dust, steam is blown into a shaft contg the fuel so that the fuel is whirled about in the shaft, and the necessary heat is

Continuous water-gas production. I G FARBENIND A G Brit 337,807, Aug [illegible] fuel such as brown coal small coal, semi-coke or peat is passed downwardly through externally heated vertical retorts supplied with steam (preferably superheated to about 500° while the fuel is heated to about 500° and the retort heating flues are heated to about 1200°) Distn gas from the upper part of the retort is collected separately from the water gas from the lower portions Various details for continuous operation are described also of app construction

Automatic control system for electric valve operation in apparatus for generating water gas. JAMES S KENNEDY U S 1,794,906, March 3 Mech and elec. features.

Apparatus for producing oil gas by partial combustion of heavy oil with superheated air and steam C CHILOWSKY Brit 338,281, Jan 18, 1929. An atomized oil-fuel superheated steam and air issues from a nozzle and impinges against a crucible which may be of graphite or carborundum or non-oxidizing steel and in which eddy currents are set up the flames pass in contact with the outer walls of the crucible and the products of partial combustion are then discharged through a catalyst (or the crucible itself may constitute a catalyst) Various details of construction are described. Cf C A 24, 283

Gas producer HARRY F SMITH (to Gas Research Co) U. S 1,794,478, March Automatic control is provided for effecting communication between the offtake and a vent pipe or delivery main in accord with the quality of the generated gas, and various structural details are described

Gas-producer plant. POWER GAS CORP., LTD., and N E RAMBUSH. Brit 337,825 Aug 9 1929 Various details are given of the construction and operation of a plant comprising a generator or producer, a waste heat boiler, a generator jacket boiler and a tubular superheater, two sets being used (alternately on "run" and "blow") for making water gas

Gas producer (with a rotatable fuel shell and rotatable ash pan). ANSON K. BRADLEY (to Morgan Construction Co) U. S 1,795,162, March 3

Gas producer (with a rotary ash pan). PHILIP S HULT (to Morgan Construction Co) U S 1,793,618 Feb 24 Structural features

Gas producer adapted for directly heating steam boilers. W. B CHAPMAN Brit. 337,388 July 29, 1929

Apparatus for distributing granular fuel to gas producers or for similar purposes. A JADOUL Brit 338,141, July 11, 1928 Structural features

Domestic gas plant for generating gas from oil and vegetable materials. JOSEPH S BIRTCIEL (one fourth each to E A Rodgers, John S Fogarty, Gerald Redmond and Homer L Baughman) U S 1,795,005, March 3. Structural features

Apparatus for washing flue gases with water sprays. J. T. BARON and J B. CLARKE Brit 337,436, July 1, 1929 Structural features

Gas holder. E CHUR Brit 337,711, March 7, 1929

Purifying furnace gases. SIEMENS-SCHUCKERTWERKE A.-G Brit 337,448, Jan 9 1929 Furnace gases which are to be passed through a separator such as an electrostatic pptn app are preliminarily brought to a uniform temp and humidity by an app automatically controlled by a thermometer and hygrometer Various details of app are described

Removing naphthalene from coal gas. C. OTTO & CO., GES. (to N.-V. Silica en Ovenbouw Mij) Brit 337,723, May 17, 1929 A solvent for naphthalene such as xylene is introduced into the gas in atomized or nebulized form, followed by electrostatic pptn., sepn. of solvent from the naphthalene and reuse of the solvent.

Separating ammonia and hydrogen sulfide from gases. CHRISTIAN HANSEN (to I G Farbenind A G) U. S 1,795,121, March 3 In treating gases such as coal gases most of the $NH_3$ content is sepd by treatment with water, and the residual gases are then washed in 2 stages, in the first stage, with the aid of a soln. contg $NH_4$ thiosulfate, $SO_2$ and $NH_4$ polythionate, such a part of the $H_2S$ is pptd. in the form of S that for the washing of the residual $H_2S$ in the second stage a neutral $NH_4$ sulfite-bisulfite soln suffices which is produced from the sepd $NH_3$ and S

Ammonia and hydrogen sulfide absorption simultaneously from industrial gases. CHRISTIAN HANSEN (to I. G Farbenind. A.-G) U. S 1,795,120, March 3 Absorption of $NH_3$ and $H_2S$ from gases such as coke-oven gas or illuminating gas is effected in a 2 stage process in the first stage of which is used "ammonium sulfite disulfite" wash liquor having a lower ratio figure of $SO_2$ to $NH_3$ than about 1 5, and in the second stage of which there is used an "ammonium sulfite bisulfite" wash liquor having a higher ratio figure of $SO_2$ to $NH_3$ than about 1 5

Storing explosive gases AUTOGEN GASACCUMULATOR A.-G Ger 514,722, Mar 2,

1928 Porous raw material is extd and evacuated to remove substances such as resin, fat, gas, etc., and then filled into vessels to store such gases as $C_2H_2$. Cf. *C. A.* 24, 4921.

Storing acetylene, etc. INDUSTRIEGAS A.-G. ZWEIGNIEDERLASSUNG WAGIRO-DISSOUSGASWERKE (Gustav Offe, inventor). Ger. 517,351, Sept. 24, 1929. Peat or like bituminous substances mixed with active C, or with flue dust from boiler furnaces, are used as a filler for containers in which $C_2H_2$ or other gas is to be stored in soln. under pressure.

Distilling tar. T. O. WILTON and CHEMICAL ENGINEERING & WILTON'S PATENT FURNACE CO., LTD. Brit. 337,581, June 13, 1929. In distg. tar by a process such as that described in Brit. 307,577 (*C. A.* 23, 5308), more intimate mixt. of the crude tar and the pitch from the process is obtained by introducing them side by side through pipes into a const. level tank. Various details of app. and operation are described.

Coking tar or molten pitch, etc. E. O. RHODES (to American Tar Products Co.). Brit. 337,800, Feb. 9, 1929. The material to be coked is sprayed into a heated coke oven in the presence of an inert gas such as steam (preferably after a preliminary distn. of tar if the latter is used). Various details of app. and procedure are described.

Coke and distillation products from coal. RICHARD H. CARR and CORNELIUS B. WATSON (to Pure Oil Co.). U. S. 1,793,838, Feb. 24. Various details of app. and procedure are described for low temp. distn.

Vertical-flue coke oven. C. OTTO & CO., GES. (to N.-V. Silica en Ovenbouw Mij.). Brit. 337,667, May 9, 1929.

Vertical-flue coke oven. J. VAN ACKEREN (to Koppers Co.). Brit. 337,801, April 25, 1929. Numerous details of construction and operation are described.

Vertical coking retort and charging and discharging apparatus. T. TOPPING and J. S. BLACK. Brit. 337,842, March 27, 1930.

Coke-oven gas-reversing valve. COLLIN & CO. Brit. 338,040, Dec. 27, 1928.

Coke oven (door construction). CARL STILL. U. S. 1,795,239, March 3.

Apparatus for operating a coke-oven door. RAYNARD CHRISTIANSON (to Koppers Co.). U. S. 1,793,456, Feb. 24. Structural features.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Quinquennial review of the mineral production of India for the years 1924 to 1928. Petroleum. E. H. PASCOE. *Records Geol. Survey India* 64, 257–73(1930); cf. *C. A.* 24, 4245.—Indian oil production from 1924 to 1928 declined, although 1928 was a banner year. The country contributes less than 1% of the world's marketed supply. World's production and consumption are reviewed and the individual Indian fields discussed in detail. ALDEN H. EMERY

The total heat and specific heat of a series of fractions of petroleum oils and their relation to other properties. H. R. LANG, R. JESSEL AND A. H. STEED. *J. Inst. Petroleum Tech.* 16, 783–813(1930).—This paper gives the 1st. results of a planned systematic study of the phys. and particularly the thermodynamic properties of petroleum oils. A Miri (Borneo) petroleum was sepd. into 5 fractions with little overlapping. Sp. heat, total heat, their variation with temp., $n$, mean mol. wt., sp. gr. and coeff. of expansion were measured. Variations of the sp. heat, temp. curve from the straight-line relation are explained at low temps. by the presence of $C_6H_6$, with its high f. p., at high temps. by the presence of vaporized mols. and intermediately, by some aggregate forming tendency of the mols. Total heat above 100° was measured by Callendar's continuous-mixt. method. Sp. gr. and $n$ were strictly linear with respect to mean mol. wt. EMMA E. CRANDAL

The isolation of the isomers of hexane from petroleum. JOHANNES H. BRUUN AND MILDRED M. HICKS-BRUUN. *Bur. Standards J. Research* 5, 933–42(1930).—$n$-$C_6H_{14}$, $Me_2CHCHMe_2$, $Me_2CHCH_2CH_2Me$ and $MeCH_2CHMeCH_2Me$ were isolated from an Oklahoma crude petroleum, but the 5th. isomer, $Me_3CCH_2Me$, was not found. Ordinary fractional distn. concd. the hexanes in a set of const.-boiling mixts., the other constituents of which were ring compds. The const.-boiling mixts. were broken up by distn. after the addn. of an alc. (MeOH or EtOH) which was later removed from the distillate by washing with $H_2O$. The f. ps. for air-satd. $Me_2CHCH_2CH_2Me$ and $MeCH_2CHMeCH_2Me$ are —143 ± 0.5° and —118 ± 0.5°, resp. The eutectic for the system $CO_2$–$Me_2CHCH_2CH_2Me$ is —153 ± 0.5°. R. E. SCHAAD

The electrical conductance of hydrocarbons in thin films. L. Brüninghaus *Compt. rend.* 192, 151–3(1931); cf. *C. A.* 24, 4142.—Films of oil 1μ thick become highly conductive to 110 v. d. c. and remain so until the electrodes are sepd. by 15μ. Conductance is always preceded by a semi-conducting stage. This is doubtless due to ions similar to those in gases. V. F. Harrington

Refining mineral oils with adsorbents. Baldassarre Saladini *Atti III congresso naz. chim. pura applicata* 1930, 581–607; cf. *C. A.* 24, 1963.—Tests were made with shale oil but the results apply to other high S oils. Active C decolorizes indifferently and desulfurizes little. Decolorizing earths give rather complete decolorization and appreciable desulfurization. $SiO_2$ gel decolorizes less than the above, but desulfurizes better. In general desulfurization follows the adsorption of colored substances. Bauxite calcined at high temp. has an appreciable desulfurizing effect and polymerizing properties. Alternate use of bauxite and decolorizing earths on crude oil gives the best results and an economy in adsorbent. Decolorization is rather complete, desulfurization reaches 50%; the oil has a pleasant, ethereal odor and is stable. Regeneration of the treating materials is effected by calcination, which allows recovery of oil and S. F. M. Symmes

Separation of obstinate crude-oil emulsions. The L. Berkhan patent. F. Pyhälä *Erdöl u. Teer* 6, 478–80(1930). Caspian crude oils, emulsified with $H_2O$ that contained clay and MgCl could not be sepd. by ordinary settling. Serious corrosion troubles made drying operations or utilization as boiler fuel impossible. The possibility of centrifugal sepn. was demonstrated in lab. expts. The Berkhan method is in successful operation. Sepn. is induced by an admixture of 0.5% of kerosene-naphthenic acids and settling of the warm mixt. It was shown experimentally that the emulsions were stabilized by traces of ozocerite. Naphthenic acids dissolve the stabilizer and lower the surface tension of the oil. K. H. Engel

Cracking processes in the Russian petroleum industry. L. Singer *Petroleum Z.* 25, 893–906(1929); 26, 482–91(1930); cf. *C. A.* 24, 3834, 4619–20.—Three types of cracking processes are described which serve for the production of (1) fuel oil of a better quality as regards η and cold test, cracking being carried out at 425° and under 10–60 atm.; (2) gasoline and fuel oil; and (3) gasoline and coke, in which the treatment is carried out at 450° and 20 atm. These processes were utilized in the cracking of Grosni and Surakhani mazouts and of various heavy crude oils. The results obtained with Grosni mazout show that gentle cracking (first method) causes a decrease in the cold test of the fuel oil obtained. In the second method with a 1% yield of coke, 35% of cracked benzine is obtained; the quantity of coke formed is independent of the temp. but is const. with equal gasoline yields. With 15% of coke in the third method 57% of cracked gasoline is produced. The following conclusions have been reached. (*a*) Greater yields of light products cause an excessive formation of coke and deteriorate the quality of the residue. (*b*) The velocity of the reaction is doubled for each rise in temp. of 10°. (*c*) The rate of coke formation depends on the chem. compn. of the cracked petroleum products. Paraffinic products yield less coke than paraffin-free or asphaltic products. Kerosene yields practically no coke, solar and spindle oils yield very little, machine and cylinder oils yield large quantities and tars greatly increase the formation of coke. (*d*) Increase of pressure causes a decrease in the content of unsatd. hydrocarbons; paraffin hydrocarbons yield no coke on cracking; while aromatic hydrocarbons tend to give significant quantities. (*e*) The extent of the production of cracked gasoline and kerosene from heavy crude oil and mazout is practically the same. (*f*) The details of a cracking process are detd. not so much by the yields of cracked gasoline (which are the same for a given temp. and cracking time with heavy crude oils and mazout) as by the yields of coke, which vary for different petroleum products. The cracking of Grosni oil tar and paraffin tar is not important on account of the excessive quantities of coke formed. B. C. A.

Refining of cracked gasolines. P. M. Edmond Schmitz *Erdöl u. Teer* 6, 493–4, 510–2(1930).—Raw gasoline treated cold with NaOH (30° Bé.) or hot with fuller's earth showed discoloration and gum formation on standing, even in the dark. Washing with *NaOH* should be followed by treatment with $H_2SO_4$ (strength 1%). A gasoline of excellent color and stability was obtained by a *vapor phase purification* (100–20° above the highest b. p.) *over* $Fe_2O_3$. Various brands of fuller's earth instead of $Fe_2O_3$, were less effective. Dry $CaCl_2$ and NaOH were practically ineffective. K. H. Engel

Compression pressure is controlling factor in inducing engine knock. Sandor D. Rubenz. *Automotive Ind.* 63, 20–3(1930).—Antiknock rating of a fuel is detd. on a single-cylinder Liberty engine by comparing the max. of the manifold vacuum-air fuel

ratio curve with those of similar curves obtained for known blends of com $C_6H_6$ in domestic aviation gasoline "The constancy of the manifold vacuum points of incipient knock leads to the conclusion that, other things being equal, the compression pressure is the controlling factor in inducing knock" Antiknock value of gasoline for air-craft engines can be detd only if the base fuel is specified when $C_6H_6$ rating is given With cold running' (large central electrode) and "hot running" (small central electrode) spark plugs, manifold vacua at incipient knock are almost identical In this Liberty engine the tendency to knock is greater with 2 plugs than with 1, although 2 plug ignition is usually stated to reduce knocking R E Schaad

X-ray studies on paraffin wax and petrolatum. Shinsuke Tanaka and Akira Tsuji *Mem Coll Sci Kyoto Imp Univ*, Ser A, 13, 369 73(1930) —The effects of temp and mech operations were studied by taking photographs of the x ray diffraction patterns *Influence of Temp* —The photographs taken at temps lower than the m p have many spectral lines characteristic of cryst powder photographs These lines generally decrease in intensity as the temp rises and vanish when the substances are melting Amorphous bands appear in other positions One intense line, however, remains until melting is reached and then suddenly vanishes This transformation occurs in a different manner for each substance *Effects of Mech Operations* —The effect of compression and rolling at room temp was studied with paraffin wax with the following results (1) The wax acquires a fibrous structure, the axis of which is perpendicular to the surface of compression and rolling (2) The crystal planes which produce the most intense reflection are also nearly perpendicular to the surface of compression and rolling C J Humphreys

Electrochemical oxidation of paraffin II. I A Atanasiu *Ber* 64B, 252–60 (1931), cf *C A* 24, 2281 —Paraffin has been oxidized to acids by nascent O in the presence of catalysts The lower the m p of the paraffin, the easier the oxidation The app and conditions of the expt are described V F Harrington

What determines the value of absorption oil? F L Kallam *Chem Met Eng* 38, 78–81(1931) —The phys characteristics of 24 new oils and 34 used oils in use as absorption oils in various refineries are presented in the form of curves to show the predominating properties which det the suitability of a given oil for this purpose It is concluded that the mol wt of the oil should be of the order of 150 to 200 The av b p of a proposed absorbent should be specified because it is the index of the initial b p, the vapor pressure and the gravity Max distn residuum or the demulsibility factor, freedom from wax sepn at the lowest operating temp and viscosity should also be included in absorption-oil specifications D F Brown

Notes on the viscosity-temperature relations of lubricating oils. W L Baillie *J. Inst Petroleum Tech* 16, 643–60(1930) —By calcns from data in Archbutt and Deeley's *Lubrication and Lubricants*, it was shown that Eckart's formula for the relation of temp to viscosity is as accurate for kinematic as for abs viscosity Results calcd by it agree with exptl results within about ±2 5% It is a special case of the general formula given by Slotte, $V = b/(t + a)^n$, in which $t$ is temp and V is kinematic viscosity An equation was derived relating efflux time in sec in the Redwood viscometer to viscosity $AT - B/T = w\theta^n$ $A$ and $B$ are consts of the instrument, $w$ and $n$, of the oil, $T$ is time of efflux, $\theta$ is the temp Rigorous temp control is most important with viscous oils A temp variation of 0 14°F may cause a change of 1% in viscosity A table is given for conversion of Redwood seconds to kinematic viscosity Emma E Crandal

Inorganic lubricants. IV. Lubricants for temperatures above and below normal. Willis A Boughton *J Am Chem Soc* 52, 4858–60(1930), cf *C A* 25, 196 —Aq solns of $HPO_3$ and $NaPO_3$, mixts of salts melted in their water of crystn with an inert material such as kaolin or graphite and solns of $Ca(NO_3)_2$ in melted $KNO_3$ are good lubricants at temps both above and below ordinary. A lower limit of —75° and an upper one of 360° have been reached Emma E Crandal

Amount of lubricating oil burned in the gasoline engine. Clarke C Minter and Wm J Finn *Ind Eng Chem* 23, 285(1931) —The amt of oil burned in a gasoline engine was detd. by operating with H and analyzing the exhaust gases L W. T. C.

Effect of carbon black on insulating oils. W. B Wiegand, C. R Boggs and D. W. Kitchin. *Ind Eng Chem* 23, 273–6(1931) —The elec. properties of insulating oils are improved by treatment with C black L W. T. Cummings

Improving petroleum asphalts. A I Voronov and N I. Logvinova *J. Petroleum Ind* 1930, 439 (in Russian); *Asphalt u Teer* 33, 876–8(1930) (in German) —Still residues of low-resin and high paraffin content may be converted into satisfactory asphalts by *vacuum distn*, followed by the customary air blowing Asphalts of the

naphthene aromatic type, rich in desirable resins but deficient in asphaltenes, should not be blown. Blending these asphalts with asphalts of the Me naphthene aromatic type is more economical and yields a technically superior product. K. H. ENGEL

Determination of asphaltene content. I. J. NELLENSTEIN AND N. M. RODDENBERG. *Chem. Ztg.* 54, 819(1930).—As a solvent for use in detg. asphaltenes, $Et_2O$ is superior to normal benzine because it is a homogeneous substance not requiring standardization; its flocculating properties are combined with low surface tension, and it has a greater dissolving power for the hydroxy acids in asphalts produced by oxidation and for certain constituents of coal tar. R. I. SCHAAD

Separation of bitumen from bituminous sands. K. A. CLARK. *Nature* 127, 199 (1931); cf. *C. A.* 24, 2873.—The bitumen sepd. by means of solns. of $Na_2SiO_3$ contained 1–4% of mineral matter. Difficulties to duplicate results were encountered. Improvements were obtained by giving the sand a preliminary wash with cold $H_2O$ and then treating with alkali to bring the $p_H$ value up to 6.4. The water removes a part of the clay and reduces the necessary quantity of alkali. The acidity of the sand is considered to be due to the presence of $Fe^{++}$ and $Fe^{+++}$ salts carried into the beds by ground water. I. M. LEVINE

The estimation of wax in pitch. W. LITTLEJOHN AND W. H. THOMAS. *J. Inst. Petroleum Tech.* 16, 814–24(1930).—As the outcome of a study of what factors must be controlled in order to get results approaching reproducibility for the % of wax in pitch, a cracking method is recommended. The pitch is distd., at the rate of 40–50° temp. rise per min. to 450°. Distn. is continued to 500° at 15° rise per min. The distillate is dissolved in pure $Me_2CO$ in the proportion of 35 cc. per g., and the washings from the neck of the flask are added. The soln. is cooled to 0°F., this ppts. the wax, which is filtered off, redissolved in 70 g. of acetone per g. and reppld. at 32°F. E. E. C.

Chemical properties and examination of tar and pitches. BOCKSHAMMER. *Teer u. Bitumen* 29, 29–32(1931).—A set of tests has been arranged which allows the general characterization of unknown bituminous materials through the identification of typical components. K. H. ENGEL

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Combustion and detonation in gaseous mixtures. Antidetonants (LAFFITTE) 24. The analytical distillation of gasoline (TORMEY) 2. The relative merits of gas, oil and electricity for industrial purposes (HOPKINSON) 13. Critical solution temperatures of systems of $SO_2$ and normal paraffins (SEYER, TODD) 2. Calculating viscosity and flash point in compounded oils (KADMER) 2. Recovering oil from waste water (Swiss pat. 140,639) 14. Oil filter (U. S. pat. 1,792,854) 1. Unactivated "prefiltering medium" for treating oils (U. S. pat. 1,794,862) 1. Apparatus for extractions with liquid solvents (U. S. pat. 1,794,874) 1. Rotary impeller agitating device and filter for treating oils (U. S. pat. 1,794,916) 1. Separator for oil and water (Ger. pat. 517,425) 1. Destructive hydrogenation (Brit. pat. 338,192) 21. Wax emulsions [for manufacture of lubricating greases] (Brit. pat. 338,176) 18. Distillation of volatile substances [in refining oils] (Ger. pat. 514,740) 13. Apparatus for "neutralizing" gases from gasoline engines (U. S. pat. 1,793,813) 1.

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Treating residues obtained on sweetening petroleum distillates. HERBERT G. M. FISCHER (to Standard Oil Development Co.). U. S. 1,795,278, March 3. Residue oil contg. alkyl polysulfides and obtained by the contact of sour petroleum distillates with S in the presence of a catalyst followed by distn. under reduced pressure to produce a sweetened distillate and a residue oil is heated to above 175° in order to reduce its S content. App. is described.

Removing corrosive sulfur compounds from petroleum. WARREN F. BLEECKER. U. S. 1,794,668, March 3. Brine is electrolyzed in the presence of the petroleum to produce Cl and H, and the nascent Cl is allowed to pass directly into the petroleum while the H is separately removed without introducing it into the petroleum. App. is described.

Purifying cracked petroleum vapors. CORNELIUS B. WATSON and RUDOLPH C. OSTERSTROM (to Pure Oil Co.). U. S. 1,793,885, Feb. 24. Vapors from a cracking process are cooled sufficiently to arrest conversion reactions, liquefied oil is sepd., remaining vapors are passed to a fractionating zone into the upper portion of which a material such as fuller's earth is introduced so that it falls countercurrentwise through the vapors, and vapors passing from this zone are further treated with fuller's earth or the like before passing to a sepg. zone. An arrangement of app. and various details of operation are described. Cf. *C. A.* 24, 489.

Apparatus (with a tank and internal pipe coil) for cracking petroleum oils. ARTHUR

E Pew, Jr and Henry Thomas (to Sun Oil Co.) U S 1,704,200, Feb 24 Structural details

**Cracking petroleum oils.** Lyman C Huff (to Universal Oil Products Co) U S 1,703,443 Feb 17 In a process such as that in which the oil is heated while passing through a pipe coil and thence introduced into a reaction and segg chamber, any accumulation of unvaporized liquid oil in the reaction zone is prevented by continuously and rapidly withdrawing the liquid from the reaction zone while maintaining both the heating zone and reaction zone under superatm pressure Cf C A 24, 410

**Cracking hydrocarbons** O D Treat Brit 336,209, April 10 1929 See Fr. 692,549 (C A 25, 1846)

**Cracking hydrocarbons.** Pantasote Refining Co Brit 337,380, June 20 1929 See Fr 678,412 (C A 24, 1687)

**Distilling hydrocarbons such as petroleum, tar or coal.** Emil Piron U S 1,704,542, March 3 A layer of the material is applied to a moving surface such as a heated chain or conveyor which is conducted through a distn zone to effect distn. under heating and the distn is positively checked by adding a further layer prior to removal of the residue from the distn chamber (to avoid over cracking) App. is described Cf C A 24, 400

**Distilling hydrocarbon oils such as petroleum** John B Bell (to Sinclair Refining Co) U S 1,703,070, March 3 Vapors of the oil are passed from a still to a refluxing tower and uncondensed vapors from the latter are brought into indirect heat exchange relation with fresh oil to preheat the oil and cool the vapors the preheated fresh oil is introduced into the tower at a point below the point of introduction of vapors from the fresh oil into the tower, and addnl oil is introduced into the reflux tower at a still higher point than the fresh oil vapors App is described. Cf C A 24, 1211

**Fuel from petroleum distillation residue.** Richard I Rogers U S 1,703,014, Feb. 17. Residue from petroleum distn or cracking, in finely divided form, is mixed with a substantially neutral liquid petroleum deriv such as residuum oil or crude petroleum and a batch of this mixt is heated at a carbonizing temp to form a solid, coherent fuel

**Converting hydrocarbon material into products of lower boiling point.** Wm. Landis U S 1,702,912, Feb 17. Various details of app are described including a heating coil, expansion chamber and superheated steam supply

**Converting heavy hydrocarbon oils into products of lower boiling point.** Jay J. Jakowsky (to C and C Developing Co) U. S 1,703,744, Feb 17. A relatively heavy oil is vaporized under conditions such that a substantial part of the resultant vapors is in non gaseous and substantially satd condition, and the vapors, while in operative proximity to a surface heated to a converting temp, substantially above that of vaporization, are subjected to the pptg. action of a high tension silent elec discharge tending to drive the non-gaseous portion of the vapors toward the heated surface, and uncondensed products are conducted away for recovery of a desired product of lower b. p. App is described Cf. C. A 25, 200.

**Refined white viscous hydrocarbon oil.** Thomas H Rogers (to Standard Oil Co of Ind) U S 1,703,134, Feb 17. A small proportion of a naphthol is added for preventing acid formation and increase of emulsifiability in use of highly refined viscous hydrocarbon oils such as those used for lubricating turbines. U. S 1,703,135 specifies the addn. of about 0.01% of pyrogallol for the same purpose, and refers to the use generally of similar polyhydroxy aromatic compds. Cf C A. 24, 5149.

**Separation of unsaturated constituents from hydrocarbon oils.** Wm M. Stratford (to Texas Co), U. S 1,702,877, Feb. 17 Material such as products from a cracking still in vapor form is continually brought into contact with a bed of adsorbent catalytic material such as fuller's earth, and adsorbed polymers are intermittently washed from the catalytic bed by the supply of solvent such as kerosene. App. is described Cf. C. A. 24, 4028.

**Apparatus for separating oil and gas.** Jay P Walker (40% to Guy O Marchant and 60% to C. G. Wells). U. S reissue 17,083, Feb 24 Reissue of original pat. No. 1,661,685 (C. A. 22, 1470).

**Modifying mineral oils.** L. Ayer. Brit 337,751, April 24, 1929 Mineral oils are modified to produce viscous oils or thin gels suitable for use as lubricants by admixt with them, while heated, of greatly modified fats, fatty oils or resin products which may be prepd by heating in vacuo with reagents such as amines (as described in Brit. 337,753, C. A. 25, 2312) or with compds such as benzenesulfonic acid (as described in Brit 321,724, C. A. 24, 2004) or with compds such as Fe sulfate (as described in Brit. 321,725, C. A. 24, 2004) or with saponaceous compds. (as described in Brit.

321,691 *C. A.* 24, 2910 and in Brit. 321,723, *C. A.* 24, 2911, but with a larger proportion of modifying agent than used in the previously described processes), or by use of a product formed by treating an aq. soln. of salts of amines such as benzidine or dianisidine with a soap soln. of high mol. org. acids such as the $NH_4$ soap or linseed oil fatty acids.

Refining mineral oils. Axtell Research Laboratories, Inc. Ger. 517,196, Dec. 22, 1927. See Brit. 282,738, *C. A.* 22, 3684.

Refining mineral oils. Grigori Petroff. Ger. 517,197, Jan. 18, 1927. A fat or a fatty acid, e. g. stearic or oleic acid, is added to mineral oils before refining them by means of concd. or fuming $H_2SO_4$. Examples are given.

Storage tank and breather system for storing mineral oils and gas. Wilbur G. Laird to Doherty Research Co. U. S. 1,794,283, March 3. Structural features.

Heating oil to cracking temperature and superheating steam. John Primrose (to Foster Wheeler Corp.). U. S. 1,792,927, Feb. 17. Oil is passed serially through a portion of a heating tube bank absorbing radiant heat in a combustion chamber from a horizontally disposed tube bank in a second chamber partly sepd. from the combustion chamber at a velocity high enough at least substantially to avoid cracking of the oil being heated, and heating gases are contacted with the tube system at such temp. and volume that they may be subsequently used for superheating steam to about 490° or higher. App. is described.

Oil-still operation. Benjamin Brodo (to Superheater Co.). U. S. 1,794,439, March 3. Viscous material such as heavy petroleum has its viscosity reduced rapidly by heating with a heating medium such as furnace gases while the latter is at a high temp. and transfer of heat from the heating medium to the liquid is completed under counterflow cond. tions without permitting any vapors to sep. from the liquid during the second heating. Gaseous products are removed from the liquid after the initial heating and are added to the liquid at the end of the second heating. An app. is described comprising pipe coils in a furnace setting.

Distilling oils in vacuo. R. R. Collins. Brit. 337,545, Oct. 11, 1928. Distn. such as that of a heavy cylinder oil mixed with wax distillate is effected *in vacuo* by spraying in several zones across the rising vapors of the liquid in a column, collecting liquid in peripheral troughs, and recirculating in each zone by sep. pumps. Various details of app. are described.

Recovery of oils from mixtures such as destructive hydrogenization products of brown coal. Mathias Pier, Rudolf Wietzel and Bruno Engel (to I. G. Farbenind. A.-G.). U. S. 1,794,865, March 3. Mixts. such as sludges and residues contg. oils and free C are centrifuged with an addn. of liquid aromatic hydrocarbons such as benzene possessing good solvent properties for the oil. Na isopropylnaphthalenesulfonate also may be added.

Destructive hydrogenation. J. M. Jennings (to Standard Oil Development Co.). Brit. 337,671, Dec. 21, 1928. In destructive hydrogenation of heavy fluid materials such as crude oils, tars, cracked residues or suspensions of coal in oils, by use of solid catalysts immune to poisoning from S, such as Cr or Mo oxides, the ratio of asphalt to catalyst in the material treated is kept below 1.5 and preferably below 0.5, in order to prevent coking. Various details of temps. and pressures and construction of app. used, etc., are given. Cf. *C. A.* 25, 580.

Destructive hydrogenation. W. R. Tate, H. P. Stephenson and Imperial Chemical Industries, Ltd. Brit. 338,150, Aug. 13, 1929. In destructive hydrogenation of carbonaceous liquids such as oils or suspensions of coal in oils, a vertical reaction vessel and a vessel for the sepn. of liquid and vaporous products are housed in the same high pressure vessel, and the separator is maintained at a temp. lower than that of the reaction vessel by using the reaction products to preheat the liquids or gaseous materials or both. The entering H may be divided into 2 streams, one of which is heated by an elec. heater and the other of which is preliminarily used to cool the reaction products and then passed to the heater. Numerous details of construction and operation of the app. are described.

Freeing oils and tars from suspended solids. I. G. Farbenind. A.-G. Brit. 338,154, May 14, 1929. Oils and tars such as those obtained by destructive hydrogenation are freed from suspended solids by treatment with gases acid to wet Litmus such as $SO_2$ or $CO_2$ and then filtering or centrifuging. A thinner such as benzine may be added and $CO_2$ may be bubbled through tar at a temp. of 90°.

Producing and refining cracked gasoline. Frank A. Apgar (to Sinclair Refining Co.). U. S. 1,795,067, March 3. Raw vapor mixt. from a cracking operation is scrubbed for sepn. of unvaporized oil, tar and tarry matter, an oil condensate of higher b. p.

than gasoline is sepd from the raw vapor mixt discharged from the scrubbing operation before the vapor mixt, including the gasoline vapors, is passed through an adsorbent catalyst such as fuller's earth for refining, and oil condensate thus sepd is then passed through the adsorptive catalyst together with the vapor mixt including the gasoline vapors, to serve as a liquid washing agent and the washing agent and assocd polymers from the last mentioned step are sepd from the refined vapor mixt and are led directly to the scrubber. An arrangement of app is described. *Cf. C. A.* **24**, 718.

**Refining gasoline.** EUGENE C. HERTHEL (to Sinclair Refining Co.) U. S. 1,705,124, March 5. *Vapors of gasoline to be refined, together with vapors of higher b. p. hydrocarbons in such proportion that the vapor mixt. when condensed forms a condensate contg. not less than about 50% and not more than about 75% of the gasoline product, is passed first through a condensing operation in which a part of the higher b. p. hydrocarbons is condensed, and the total vapor mixt. and condensate are then passed through an adsorptive catalyst and thereafter the constituents of higher b. p. than are suitable for inclusion in the final gasoline product are sepd. and the remaining vapors are then condensed as the refined gasoline.* An arrangement of app. is described.

**Filter for gasoline, etc.** A. G. PENN and ANGLO AMERICAN OIL CO., LTD. Brit. 337,530, Sept. 27, 1929. Structural features.

**Filter for oil or gasoline suitable for use on motor vehicles.** SIDNEY I. WOLFSON (to Cuno Engineering Corp.) U. S. 1,702,701, Feb. 19. Structural features.

**Decolorizing material.** WALTER S. DAVIS (to Filtrol Co. of Calif.) U. S. 1,702,625, Feb. 19. A decolorizing clay is heated sufficiently to remove all free water and also water of crystn. and then mixed with 4–8% anhyd. $H_2SO_4$. The product is suitable for treating gasoline.

**Method and plant for separating waxy and fatty substances from oils, particularly paraffin from mineral oil, by cooling.** THE SHARPLES SPECIALTY CO. Ger. 517,198, July 25, 1929. This corresponds to Brit. 291,170 (*C. A.* **23**, 4155).

**Paraffin wax.** I. G. FARBENIND. A.-G. (Berthold Ottens and Martin Möller-Conradi, inventors). Ger. 517,280, Apr. 18, 1929. To remove oil from crude paraffin wax, the latter is centrifuged while gradually warming it up to the m. p. of the pure wax.

**Immersion wax.** LAURENCE W. SULLIVAN, JR. (to The Standard Oil Co.) Can. 308,755, Feb. 17, 1931. A immersion bath for heat treating molded articles comprises a paraffin wax and from about 0.05–0.5% of an org. aromatic compd. of the class including β-naphthol, pyrogallol, diphenylamine, gallic acid, hydroquinone and *p*-$C_6H_4(NH_2)_2$. This additive substance inhibits the rapid formation of excessive acidity and *prolongs the life of the bath.*

**Apparatus for determining the friction coefficient of lubricating oils, etc.** VACUO S. A. F. Ger. 517,211, July 3, 1928. See Brit. 305,212 (*C. A.* **23**, 4580).

**Thickening lubricating, insulating or other oils.** I. G. FARBENIND. A.-G. Brit. 337,630, Nov. 20, 1929. The viscosity of oils such as castor oil, whale oil or transformer oil is increased by adding esters, ethers, mixed esters or ether esters of carbohydrates such as those of starch or cellulose, *e. g.*, triethylcellulose, cellulose naphthenate or the like.

**Purifying used lubricating oils.** PRATON, STALLARD & CO., LTD., and J. MAISNARY. Brit. 317,081 2, Nov. 8, 1929. Various details are described of an app. suitable for use in purification processes such as described in Brit. 306,771 (*C. A.* **24**, 511).

**Refining used crank case oil.** RUDOLF A. WISCHIN. U. S. 1,702,882, Feb. 19. The oil is intimately mixed with cold concd. $H_2SO_4$ and then gradually heated in the course of several hrs. to about 50–60°, sludge is sepd., suspended solid matter is removed, and steam is injected into the mixt. App. is described.

**Emulsifying asphalt.** ROBERT K. PAINTER (to Bitutect, Inc.) U. S. 1,701,057, Feb. 21. Asphalt is dissolved in a solvent such as $CCl_4$ and there is added to the soln. an aq. soln. of colloidal clay, the solid content of which is less than 2% of the emulsion produced, the mixt. is agitated (suitably at a temp. of about 55°) and additn. of an org. acid such as HOAc are made to maintain a desired acidity, and the asphalt is ppted. in the presence of the colloidal soln. and at the proper degree of acidity. App. is described.

**Aqueous dispersions of water-insoluble materials such as asphalt.** JACOB M. PAIN (to Flintkote Co.) U. S. 1,701,018, Feb. 24. In producing aq. dispersions of material such as asphalt contg. less than 2% as much of a dispersing agent such as bentonite and soap or saponin, an aq. suspension is made of paste forming colloidal material such as bentonite and the suspension is modified by adding to it an agent such as soap of such character and quantity as to reduce the surface tension of the aq. medium

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Cellulose from sugar V N IPATIEV *Compt rend acad sci U. R. S. S.* 1930A, 381.—Five g. of cellulosic material obtained from monosaccharides was analyzed. The cellulosic material proved to be sol. in Schweitzer reagent and did not reduce Fehling soln.; it is seen to be cryst. in a polarization microscope, and it hydrolyzes if heated with $H_2SO_4$. L. JACOBLEFF

X-ray studies of cellulose derivatives. VIII. The alkali celluloses. KURT HESS AND CARL TROGUS. *Z. physik. Chem.*, Abt. B, 11, 381–408(1931).—The x-ray fiber diagram of natural cellulose disappears in fibers treated with NaOH $H_2O$ solns. Two new fiber diagrams are obtained, one characteristic of Na cellulose I, formed in solns. contg. up to 19% NaOH by wt., and the other characteristic of Na cellulose II, formed in solns. contg. 21% or more NaOH. Drying Na cellulose II produces no change in its fiber diagram, but a new fiber diagram corresponding to an anhyd. Na cellulose III is obtained from dried fibers of Na cellulose I. Calcd. fiber periods are: Na cellulose I, 10.4 ± 0.2 A. U.; Na cellulose II, 15.1 ± 0.2 A. U.; Na cellulose III, 10.2 ± 0.2 A. U. Na cellulose I is considered responsible for the phenomenon of swelling since the greatest swelling of fibers is produced by 14.5–15% NaOH soln. Washing unstretched Na cellulose I or II with water forms a fiber giving the diagram of cellulose hydrate; by washing stretched the diagram of natural cellulose is also obtained. Washing Na cellulose I with $CH_3OH$ produces decompn. Na cellulose II changes to Na cellulose I. Several weeks' action of NaOH $CH_3OH$ solns. on cellulose forms Na cellulose III or Na cellulose II; if water is added, Na cellulose I or Na cellulose II are formed quickly. Sharp fiber diagrams are obtained for K cellulose (fiber period 10.2 ± 0.2 A. U.) formed by the action of 18.5% KOH soln. on cellulose, and for Li cellulose (fiber period 10.4 ± 0.2 A. U.) formed by the action of 10.9% LiOH soln. Other forms of Li and K celluloses will be described later. JANET E. AUSTIN

Fatty acid-nitrocellulose mixed esters. HANNS SCHMIDT *Nitrocellulose* 2, 4–6 (1931).—A review of patents. E. M. SYMMES

A study of some properties of nitrocellulose made from jute with special reference to its stability. RAMESH CHANDRA BAGCHI. *J. Indian Chem. Soc.* 7, 863–74(1931).—The amt. of stabilization necessary increases with the content of impurities. Washing with dil. acid alone is not sufficient but must be followed by neutral or alk. washing. Alc. is a very effective washing agent for improving stability. Very small quantities of easily hydrolyzable pentosans and hexosans, or degraded cellulose from the action of concd. alkali, will give unstable products. The N content of the nitrocellulose decreases as impurities increase. Unless the jute is carefully purified uniform nitration is more difficult than with cotton. The $Et_2O$-alc. soln. of jute nitrocellulose is much less viscous than that of cotton, this indicates that the 2 celluloses are not identical. FOSTER DEE SNELL.

Tentative standard method for the determination of α-cellulose. WM. R. WILLETS. *Paper Trade J.* 92, 117(1931).—The procedure is essentially that of Method IV of the Am. Chem. Soc. (Ritter, *C. A.* 23, 5569), with the following minor modifications. (1) The use of 95% EtOH or MeOH followed by petr. ether or other non-reacting volatile liquid for washing the α-cellulose after the final treatment with hot water is recommended to facilitate drying. (2) The detn. of residual lignin (by the Madison Forest Products Lab. method) in the α-cellulose is recommended for unbleached pulps. A. PAPINEAU-COUTURE

units of genuine beechwood lignin but that there are other alkylatable groups The MeO groups found in the cleavage products are already present in genuine lignin The 2 cleavage fragments identified probably originate, in part, at least, from a common unit, $—OC_6H_2(OMe)_2C—$, but the MeO content of the isolated lignin and methyllignin is not in harmony with the assumption that the lignin consists only of a chain of the units $—OC_6H_2(OMe)_2CH_2CH\ CH—$ C A R.

Recent advances in the chemistry of cellulose in relation to pulp and paper. C. J. J. Fox *World's Paper Trade Rev* 95, 374, 376, 420, 422, 462, 464, 518, 520(1931) — An address dealing with recent investigations on the chemistry and physics of cellulose, particularly as regards its structure A Papineau Couture

Report of the committee on chemical and physical standards. H O Kray *Pulp Paper Mag Can* 31, 185–8(1931) —The present methods of prepg sheets for testing the initial strength of paper pulp prevailing in North America and in Europe are reviewed The disintegration of the pulp the formation of the sheet, couching, pressing, drying and conditioning are discussed The comm considers that the best means yet devised for the formation of the test sheet is the Brit sheet machine, that the couching of the sheet should be done by means which eliminate the influence of the operator, which is probably best obtained by the use of a couch plate together with a roll of fixed wt as adopted by the Brit comm on evaluation of paper pulp, that the work of Cameron and his co-workers (*C A* 21, 1370) has shown that 200 lb per sq in is most satisfactory for pressing the sheets and that the procedure of the Brit Assocn. for drying the sheets, though more elaborate, is justified because it eliminates the uncertainty which results from shrinkage when the sheet is not dried under tension It is felt that as yet insufficient data have been accumulated to warrant definite recommendations A Papineau Couture

The determination of the strength of pulps. K G Jonas *World's Paper Trade Rev* 95, 466, 468, 510–6(1931). cf *C A* 25, 1074 —In order that detns of the strength of pulp may be of value, it is essential to have a beating method and a sheet forming method, each giving reproducible results The ideal exptl beater should fulfil the following conditions it must (1) work reproducibly, (2) allow of a beating effect as nearly as possible corresponding to that of the beater in practice, (3) make possible the working out of a complete beating curve without a great consumption of time, (4) permit variation of and exact regulation of the beating pressure These requirements are claimed to be met by a lab beater devised by J and Kross Six cylindrical beating containers are symmetrically arranged around the axis of a disk to which they are firmly but rotatably attached they are closed by means of covers fitted with packing rings, each cover carrying a toothed wheel which engages with a similar wheel keyed on a fixed central shaft, so that when the machine is running each container rotates about the central shaft and about its own axis In each container is a beating roll consisting of a free massive cylinder, in whose surface a series of half round (6 mm diam ) flutes are milled so that a tooth 2 mm wide remains between adjacent flutings The beating pressure is regulated by adjusting the speed of rotation The equiv of 11 2 g of oven-dry pulp is weighed into each beating container, the calcd quantity of water (preferably to a consistency of 6%) is added, the material is softened by allowing it to stand exactly 30 min and is then disintegrated by running for 10 min at 100 r p m , beating is then carried out by running at a suitable speed (150 r p m or more) so as to obtain a complete beating curve within 1 hr , the containers being successively removed at stated intervals and replaced by empty containers of the same wt A test sheet forming machine is also described, which is claimed to give very even formation and reproducible results, the variations in the strength of sheets made from the same pulp and beaten to the same degree being from 2–3 times as great with the Schopper sheet former as with the Jonas Kross app J found that the highest breaking length was obtained with sheets weighing 90–2 g per sq m , and suggests that this wt should therefore be adopted A Papineau Couture

Some factors affecting the strength of groundwood. A Ruby *Papier* 33, 1283–1300(1930) —A review is given of the effects of the species of wood, conditions of growth, age, dryness and state of preservation of the wood, barking, nature, dressing and speed of the stone, grinding pressure and temp , screening and refining of the groundwood and conditions of storing A Papineau Couture

Studies in the manufacture of groundwood pulp H Wyatt Johnston *Pulp Paper Mag Can* 31, 221–32(1931) —An analysis is given of the program for investigation of groundwood manuf at the Montreal Forest Products Labs A P.-C

Practice and control of beating and jordaning. F W Motschman *Paper Trade J* 92, No 8, 127, 129(1931) —Experiences and opinions concerning the manipulation of

beater rolls and measurement of power consumption and indices of hydration Particular attention is given to types of jordan filler to make sp grades of paper A P.-C.

**Bibliography of wood-pulp strength testing.** DONALD E CABLE *Paper Trade J.* 92, No 9, 35-9(1931) —This is a continuation of Moore's bibliography (*C A* 23, 5580) and comprises abstracts of 27 articles published in 1929 and 1930 A P.-C

**Tests on cotton and wood pulp for nitrocellulose plants** M STRUDE *Nitrocellulose* 2, 10-11(1931) cf *C A* 25, 413 —Methods of detn of Cu no., degree of bleaching, neutral gum, hemicellulose, albumen, absorptive power and viscosity are given E M SYMMES

**Instruments for determining the freeness or degree of beating of paper pulps.** LOUIS SCHOPPER LABORATORIES *Papier* 33, 1303-19(1930) —The construction and method of using the latest type of Schopper Riegler freeness tester are described A PAPINEAU COUTURE

**Hard facing in the pulp and paper industry** W A WISSLER *Paper Trade J.* 92, No 8, 137-43(1931) —A discussion is given of the merits of hard facing of equipment parts subjected to wear in various applications in the pulp and paper industry The different types of hard facing materials are indicated, together with their fields of application and the method of applying them to the parts to be faced A P.-C

**Instrument applications in pulp and paper mills cut costs and safeguard profits.** REGINALD TRAUTSCHOLD *Paper Trade J* 92, No 2, 32-8 No 4, 28-42(1931) —A general discussion is given of the importance of instruments in pulp and paper mill operation, where they make for economical operation by permitting of a satisfactory balance and coördination of all the many steps involved A PAPINEAU COUTURE

**The photoelectric tube in paper manufacture.** S A STAFOE *Pulp Paper Mag. Can* 31, 315-6(1931) —A brief outline is given of some of the possible uses to which the photoelec tube can be put in the manuf of paper A PAPINEAU COUTURE

**Bibliography of paper making for 1930.** C J WEST *Paper Trade J* 92, No 8, 145-85, No 9, 40-6, No 10, 47-54(1931) —A classified list is given of articles on pulp and paper making published in 1930 A PAPINEAU COUTURE

**United States patents on paper making: fourth quarter, 1930** C J WEST *Paper Trade J* 92, No 6, 61-2(1931) cf *C A* 25, 590 —A list in numerical sequence of U. S pats relating to pulp and paper manuf issued during Oct., Nov and Dec., 1930. A PAPINEAU-COUTURE

**A review of current investigations at the Division of Pulp and Paper of the Forest Products Laboratories of Canada, Montreal.** E P CAMPBELL *Pulp Paper Mag. Can* 31, 189-94(1931) —A review A PAPINEAU COUTURE

***Recent investigations of paper-making materials*** ANON. *Bull Imp Inst* 28, 411-24(1930) —*I Soft wallaba wood (Eperua falcata) from British Guiana* —The wood contained 55.3% cellulose on the dry basis, as compared with 39.7% in a sample analyzed some yrs previously (*C A* 22, 3207) The difference in cellulose content is attributed to difference in age Cooking with 20% NaOH on the wt of the wood, at a concn of 4%, for 5 hrs at 160° yielded 46% of dry unbleached pulp and 40% of dry bleached pulp This treatment gave a well reduced pulp, which furnished a soft, opaque, rather bulky, brown paper, of fairly good strength, but containing a no of very small pieces of undisintegrated fiber and small black specks The pulp bleached fairly readily to a cream color, but the black specks were not eliminated. Increasing the cooking temp to 165° yielded 41% of dry unbleached pulp and 40% of dry bleached pulp, similar in quality to those obtained at 160°, but containing no specks Kraft paper of fair quality, but lacking somewhat in strength, could be produced from the above pulp, but the wallaba fiber being very resistant to hydration, the cost of beating would be about twice as high as in the ordinary com production of kraft paper A sulfite pulping test carried out by cooking 100 g of wood for 8 hrs at 75 lb and at a max temp of 158° (maintained for 7.4 hrs.), with 1000 cc of liquor contg 5.08% total and 3.48% free $SO_2$, yielded a gritty, resinous pulp showing very little felting power, which could not be made into sheets, this result is attributed to the high "resin" content (12% acetone sol.) *II Xerotes longifolia from Tasmania* —The material, consisting of tough, rush like stems and rather tightly rolled thin leaves, contained 4.2% ash and 41.1% cellulose (10% moisture basis) The fibers were 1.0-3.2 mm. long (av 2.0), and 0.005-0.020 mm in diam (av. 0.012) Cooking 3 hrs at 145° with 17.2% NaOH at a concn of 3% yielded 40% dry unbleached pulp and 36% dry bleached pulp (bleach consumption 20%), but there remained numerous particles of brown, incompletely disintegrated material, even after bleaching Increasing the NaOH to 21.5%, the time to 3.5 hrs and the temp. to 150° gave 39 and 35% of unbleached and bleached pulps, resp The unbleached pulp still contained a large no of particles of imperfectly

dige ted material most of which were removed on bleaching The well beaten pulp vielded a tough opaque paper of good strength somewhat similar to that produced from esparto but less bulky harder and somewhat stronger *III Paupo leaves from New Zealand* Raupo leaves (*Typha angustifolia* Linn var *Brownii*) contained H,O 12 ash 3 0 cellulose 38 3% (43 8% on dry basis) the fibers were 0 6 3 0 mm long (av 1 42) and 0 0105–0 0177 mm in diam (av 0 0076) Cooking 3 hrs at 140° with 10% NaOH at a concn of 3% yielded 32% of dry unbleached pulp and 23% of dry bleached pulp The test produced a fairly well digested pulp which furnished a pale brown hard rather rattly opaque paper of good strength this showed some shrinkage on drying and contained some imperfectly sepd fibrous material which was removed by bleaching The yield is too low to make the material promising as a source of paper pulp for the manuf of rayon the pitch would first have to be removed from the leaves and this would still further reduce the yields *IV Reeds (Phragmites vulgaris) from northern Rhodesia* —The material contained H,O 7 5%, ash 1 9%, cellulose 70 6% (76 4% on the dry basis) the fibers were 0 8 3 0 mm long (av 1 7) and 0 0102 0 018 mm in diam (av 0 0193) Cooking 4 hrs at 170° with 16% NaOH at a concn of 4% yielded 47% dry unbleached pulp and 39% dry bleached pulp, similar to that furnished by esparto yielding a fairly soft, bulky opaque paper, but requiring nearly twice as much bleaching powder as esparto *V Straw waste* —Cooking 5 hrs at 168 with 20% NaOH at a concn of 4% yielded 44% of dry unbleached pulp and 42% of dry bleached pulp, which gave a tough, rather rattly, opaque paper of excellent strength but contg numerous brown specks (consisting of cellular material) which were eliminated to a large extent on bleaching A preliminary dusting treatment which removed about 30% of non fibrous matter, gave by the same treatment 53% dry unbleached pulp and 50% (equiv to 35% on the original material) of dry bleached pulp The unbleached pulp still contained a small amount of cellular material, which was easily eliminated on bleaching The bleached pulp yielded a white paper of excellent strength and quality and practically free from specks A P-C

**Testing of paper for water resistance.** Philip W Cobwise *Paper Trade J* 92, No 10 55–7(1931) —The dry indicator method offers the greatest promise of development to a universally acceptable standard test for the degree of total size resistance Preliminary collaborative work having given results that were inconclusive and that indicated the necessity of further development work, the following points were studied nature and prepn of the indicator mixt, application of the indicator on the test sheet reading of the end point effects of humidity and temp A technic embodying the results of the investigation is described in detail A Papineau Couture

**Porosity and air space of paper** James Strachan *Paper Maker & Brit Paper Trade J* 81, No 1, xli–xlix(Jan, 1931) —A general discussion is given of the subject, defining the difference between porosity and air space, indicating the practical importance of the subject to paper users outlining the methods of practical paper making adopted in controlling porosity and air space, and reviewing the methods of testing the porosity of paper A Papineau Couture

**Freeness testing** W Boyd Campbell *Research Notes* 3, 25–30(1930), *Pulp Paper Mag Can* 31, 264–7 280(1931), cf *C A* 24, 1976 —The principles underlying freeness testing of pulps are discussed and the conditions necessary for the operation of freeness testers are pointed out The effect of the pressure head and the duration of flow in compacting the pulp are particularly stressed A math analysis is given which relates the freeness as detd by the Can freeness tester and the English sheet machine to the sp resistance of the pulp to flow through it. For the Can tester $R = 30.44 (1000 - V)/V$, for the English sheet machine $R = 10.30\ tF/W$, where $R$ is the resistance of 1 g of pulp in a layer on 100 sq cm, $V$ is the vol of outflow from the chamber at the end point of the test, $t$ is the time of flow in sec, $F$ is the fluidity of water in reciprocal centiporses, and $W$ is the wt of sheet formed. It is pointed out that $R$ is different when detd on the 2 machines and that the ratio of the 2 values is a measure of a pulp quality termed the compressibility. Typical values of the ratio for ground wood are about 1 55, while for kraft and unbleached sulfite (beaten) the value is about 3 0 It remains to be seen whether this quality varies in any one type of pulp to an extent sufficient to make the test of value for control work. A Papineau Couture

**The folding resistance of paper** Raymond Fournier *Papeterie* 53, 146–50 (1931) —A brief description is given of a new type of folding resistance tester, based on the same principle as the Schopper Riegler but quite different in construction The test strip is 15 × 180 mm (same as for the Schopper tensile test) and both ends are clamped in a 2 kg wt, so that the tension is exactly 1 kg The fold is effected by passing the test strip through a slot in a blade which is reciprocated vertically between 2

pairs of 14 mm steel rolls mounted on ball bearings. When the strip breaks, the fall of the weight stops the motor and applies a powerful brake to the flywheel. An automatic revolutions-counter indicates the no. of double folds. A PAPINEAU COUTURE

Low-pressure steam and paper-machine drying. DONALD ROSS-ROSS. *Paper Trade J.* 92, No. 8, 106–9(1931).—The superiority of the "blow through" type of drainage system over that employing individual traps is explained and its advantages are enumerated. A "blow through" system of paper machine drainage, with temp. control, as installed on No. 1 machine at the Beauharnois Division of Howard Smith Paper Mills, is described in detail. It is claimed that this drying system has reduced cockling troubles, maintained more satisfactory final moisture in the sheet, and substantially increased the drying capacity. A. PAPINEAU-COUTURE

The efficient drying of paper. E. W. G. COOPER. *Paper Trade J.* 92, No. 8, 110–2 (1931).—A practical discussion is given of the factors involved in paper drying, including notes on the selection of felts, press rolls and the use of pre-driers. A. P. C.

White water in paper mills. A. J. MACNAUGHTON. *World's Paper Trade Rev.* 95, 268–80, 300–8, 426, 428(1931).—General notes are given on the utilization of white water in a wide variety of mills. A. PAPINEAU COUTURE

Utilizing fuel value of waste sulfite liquor. HERBERT S. KIMBALL. *Paper Trade J.* 92, No. 8, 124–7(1931).—The details of Kubles' process (*C. A.* 24, 6008) for the concn. and drying of sulfite waste liquor are interpreted in terms of American practice, the calcns. being based on the waste liquor output of a 50-ton sulfite mill. It is estd. there can be generated 13,063 lb. of steam net per hr., at a cost of $2.65, or about $0.20 per 1000 lb. A. PAPINEAU-COUTURE

Waste liquors and gases of the paper industry. C. J. WEST. *Paper Trade J.* 92, No. 3, 48–56, No. 4, 50–6, No. 5, 46–51(1931), cf. Schrohe and W., *C. A.* 20, 987.—Abstracts are given of 330 U. S., Can., Brit., German, Fr., Swedish, Norwegian, Austrian and Swiss pats. issued during the period 1925–1930, compiled from *Paper Trade J.*, *C. A.* and *Papier-Fabrikat*. Author and subject indexes are appended. A. P. C.

Color. R. CARTER. *World's Paper Trade Rev.* 95, 716–20(1931).—After a brief review of the properties, uses and advantages of basic, acid and substantive dyes and of pigment colors, the chief tests which should be applied to dyes in the paper mill are briefly discussed. A. PAPINEAU-COUTURE

The preparation and purification of some paper makers' pigments. E. T. ELLIS. *Paper Maker & Brit. Paper J. Annual No.*, 32–4(1930).—A description is given of the prepn. and purification of bone black, ferric oxide, iron buff, lead chromate, manganese bronze, Prussian blue, red lead, smalt and ultramarine. A. PAPINEAU COUTURE

The dyeing and coloring of paper. F. HAMILTON. *World's Paper Trade Rev.* 95, 689–94, 730–4(1931).—An address is given which deals chiefly with the properties of the various classes of coloring matters. A. PAPINEAU-COUTURE

Improved constant humidity room. JAMES D'A. CLARK. *Paper Ind.* 12, 1559–63 (1931).—A detailed description is given of a const. humidity room, based on, but somewhat modified from, that described by Ruff (*C. A.* 21, 4097), built and equipped at a cost of approx. $1000. It has been operating with complete satisfaction since the end of 1928. A. PAPINEAU-COUTURE

The resins of jack pine. JOHN B. PHILLIPS. *Pulp Paper Mag. Can.* 31, 211–9 (1931).—The resins were found to consist chiefly of resin acids and fatty and unsaponifiable matter. The fatty constituents, to which are generally attributed so-called "pitch troubles" in pulp and paper mills, are made up largely of acids and glycerides of the unsatd. type (including large proportions of oleic and linoleic acids and traces of linolenic acid). The fats of seasoned wood were found to contain a high percentage of oxidized fatty acids, probably derived from the unsatd. acids, which oxidize and polymerize very readily. These transformations involve a change from oily, sticky material to more inert, solid products. As it is generally agreed that pitch trouble is brought about mainly by flocculation and coagulation of resin particles, it is suggested that the possibilities of triethanolamine as an agent for removing the troublesome resinous particles, or rendering them harmless, should be investigated. A. PAPINEAU-COUTURE

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Two years' progress in corrosion resistance [in sulfite industry] (MATHEWS) 9. Cr-plating of paper mill rolls (CLEVELAND) 4. Lignin, humic acid and humin (FREMY) 10. Lignin and related compounds (HIBBERT, SANKEY) 10. Destructive hydrogenation (Brit. pat. 338,192) 21. Solvents for cellulose esters and ethers (Ger. pat. 517,097) 13. Obtaining cellulose from seeds (U. S. pat. 1,794,105) 27. Synthetic rubber [for use in manufacture of threads, films, etc.] (Brit. pat. 328,152) 30. Sugars from cellu-

losic material (U S pat 1,793,081) 28 Cutting elements for paper making engines (U S pat 1,792,546) 9

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**Cellulose** Steckborn Kunstseide A G Swiss 142,113, May 6, 1929 Mat cellulose of good textile properties is obtained by emulsifying viscose with an agent insol therein and adding a substance sol both in this agent and in viscose Thus, viscose is emulsified with toluene and acetone is added

**High α-cellulose product from wood cellulose** Zellstoffpapierk Waldhof and A Bernstein Brit 337,445 July 29 1929 A cellulose contg 98 99% α-cellulose suitable for production of cellulose acetate nitrate or formate, etc , is obtained from bleached or unbleached wood cellulose by treatment with a 5% or stronger soln of caustic alkali or alk carbonate in the presence of a bleaching agent such as chloride of lime A 2 5-5 0% alkali soln gives a 90-95% α-cellulose Various details of procedure are given

**Cooking sulfite cellulose** Sergei I Chuvikovskii and Grigory I Liachovetzkii U S 1 793 264, Feb 17 Liquor leaving the cookers is conducted to an evaporator where it is heated by fresh steam and the vapors are returned to the cookers Various details of app are described

**Cellulose derivatives.** Courtaulds, Ltd Ger 514 892, Jan 19, 1927. Alkali cellulose is subjected to the action of a small quantity of $Et_2SO_4$ at 25°, the free alkali is removed and the product dried and acetylated The ethylated cellulose contains not more than one Et group to each $C_6H_{10}O_5$ group Examples are given

**Cellulose derivatives** Soc anon pour l'ind chim à Bâle Swiss 141,556, Aug 31, 1928 Cellulose derivs are obtained by the action of substances of the general formula halogen—$C_2H_4$—N=$(C_2H_5)_2$ on alkali cellulose The product has basic properties which enable it to unite readily with acid dyes Examples mention the action of chloroethyldiethylamine on cotton and cellulose Cf *C A* 24, 4156

**Cellulose derivatives.** Soc anon pour l'ind chim à Bâle Swiss 142,173, Sept. 8, 1928 New derivs are prepd by treating cellulose with phthalic acid anhydride in the presence of tertiary bases The product is a white mass with an affinity for cotton and basic dyes In the example, cellulose is treated with the anhydride and pyridine at 60°

**Cellulose derivatives** Soc anon pour l'ind chim à Bâle Swiss 142,175, Apr 11, 1929 New derivs are prepd by the action of cyanuric chloride on alkali cellulose The products are unresponsive to vat and acid dyes, but responsive to basic dyes, and can be used as the raw material for textile fibers In an example, unbleached cellulose in KOH is treated with the chloride Cf *C A* 25, 1082

**Cellulose derivatives.** Soc anon pour l'ind chim à Bâle Swiss 142,749. Aug 8 1928 A new deriv is obtained by the action of phenylisocyanate on cellulose The product can be used to make textile fibers and has a strong affinity for basic dyes

**Acetylcellulose** Samuel I Vles and Louis de Hoop (to Allgemeene Kunstzijde Unie N V) U S 1,794,126, Feb 24 An acetylizing bath formed from $Ac_2O$ and glacial HOAc is allowed to stand for several hrs until part of the water in the acid has combined with the $Ac_2O$, and cellulose is then introduced into the bath

**Cellulose acetates, acetopropionates, acetobutyrates, etc.** I G Farbenind A -G Brit 337,366 July 25, 1929 In the production of cellulose acetates, propionates, butyrates and mixed esters, the esterification is carried out in the presence of methylene or ethylene chloride as solvent instead of free acid and by effecting the reaction at temps of 20-60° degradation of the cellulose is avoided and clear solns of unusual homogeneity and viscosity are obtained, which may be spun directly or may be hydrolyzed to give acetone soly The quantity of catalyst such as $H_2SO_4$ used may be reduced to about 0 5% Various auxiliary details of procedure are described

**Precipitating cellulose acetate** K. Werner Brit 338,214, Aug 15, 1929 An app is described for pptn of primary or secondary cellulose acetates from HOAc soln by a pptg liquid such as water, by bringing the materials together in streams which flow into each other through a centrifugal pump to cause intimate admixt , suitably at a temp of about 70° A bleaching agent such as Cl gas may be supplied to the app

**Mixed cellulose esters** C J Staud and C. S Webber (to Kodak, Ltd ) Brit 338 201, Feb 18, 1929 Mixed cellulose esters, other than lacto-formate, are prepd by digesting an acyl ester of cellulose such as cellulose acetate with an aliphatic or aromatic aliphatic mono- or di basic carboxylic acid contg a hydroxy group in the α-position, such as lactic tartaric, racemic glycolic, glyceric, mandelic and malic acids Several examples with details of procedure are given

**Mixed cellulose esters** C J Staud and C. S Webber (to Kodak, Ltd ) Brit

338,202, Feb 25, 1929 Mixed esters are formed by digesting an acyl ester of cellulose such as cellulose acetate with a carboxylic acid contg a ketonic group in the $\alpha$- or $\gamma$-position such as pyruvic, $\alpha$ ketobutyric, $\alpha$ ketovaleric, $\alpha$ ketocaproic and levulinic acids, the reaction being preferably effected in a vessel provided with a reflux condenser, in which a soln of the cellulose acyl ester and reacting acid are heated to about 100° under atm pressure Several examples are given

**Cellulose esters and ethers** SPICERS, LTD Ger 514,945, Nov 24, 1926 Masses are formed from cellulose ethers and esters or similar carbohydrates of empirical formula $n(C_6H_{10}O_5)$ especially the org acid esters, by incorporating with them, hepta- or hexachloropropane alone or mixed with other solvents or softening agents Cf *C A* 22, 1237 2840

**Solutions of cellulose esters and ethers.** MAX OW ESCHINGEN (to Radio Patents Corp) U S 1,794,066, Feb 24 Materials such as nitrocellulose, cellulose acetate or ethyl cellulose are dissolved in wood oil together with other known solvents such as EtOH or MeOH (the wood oil used being the product resulting from the distn, at a max temp of 120° of residual oils obtained in the initial distn of wood)

**Capsules of cellulose hydrate.** RUDOLF BEYRICH Ger 514,877, April 22, 1926 The capsules are immersed in a bath of lower b p than water, *e g*, acetone, alc, etc, so that a complete or partial replacement of the water in the cellulose hydrate takes place by the liquid of lower b p, so diminishing the shrinkage duration of the capsule

**Capsules** KALLE & Co A -G (Julius Voss, inventor) Ger 517,021, Dec 15, 1925 Addn to 515 377 (*C A* 25, 1672) Capsules made from viscose with which mica and (or) mosaic gold has been incorporated, are rendered opaque as described in Ger 515,377

**Effecting deodorization, bleaching and sterilization of fibrous materials such as sawdust.** FREDERICK W BRODERICK U S 1,792,805, Feb 17 The material is moistened with a dil $Na_2CO_3$ soln, heated to about 38°, and treated with Cl gas so that the latter reacts with the $Na_2CO_3$ present and forms HOCl directly on the material, which is washed and dried App is described

**Waterproof fibrous products suitable for making milk bottles, etc.** ALBERT L CLAPP U S 1,793,839, Feb 24 A thermoplastic waterproofing material such as paraffin and rosin is mixed with a suspension of wood pulp at a temp above the m p of the thermoplastic material, and while hot the suspension is made into the desired form such as milk bottles, dishes or toys

**Bleaching bands, films, capsules, etc, made of regenerated cellulose or cellulose derivatives.** CHEM FAB VON HEYDEN A G Ger 517,284, Dec 20, 1927 The materials are treated at atm or raised temp with solns of salts of aromatic sulfochloramides, *e g*, with a 2% soln of the Na salt of *p* toluenesulfochloramide

**Plastifiable material comprising acetylated wood** I G FARBENIND A G Brit 337,791, Aug 7, 1929 Material such as degummed beechwood meal is treated with $Ac_2O$, with or without addn of concd HOAc, in the presence of 8–14% of $H_2SO_4$ or an equiv quantity of other acid such as HCl or $H_3PO_4$, at a temp below 30°, and the swollen mass which is no longer fibrous is further worked up as in cellulose acetate manuf A product may be obtained sol in HOAc or $CHCl_3$ Various details of procedure are given

**Artificial silk.** CARL HAMEL SPINN- & ZWIRNEREIMASCHINEN A G Swiss 142,978, Nov 13, 1929 App is described for stretching the fibers after treating them with a softening bath

**Artificial silk.** N V J A CARP'S GARENFABRIEKEN Brit 337,418, May 24, 1929 Various kinds of artificial silk such as that made from viscose, cellulose acetate or cuprammonium cellulose are given a dull luster by treatment with a soln of a fluosilicate, either during or after manuf, under such conditions that silicic acid is produced by hydrolysis and partly incorporated in the material so that it is not removable by water, dil acids or soap solns Various details of procedure are described

**Artificial silk from viscose.** N-V NEDERLANDSCHE KUNSTZIJDEFABRIEK (to British Enka Artificial Silk Co, Ltd) Brit 337,350, June 8, 1929 Viscose is used with a spinning bath contg at least 30% of sulfonic acids of aromatic hydrocarbons (suitably one contg benzenesulfonic acid 37 9 and $H_2SO_4$ 22 3%) Glucose and alcs may be added, and the filaments may be subsequently treated with water or dil acid or salt soln, and weakly matured viscose may be used The product has an elongation of 10-13%

**Artificial silk and films from viscose.** I J. FRENKEL Brit 338,318, Oct 21, 1929 In order to avoid evolution of disagreeable gases during the manuf, nitrocellulose is dissolved in the viscose during its treatment with alkali (the nitrocellulose being de-

compd into cellulose and $NaNO_2$ being formed, which reacts with the $H_2S$ and other noxious gases liberated in the coagulation bath) A small quantity of hydrazine is also formed and preferably converted into a harmless complex Fe compd by adding an Fe salt such as $FeSO_4$. The filaments made from material thus treated are chocolate-colored when first formed but assume a normal color after desulfuration. Various details of procedure are described

Artificial fibers from viscose. Zellstofffabrik Waldhof and Arnold Bernstein Ger 514,702, July 14 1928. An app is described in which the coagulating and fixing liquids are sepd by a partition, the spun fiber passing through the top layers of these liquids.

Device for applying friction to filaments, etc., spun from viscose. Hermsdorf & Co G m b H (Hugo Fling, inventor) Ger 517,324, Mar 18, 1926

Use of viscose precipitating baths containing magnesium sulfate. Johann J Stöckly and Richard Bartunek (to the firm Vereinigte Glanzstoff Fabrieken A.-G.) U S 1,793,649 Feb 24 For maintaining the compn of viscose-pptg baths contg $MgSO_4$ and $Na_2SO_4$ in soln, the soln, at a $MgSO_4$ content of over 220 g per l, is cooled to effect crystn of $MgSO_4$ in practically pure form the cryst. material is sepd, the resulting liquor is diluted and practically pure $Na_2SO_4$ is sepd by further lowering of the temp and the resulting mother liquor is concd and is added with a suitable proportion of $MgSO_4$ to the pptg bath to be revivified

Artificial silk. A Bosse Fr 637,340, June 25, 1928. See Fr 677,479 (*C. A* 24, 3113)

Artificial silk filaments from cuprammonium cellulose solutions. British Bemberg Ltd Brit 337,608, Nov 19, 1928. In a method involving stretching and coagulation by a stream of precipitant flowing with a gradually increasing speed through a funnel within a spinning vessel, the fresh precipitant, before encountering the threads, is mixed with part of the used precipitant passing from the funnel through apertures into a surrounding space App is described.

Liquid treatments of wet cakes of artificial silk. J P. Bemberg, A.-G (to British Bemberg, Ltd) Brit 337,590, Nov 9, 1928 For treatments such as washing, or satg with soaps or fatty emulsions, etc, wet cakes of artificial silk contg acid are removed from spinning pots and placed upon supports having a yielding periphery and are then immersed in the treating baths Various details of app and operation are described.

Apparatus for making silk filaments by the centrifugal box method. I G Farbenind A G Fr. 637,610, Nov 8, 1928. Impurities such as salts and acid are removed in a counter-current of washing liquor which preferably enters the guide funnel at its lower part and leaves at its upper part Water or dil. $H_2SO_4$ soln may be used for the washing Various details of app and operation are described

Protecting rayon fibers. Arthur Reilly (to Twitchell Process Co.) U. S. 1,794,342, Feb 24 Rayon fibers, after their formation and before completion of articles formed of them, are protected by coating them with inert mineral oil and "true mahogany" (a described sulfonate material)

Hollow artificial fibers. Erste böhmische Kunstseidefabrik A.-G Ger 517,355 Sept. 5 1926 Hollow artificial fibers are prepd by incorporating into the usual spinning solns. liquid or solid substances which are insol in the solns. and which do not give rise to gases or vapors during the spinning process, the added substances being ultimately removed from the spun fibers by means of a solvent. Thus, paraffin oil may be emulsified in viscose, and after spinning washing and bleaching the oil particles may be removed from the fibers by means of $C_6H_6$.

Device for the wet spinning of artificial fibers. Novaseta A.-G Arbon Swiss 142,046 and 142,047, Oct. 10, 1929 Addns. to 140,048 (*C. A* 25, 815). Details of the funnel shaped app are given

Apparatus for making artificial silk filaments. Courtaulds, Ltd Ger 517,323 July 7, 1927 See Brit 275,042 (*C. A* 22, 2273)

Spinning device for artificial silk. Weber & Co Swiss 142,115, Sept 19, 1929

Spinning device for artificial silk. Carl Hamel A.-G Ger 514,667, Aug 6, 1929

Spinning chamber for artificial silk. Emil Blaschke Ger 514,844, Oct. 6, 1929

Saccharification of wood. Eduard Färber, Gregoire Minkoff and Thomas W M Pond (to International Sugar and Alcohol Co., Ltd) U S. 1,795,160, March 3 Wood is first treated with concd HCl and HCl gas in quantities insufficient to effect complete conversion into sugar, then is transferred to a diffusion battery and allowed to stand without agitation, the conversion is completed by treatment with HCl of a

paper or rayon manuf., the wood is subjected to a partial vacuum to remove volatile constituents and then subjected to a relatively high gas pressure until the cells of the wood are permeated with the compressed gas, and the pressure is then suddenly released

Apparatus (with reciprocating and rotating saws) for reducing wood to pulp. JOHN A WIFNER (to Oswego Board Corp.) U S 1,795,064, March 3 Structural features

Wood pulp CLIFFORD F PETERSON (to Champion Fibre Co.) U S 1,792,703, Feb 17 Wood chips are digested in relatively dil alk cooking liquor such as NaOH and Na sulfide soln with continuous withdrawal of liquor from the bottom of a body of liquor and chips and continuous addn of the withdrawn liquor to the top of the same body the temp of the materials is raised to the desired cooking temp by introducing steam directly into the lower portion of the body of materials, and the cooking temp is thereafter maintained by indirect heating of the circulated liquid. App is described

Wood-pulp product suitable for paper making. GEORGE A RICHTER (to Brown Co.) U S 1,793,194, Feb 17 An unbeaten chemical wood pulp is homogeneously blended with like beaten or hydrated pulp Cf *C A* 24, 2884

Paper pulp from groundwood. RAYMOND S HATCH, ROBERT B WOLF and RAYMOND P HILL U S 1,794,174 Feb 21 Wood is ground to produce short fibered groundwood pulp slivers are sepd from the pulp, the slivers are subjected to a softening and defibering treatment with a suitable soln and the resulting pulp is mixed with the short fibered ground pulp

Furnace for recovery of values from waste wood-pulp liquor residuum. FERNANDO FALLA (to Edge Moor Iron Co.) U S 1,794,006, Feb 24 A steam boiler is operated by the furnace gases and cooling gases are supplied to the boiler space at a point beyond the inlet of the furnace gases so that the furnace gases will be cooled to an extent sufficient to ppt entrained "chemical ash" from them Various details of construction are described

"Kraft-simulating" pulp. GEORGE A RICHTER (to Brown Co.) U S 1,792,510, Feb 17 Wood chips are digested by heating under pressure in an acid sulfite liquor in which the free $SO_2$ and combined $SO_2$ are in approx equal proportion (of 3 to 4% each), the pulp is sepd from the digesting liquor and is further digested in an alk. cooking liquor

Apparatus for continuous filtration and dehydration of pulp for artificial leather or paper manufacture. C CARCANO Brit 337,346, July 22, 1929 Structural features

Hydrating and beating paper pulp. G H CARNAHAN (to Intercontinental Rubber Co.) Brit 338,389, Dec. 4, 1928 Pulp is hydrated by repeated squeezing and rubbing between resilient surfaces such as rubber in the presence of water (suitably by the use of rubber-covered balls in a tube mill)

Apparatus for beating paper pulp. WM V KNOLL (to Mid-West Machine Co.). U S 1,793,095, Feb 17. Structural features

Paper. OTTO ENGEL. Ger 514,787, Oct 15, 1926 Addn to 483,735 The method of 483,735 (*C A* 24, 699), for producing layers of paper felt, cardboard, etc., with intermediate layers of fabric, gauze, bands or fibers, etc., is modified by using as the binding material, asphalt, resin, bitumen, etc., mixed with oil, tar, etc., with a m p considerably higher than that of the finishing material to be subsequently used

Paper. I G FARBENIND A.-G Ger 514,856, Aug 14, 1926 Addn to 500,567 (*C A*. 24, 4932) Cellulose material such as straw, wood, etc., is impregnated with dil $HNO_3$ and treated with air after the removal of the excess of acid The fibers are then worked up as usual

Paper. ERNST FUES Ger 514,921, July 8, 1927 Paper consisting of one or more layers is impregnated, colored, glazed, etc., by sprinkling the impregnating, etc., agent on or between the paper layers in powd form in the presence or absence of diluents, treating with solid or liquid assisting agents, and pressing over rollers Synthetic resins of the $C_6H_5OPhOH$ types are mentioned as suitable assisting agents

Paper-making apparatus. W P FELNEY Brit 337,532, Aug 5, 1929 Structural features

Paper-making machine (Fourdrinier type). PAUL ERKENS. Ger 517,229, Feb. 25, 1927 Addn to 406,942 Structural features are described

Metallic cloth for paper-making apparatus. RICHARD KASTNER U. S 1,794,624, March 3

Filtering apparatus suitable for treating "white water" from paper manufacture. EDWIN M BASSLER (to D J Murray Mfg Co) U S 1,793,449, Feb 17. Structural features

Automatic apparatus for regulating the drying of paper, fabrics, etc. MASCHINENFABRIK AUGSBURG NÜRNBERG A G (Friedrich Inglert, inventor) Ger 517,232, Nov 7, 1925

Moistening device for paper, etc., sheets. HUBERT AUER, JOSEF DERCKS and GUSTAV RONSIEK. Ger 517,035, April 9, 1929

Sizing paper. KARL SVEEN Ger 517,228 July 21, 1925 A thin dispersion or soln of a sizing material, *e g*, animal glue, in an amt. not exceeding 1 part of dry sizing material to 100 parts of dry paper is continuously added, at a point between the hollander and the wire cloth, to paper stuff contg fillers, etc., and $Al_2(SO_4)_3$ or other usual precipitant The sizing soln may be stored for some time at atm or reduced temp. before use

Apparatus for locally applying coloring, etc., liquids to wet sheet material (paper). GEBR PALM, PAPIERFABRIK Ger 517,325, Dec 21, 1924 Addn to 509,392 (*C A* 25, 817)

Waterproof flexible paper. THE SCOTAN CO Ger 514,922, Nov 25, 1927. See Brit 281,316 (*C A* 22, 3550)

Treating paper to improve its light-reflecting properties. NATIONAL PAPER PROCESS CO Brit 338,168, Aug 14, 1929 To cause paper or other surfaces to reflect whiter light than usual, a light filter is applied to them in uniformly distributed areas, which with the untinted areas reflects a combination of colors giving a substantially white effect (the individual tinted and untinted areas being sufficiently small to prevent conscious resolution at the normal viewing distance) The color applied (usually blue) is such as to counteract the preponderant colors normally reflected by the surface Various details of manuf are given.

Etching designs on paper I G FARBENIND A.-G (Kuno Franz and Karl Dankert, inventors) Ger 514,626, June 15, 1928 Sharp etched designs are produced by treating the outer layer of paper material with the etching dye prior to subjecting the paper to the etching process

Variegated paper. LUDWIG HENNEBERGER. Ger 517,137, April 7, 1929 In the manuf of variegated paper by dropping oil colors onto soft water and then contacting the paper sheet with the surface of the water, the spreading of the color is assisted by adding a little $NH_4OH$ to the color, in addn. to the usual ox gall or alc. soap

Anti-moth paper. CARTON & PAPIERFABRIK G LAAGER Swiss 142,372, Nov 15, 1929 An anti moth prepn. such as tar soap is added to the pulp mass during the manuf of the paper

Coating paper on both sides with metal foil. LEOPOLD RADÓ Ger 514,577, April 1, 1927 Cf C. *A*. 24, 4634

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E MUNROE AND C. G STORM

The characteristics of an explosive: properties determined by combustion in a closed chamber. M E BURLOT *Army Ordnance* 11, 283–6(1931) —The paper describes 2 pressure gage eprouvettes, with vols of 25 and 150 cc., for testing pulverulent explosives and *smokeless powders*, resp., and a special calorimeter of the Landrieu Malsallez type, in which the eprouvettes are immersed for detg heat of combustion. $P(t)$ is measured by registering the compression of Cu cylinders as a function of the time, by means of a pen attached to the crusher gage piston, and a revolving cylinder. For measuring gas vol ($V_0$) a gasometer is connected with the eprouvette through a special needle valve $T$ is calcd. from measured values for $P$ and $V_0$ or from the equation of combustion and the value of $Q$ detd. by the calorimeter Potentials of explosives are measured by this app to an accuracy of 1/1000 C G STORM

Consumption of explosives in January, 1931. W. W. ADAMS AND L. S GERRY Bur Mines, *Repts of Investigations* 3093, 13 pp (1931) ALDEN H EMERY

A nitro explosive five hundred years ago. F. M FELDHAUS. *Nitrocellulose* 2, 12–3 (1931) E M SYMMES

Determination of moisture in smokeless powder by the Benesch method. W. GRATLICH. *Nitrocellulose* 2, 13–4(1931) —Dry air is passed through smokeless powder.

the $H_2O$ is absorbed, and PtOH and acetone vapors are oxidized by hot CuO, the $CO_2$ and $H_2O$ therefrom being absorbed separately F M SYMMES

**A combustion theory for colloidal powders in closed vessel.** HENRI MURAOUR *Compt rend* 192, 227–9(1931) —From observations on the behavior of explosive powders in a closed vessel, a theory is derived to explain the behavior based on temp, pressure and gaseous layer effects M McMAHON

**High-brisance studies IV. Penthrinit versus dynamite.** ALFRED STETTBACHER *Z ges Schiess Sprengstoffw* 26, 38–40(1931) cf *C A* 25, 1998 —S answers the criticisms of Naoum (*C A* 25, 818) by describing tests in which Penthrinit is compared with various types of com *blasting gelatins*, the explosives varying in age from 30 hrs to 34 days The tests were made with 250 g charges on 25 mm steel plates, 150 g charges on 7 mm Fe plates resting on an Fe support, 100 g charges on 8 mm and 10 mm Fe plates, and 30 g charges stemmed in bore holes 22 5 mm diam × 0 4 cm deep in steel cylinders 12 cm diam × 15 2 cm high In every case the greater brisance of the Penthrinit mixts was demonstrated C G STORM

**Penthrinit, dynamite and the so-called high-brisance studies of Dr. Stettbacher.** P NAOUM *Z ges Schiess Sprengstoffw* 26, 40–5(1931), cf *C A* 25, 818 —N comments on the claims of Stettbacher (cf above abstr and *C A* 25, 1674, 1998) relative to the superiority of 'Penthrinit' mixts and their practical application The plate tests of S are interpreted as indicating relative sensitiveness to detonation rather than brisance The more insensitive gelatin explosives require stronger confinement than that afforded in the tests of S to develop their max brisance Even 30 mm steel tubes do not represent the confinement of a charge in a bore hole in rock The article is mainly controversial in nature C G STORM

**Combustion and detonation in gaseous mixtures Antidetonants** PAUL LAFFITTE *Bull soc encour ind nat* 130, 15–30(1931), cf *C A* 22, 1475, 2655, 23, 2571, 24, 966, 1207 ARTHUR FLEISCHER

**The testing of mine dusts.** A L GODBERT AND R V WHEELER *Trans Inst Mining Eng* 80, 312–27, *Colliery Guardian* 142, 301–4(1931) —A study of some 200 mine dusts indicates that percent of ash or incombustible dust is not a true guide to inflammability Some 16 samples contg more than 50% of incombustible matter were still classified as inflammable according to the test used These tests emphasize the wide differences in inflammability that exist between coal dusts of different chem compn and indicate that in the use of incombustible dust as a precaution agent against coal dust, there should be greater discrimination R S DEAN

**The inflammation of coal dusts: effect of the presence of fire damp.** T N MASON AND R V WHEELER Safety in Mines Research Board, London, *Paper* No 64, 32 pp (1931) —An account is given of inter related studies of the relative inflammability of a number of different coal dusts and the effect of the presence of fire damp in the air on the inflammability of coal dusts There is a fairly regular relationship between the content of volatile matter in coal and the inflammability of its dust Flame is not propagated in coal dust contg less than 12 5% of volatile matter The presence of fire damp in the air requires the use of a higher % of stone dust mixed with the coal dust for extinguishing the explosion of the latter When 2 5% of fire damp was present, coal dust contg only 7 5% volatile matter was just capable of propagating flame under the conditions of the expts The tests were conducted in a steel gallery 48 in in diam and 325 ft long, in which ignition was effected by a blown out shot of 20 oz of black powder stemmed with 1 lb of coal dust from a steel cannon with 2 in bore C G S

**Gaseous explosive reaction: effect of pressure on the rate of propagation of the reaction zone and on the rate of molecular transformation.** F W STEVENS *Natl Advisory Comm Aeronautics, Rept* No 372, 3–19(1930), cf *C A* 24, 1982 —A beam of light interrupted by a tuned shutter passed through a lens focused on a spark gap in the center of a soap bubble of explosive gases suspended in the center of a large sphere Through a second window, opposite the source of light, a camera focused on the spark gap recorded the explosive transformation on a moving film The reactions (I) $2CO + O_2 \longrightarrow 2CO_2$, (II) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$, (III) $2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O$, (IV) 1 8 Fuel + 1 $2O_2 \longrightarrow$ 1 $8CO_2$ + 0 $4H_2O$, (V) 1 5 Fuel + 1 $5O_2 \longrightarrow$ 1 $5CO_2 + H_2O$ were studied over a range of pressures from 100 to 2050 mm In all reactions studied, irrespective of the order given by stoichiometric equations from 3 to 15, the rate of transformation is proportional to the pressure This indicates a much simpler reaction than is indicated by stoichiometric equations in accord with the impact theory The findings are strong evidence in support of the theory of chain reactions High order reactions proceed by many simultaneous simple reactions Previous investigators, working in const vol, have in most cases given the

rate of displacement of the reaction zone and not the rate of propagation of the zone relative to the gas it transforms. Conclusion: "The rate of propagation of the reaction zone within the gases is independent of the pressure," from which it follows that the rate of mol transformation within the reaction zone is proportional to pressure." In constant vol measurements of rate of propagation the generally noted fact that the rate of propagation is uniform for a time after ignition is due to the approach to const. pressure conditions during this time. The work of others is discussed. A bibliography is given. A. LLOYD TAYLOR

Sensitivity of nitroglycerin: effect of static electricity on it and related compounds. H. E. NASH. *Army Ordnance* 11, 384–5(1931).—Sparks were passed through pieces of filter paper satd. with the liquid explosives, or through small samples on a Cu plate. The condenser furnishing the spark was of 0.008 mfd. capacity. Voltage varied from 4000 to 13,000. No explosions or ignitions were obtained in repeated tests with nitroglycerin, mixts. of nitroglycerin and *ethylene glycol dinitrate, propylene glycol dinitrate, nitrostarose*, and 40% *dynamite*. With a 50% soln. of *DNT* in anhyd. EtOH, ignition of the EtOH vapors occurred. In all tests the samples were surrounded by a cylindrical water jacket to maintain the temp. at the desired point, usually *50–60°*. The insensitivity of the liquid explosives to sparks is attributed to their low vapor pressure. Conclusion: Static electricity is not a hazard on nitroglycerin lines in dynamite plants. C. G. STORM

Fire, explosion and health hazards with rayon (nitrocellulose) lacquers. MAX GREMPE. *Nitrocellulose* 2, 36–8(1931). E. M. SYMMES

Two little-known sources of explosion. HANS WOLF. *Chem.-Ztg.* 54, 796(1930).—Iron sulfides resulting from the corrosion of gasometers by S products in illuminating gas can ignite spontaneously. Thin Al foil or Al bronze dust is capable of igniting under the influence of a strong light. A. L. HENNE

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Gas-analysis apparatus [for attachment to a miner's lamp] (Brit. pat. 338,410) 1

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Poudres et explosifs. Volume mis à jour à la date du 1 Janvier, 1930. Paris: Charles Lavauzelle et Cie. 199 pp.

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Explosive primer composition. CHARLES H. PRITHAM. U. S. 1,794,732, March 3. Hg fulminate 37, $Ba(NO_3)_2$ 32, Sb sulfide 28, ground glass 3 and a high explosive such as trinitrotoluene 4–8 parts are used together.

Propellent explosive comprising colloidized nitrocellulose. CHARLES M. A. STINE and CHARLES E. BURKE (to E. I. du Pont de Nemours & Co.). U. S. 1,792,516, Feb. 17. Nitrocellulose is colloidized with a nitrated ester of lactic acid and a polyhydric alc. such as dinitroglyceryllactate and nitroglyceryllactate or glyceryldinitrolactate.

Paper shot shells. WATSON H. WOODFORD (to Remington Arms Co.). U. S. 1,795,191, March 3. A portion of the paper shell wall is impregnated with a heat absorbent comprising a lacquer plasticizer, such as various described varnish or lacquer compns. Cf. *C. A.* 24, 4398.

Nitrated ester of lactic acid and glycerol, etc. CHARLES M. A. STINE and CHARLES E. BURKE (to E. I. du Pont de Nemours & Co.). U. S. 1,792,515, Feb. 17. A nitrated ester of lactic acid and glycerol is prepd. by nitrating a glyceryllactate with $HNO_3$ and $H_2SO_4$ and may be used in explosives with nitrocellulose, etc. Nitrolactates of ethylene glycol are also mentioned.

Electric blasting fuses. LIGNOZA SPOLKA AKCYJNA. Brit. 337,837, June 15, 1928. Structural features.

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## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The constitution and properties of level-dyeing rayon dyes. KARIN SCHULZE. *Seide* 36, 43–7, 85–90(1931). H. W. STIEGLER

Azo dyes and their intermediate products. V. Constitution and degree of dispersion of azo dyes. PAUL RUGGLI AND ARTHUR ZIMMERMANN. *Helv. Chim. Acta* 14, 101–26(1931). cf. *C. A.* 25, 417.—Substantive dyes for cotton are usually colloidal in soln. In this work an attempt has been made to trace a relationship between the constitution of such dyes, their affinity for cotton, and their degree of dispersion as measured by the viscosity of a dil. soln. and the rate of diffusion through a 1% gelatin

soln Definite conclusions are difficult to form Much depends on the number and position of the $SO_3H$ groups. A large amt of tabulated data is given which cannot well be abstracted VI. Relation between molecular size and properties of azo dyes. *Ibid* 127–41.—A series of dyes were prepd by a successive 2,6′ diazo coupling of 2, 3, 4, 5 and *x* mols of J acid (2 amino-5-naphthol-7-sulfonic acid) All showed more or less affinity for cotton, but from a technical standpoint would be considered very poor substantive dyes J acid alone does not dye cotton The 2 J compd in soln is highly dispersed The *x* J compd is coarsely dispersed, nearly insol, does not diffuse, and dyes poorly The others diffuse about the same rate as Congo red and their degree of dispersion approaches that of other substantive dyes, but even the 5-J compd, with a higher mol wt (1349) than any known azo dye, can hardly be classed as a true substantive, nor a true colloid, but is on the border line L E Gilson

The resistance of coloring substances to ultra-violet light. II. Giuseppe A Bravo *Boll ufficiale staz sper ind pelli mat concianti* 8, 184–90(1930).—A continuation of earlier work (*C A* 24, 2888) Measurements are given of dyes belonging to the nitro, nitroso, azo, stilbene, pyrazolone, diphenylmethane and triphenylmethane series G. Schwoch

Relation between fading of dyed colors in light and their color-depth. H Sommer *Z angew Chem* 44, 61–5(1931).—It is well known that pale shades of dyed colors fade more strongly in light than the heavier shades By employing a Zeiss graduated photometer for the measurement of color by the Ostwald system it is possible to establish a relation between the depth of color and the amt of fading The general process to be carried out for the detn of this relation is described Graphs are given plotted on the triangulated coordinate system, and expressed in the Ostwald color units, with a dyeing of Anthracene Blue SSWG extra on wool The relations deduced are expressed in math formulas, such as $A = n\sqrt{t}$, where $A$ = the Ziersch degree of bleaching, $t$ = the time of the action expressed in normal bleaching hrs, and $n$ = the "bleaching coefficient," being a const dependent on the light fastness of the dyestuff Also the relation between the collective range of different depths of dyed color and a definitely established normal is given as $A = N\sqrt{t}\,(\log c - \log f)$, where $N$ is the "bleaching constant" detd empirically from a comparison of different depths of dyed color, where $c$ = the dyestuff quantity used and $f$ = dyestuff quantity absorbed. The deduction of such a complicated formula from one set of expts on Anthracene Blue is assuming rather too much, but this is simple compared with further formulas involving exponential equations expressing the psycho-phys laws of Fechner with respect to color phenomena J M Matthews

Chlorinating and dyeing woolen goods. J Robert *Bol laniera* 44, 834–5 (1930).—Treat woolen yarn for ¼ hr with 100 l $H_2O$, contg 1.5 l HCl (22° Bé.), eliminate excess of bath, treat in 10–20% $Ca(OCl)_2$ for ½ hr, and again in the 1st bath for 20 min and in a cold bath with 5 g $NaHSO_3$ per l $H_2O$ After washing, initiate dyeing at a lower temp than usual, and without acid in the case of easily absorbed colors, only adding it gradually until exhausting the bath For a scroop treat in the cold with 5 g soap per l, dry slightly and acidify with dil HCl, $H_2SO_4$ or tartaric acid For a soft grip treat 10–15 min in a cold bath with 8–10 g soap, 1–2 g olive oil, and 3–4 g ammonia (24° Bé) per l $H_2O$. Woolen muslins absorb 120–160 g active Cl, while heavier articles take ½ to ⅓ this quantity Chlorination is often followed by a passage in Na stannate of 3–6° Bé, leaving the wool to itself for some time, and fixing with $H_2SO_4$ of 10° Bé, washing and drying To prevent the yellowing of whites during the steaming for fixing printing colors, the cloth is prepd with 15–20 g Na stannate per l, and dried without souring The same effect is obtained by passing in a bath with 50 g oxalic acid per l R Sansone

The dyeing of wool with vat colors. L Rinoldi. *Bol laniera* 43, 989–92(1929).—Indigo dyeings on wool sometimes have reduced fastness to light, attributed to hypo sulfite, free S, colloidal S, $H_2SO_4$, or sulfites formed by decompn, to strong alky. or acidity, to the color absorption conditions, or to the addn of glue When reduced color is absorbed, even if combined with alkali, it remains in a colloidal soln, and acts as a direct product, being absorbed mechanically as aggregated mols When absorbed as a sulfonate it acts as a well dissolved acid color, and is fixed by the wool as simple mols, much less resistant than mol aggregates Weakening of the wool is caused by NaOH, and by too much hyposulfite, which provokes, even after taking from the bath, an excessive oxidation that also destroyed a part of the color. R Sansone

Dyeing wool with tin salt and oxalic acid. J. Robert. *Boll laniera* 44, 837 (1930).—When cochineal or quercitron is used with aniline colors for dyeing wool

in shades faster to light and alkalies, prepare a bath contg oxalic acid 2, salt 1 5, cream of tartar 1 5 and $SnCl_2$ 1% *Add the cochineal powder*, after making into a paste with a little Sn salt soln , dye at the b p 1 hr and wash in soft water Cu and Fe must be absent and wooden vats are preferred, when tinned Cu or Sn vats are not available Orange II palatin scarlets, ponceaux *R and the rhodamines, are used in the cochineal bath after* this has been fixed on the wool, although better results are obtained by using them in a fresh bath With the phloxins and eosins this is indispensable

R SANSONE

**Faults in the dyeing of rayon viscose and their prevention.** L RISOLDI *Boll lanıera* 44, 201–5(1930) —Uneven shades and other faults are produced on viscose silk during dyeing by colloidal S sulfides or polysulfides coming from the manufacturing process and by ununiform threads *The S oxidizes to $H_2SO_4$, weakening the fiber* Deacidification with Na $CO_3$ or NaOH is not enough for uniform shades with direct or S colors, for the fiber in the more altered parts dyes less Better results are obtained by *treating with* NaOH at 50–60° and addn to the dye bath of soap, sulfonicinate, pyridine *old degumming baths and glue* *The greatest uniformity is* obtained during the most rapid dyeing and near the b p Colors strongly fixed in tepid baths give more regular shades at 90–95° With dark shades, for exhausting the bath there is added, after ½ hr dyeing 5–20% $Na_2SO_4$ *Many dyers avoid this, as it can produce uneven* shades

R SANSONE

**Dyeing unmordanted cotton in cold or tepid concentrated sea-salt baths.** J. ROBERT *Boll lanıera* 44, 837(1930) —The eosins, erythrosins, phloxins, Bengal pinks *and certain acid colors are dyed in a lukewarm bath contg* 50 *g* sea salt *per* l Quinoline yellow S, naphthol yellow S and metanil yellow are dyed in a lukewarm bath with 10–20 g sea salt per l Azoflavine RR, orange II, orange GR, ponceaux R and fast ponceaux need instead a bath with *10–20 g* sea salt *and 0 5–2 g alum per* l. *The* cotton is dyed for ¾ hr , freed from the excess of bath and dried in the cold without rinsing in water Very bright shades are obtained with a mediocre fastness to washing From 2 to 10 kg of color is needed for every 100 kg of cotton The baths exhaust badly

R SANSONE

**Conditioning textiles in laboratory experiments.** W WELTZIEN *Seide* 35, 482–6 (1930) —A photographically illustrated lab app for conditioning textile samples is *explained and discussed*

H W STIEGLER

**Physical and chemical properties of textiles** I. A J HALL *Textile Mercury* 84, 211(1931) —X ray methods are discussed and the micelle structures of cotton and rayons are correlated with the fiber properties of dyeing, luster and resistance to decompn by snail enzyme The following figures give % degradation of celluloses by snail enzyme ($p_H$ const at 5 28 by Na phosphate buffer, temp 36°, time 6 days): Cotton 2 1, filter paper 7 1, cotton, solvent extracted and mercerized, 10 2, cellulose *regenerated from nitrocellulose* 7 8, *cuprammonium cellulose* 18 3, *viscose cellulose* 33 1, alkali sol cellulose prepd from nitrocellulose 32 4, cellulose regenerated from acetyl-cellulose 70 0, alkali sol cellulose prepd by treatment with HCl 68 5. A K J

***Some physicochemical properties of the wool fiber.*** J B SPEAKMAN *J Textile Sci* 4, 6–9(1931) —This paper relates chiefly to the adsorption of dyes by wool Dye mols are so enormous that there would seem to be little chance of their ever entering the fiber The size of the pores in the dry fiber were detd by reaction with alc hydroxyl groups associated with stretching of the wool, *the work required to stretch the fiber* being measured first in water, and then in MeOH, EtOH, etc The alcs employed increase progressively in mol size and wt. The resistance to extension increases until butyl alc is reached *when the fiber behaves as it does in dry air* Alcs beyond butyl, therefore, do not enter the wool mol , and therefore the size of the pores in the dry wool fiber is approx the same as the length of the *n* propyl alc mol The work required to *stretch wool fibers* 30% (g cm per cc ) in various media at 22 2° is $5\ 37 \times 10^4$ for octyl alc. and $1\ 63 \times 10^5$ for ethylene glycol The increase of pore size of wool fibers swollen *in water is more than 100%* *Dry wool fibers* immersed in water give an increase in length of 1% and an increase in diam of 18% Water and other reagents are adsorbed on the surfaces of the constituent micelles, causing a *swelling of the fiber* Actual detns of the pore size show the micelles are about 200 A U thick The size of the swollen pores is about 40 A U Thus any dye having a mol greater than this size is only adsorbed on the *exterior of the fiber and will be deficient* in fastness to rubbing On transferring the dry wool fiber from dry air to water the breaking load of the fiber is changed from 22 1 to 14 9 $\times 10^5$ g /cm² The increase in cross section is about 40% and the rigidity is altered *in the ratio of* 15 1 as compared with the breaking load This indicates that the micelles are much longer than they are thick The conclusion

is that the wool fiber is built up of tiny plates, 200 A U thick, the long axis of the plates being parallel with the length of the fiber When the wool is swollen in water the distance sepg the surfaces of the plates is about 40 A U, whereas in the dry fiber this is only 6 A U J M MATTHEWS

**X-ray investigations of the inner structure of wool.** W T ASTBURY *J Textile Sci* 4, 1-5(1931) —The minute structural elements of the wool fiber may be studied with the aid of x rays Wool is a complex biol structure built up from the protein keratin which is characterised by containing S in the mol The elements of the wool fiber are to a large extent" cryst meaning that the constituent mols are built together in a regular 3 dimensional pattern Wool is generally called colloidal, but this is because its crystals are so minute X ray photographs are given showing that stretched wool fibers have a different crystallographic structure from the unstretched the latter is called $\alpha$ keratin and the former $\beta$ keratin, though this difference is postulated entirely on the showing of the x ray photographs and is not substantiated by any chem analysis Wool when wetted, may be stretched to twice its normal length without losing its elasticity or its ability to regain its normal length when dried But stretched wool is very susceptible to the action of steam so that the $\beta$ keratin loses its power of returning to the $\alpha$ form The stretched wool is 20 times as sensitive to the action of $Na_2S$ soln as the unstretched fiber The x ray measurements indicate that the $\alpha$ to $\beta$ transformation is associated with a mol elongation of from 5 15 to 10 2 A U along the axis of the fiber Spatial mol models are given showing a theoretical structure on the wool mols J M MATTHEWS

**The oiling of wool by means of glycerol.** A M SEREBRIAKOV *Niti (Suppl to Izvestiya Tekstil Prom u Torgovli)* 1, Nos 4 5, 16 7(1930) *Chimie & industrie* 25, 165(1931) —Though attempts to substitute glycerol for spinning oils have not previously been successful with high grade wools, excellent results were obtained in the present tests by using 20-30% glycerol on wool which had been incompletely scoured and still contained a relatively large amt of grease Tests showed that Turkey-red oil also can be used satisfactorily, but its use will depend on the price A P-C

**The oxidation of the fat used in oiled wool.** G SALOMONE *Boll laniera* 44, 297-300(1930) —The oils used for wool should be easily absorbed, should furnish emulsions in water with very fine fluid particles covering easily and equally the wool fibrils, should not become agglutinated in the air, should not have any corrosive action, should be very little oxidizable, should develop little heat, should be easily eliminated by a weak alkali and should give no disagreeable odor or color The oils extd from woolen yarn stored for some time are colored brown, and have an unpleasant odor, their fatty acids turn the wool a yellow brown, not always eliminated by scouring, even with volatile solvents Rancid oils can cause a sensible reduction in the resistance of the wool, and after scouring, a slight increase in the soly in water, in acid and in alk. solns The more satd fatty acids are altered less easily They give with soap solns very good emulsions, but melt too high, having a weak lubricating action Some of their esters, *e g*, Me, Et or Am stearate, or Me or Et palmitate can replace natural oils and olein; they can be used alone or in mixt with oleic acid, emulsifying easily, giving emulsions with very minute particles and an increased stability R SANSONE

**Determining the size in cotton cloth.** CAMILLO LEVI *Boll assoc ital chim tessile e color.* 6, 249-59(1930) —To det the amount of size, 10 g of the cotton cloth was immersed in distd water, boiled 15 min, treated in 500 cc of a 1% rapidase soln at 80-85° for 3 hrs, washed with warm distd water and cold water, boiled 15 min in 300 cc of 0 2%, $Na_2CO_3$ soln, washed again with warm distd water and cold water, with light rubbing, washed with alc and then with ether and dried at 100-105° to a const wt R SANSONE

**Linseed oil size and viscose silk.** K GÖTZE *Seide* 35, 445-9(1930) —The use of linseed oil size applied in org solvents and as an emulsion is discussed When used in solvents the oil penetrates the fiber but as an emulsion it penetrates only slightly. Oxidation of the oil can damage the fiber if the rayon is left on bobbins for some time. It also alters the oil, making it difficult to remove, causing streaks and affinity for acid dyes, thus preventing a pure white rayon in wool rayon mixtures Increase in wt. proceeds with oxidation. Oxidation takes place in two steps, rapid and slow. The former causes coagulation and film formation and is desired Catalysts or ozone complete it in 24 hrs The slow oxidation decomposes the mol into acids Manganese and lead are used as oxidation catalysts The lead, however, has a tendency to discolor later on when wool rayon mixts are scoured in alkali The brown color can be obviated by adding perborate to the scouring bath Regarding strength and elasticity, no difference was found between the soln and emulsion methods of application Tables

**Azo dyes** I G. FARBENIND A.-G. (Winfrid Hentrich and Rudolf Knoche, inventors). Ger 517,437, Mar. 31, 1928 The diazo compds from amines of the formula $RSO_2C\overline{C\,C(NH_2)\,CH\,CH\,C(NO_2)\,CH}$, where R is an aryl residue contg at least one sulfo group and free from or contg other substituents, are coupled with sulfonic acids of 2 aminonaphthalene or 2 amino-8 hydroxynaphthalene or their *N*-substitution products Examples are given

**Azo dyes** I G FARBENIND A G (Leopold Laska and Arthur Zitscher, inventors) Ger 517,438 May 8, 1928 Diazo, tetrazo or diazoazo compds not contg $SO_3H$ or COOH groups are coupled with 2',3' hydroxynaphthoyl-4 aminodiphenyl amine or its derivs substituted in the diphenylamine residue Coupling may be effected in substance or on a support The products are red, brown or black dyes insol in water Numerous examples are given

**Azo dyes.** I G FARBENIND A.-G (Heinrich Clingestein and Karl Dobmaier, inventors) Ger 517,439, Dec 6, 1928 The diazo compds from *o*-aminobenzophenone and its derivs or substitution products not contg a sulfo group, are coupled with suitable components such as naphthols, arylides of 2,3 hydroxynaphthoic acid etc Coupling may be effected in substance or on a support The products are yellow to red dyes insol in water Examples are given

**Azo dyes.** HERMANN WAGNER and KARL BECK (to General Aniline Works) U S 1,794,210, Feb 24 Azo dyes of excellent fastness and of favorite tints are obtained by coupling, in substance or on the fiber a diazotized 2,3 aminonaphthoic acid ester or a substitution product thereof with a naphthol or with a 2,3 hydroxynaphthoic acid arylamide or a substitution product thereof The dyes are characterized by the formula 3,2-$(R_1OOC)C_{14}H_4N\ NC_{14}H_3(OH)R_2$ 1,2,3, wherein $R_1$ stands for an alkyl group, $R_2$ stands for H or the group CONHaryl and wherein the aryl nuclei may contain substituents, such as the $NO_2$ group or halogen, but contg no free sulfo or carboxy group Several examples are given with details of dyeing processes Cf *C A* 24, 2301

**Azo dyes.** KARL HEUSNER and MAX SIMON (to General Aniline Works) U S 1,795,125, March 3 Dyes of the general formula $RN\ NR_1NHSO_3H$ wherein R represents the residue of any diazo compd and $R_1$ a benzene nucleus, which may be substituted are obtainable, for instance, by coupling any diazo compd with a sulfaminic acid of the benzene series such as the sulfaminic acid of aniline, a toluidine or a cresidine. They are, when dried and pulverized, generally reddish to brownish powders dyeing wool in yellow to orange shades An example is given of the use of acetyl *p*-phenylenediamine and the Na salt of 2 sulfamino-4 methyl 1 methoxybenzene as starting materials

**Azo dyes containing chromium.** HUGO SCHWEITZER (to General Aniline Works) U S 1,794,252, Feb 24 Products dyeing wool clear greenish yellow shades of good fastness and suitable for use as lake or pigment dyes are obtained by boiling the aq soln of a dye of the general formula $\overline{N\,Cx\,CH(N\,NR_1)\,CO\,N}\,R_2\,SO_2C_6H_2(OH)$-$CO_2H$-2,1, wherein $R_1$ stands for an aromatic nucleus, x stands for the methyl or the carboxy group, $R_2$ stands for a benzene nucleus, wherein $R_1$ and $R_2$ may be substituted, and wherein the salicylic acid radical is attached to the sulfone group in *o*- or *p* position in relation to the hydroxy group of the said radical (said dyes being obtainable according to the U. S Patent 1,685,071, *C A* 22, 4833) with a $H_2O$-sol salt of tervalent Cr, such as Cr formate, Cr acetate or Cr fluoride, for about 2–4 hrs Examples with details of procedure are given

**Pyrazolone azo dyes.** HERMANN WAGNER, HEINZ EICHWEDE and ERICH FISCHER (to General Aniline Works) U S 1,794,218, Feb 24 Dyes giving yellow tints on wool are obtainable by coupling any diazo compd with a compd of the general formula $2,4,5\text{-}(HO_3S)ClMeC_6H_2\overline{N\,CO\,CH_2\,CX\,N}$, wherein X represents a methyl, carboxyl or a carboxylic acid ester group These compds, which have not yet been described, are obtainable in the known manner by condensing the hydrazine with acetoacetic ester or oxalacetic ester Several examples are given

**Producing azo dyes on acyl celluloses.** FRIEDRICH FELIX and WOLFGANG JAECK (to Soc anon pour l'ind chim à Bâle) U S 1,793,390, Feb 17. Products such as "acetate silk" are dyed with an azo dye of the general formula, $NH_2\,R'\,N\,N\,R''\,NH_2$ in which R' and R'' signify 2 aryl residues which may be different from each other (such as the diamino azo dye obtained by saponifying the coupling product from diazotized *p*-aminoacetanilide and cresidine) and the material is then treated with

*nitrous* acid and further coupling is effected with *β* hydroxynaphthoic acid (or with *β* naphthol for producing a somewhat less light fast dyeing) in a medium with a *p*H below 7 1 Various details of procedure are given

Monoazo dyes. J R Geigy Soc Anon Brit 337,577, Oct 15, 1928. Monoazo dyes giving clear red shades, *fast to light and acid or alk fulling* on wool and silk are made by combining a diazotized aryl or aralkyl ether of *o*-aminophenol or a substitution product with a *N*-arylsulfo-1 amino-8-naphtholdisulfonic acid Several examples are given

Vat dyes. Heinz Schiffer (to General Aniline Works) U S 1,703,138, Feb 17. A 2 arosylpyrazoleanthrone contg *in the pyrazole ring the free imino group and in the* aryl residue a halogen atom in *o*-position to the keto group such as dichlorobenzoylpyrazoleanthrone or like compd in which the anthraquinone as well as the benzene nucleus may contain substituents, is treated with an inorg substance of feebly alk. reaction such as KOAc or $Na_2CO_3$, suitably in the presence of a diluent such as $PhNO_2$ and a catalyst such as Cu powder, producing products which dye cotton *from a violet vat fast blue shades. Details of procedure are given*

Vat dyes. I G Farbenind A G Brit 337,741, July 4, 1929 Anthraquinonylaminobenzanthrones contg 2 or more anthraquinonylamino groups, one of which is in the *Bz* 1 position, are converted into vat dyes by treatment with alk condensing agents, as by fusion with ale KOH. *Numerous examples are given of the production of dyes producing brown shades in most cases.*

Vat dyes. I G Farbenind A-G (Fritz Baumann, inventor). Ger 513,608, April 10, 1929 Vat dyes are produced by introducing a substituted or unsubstituted anthraquinone *β*-carboxylic acid residue into the amino group of *α*-aminoanthrimidecarbazole or its derivs and substitution products Thus, 5,5'-diamino-1,1'-anthrimidecarbazole (obtained by sapong 5 5'-di(benzoylamino) 1,1'-anthrimidecarbazole) is taken up in $PhNO_2$ and heated Anthraquinone 2-carboxylic acid chloride is then added to form the dye Other examples are given Cf *C A* 25, 1396, 1682.

Vat dyes. I G Farbenind A G (Walter Mieg, inventor) Ger 514,518, July 10, 1928. Addn to 465,835 *Vat dyes of the anthraquinone series are prepd* by the action of condensing agents (especially $ClSO_3H$ or $H_2SO_4$) on dianthraquinonylamines which contain at least one halogen substituted acridone ring and at least one acylamino group, at low temps. The product may be oxidized Thus, the dianthraquinonylamine deriv prepd as described in Ger 513,045 (*C A* 25, 1396) by the *condensation of 1 mol of trichloroanthraquinoneacridone with 1 mol of 1 benzoylamino-5-*aminoanthraquinone, is treated with coned $H_2SO_4$. The product is treated with $Na_2O_2$ to give a dye which colors cotton in fast black shades. Other examples are given

Vat dyes. I G Farbenind A-G (Heinrich Neresheimer and Georg Böhmer, inventors) Ger 517,277, Oct 3, 1929 *Vat dyes are prepd.* by halogenating *α*-arylaminoanthraquinonealdehydes contg at least one CHO group in *o*-position to an NH group, and free from or contg other substituents. Examples are given of the prepn of dyes from 1 phenylaminoanthraquinone-2'-aldehyde, 1 phenylaminoanthraquinone-2 aldehyde *and* 1,5-diphenyldiaminoanthraquinone-2',2''-dialdehyde.

Vat dyes. I G Farbenind A G (Max A Kunz, Karl Köberle and Erich Berthold, inventors) Ger 517,440, July 27, 1929 Addn. to 490,169 (*C A* 24, 4168) Vat dyes contg more than one halogen are prepd (1) by treating dibenzanthrone or isodibenzanthrone or their derivs with at least two different halogens or halogenating agents, *simultaneously or in succession*, or (2) by introducing *into* halodibenzanthrones or haloisodibenzanthrones a halogen other than that already present, or (3) by treating polyhalodibenzanthrones or polyhaloisodibenzanthrones so that the halogen is partly replaced by another halogen, or (4) by treating substitution *products of dibenzanthrone* or isodibenzanthrone so that a nitro, sulfo or other substituent group is replaced by halogen *and then introducing a different halogen*, if necessary Examples are given Cf *C A* 25, 2003.

Vat dyes. I G Farbenind A-G (Robert Berliner, inventor). Ger 517,441, Aug 8, 1928. Carbazole derivs. useful as vat dyes are prepd by the action of $H_2SO_4$ at a low temp., *on dianthraquinonylamines* contg at least two acridone rings, the products being oxidized, if necessary. An example is given.

Vat dyes. I G Farbenind. A-G (Filip Kačer, inventor) Ger. 517,443, April 12, 1929 Vat dyes giving yellow shades on cotton are prepd by heating 3 mercapto-2-*methylanthraquinone or its derivs.* with S. An example is given.

Vat dyes. I G Farbenind. A-G (Karl Schirmacher and Karl Eisbold, inventors) Ger 517,444, May 31, 1927. See Brit. 291,361 (*C A* 23, 1283)

Arylaminoanthraquinones suitable for dyeing cellulose esters and ethers. Soc. anon four l'ind chim a Balf Brit 338,412, Dec. 22, 1928 Arylaminoanthraquinones are made by heating with $H_3BO_3$ and a primary aromatic amine the leuco deriv of a hydroxyanthraquinone, or of an amino or alkylamino deriv. or of a sulfonic acid of any of these compds., in aq soln or suspension (or instead of the leuco derivs. the anthraquinone compds themselves may be used in the presence of a reducing agent) If desired the reaction may be so conducted that any sulfonic groups present in the β position are completely or partially removed during the condensation. The products are *acid dyes* for animal fibers or for artificial fibers such as "acetate silk," or if non sulfonated, for *resins, varnishes* or colloids such as nitrocellulose varnish or cellulose acetate Several examples are given of the production of dyes giving green and blue colorations

Aniline-black dyeing on cellulose acetate. Silver Springs Bleaching & Dyeing Co., Ltd and A J Hall. Brit 337,746 July 27, 1929 Fibers, films, fabrics, etc., comprising cellulose acetate, are treated with a mixt contg aniline and at least one org amine serving as an oxidation catalyst such as *p*-aminodiphenylamine, *p*-phenylenediamine *p*-aminophenol or nitrosodimethylaniline, followed by oxidation in a hot acidified soln of a dichromate at least nearly satd with NaCl Other amines may be used with the aniline, such as *o*- and *p*-toluidines, *m* phenylenediamine or α-naphthylamine Various details of procedure are given

Thickening agents for dyeing. Ferd Sichel Komm Ges Ger. 514,842, Mar. 2, 1928 A thickening agent is prepared, by pulverizing vegetable mucus with a small quantity of steeped starch

Dyes and intermediates. I G Farbenind A.-G (Georg Kränzlein, Heinrich Greune and Max Thiele, inventors) Ger 517,194, June 7, 1928. See Brit. 313,094 (*C. A.* 24, 971)

Dyes and intermediates. I G Farbenind A.-G Brit. 337,860 Aug 20, 1929 Monoöxamic acids of 4,4'-diaminodiaryl 1,1'-cyclohexane are made by heating with oxalic acid (preferably in the presence of a solvent) parent substances such as 4,4'-diaminodiphenyl-1,1'-cyclohexane, 4,4'-diamino-3,3'-dimethyldiphenyl 1,1'-cyclohexane, 4,4'-diamino-3,3'-dimethoxy-1,1'-cyclohexane, 4,4'-diamino-3,3'-diethoxy 1,1'-cyclohexane, 4,4'-diamino-3,3'-dichloro(or dibromo) 1,1'-cyclohexane or 4,4'-diamino-3,3'-dimethyl-4'-methylcyclohexane The monoöxamic acids thus formed may be diazotized and coupled with various components to form azo dyes (of which numerous examples are given)

Dye intermediates. I G Farbenind A.-G Brit. 338,240, Aug 27, 1929 4-Aminodiphenylamine derivs. substituted in the 3- or 4'-positions or both, by alkyl, Cl or alkoxy groups are obtained by condensing a *p*-alkyl-, chloro- or alkoxy-substituted or an unsubstituted nitrosobenzene, with an *o*-alkyl-, chloro- or alkoxy-substituted or an unsubstituted nitrosobenzene (at least one nucleus being substituted) and reducing the product (suitably with Na sulfide) Several examples are given

Dye intermediates. I G Farbenind A.-G Brit. 338,314, Oct. 18, 1929. Urea derivs. of the general formula $(NH—R—CO—NH—R'—OH)_2CO$ (in which R and R' are aromatic residues of the benzene or naphthalene series which may contain substituents but no free sulfonic or carboxylic acid group and in which at least one *o*- or *p*-position to the OH group is free) are made by condensing a diarylureadicarboxylic acid or the corresponding acid chloride in the presence of a dehydrating agent with an aminophenol. Several examples are given for producing intermediates, the alkali salts of which can be used for impregnating cotton goods for the production of azo dyes on the fiber.

Dye intermediates. I G Farbenind A.-G Brit. 337,563, Oct. 10, 1929 Azo and azoxy compds are made by reduction, in alk soln., of compds. of the general formula HO-aryl NHCO-aryl $NO_2$ (in which the aryl radicals may be the same or different and may contain further substituents, and *o*- or *p*-position to the OH group being free and the $NO_2$ group being in *m*- or *p*-position to the CO group) Glucose, Zn dust and Na sulfide are suitable reducing agents Several examples are given, and nitroarylacylaminophenols suitable for use as starting materials are made by condensing *m*- or *p*-nitrobenzoic acid or their halogen, alkyl or alkoxy derivs. with an aminophenol or substitution product, which has a free *o*- or *p*-position to the OH group

Dye intermediates. I G Farbenind A.-G Brit 337,821, Aug 8, 1929 3-Methoxytetrahydrocarbazole distd. over Pb oxide at 500–600° gives 3-hydroxycarbazole and, similarly, 2-hydroxycarbazole is obtained from 2-ethoxytetrahydrocarbazole The starting materials may be obtained by forming hydrazones from the alkoxyphenyl

hydrazines and cyclohexanones and effecting ring closure with $H_2SO_4$ to the corresponding tetrahydrocarbazole

**Dye intermediates.** I G FARBENIND A.-G. Brit. 337,900, Sept. 18, 1929. Carboxylic acids of aromatic diamino compds. in which both amino groups are nitrobenzoylated or in which one amino group is nitrobenzoylated and the other is either unsubstituted or contains a substituent which is easily eliminated or of mononitrobenzoylated aminonitro compds., are subjected to a slight reduction such as required to convert an aromatic nitro compd. into an azo or azoxy compd. The resulting products may be diazotized and coupled to form azo dyes on the fiber with compds. such as 1-phenyl-3-methyl-5-pyrazolone or β-naphthol. Several examples are given for dyeing various yellow and red shades.

**Dyeing and printing fibers.** I G FARBENIND. A. G. (Erwin Hoffa and Max Kerth, inventors). Ger. 514,738, Oct. 21, 1927. To produce fast colors on fibers, the fibers are treated with an arylthioglycol-o-carboxylic amide of the general formula $H_2NCO.R.SCH_2CO_2H$ and an alkali. Thus, cotton is printed with a paste contg. 5-chloro-1-methylbenzene-3-thioglycolic acid-2-carboxylic amide, water, NaOH, alk. thickening and gum. The thickening contains gum and NaOH in the proportions 1:10. After drying, the cotton is steamed, oxidized and developed in a soln. of $K_3FeC_6N_6$. The resulting colors are fast. Other examples are given. Cf. C. A. 24, 783.

**Dyeing cellulose esters and ethers.** I. G. FARBENIND. A. G. Brit. 338,093, April 9, 1930. Deep greenish yellow tints are produced on products such as "acetate silk" by use of compds., non-sulfonated in the nucleus, such as are obtainable by interaction of 4-amino-1,8-naphthalic anhydride with hydrazine or a deriv. or compds. of the same general type. Cf. C. A. 25, 307.

**Dyeing cellulose derivatives.** I. G. FARBENIND. A. G. Ger. 514,932, Dec. 10, 1926. In dyeing cellulose derivs., alkylated, arylated or aralkylated ethers or thioethers of the anthraquinone series, contg. no additional chromophore groups, are used. Thus, acetate silk is colored golden yellow, greenish yellow and orange by neutral soap pastes contg., resp., 1,4-dimethoxy-, 1,4,5-trimethoxyanthraquinone and anthraquinone-1,4-dithioldimethyl ether.

**Dyeing cellulose acetate.** GEORGE H. ELLIS (to Celanese Corp. of America). U. S. 1,733,380, Feb. 17. The material is treated with at least one amino compd. such as *p*-aminodiphenylamine from an aq. soln. and is then impregnated with a soln. comprising an oxidizing agent such as a mixt. contg. $NaClO_3$ and then, without rinsing, subjected to aging in a warm moist atm.

**Dyeing regenerated cellulose materials.** IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit. 338,111, July 3, 1929. Level dyeings are produced by use of dyes of any of the three following characters. (1) an aminobenzoylphenylenediamine of the formula $NH_2C_6H_3(CONHC_6H_4NH_2)_2$ or a homolog or substitution product of suitable character, tetrazotized and coupled with 1 mol. of a 2,8-, 1,8- or 1,3-aminonaphtholsulfonic or disulfonic acid or a *N*-substituted or azo deriv. or aminocyclic aryl or aroyl deriv., contg. no external amino group, of 2,3,7-aminonaphtholsulfonic acid, and with 1 mol. of a coupling component other than 2,3,7-aminonaphtholsulfonic acid or a monocyclic aryl deriv. contg. an external amino group. (2) an aminoacetanilide or a nitroaniline or a substitution product, diazotized and coupled with a component corresponding to one of those specified in "(1)" (which component, when a diazotized aminoacetanilide is used, should not contain an acylamino or unsubstituted amino group, and, when a diazotized nitroaniline is used, should not contain a nitro or unsubstituted amino group), followed by hydrolysis of the acylamino group or reduction of the nitro group, diazotizing of the aminoazo product and coupling to a component such as the other components specified in "(1)", or, (3) a diazo compd. is coupled with an amine of the benzene series which couples in *p*-position to the amino group, the aminoazo product is condensed with a nitrobenzoyl chloride, the nitro group is reduced, and the product is diazotized and coupled with a 2,8-, 1,8- or 1,3-aminonaphtholsulfonic or -disulfonic acid, or a *N*-substituted or azo deriv. or a monocyclic aryl deriv., contg. no external amino group, of 2,3,7-aminonaphtholsulfonic acid. Numerous examples are given of dyes suitable for use on "viscose silk." Cf. C. A. 25, 604.

**Dyeing threads, etc., with developing dyes.** F. KARRER. Brit. 338,012, Nov. 25, 1929. The material in the form of cops or transverse wound bobbins is introduced into a vessel which is filled with grounding liquor and subjected to a vacuum after satn. with the liquid. The vacuum is broken and the liquor removed, and, without removal from the vessel, an intermediate dyeing is effected followed by development. Various details of app. are described.

**Dyeing furs, hairs and feathers.** KARL MARX and ERICH LEHMANN (to General Aniline Works). U. S. 1,795,133, March 3. In contradistinction to 4-aminodiphenylamine, the salts of the *N* substituted-4-aminodiphenylamines are easily sol. in water, and they give good gray tints on furs, hair, feathers and the like, even when dyed from a soln. in hard water or from a soln. which is alk. as from the presence of a small quantity of $NH_3$. Among the substances which may be used are: 4-amino-*N*-methyldiphenylamine, 4-amino-*N*-ethyldiphenylamine, 4-amino-*N*-propyldiphenylamine, 4-amino-*N*-butyldiphenylamine, 4-amino-*N*-benzyldiphenylamine, 4-amino-*N*-ethoxydiphenylamine or corresponding compds. with a substituent in the *p*-position of the benzene nucleus. The fur to be dyed may be treated with a mordant. The *N* substituted amines may be manufd. by subjecting the *N* substituted diphenylamines to nitration and subsequent reduction.

**Dyeing and printing textiles.** I. G. FARBENIND. A.-G. Brit. 337,846, Aug. 13, 1929. Acid amides or esters obtainable from vat dyes or their leuco compds. as described in Brit. 324,119 (*C. A.* 24, 3380) or Brit. 330,579 (*C. A.* 24, 6032) are used for dyeing or printing and development is effected with alk. agents (some of which may be added to the thickening in printing cotton so that partial development is effected by moist steaming). Several examples are given.

**Dyeing and printing textiles.** MANCHESTER OXIDE CO., LTD. Ger. 514,953, June 29, 1928. See Brit. 296,530 (*C. A.* 23, 2580) and Fr. 656,827 (*C. A.* 23, 4350).

**Mordanting, weighting and metallizing textile materials, films, etc.** BRITISH CELANESE LTD., W. A. DICKIE and F. B. HILL. Brit. 337,813, Aug. 7, 1929. Metals such as Al, Sn or Zn or alloys of lake forming and other metals, are applied (intermittently or in the form of a pattern if desired) by an app. such as a Schoop metallizing app., to textile materials, films or the like and the metal may then be oxidized on the material if not sufficiently oxidized during its application. In mordanting by this method, the dye may be applied before or after the mordant or at the same time with it, as by spraying through a stencil. In treating materials of cellulose esters or ethers, the dye is preferably used together with an org. solvent. Various details and modifications of procedure are described.

**Coloring plastic masses or their solutions.** I. G. FARBENIND. A.-G. (Werner Müller, Karl Holzach and Hans Krzikalla, inventors). Ger. 517,491, May 26, 1926. Celluloid, cellulose esters or ethers, natural or synthetic resins and other plastic masses or their solns., are colored by incorporating into them sol. Cr or Cu compds. of dyes particularly *o*-hydroxyazo dyes. Solns. in org. solvents of the dye compd. and the celluloid, etc., may be mixed, or the materials may be kneaded together on rolls. Examples are given.

**Acid baths in dyeing.** I. G. FARBENIND. A.-G. (Josef Nüsslein and Josef Stadler, inventors). Ger. 514,801, May 16, 1926. Addn. to 466,420 (*C. A.* 23, 529). Instead of the soap or Turkey red oil of 466,420, other soap like substances are added to the dye baths. Thus, a soln. of olein in ethyl ether of polyglycol is stirred with isopropylated Na naphthalenesulfonate. The product congeals into a clear soln. and is used in acid dye baths. Butylated naphthalenesulfonic acid or its salts, or sulfite cellulose lye may be used.

**Fabric printing machine.** JOHN WALDRON CORP. Ger. 514,950, Aug. 9, 1928.

**Dye vat and jigger apparatus.** F. HEWITT. Brit. 337,894, Sept. 12, 1929. Structural features.

**Apparatus for dyeing tubular packages of textile threads.** J. BRANDWOOD. Brit. 338,134, Aug. 7, 1929. Various details of construction and operation are described.

**Apparatus for dyeing thread or yarn in packages.** CHARLES K. DUNLAP (to Sonoco Products Co.). U. S. 1,793,736, Feb. 24. Structural features.

**Apparatus for passing woven fabrics through dyeing, washing or bleaching baths, etc.** CHARLES G. HANHART (to Färberei Weidmann A. G.). U. S. 1,794,403, March 3. Structural features.

**Apparatus for applying sizing, dyeing or dressing liquids etc., to, cellulose acetate or other yarns.** BRITISH CELANESE, LTD., and W. I. TAYLOR. Brit. 337,433, May 30, 1929. Structural features.

**Treating fabrics.** EDUARD TSCHÖRNER and HEINRICH RIES. Ger. 514,951, Aug. 25, 1928. Pile fabric is prepd. for cutting by treating the weft with an alk. soap soln. or a soln. of alkali with sulfonated oil, to which an oxidizing agent, such as $Na_2BO_3$, $Na_2O_2$ or $H_2O_2$, is added.

**Impregnating textiles.** GIULIA KNÖZINGER and LEO KNÖZINGER. Ger. 517,174, Oct. 9, 1928. Textile materials are strengthened and given a weighty appearance by

applying a suspension of kaolin or $BaSO_4$ in glue. The treatment is particularly intended for theatrical accessories, decorations, etc.

Retting flax with yeast and sulfurous acid. MARTIN WADDELL and HENRY C. WATSON. Ger 517,103, Oct 26, 1927. See U. S 1,708,812 (*C. A.* 23, 2582).

Bleaching jute fiber. J. BERLINERBLAU Brit. 337,986, Nov. 22, 1928. Jute fiber is moistened with acid such as a 2–3% HCl soln. and treated with $SO_2$ at normal pressure to brighten its color while retaining its natural tint and gloss.

Fibers. FIRMA A MONFORTS Ger. 514,706, Nov. 27, 1927. Yarn, cord, etc., made from hard fibers such as manilla, etc., is smoothed and polished by treating with rubber or rubber soln., and with a mineral lubricant such as talcum.

Mercerizing fabrics C MOCKER. Brit. 337,646, Dec. 6, 1929 The fabrics are subjected to a series of baths of increasing concns and gradually decreasing temps., detd continuously by the shrinkage or elongation of the fabric during treatment, maintained in counterflow to the movement of the fabric and suitably replenished App is described

Zig-zag roller apparatus for mercerizing fabrics. O HOFFMANN Brit. 337,712, March 10, 1930 Structural features

Preventing creasing in liquid treatments of textile materials. BRITISH CELANESE, LTD. and G H ELLIS. Brit 338,190, Aug 13, 1929 In treating materials such as those of cellulose acetate or other cellulose esters or ethers made by dry-spinning processes, with scouring, dyeing or other liquids, in folded form as in winch machines, creasing is avoided by first wetting out the material thoroughly in open width form Various wetting agents are mentioned as suitable and this treatment may be combined with other treatments such as delustering with a hot soap soln.

Steaming printed textile fabrics. I G FARBENIND A.-G Brit. 336,590, March 18, 1929. A steaming process as described in Brit. 333,873 (for reducing printed fabrics by passing steam from the lower part of a vessel up through the fabric surrounded with a protective filling material such as sand) is applied to various printed or dyed fabrics

Bleaching materials such as linen. O HOFFMANN Brit. 337,305, Feb 9, 1929. The material is uniformly and moderately moistened and then kept in constant and uniform movement (as by passing fabric in a zig-zag path over rollers) while exposed to a low concn. of ozone (not over 2 g per cu m of air and preferably a much lower concn.). App and various details of procedure are described.

Delustering artificial threads and filaments. COURTAULDS, LTD., and C. DIAMOND. Brit. 338,269, Sept. 16, 1929. Products such as those formed from cellulose acetate (suitably by dry spinning in acetone contg 1% of Arachis oil) are treated with aq soap soln. at or near the b. p.

Improving elasticity of knitted artificial silk fabrics, etc. COMPOLASTIC CORP. Brit 337,400, Nov 2, 1928 The material is stretched while moist (as after dyeing), in one direction, allowed to dry in stretched condition, and a sheet of rubber is vulcanized on one face of the fabric. The material is suitable for making waist-bands, garters, etc.

Waterproofing fabrics. BRITISH CELANESE, LTD. Brit. 338,065, Jan. 15, 1929. A material suitable for raincoats or bathing-suit bags comprises a fabric base having on it a layer of rubber compn. and also a layer of a cellulose ester or cellulose ether compn. together with a compatible synthetic resin Various examples of materials used are given, and plasticizers, coloring agents, etc., may be added.

Waterproofing wool. MERKEL & KIENLIN GES. Brit 338,391, Dec. 13, 1928. Waterproofing is effected by treating the material first with an aq. emulsion contg. soap and an oil or fat of animal or vegetable origin (suitably olive oil) and then with a soln of salts of those metals the hydroxides and carbonates of which are insol or but slightly sol in water, such as Al formate, and subsequently heating to 60–80° for some time.

Carbonizing wool. I G FARBENIND A.-G (Albrecht Kittel, Carl Daimler and Gerhard Balle, inventors) Ger 517,201, Jan. 11, 1925 In carbonizing wool with $H_2SO_4$, an aromatic sulfonic acid having a tanning action, or a salt of such acid, is added to the bath A bath of lower $H_2SO_4$ content than is usual can then be used. An example is given

Forming yarns and threads of impregnated fibers. L. S. M. LEJEUNE and J. E. C. BONGRAND Brit. 338,381, Nov. 25, 1929 Fibers such as cotton, wool, silk, flax, hemp, ramie, etc., are impregnated with solns., suspensions or dispersions of materials such as rubber, rubber like substances or synthetic resins on the spinning-frame when the fibers are in the roving stage and before twisting into thread. Numerous details of app. and procedure are described.

**Imitation linen, etc.** F O MUNKTELL. Brit 338,224, Aug 20, 1929 Imitation linen, towels, handkerchiefs, etc, are made by pressing superposed layers of cellulose wadding material, which may be replaced wholly or in part by Japanese yoshino paper or the like, some of the layers of which are impregnated more strongly than others with waterproofing or sizing agents, etc., such as compns comprising cellulose esters, gelatin, glue paraffin oil or wax, starch, borax, Japan wax, casein, resin glue, etc, in various mixts Goffering is usually effected simultaneously with the pressing

**Plaited fabric containing cellulose acetate yarns** CAMILLE DREYFUS U S 1,793,915, Feb 24 The material is subjected to a plaiting operation in the presence of a softening agent for the cellulose acetate such as aq acetone soln in order to render the plaiting permanent

**Washing materials with soap-forming substances** A MARQUARDT and F WALTER Brit 338 121, Aug 8, 1929 In a combined soap forming and cleansing process, the materials of soap forming character are added together or successively to the wash without previous pressing into the articles to be washed and without pressing out of the liquid and ales, hydrocarbons, colloids, ferments, bleaching agents, etc, also may be added Carbonates may be used for saponifying fatty substances and for liberating gas which assists in the cleansing Numerous details and modifications of treatment are described Cf *C A* 24, 3869

**Edging fabrics to prevent fraying** TILLIE MILLER U S 1,793 630, Feb 24 Various details are described of a treatment involving the application of a melted material (such as a mixt of shellac, rosin, stearic acid and Al bronze) to the edge of the fabric so that it serves as a binder when it solidifies

**Material for "jacquard" cylinders of looms** MILES J SMITH and HERBERT I CHILSON (to Carolina Rubber Co) U S 1,793,722, Feb 24 A compn is used formed of clean thin brown rubber 35, ZnO 10, "Dixie clay" 25, "Cycline oil" 3, lime 8, an accelerator 0 4 and S 15 parts, cured by heating Various details of manuf are described

**Transferring pictures to fabrics.** A DENGLER Brit 337,877, Nov 3, 1928 Pictures fast to light and to washing are applied to fabrics by a transfer comprising a paper backing carrying a paste contg colors and mordants which only commence to interact under the influence of heat and moisture applied in the transferring K percarbonate may be added to a cooled soln of gelatin and this soln added to an aq soln of com Na phosphate contg indigo Various other substances are mentioned which may be used

**Gasproof fabric suitable for aircraft gas cells** JOHN B FLOWERS U S 1,793,075, Feb 17 Alternate layers of rubber cement and metal leaf are applied to a fabric and each layer of cement is allowed to dry until tacky before applying the metal leaf and to harden before applying the next layer of cement The metal leaf is applied in sheets which are overlapped

**Treating fibrous materials with rubber, etc.** F T. LAIBY. Brit 337,359, June 19, 1929 Animal or vegetable fibers, either combed or in the form of batting, yarn or cloth are cleaned, mordanted with a latex coagulating substance, and then treated with a natural or artificial dispersion of rubber which may be assocd with linseed oil, and various compounding, pore forming or other substances for making *artificial leathers, tire fabrics, floor coverings, insulation*, etc Cf *C A* 24, 4406

**Rubber-coated fabric.** JOHN R COUTURE (to E I du Pont de Nemours & Co) U S 1,795 199, March 3 A material suitable for automobile tops comprises a textile fabric coated with rubber and provided with an overlying coating of baked petroleum-asphalt varnish Cf *C A* 24, 1524

**Protein products resembling wool, hair, horn, etc** SOC D'APPLICATIONS ET DE RECHERCHES SCIENTIFIQUES ET INDUSTRIELLES (S A R S I) Brit 338,015, Nov 24, 1928 Materials such as gelatin, chondrin, albumin, casein and gelose are treated with an alkali or alk earth metal thiosulfate in the presence of an acid or salt (such as an alum) which decomposes the thiosulfate and liberates S in a colloidal or finely divided state within the mass The material may be successively and alternately treated with reagents of this character until the entire mass is insol in hot water and swells but little, and may be subjected to a preliminary treatment or subsequent treatment with substances such as formal Na borate, a dichromate, picric or pyrogallic acid, tannin or alum to impart insoly and impermeability to the material, and may be rendered more flexible by treatment with a final bath such as one contg glycerol, glycol, molasses or a plasticizing agent Cf *C A*. 24, 3868

**Protecting wool, fur, hair, etc., from "textile pests."** I G FARBENIND A G Brit 337,823, Aug 8, 1929 The materials are treated with solns of *as* phenyl

caproylpseudothiourea, *as* phenylvaleroylthiourea, acetylallylthiourea or other thiourea derivs of the same general type

**Halogenated hydroxy-di- and tri-arylmethanes.** I G FARBENIND A.-G. Brit. 337,832, Aug 9, 1929 Products suitable for mothproofing wool, furs, etc., are obtained by condensation of an aldehyde deriv in which the carbonyl O is replaced by alkyloxy or inorg or org acid residues, with a *p* halogenated phenol contg a free *o*-position to a OH group but which may be substituted in the other positions by "indifferent" substituents such as halogens or alkyl groups The products may be used as addns to dye baths Among the starting materials which may be used are (1) methylal, methylenediacetate or the dimethylacetal of *o* chlorobenzaldehyde, condensed with *p*-chlorophenol, (2) 2,4-dichlorophenol condensed with the acetal-like chlorides and sulfates produced by adding benzal chloride, 2,6-dichlorobenzal chloride or 2-chlorobenzal chloride to $H_2SO_4$, (3) 2-chloro-, 4-chloro-, 2,6-dichloro-, 4-chloro-2-sulfo- or 5-chloro-2 sulfobenzal chloride condensed with *p*-chlorophenol, 2,4 dichlorophenol or mixts of *p*-halogenated phenols (4) *p*-chlorophenol condensed with the chloride obtained by treating *o* sulfobenzaldehyde with $PCl_5$ Condensing agents such as $H_2SO_4$, chlorides of Zn, Fe or Al or a mixt of HCl and glacial HOAc may be used and the condensation may be effected in solvents such as PhCl or $PhNO_2$ 4 Chloro- and 5-chlorosulfobenzaldehydes are prepd by treating the corresponding benzaldehyde with $PCl_5$

**Sulfonated hydroxyarylmethanes** I G FARBENIND A.-G Brit 337,808, Aug. 6, 1929 Hydroxy di and tri arylmethanes prepd as described in Brit 316 900 (*C A* 24, 1993), Brit 333 561 (*C A* 25, 607) Brit 330 893 and Brit 330 894 (*C A* 24, 6036), Brit 335,547 (*C A* 25, 1687), Brit 337,832 (preceding abstr.) and Brit 338,126 (following abstr.) are sulfonated (suitably in the presence of org solvents, and the products thus obtained may be used for *protecting furs, wool, etc., from moths* (being used conjointly with a dye bath if desired) Various details and examples are given

**Brominated and chlorinated *o*-hydroxy-di- and tri-arylmethanes** I G FARBENIND A.-G Brit 338,126, Aug 9, 1929 Compds of this character are prepd by brominating or chlorinating the corresponding parent materials, and are suitable for use in *mothproofing wool, fur, hair* etc., and for this purpose may be added to dye baths. Examples are given of the prepn of 2,2′-dihydroxy-5,5′ dichlorodiphenylmethane, 2-hydroxy 3,5-dibromodiphenylmethane, 3,5-dichloro-2-hydroxydiphenylmethane and some similar compds

**Wetting agents.** I G FARBENIND A.-G Brit 337,737, April 27, 1929 Monoamines contg only one hydroxyalkyl group and free from aromatic groups are condensed with aliphatic carboxylic, sulfonic or sulfonated carboxylic acids contg at least 8 C atoms or their esters or halides (at a temp above 100° when the free acids or their esters are used) and the products may be treated with alkylating agents and (being usually basic in character) may be converted into salts with acids Numerous details and examples are given for prepg compns which may be used as wetting, emulsifying, cleansing and dispersing agents in the textile industry, etc Cf *C A*. 24, 1947, 4906

**Apparatus for degreasing clothes by treatment with solvents.** MAURICE DEW HIRST (one half to Leroy A Goodwin) U S 1,795,170, March 3 Structural features

**Bag filter for filtering garment-cleaning solvents or other liquids.** ANTON L DORFNER U S 1,794,281, Feb 24

**Apparatus for purifying garment-cleaning liquids by materials such as saponifying agents and water.** CLARENCE V FUQUA (to Cleaners Equipment Corp.). U S 1,793,475, Feb 24 Structural features

## 26—PAINTS, VARNISHES AND RESINS

A. H SABIN

**Additional field tests on quick-drying paints.** H A GARDNER AND L P HART *Am Paint & Varnish Mfrs' Assoc* Circ No 377, 113–9(1931).—The formulas of 20 more paints supplementing those reported in *C A* 25, 1104 are given G G S

**Rapid methods for detecting with organic reagents the metals used in the paint industry.** HANS SCHEIBER *Farbe u Lack* 1931, 111–2.—Methods are compiled for the detection of Fe, Al, Mn, Co, Zn and Mg G G SWARD

**Experiences in painting façades (plaster).** HANS WOLFF. *Farbe u Lack*, 1931, 99–100.—Regardless of the type of material (aq or non aq.) used to paint plaster, water must be excluded after the coating is in place. If water does not destroy the film

itself, it promotes efflorescence, permits growth of molds, collection of soot, etc. Spraying a painted surface with a colloidal soln of paraffin (Schmidt's encaustic process) is effective in excluding water G G SWARD

The preparation of precipitated white lead with high hiding power. A. I KOGAN *Farben Ztg* 36, 826–8(1931).—White lead prepd by pptn from a basic Pb acetate soln by $CO_2$ is low in hiding power because of the formation of considerable $PbCO_3$. When $CO_2$ is passed through a basic lead acetate soln, $2Pb(OH)_2 \cdot PbCO_3$ is formed in the early stages Later $PbCO_3$ is also formed at the expense of some of the basic carbonate already formed If the process is stopped in the early stages a pigment of high hiding power is obtained This ppt may be removed and the process repeated several times Hiding-power values for the pigment obtained in the improved manner ranged from 22 4 to 29 3 sq cm /g as compared with 15 3 sq cm /g for the complete pptn method The sp gr ranged from 5 95 to 6 26 G G SWARD

The red lead question A V BLOM *Farben-Ztg* 36, 1015–6(1931).—The reaction of linseed oil with red lead is governed not only by the particle size and percentage of PbO, but also by the cryst structure of the PbO *E. g.*, flat plates and spheres are less reactive than irregular crystals or clusters The form which is ideal for non reactivity is a kernal of PbO surrounded by small spheres of $Pb_3O_4$ G G SWARD

Adulteration of red lead and chrome green. F. DINSLAGE AND B STEMPEL. *Pharm Ztg* 76, 262(1931).—Red lead (minium) was found admixed with heavy spar ($BaSO_4$) colored with an aniline dye Chrome green (normally a mixt of oxides of Cr) carried $PbCrO_4$ and $BaSO_4$ W. O E

The colorimetry of pigments and a suggested scale of fastness. G F. NEW, G S. DISNEY AND D L. TILLEARD *J Oil & Colour Chem Assoc* 14, 3–48(1931).—A method for quantitatively measuring the extent of fading of colored surfaces is The color quality before and after fading is located on the trichromatic color chart. The length in color triangle units (C. T U.) of the line connecting these loci is then plotted against the time of fading In most comparisons brightness need not be considered Colors of different hues, satn and brightness may be directly compared According to their fastness pigments and dyestuffs may be placed in 10 or more groups, group 1 being the most stable with a fading line of 1 to 1 33 C T U. for 75 hrs' exposure to a C arc. The lengths of the fading lines of successive groups bear a ratio of 3 4 Examples of the fading of red pigments diluted with white pigments are given The study of the color characteristics of pigments is best made at a dilution of 9 parts of diluent The medium recommended is a 1% soln of gelatin in $H_2O$ in such quantity that not more than 0 5% of the film is gelatin A discussion follows. G G S

Fastness of pigment finish to rubbing M C. LAMB AND R. DENYER. *J Intern Soc Leather Trades Chem* 15, 107–13(1931).—The whole question of the manuf of pigment finishes is critically considered Suitable grinding media for pigments are soap solns., sulfonated oils, and solubilized mineral oils, pigments ground in soap soln possess exceptional covering power and stability in suspension Pigments should not be allowed to dry before mixing with the binder $NH_4OH$ is preferred to borax or soda for dissolving casein or shellac to be used as a binder, since the excess $NH_3$ is evapd on drying and the resulting deposit is more waterproof Since a finish contg only shellac-casein ammonia pigment would be too brittle, various gums are added Casein (and other protein binders) are made insol by HCHO, but the resulting finish is brittle, and available softening agents are not very satisfactory *Tung oil* seems to be an excellent binder The following tentative procedure is suggested Add 100 parts tung oil to 10 parts soap dissolved in 250 parts water (not over 60°), emulsify, let stand 24 hrs., add 250 parts $H_2O$, emulsify add 100 parts dry pigment and grind until the pigment is sufficiently fine Mix this pigment emulsion with (1) a soln contg 15% casein and 1% com $NH_4OH$, (2) a 10% soln of glue and (3) glycerol, in the proportions 15 30 25 8 Sterilize with about 0 13% nitrobenzene. Apply by spraying, and top off with HCHO soln H B MERRILL

Pigments and lacquers from organic coloring materials. A SANDER *Industria chimica* 5, 1490–5(1930).—A brief summary of the history, classification, theory, prepn, use and analysis of org dyestuffs A W. CONTIERI

Reactions between inorganic basic pigments and linseed oil. K CHARISIUS AND E KINDSCHER *Farben Ztg* 36, 780–3(1931), cf *C A* 24, 3913–4.—Equal apparent vols of ZnO, basic Pb carbonate, basic Pb sulfate, highly disperse red lead, ordinary red lead and litharge were each suspended in raw linseed oil in the absence of air. The reaction of the oil with the pigments was essentially the same as in systems in which air was not excluded, *viz.*, large amts of metal were found in the oil in ordinary red lead and litharge and relatively small quantities in the other pigments G G S

Some properties of pigment-oil pastes. W. Droste. *Farben-Ztg.* 36, 916–8 (1931), cf. *C. A.* 25, 831.—The relationship between the oil absorption of pigments and the consistency of paint is reviewed. G. G. Sward

Application of a few colloid-chemical methods of investigation to the drying of linseed oil. H Freundlich and H W Albu. *Z. angew. Chem.* 44, 56–60(1931).—Depolarization expts. as well as viscosity measurements and ultramicroscopic examn. show that at a low drying rate colloidal properties are not obtained in pure or siccative linseed oil. H. Stoertz

The drying time of linseed oil. J Rinse. *Chem. Weekblad* 28, 131–2(1931).—The influence of the humidity and other factors of the atm. on the drying time of linseed oil is discussed E. Schotte

Tung-oil tree. Wilmon Newell, Harold Mowry and R. M Barnette. Fla. Agr. Expt. Sta., *Bull.* 221, 5–63(1930), cf. *C. A.* 24, 1526.—The Fla. acreage in tung-oil trees is about 5000. The fruits on examn. gave 55% hulls, 45% meat, 49% oil in the meat and 32–9% of oil in the seeds. Fully matured and thoroughly air-dried fruits consist of approx. 56% seed and 44% hulls. The tree thrives best in an acid, well-drained soil. Lack of N in the soil is the principal limiting growth factor in Fla. but a well-balanced mixed fertilizer gives max. growth and yields of nuts. A tung-oil expression plant is located at Gainesville. The oil is graded as cold Pressed Fla. No. 1 and Fla. No. 2. The appearance of the former is pale and clear with a sp. gr. at 15.5° of 0.941, acid no. 0.5, sapon. no. 193.8, I no. 166, A. S. T. M. heat test 10.75, and $n_D$ 1.519. Hulls and pomace remain after extn. of the oil. Pomace contains about 6% of N and compares favorably with castor-bean pomace as a *fertilizer*. The hulls contain a little N and K and are valuable chiefly as a mulching material. For *varnish manuf.*, the oil gives a clearer and faster drying finish than the ordinary imported Chinese oil. C. R. Fellers

Reactivity of mineral umbers with oils. A. Eibner, Richard Schwarz and E. Rossmann. *Farben Ztg.* 36, 962–4, 1006–7, 1046–9(1931).—The formation of soaps in mixts. of pigments and drying oils is usually due to the presence of the original fatty acids. Only a few pigments, *e. g.*, red lead, are able to react with glycerides under the conditions of storage and drying usually prevailing. The principal requirement is an elevated temp. If a reaction does occur, the products are mixts. of normal soaps and mixed glycerides of the metal, the so-called aggregates. Such a reaction should not be called sapon. With 2 umbers, no reaction took place with either linseed oil or poppyseed oil until resins were added. This indicates greater reactivity of resin acids than of fatty acids. Metal aggregates improve not only the drying but also the durability of paints. Under certain conditions linseed and poppyseed oils, and presumably all other drying oils, yield $H_2O$-soluble cryst. compds. of a peroxide nature. With further oxidation, the cryst. character is destroyed. Such a reaction in the drying of oils is contrary to Auer's theory. G. G. Sward

Lacquer poisoning. G Ohnesorge. *Deut. med. Wochschr.* 56, 961–3(1930).—Several cases of poisoning among workers in a hat factory were traced to the *action of tetrachloroethane*. Arthur Grollman

Nitrocellulose lacquers in the wood-working industry. Prellwitz. *Nitrocellulose* 2, 5–10(1931). E. M. Symmes

Alcohol-soluble nitrocellulose. Hans Wolff and B Rosen. *Farben-Ztg.* 36, 964–6(1931).—The hardness, abrasion resistance, tensile strength, elongation and resistance to pressure of a no. of alc.-sol. nitrocelluloses were detd. Better properties were exhibited by those samples possessing the highest viscosities. G G. Sward

New method for examination of pictures. A. M. de Wild. *Chem. Weekblad* 28, 128–8(1931), cf. *C. A.* 24, 739.—A summary of the scientific methods of picture examn. developed during the last 3 years. Chem. analysis can det. with certainty the period in which a painting was made. Röntgen-ray examn. is a valuable method for the detection of technical particulars about a certain painter. The method of magnified photographs and photography with grazing light need too much of a subjective interpretation yet to give conclusive and convincing results. E. Schotte

Determining the roughness of a surface. K. Würth. *Farben-Ztg.* 36, 575–6 (1931).—Since the amt. of paint required to cover a surface depends upon the roughness as well as the porosity, a method of detg. roughness is desirable. W. does this by making an impression of the surface on tinfoil. G. G. Sward

Rosin used to produce rosin oil. V. E. Grotlisch. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 534–8(1930).—Rosin oil is produced by distg. 6500–12,000 lb. of rosin, usually of a dark or opaque grade, in a cast Fe or steel still. Water is first liberated. Rosin spirits (pinolin) begin to distil at 160°, "light oil" at 200°, "kidney

oil ' at 250° and ' bloom oil ' at 270°. The "kidney oil ' is the most valuable fraction It is used in the manuf of greases and printing inks and may be redistd to give the higher grade oils Other uses of rosin oils are listed ' Synthetic" rosin oils are solns of rosin in mineral oils H K Salzberg

**Rosin in the manufacture of rosin esters** Stephen Babcock *Proc Am Soc Testing Materials* 30, Pt II, 705–7(1930) —The discussion is limited to ester gum, its history and manuf, and the properties of rosin which are important in its manuf Wood oil-ester gum combinations are popular because they require relatively little time to age Clean rosin of a clear grade having a high m p and acid no is desirable in manufg ester gum H K Salzberg

**Tests on oil cloth and artificial leather.** R Hesse *Nitrocellulose* 2, 6–8(1931) — Detailed methods of proximate analysis are given I M Symmes

**Rosin as a linoleum component** M K Barr *Proc Am Soc Testing Materials* 30, Pt II, 803–6(1930) —Since 1926 the use of rosin by the linoleum industry has increased by 31%. At present this industry ranks fourth in the consumption of rosin Linoleum cement, which is made from wood rosin, accounts for 90% of the total rosin used by the industry The remainder gum rosin goes into linoleum paint Linoleum binder consists of oxidized linseed oil rosin and other resins The rosin serves as a solvent for the oxidized oil, its solvent power being greater the higher its acid no A rosin of very high acid no cannot be used however, because of its high m p and susceptibility to attack by alkali The presence of rosin in the binder gives it heat sensitiveness enabling it to be worked under the compounding machines Rosin also serves to keep the finished linoleum in a flexible condition Substitutes for rosin are deficient in this stabilizing effect H K Salzberg

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*Fire, explosion and health hazards with nitrocellulose lacquers (Greuff) 24 The* resins of jack pine (Phillips) 23. Solvents (Durrans) 2. Solvents for resins (Ger pat 517,097) 13. *Arylaminoanthraquinones [dyes for resins and varnishes] (Brit pat* 338,412) 25 Coloring plastic masses or their solutions (Ger pat 517,491) 25. Synthetic *rubber [for addition to paints or lacquers] (Brit pat* 338,152) 30 *Discharge device* [apparatus for atomizing paints with $CO_2$] (U S pat 1,794,185) 1

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Bianchi, Calisto **Celluloseesterlacke** Revised German ed by Adolf Weihe Berlin J Springer 328 pp Bound, M 22 50 Reviewed in *Chem Trade J.* 88, 261 (1931)

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**Paints** A Rogler Brit 337,523, Sept 5, 1929 Paints which dry rapidly are made by heating, drying or semi drying oils such as linseed, poppyseed or wood oils, with metal oxides such as those of Zn or Ti, to about 100–150° until a pasty product is formed and mixing the latter with solvent and pigments Resins may be added

**Paints containing finely divided metals** L V Adams (to British Thomson Houston Co, Ltd) Brit. 337,682, Jan 11, 1929 Metal powders such as Al Zn, Cu alloys (bronzes), Ag or Au are suspended in a soln comprising a volatile solvent and a synthetic resin compn such as one formed from glycerol, phthalic anhydride, linseed oil fatty acids, wood oil resin and diethylene glycol Paints thus formed contg Zn or Al may be applied to base metals such as iron or Cu and the Zn or Al subsequently alloyed with the coated base metal surface by heating

**Apparatus for mixing ingredients of paints, etc.** I I Begros Brit. 337,945 Oct 21, 1929 The materials to be mixed are passed under pressure through a pipe contg a roll of metal net (suitably of 25–35 mesh and about a meter long)

**Pigment.** Soc anon pour l'ind chim a Bâle Swiss 141,886, Aug 21 1928 A colored pigment is prepd by mixing chalk or other similar Ca compds with the azo dye produced by the action of $COCl_2$ on the sapond dye from the diazotized *p* toluenesulfonic acid ester of 1,8-aminonaphthol-3 6 disulfonic acid and cresidine, 1,4,3,-Me(MeO)($NH_2$)$C_6H_3$ The resulting pigment is red and has good light, water- and weather-resisting power Examples are given

**Iron oxide pigment** Julius Laux (to I G Farbenind A G) U S 1,793 041, Feb 24 An aromatic nitro compd such as $PhNO_2$ is reduced with Fe and an aq soln contg at least 25% of a salt of an org amino compd such as $PhNH_2$ HCl, and the resulting Fe oxide sludge is sepd from the aromatic amino compd produced and is purified by washing U S 1,793,942 relates to a process in which an aromatic nitro compd such as $PhNO_2$ is reduced with Fe and an aq soln of acid such as HCl contg at least 2 mols of anhyd acid in 1000 parts of soln, insufficient in quantity to dissolve the Fe,

the sludge formed being sepd from the resulting amino compd. and purified by washing. Cf. *C. A.* 24, 5171

Drying oil. IRVIN W HUMPHREY (to Hercules Powder Co) U S 1,793,220, Feb 17. A drying oil suitable for use instead of linseed oil comprises a polymerized terpene product composed mainly of polymers having a higher b p range than that of the polymer $(C_{10}H_{16})_2$

Modifying the physical properties of fatty oils. L AUER Brit. 337,736, April 24, 1929 For producing a modified product sol. in a desired org solvent for the manuf of *"leather cloth," lacquer or varnish*, the fatty oil is treated with a modifying agent insol in the selected solvent, and there is heated with the material over 2% of a soly-promoting agent such as phenols or ketones, e g, linseed oil heated with $CaO_2$ and $ZnSO_3$ produces when the product is dissolved in turpentine a varnish too viscous for use, but a suitably reduced viscosity may be attained by adding about 4% of *o*-nitrophenol or benzoic acid to the modifying agents The modified products may be used as softening agents with nitrocellulose Products sol in acetone or benzene are obtained by heating castor oil with $Li_2CO_3$ or Li sulfite to which *p*-cresol has been added. Cf *C A* 24, 2910

Varnish. "CIRINE-WERKE" JOSEF LORENZ & Co Swiss 142,167, April 18, 1929 A weather- and acid-proof varnish is made by pulverizing a composition made from several varieties of wax, cold-emulsifying with a dry vegetable oil and mixing with a soln of Co linoleate in dry vegetable oil and a wax solvent. Thus, bees-, carnauba, mineral and shellac wax are ground up and emulsified with linseed oil A paste of Co linoleate and linseed or wood oil and $C_6H_6$ is then added

Varnish bases. BAKELITE G M B H (Fritz Seebach, inventor) Ger 517,445, Feb 26, 1929 Phenol aldehyde condensation products capable of being hardened are combined with partly or completely oxidized drying oils The materials may be combined in soln and the solvent then evapd The process may be effected in the presence of an O-carrier, and the oil may be oxidized *in situ* Examples are given

Lacquers. KAZUO TAKEMURA and KAZUE OTWA Ger 517,349, Aug 15, 1926 Nitrocellulose is dissolved in AcOAm, $Et_2O$ and acetone, and the soln is dild with EtOH and Bu tartrate $K_4Fe(CN)_6$ and powd bamboo cane are then incorporated

Oil lacs. I G FARBENIND A.-G (Karl Ott and Hanns Bernard, inventors). Ger 514,914, Sept 11, 1927 See Fr. 660,748 (*C. A* 24, 252)

Non-inflammable nitrocellulose lacquer. MARKUS THAU. U S 1,793,726, Feb 24. $CCl_4$ is added to a soln of nitrocellulose in a solvent mixt. such as BuOAc and turpentine

Coating sheet materials such as wallboard with enamel. JOHN W COWELL. U. S 1,793,437, Feb. 17 Mech features

Coating metal foil. STANIOLFABRIK BURGDORF A G Brit. 338,340, Oct 9, 1929 Sn or other foil is coated with a soln of nitrocellulose in Et lactate and alc, an alc shellac soln and castor oil, with or without AmOAc

Impregnating porous materials. ADOLF KANZOK. Swiss 141,109, Jan 2, 1928 The materials are soaked in a liquid contg a phenolic soln of a substance which will not react with the phenol on forming synthetic resin, but which will promote the polymerization of the phenolic resin Thus, wood is steeped in a mixt of aldehyde-$NH_3$ and cresol and heated to about 160° The aldehyde and cresol form a synthetic resin which later polymerizes under the contact action of the $NH_3$

Films of cellulose esters or ethers, etc., suitable for tipping cigarets. CHEMISCHE FABRIK VON HEYDEN A.-G Brit 337,501, Feb. 15, 1929. Thin bands are formed comprising 2 continuous layers of cellulose esters or ethers such as cellulose acetate and ethyl or benzyl cellulose or the like, one layer contg a pigment such as a metal powder while the other layer contains a material such as powd magnesia, lithopone, powd cellulose or cork which enhances its affinity for adhesives Various details of manuf. are described

Revivifying decolorizing clays containing rosin impurities. ROBERT C. PALMER (to Newport Co) U. S 1,794,537, March 3 Clay such as that which has been used for purifying rosin is treated with a mixt of alc, and an org. solvent such as petroleum naphtha to dissolve the impurities in the clay, and the soln. thus formed is displaced from the clay with an org alc solvent such as a further quantity of petroleum naphtha

Revivifying fuller's earth contaminated with rosin impurities. ROBERT C. PALMER U. S 1,794,539, March 3 Fuller's earth which has been used as a filter for purifying rosin is washed with a soln of a rosin solvent such as petroleum naphtha and an org revivifying liquid such as acetone having a high miscibility with the rosin solvent em-

ployed and at least moderate miscibility with water at the temp of the process (which may be about 65°) Mention is made of various other solvents which may be used.

Removing water from fuller's earth such as that used for purifying rosin. Robert C Palmer and John L. Burda U S 1,794,528, March 3 The material is treated with a substantially anhyd. liquid immiscible with water such as petroleum naphtha at a temp (suitably about 130–150°) above the normal initial b p of the liquid and under pressure, and the pressure is then reduced to vaporize part of the anhyd. liquid together with the water contained in the earth

Castings of weighing apparatus formed of resinous material. C. P. M. van Berkel. Brit. 338,424, Jan 11, 1930 Castings of weighing app are formed wholly or in part of molded natural or synthetic resin compn which may comprise a filling of wood flour, asbestos or linen or other fabric. Various details of manuf and construction are described

Refining wood-resin. Willi Schultze (to A Schultze & Co) U. S. 1,793,967, Feb 24 Resin obtained from dead trees is distd in a high vacuum (of 8 mm. Hg or less) in the absence of foreign gases

Modifying the properties of resins. L. Auer. Brit. 337,733, April 24, 1929 In a process such as is described in Brit. 321,724 (*C A* 24, 2904) for modifying the phys. properties of resins contg high mol. org acids, such as colophony or ester gum, the resins are heated under atm. or higher pressure with org compds. of the O acids of S or their Cl derivs such as aromatic sulfonic acids or chlorides. The material such as colophony or ester gum may, *e g*, be heated at 280–300° in an open vessel with *p*-toluenesulfonyl chloride, 2,5-dichlorobenzenesulfonic acid, *β*-naphthol-3,6,8-trisulfonic acid or sulfosalicylic acid. The products are either viscous oils or are brittle solids and may be used in varnishes They may be subjected to a supplementary gas treatment or to irradiation. *Brit. 337,734 relates to the modification of the phys. properties* of fats, fatty oils or fatty acids by heating and dispersing in them modified isocolloids such as those prepd. by heating with amines (Brit 337,732, following abstr) or with compds. comprising an org residue united to an inorg acidic residue (such as benzenesulfonic acid) as described in Brit. 321,724 (*C A* 24, 2904) or with water insol. compds. as described in Brit. 321,725 (*C. A* 24, 2904), or by treating an aq soln. of the salts of amines such as benzidine or dianisidine with a soap soln. of high mol org acids. The products may be irradiated with ultra violet or x rays, treated with gases such as $SO_2$ or N, and may be vulcanized, they are suitable for varnish or rubber-substitute manuf.

Modifying isocolloids for varnish or rubber-substitute manufacture, etc. L. Auer. Brit. 337,732, April 24, 1929 Materials such as linseed or China wood oil or their fatty acids are heated to above 250° (or thickened oils or tung oil to above 200°) with 2–10% of a primary aromatic diamine or a monoamine of high mol. wt. or both, such as *m* phenylenediamine, *p*-tolylenediamine, *β* naphthylamine or *p,p'*-diamines such as *p,p'*-diaminodiphenylamine or *p,p'*-diaminodiphenylurea. Various other substances may be added and the products may be vulcanized with or without use of an accelerator or activator Cf *C A* 24, 2904

Modifying natural and artificial resins. L. Auer. Brit. 337,750, April 24, 1929. Various materials such as colophony or ester gum are heated under less than atm. pressure with metal free inorg S compds. such as S chloride, chlorosulfonic acid, $H_2SO_4$ or sulfuryl or thionyl chloride (suitably at a temp of about 290–300°) The products thus formed are brown viscous oils or semi-solids suitable for use in varnishes and may be irradiated with ultra violet or x rays or mixed with ketones, phenols, etc. Cf *C. A* 24, 2904.

Synthetic resin from xylenols and furfural. Emil E Novotny (to John S. Stokes). U S 1,793,715, Feb 24. In making a potentially reactive resinous product, a mixt. of the ingredients is heated to above 100° and the water of soln. and of reaction is removed substantially as fast as it is vaporized while the reactive ingredients are returned to the zone of reaction, and a methylene-contg hardening agent such as formaldehyde is combined with the reaction product. Cf *C A* 24, 5173

Synthetic resins. Carleton Ellis (to Ellis-Foster Co). U S. 1,793,310, Feb. 17. *A chlorination product of toluene*, chlorinated in the side chain and contg benzotrichloride is caused to react on a phenol in the presence of a chloride of Fe or Al to produce a resinous product, and the latter is acted upon with about 10% of $CH_2O$ U. S. 1,793,311 relates to products similarly formed with the further addition of $(CH_2)_6N_4$ and U. S. 1,793,312 also relates to details of procedure of processes of the same general character

Synthetic resins. British Celanese, Ltd. Brit. 338,002, Nov. 17, 1928. A toluenesulfonamide-aldehyde condensation product is further condensed with a toluene-

sulfonamide, and an addn. of 5–10% urea may be made to the initial materials, and the reaction may be effected in the presence of a catalyst of acid or alk. character or in the absence of a catalyst. The products are suitable for use in lacquers, plastic compns., etc., together with cellulose derivs, other synthetic resins, natural resins, solvents, plastifiers, modifiers, etc., various details and examples being given both of the prepn. and use of the products Cf *C A* 24, 2317.

Synthetic resins. British Celanese, Ltd Brit 338,024, Dec. 5, 1928. Resinous products prepd by condensing a toluenesulfonamide-aldehyde condensation product with a toluenesulfonamide, as described in Brit. 338,002 (preceding abstr.) are modified by further condensing with an aldehyde, *e g*, a benzene-insol product formed as described in Brit 338,002 may be heated with formaldehyde soln under reflux at 120–150° to form a non resinous product which is converted into a benzene-sol. resin by heating at 130–150° in an open vessel

Synthetic resins. Wilfred S Rothera, Stanley Blythen and Henry R. Gillespie Ger 517,251, Feb 16, 1926 Hydrophobe resins are prepd by warming urea or a urea deriv with an aldehyde, particularly $CH_2O$, for a short time, treating the primary condensation product so obtained with an org compd capable of condensing with the aldehyde in an acid medium, *e g*, PhOH or thiourea, and then heating the mixt in the presence of free H ions until the resin ppts from the mixt. on cooling. The mixt. may be neutralized or rendered feebly alk before cooling Examples are given

Synthetic resins. I G Farbenind A -G Brit. 338,109, May 9, 1929 Cyclic hydrocarbons contg at least one aromatic nucleus but having no olefinic side chains, such as benzene, naphthalene or tetrahydronaphthalene, or their alkylated, halogenated, nitrated, alkloxylated or carboxylic ester derivs, are condensed with diolefins such as 1,3-butadiene, isoprene or 2,3-dimethyl 1,3-butadiene, in the presence of anhyd. inorg halides which evolve heat on contact with water such as $AlCl_3$, $ZnCl_2$, $FeCl_3$, B chloride or B fluoride, or of "ansolvo" acids derived from such halides, such as complex compds of the halides of Zn, Ca or Mg with HOAc Products are obtained suitable for use in lacquers, etc, and several examples are given

Synthetic resins. I G Farbenind A -G (Friedrich Frick, inventor). Ger. 517,430, Dec. 29, 1928 Resins are prepd by condensing urea with $CH_2O$ in the presence of aryl ethers of glycols or polyglycols, or lower fatty acid esters of such ethers. About 0 5 mol of glycol deriv may be taken for each mol of urea. Examples are given Cf *C A* 25, 835

Synthetic resins. I G Farbenind A -G (Leo Rosenthal, inventor). Ger 517,477, May 1, 1928 Resins are prepd by treating crude solvent naphtha, alone or contg phenols or naphthols, with compds of $BF_3$ and fatty acids. The reaction may be effected by gradually adding about 3% of a $BF_3$-fatty acid compd to crude solvent naphtha while stirring and preventing rise of temp above 70°. The products are colorless or nearly so, and are *useful as varnish bases* Examples are given

Apparatus for cutting thin sheets from a heated block of fully hardened artificial resin. Herold A -G Brit 337,530, Sept. 13, 1929. Structural features.

Urea-formaldehyde resins. Toledo Scale Mfg Co Brit. 337,357, April 27, 1929. Urea and $CH_2O$ are caused to react in aq soln to form an initial condensation product, the soln is concd, a condensation product of a "polybasic" acid and a polyhydric alc is then added and the soln is further concd In the initial condensation, the $p_H$ may be adjusted to from 5 to 6 by adding triethanolamine, and after such condensation the $p_H$ may be increased to 7 or 8 Sufficient of the "polybasic acid"-polyhydric alc condensation product may be added to lower the $p_H$ to 3 5 to 5 0 and the mixt. may be dried by heating *in vacuo* and may be molded under pressure and cured by heating. Thiourea may be substituted for part of the urea Cf *C A*. 24, 6041.

Linoxyn or similar material. Victor Scholz (to Atlas Ago Chemische Fabrik). U. S 1,794,325, Feb 24 Oil such as linseed oil is preliminarily converted into a jelly by heating and blowing with air and is then subjected to a kneading process to give the product a fine crumby, flaky, yellowish opaque character Cf *C A* 24, 2316

Decorating linoleum and similar materials. H. W. Prentis (to Armstrong Cork Co). Brit. 338,205, Oct. 9, 1928 Various mech features of operation are described.

Forming color patterns on linoleum, felt, oil cloth, etc. J. C McCarthy (to Armstrong Cork Co). Brit. 337,924, Nov 21, 1928 Various details are given of procedure for successive color applications Cf. *C A*. 24, 2623

Floor covering. Julian T. Baldwin (to Sandura Co.). U. S 1,793,666, Feb. 24. A thin sheet material such as paper is placed on a supporting base such as a linoleum

or felt base with an intervening cementing material *comprising* a resin such as rosin, shellac or ester gum, a plasticizer for the resin such as diethyl phthalate and a "modifier" such as montan wax, rubber or oil and the product is provided with a decorative coat such as a pigmented resin *compn and an overlying* transparent wear resisting coating such as a shellac varnish contg a plasticizer U S 1,793,667 relates to floor covering material prepd by mixing body ingredients such as cork, wood flour, *starch or rubber* with a binder such as a resin and plasticizer and affixing the resulting mixt under pressure to a fibrous support such as textile fabric

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E SCHERUBEL

A new method for determining iron in fats and soaps. O HAGEN *Seifensieder-Ztg* 58, 110-2(1931) —H dets Fe in oils by carefully ashing *10 g* and detg *Fe in the* HCl soln. of the ash colorimetrically with standard Fe soln. and KCNS. The following results are tabulated colorless coconut oil 0 4–0 9, I A lard 0 6, II A lard 27 0, 1st pressing castor oil *0 9, tallow 4 5–36 0, coconut oil fatty acids 20 7 mg* Fe per kg. of oil Soaps are ashed in successive portions, a total of 5 g. is used and combustion is aided with a few crystals of $NH_4NO_3$. The titration with KCNS gave for soaps a content of 2 3–25 2 mg Fe per kg of soap In a series of expts. for development of brown spots, the unchanged soaps contained 1 4–1 8 and the discolored soaps up to 9 0 mg Fe per kg P. ESCHER

Wool fat. P MARTELL. *Pharm Presse, Wiss.-Prakt Heft* 1931, 17–8 —A description of the secretion of wool fat and of its phys and chem properties in connection *with the usual procedures followed* in the production of the crude and refined brands. W. O E.

Wool *fat*, its properties and composition. G SALOMONE. *Boll. lanera* 44, 199–201(1930) —The properties and compn. of wool fat depend greatly on the way it is extd The wax extd with petr ether has a thicker consistency and is richer in hydroxy *acids than* that extd *with trichloroethylene. It is brown or* brown yellow, has no disagreeable odor, is little sol in 95° alc., much more in ether, in benzine, in chloroform, trichloroethylene, $CS_2$, and is dextrorotatory It has $d_{15}$ 0 941–0 945, m 36–42°, sapon no 98–115, I no 17–29, unsaponifiable 30–52%, fatty acids m 42°, mol. wt. of acids 327 3 The fat extd with petr ether or acetone has little acidity, while that obtained *from* scouring baths has 20–25% *of free fatty* acids calcd. as oleic acid. Wool fat is difficultly sapond , it contains lactones that are transformed gradually by the alkali into acids and their salts There is a little myristic acid and a large amt. of palmitic, stearic, carnaubic and cerotic acids. Small quantities of cetyl, carnaubyl and ceryl ales are present with cholesterol, isocholesterol and oxycholesterol, in a free state in limited amount, and for the greater part *esterified with the fatty acids.* Such ales represent the unsaponifiable portion that can reach 50% of wool fat. The esters predominating in wool fat are principally palmitate, stearate and cerotate of cholesterol and isocholesterol The identification of wool fat is based on the presence of cholesterol. Impure wool fat, if exposed for some time to air, becomes brown, and acquires a less agreeable odor, a greater consistency, a higher *refractive index, a lower I no*, a less complete soly in petr ether and a higher mol. wt. by the decompn. of the cholesterol esters that are first hydrolyzed and then oxidized. R. SANSONE

Freezing-point method for the examination of cacao butter. A. G AVENT. *Analyst* 56, 180(1931) —In the paper published on the classification of chocolate fats by the *f.-p* method (*C A* 24, 4946) mention should have been *made of the assistance obtained* from H R. Jensen in devising the standard solidification test. W T. H.

Extracted cacao butter—imitation or adulterated. W. NORMANN. *Allgem Öl Fett Ztg* 27, 259–61(1930) —The inconsistency of German rulings on the subject of extd. edible fats is discussed. W. F. BOLLENS

Measurement of rate of formation of oxidative *decomposition products in fats* and oils. D P. GRETTIE AND R. C. NEWTON *Ind Eng Chem., Anal. Ed.* 3, 171–3(1931) — *The method used is* a modification of the methods of Bailey and Issoglio The measurement of the volatile products is taken as a measurement of the degree of spoilage of the fat, and is performed by titrating against acid $KMnO_4$; the products carried away in a given time by a const. stream of air pass over the fat which *is dispersed on* filter paper and maintained at a specified elevated temp The stream of air is drawn over the fat and *then through* a standard soln. of acid $KMnO_4$ maintained at 25°. This

soln. is then titrated against oxalic acid to det how much was used by the decompn. products condensed in it. E SCHERUBEL

**Causes of deterioration of fats and oils.** W L. DAVIES *Oil and Fat. Ind* 7, 427–31, 453–7(1930).—The 2 main causes of deterioration are oxidation and the agency of microorganisms O absorption is not rapid until after the induction period has been overcome This means the time required by the system to undergo activation The conditions likely to catalyze the subsequent oxidation of fats have also the effect of shortening the induction period, *e. g.*, heat, light, acidity, other impurities and metallic catalysts Lipoids in fats are oxidized first thus in butter the fishy flavor is due to oxidation of lecithin forming trimethylamine. Foots which contain lipase and protein decompn products also shorten the induction period The tests used for following the course of oxidation such as the Kreis test and the extn. of the oxidizability values of the steam volatile or water sol products of oxidation have been found valueless in detecting incipient deterioration When bacteria are present in fat no autocatalytic oxidation occurs as the organisms use all available O in the fat. Molds cause more deterioration in fats than bacteria. They are of 2 classes those which preserve the solid consistency of fat and those which have strong lipolytic properties and liberate fatty acid Very little is known of the effect of yeasts on fat. E SCHERUBEL

**Determination of rancidity in oils and fats.** ALAN TAFFEL AND CECIL REVIS. *J Soc Chem Ind* 50, 87–91T(1931).—On account of emulsification caused by ether in the Kreis reagent and the presence of peroxides which tend to oxidize phloroglucinol, the Kreis test was modified by substituting alc for ether and using 10 drops of a 5% soln of phloroglucinol in alc Oils which have been air blown or have become rancid at moderate temp contain peroxides which are reduced by HI and oils becoming rancid around 120° contain more peroxides together with other forms of combined O which offer more resistance to reduction by HI Oils air blown at 170° contain only difficultly reducible peroxides The amts of each type of oxide present in an oil can be detd For oils becoming rancid at moderate temp add 10 g of oil to 40 cc. glacial AcOH and then 2 cc of 50% KI soln. Shake the mixt for 2 min., hold for 2 min. and again shake for 2 min. and then pour into 100 cc $H_2O$, rinse with 20 cc. and titrate with 0.1 *N* $Na_2S_2O_3$ and starch Two g of $BaI_2$ may be used instead of the KI soln For oils which have become rancid by exposure to air at high temp the proportions of the reagents must be found by expts Ten to 20 g of $BaI_2$ and 100 cc. of AcOH are suitable for 1.25 to 2.5 g of oil. For the samples examd the Kreis reaction and the I or peroxide figure showed a close correlation, a strong reaction of the former accompanying a high peroxide figure While the peroxide methods have not stood the test of long experience they are of apparently general application to all types of rancidity Definite and reproducible figures are obtained by the methods which distinguish between oxidation in ordinary rancid oils and that which occurs in oils blown at high temps E S

**Three new oils.** ERICH STOCK. *Farben-Ztg* 36, 830(1931).—The analytical consts of 3 new oils were

| | *Moquilia tomentosa Benth.* | *Oenocarpus* | *Uddo* |
|---|---|---|---|
| sp. gr. | 0.9864 (at 16°) | 0.9244 (at 15°) | 0.9241 (at 15°) |
| solidification pt. | —14.5° | 7.5° | 7.9° |
| *n* | 1.4919 (at 30°) | 1.4700 (at 15°) | 1.4699 (at 15°) |
| sapon. no. | 196 | 190 | 198.9 |
| acid no. | 18.8 | 1.38 | 66.9 |
| I no. (Wijs) | 81.5 | 80.6 | 98.8 |
| unsaponifiable % | 7.5 | 0.84 | |
| resins | | | 19.4% |

G. G. SWARD

**Some titer points of mixed fatty acids. I. Mixtures of commercial oils, fats and fatty acids.** GEORGE W. JENNINGS *Ind. Eng. Chem.* 23, 413–5(1931).—Mixed fatty acids of tallow, corn, olive, coconut and cottonseed oils, garbage, grease and red oil were prepd. and mixed with each other in the desired proportion just before detn. of the titer The results are reported in the form of curves, plotted with the titer points as ordinates and the % compn of the mixed fatty acids as abscissas. The work is to continue in order to explain the cause of the apparently erratic results obtained in some cases E SCHERUBEL

**Intramolecular rearrangement of the ester of simple unsaturated fatty acids during hydrogenation.** A. STEGER AND H. W. SCHEFFERS. *Chem. Umschau Fette, Oele, Wachse Harze* 38, 45–53(1931).—S and S used specially prepd. pure ethyl, glycol and glycerol esters, etc., for a partial and complete hydrogenation with Ni on kieselguhr—

reduced at fixed temps and with Pd on C according to Mannich and Thiele (*C. A.* 10, 2148). They examd the influence of Ni reduction temps., of the hardening temps. and of the amt of catalyst upon the quality of the product. The results of the detns. of the I no. of the liquid and solid acids, % solid acids and % linolic acid are tabulated and plotted in graphs. Results. Solid isooleic acid is formed soon after hydrogenation higher temp increases it and a max is reached at 50–60 I no., linolic acid disappears rapidly and becomes oleic acid especially at higher temps.; no stearic acid is formed until only a few percentages of linolic acid remain. Oleic esters have their oleic acid in part converted into isooleic acid which reaches a max and then diminishes, disappearing entirely around I no. 20. Pt esters form more iso-acid than glyceryl esters. Solid elaidic ester forms liquid oleic acid, more of it with Pt ester than with glycerides. Changes in the reduction temp. of Ni are not reflected in the phys. properties of the product; an increase in the amt of catalyst increases the isooleic acid but slightly. A Pd catalyst forms more iso-acid than Ni, but the type of carrier (kieselguhr and C) does not influence the results. P. Fischer

Detection of sesame oil in solid mixtures of fats. R. Lucentini. *Ind. olii minerali e grassi* 10, 156–7(1930).—If less than 0.5% of sesame oil is present ext. 50 g. of the melted fat for 2 hrs. with 100 cc. 95° alc., using a Marino extractor cool to ppt. the excess of dissolved fat, filter and evap. off the alc. on the water bath. The residue contains, with a little fat, the greater part of the phenolic substance that produces the color reaction for sesame oil. After cooling, dissolve the residue in 5 cc. of petr. ether, bring it into a test tube contg. 2 drops of a furfurole soln. in alc., add 5 cc. of concd. HCl and agitate several times softly. In the presence, even of very small quantities of sesame oil, a pink red color is produced. R. Sansone

*Vitamins and palm oil in margarine.* Albert K. Epstein. *Oil and Fat Ind.* 8, 107, 109(1931).—Tests made on samples of palm oil made from selected raw material and which were refined and deodorized by careful methods were found to respond to the Drummond color test for vitamin A equiv. to about 60 units per g. This is a higher test than that given by the av. butter. E. Schierbaum

Present state of the olive-oil industry in Italy. Humberto Morini. *Quim. e ind.* 7, 232–5(1930). S. L. B. Thurton

Analysis of olive oil in Wood's light. G. Loew. *Ind. olii minerali e grassi* 10, 140–2(1930). cf. *C. A.* 24, 1532.—Tests showed that the olive fluorescence of olive oil is due principally to the presence of vitamin C or to a substance that accompanies vitamin C. R. Sansone

*Utilization of the aqueous extracts from olives.* Riccardo Cipsa, Angelo Mangini and Domenico Massimeo. *Industria Chimica* 5, 1461–4(1930).—The aq. ext. obtained during the manuf. of olive oil, previously rejected, has been found to undergo spontaneous fermentation, a max. of 3% EtOH being obtainable. In addn. 1/2% of oil can be recovered by centrifuging, as well as 2% of KCl. A. W. Contieri

The processing of the fish oils. G. Hinard. *Bull. officiale stat. sper. ind. pelli mat. concianti* 8, 101–7(1930).—The properties and uses of fish oils and of products obtained from fish oils are discussed and the methods involved in the prepn. of the products are described. G. Schwoch

The behavior of bleaching powders in acid oils and attempts at removing free acid by distillation. Lev Pick. *Allgem. Öl- Fettztg.* 27, 291–4(1930).—Bleaching earths and carbons, when mixed at 105° with peanut oil or coconut oil, contg. free fatty acids were found partially to remove the free acidity. This was found to be true for acid earths as well as for neutral earths, when amts. of 10–50% were used. This removal of free acid is thought to be due to the adsorption of the free carboxyl groups to the surfaces of the bleaching powder. This interferes with the adsorption of pigments, and thus accounts for the lower bleaching power of earths and C on acid oils. Attempts to remove the free acidity from peanut oil by steam distn. at atm. pressure were only partially successful. The best results were obtained at 287°, the free acidity being reduced from 3.5 to 2.0%. During the distn. 2.7% of fatty acids was distd. off, showing that hydrolysis had taken place. When this procedure was used on coconut oil, the free acidity was reduced from 2.2 to 0.2%. The distn. temp. was 305°. When 3% of coconut oil was added to peanut oil (free acid 4.5%) and subjected to the above process, at 300°, the free acid was reduced to 0.4%. This difference in behavior of the 2 oils is said to be that, at temps. of 280° to 300°, the higher free acids replace the lower acids of coconut oil, which at this temp. are readily distd. leaving a practically neutral oil. Attempts were also made to remove the free acid by distn. with a volatile solvent. An app. is described in which the oil dissolved in benzene (2:1) is subjected to a continuous distn. under a reduced pressure of about 100 mm. Hg. The benzene soln. is

drawn through a long Al tube submerged in an oil bath at 300°, and thence into a flask submerged in an oil bath at 230° The neutral oil collects in this flask, while the fatty acid and benzene vapors are carried through a condenser into a receiver This procedure reduced the free acid of peanut oil from 4 0 to 0 1%, and that of coconut oil from 1 1 to 0 1% In another sample of coconut oil the free acid was reduced from 13 6 to 0 7% W F. BOLLENS

**Substitution of steam for carbon dioxide in the hydrogenation of oils.** V. YASHCHENKO *Maslobeino Zhirovoe Delo* 1929, No 5, 21-4. *Chimie & industrie* 23, 427-8.—Before removal of the catalyst after hydrogenation $CO_2$ is passed through the hydrogenation vessel Passing steam at about 120–40° (to prevent condensation) was found equally satisfactory A PAPINEAU-COUTURE

**Preparation of nickel catalyst for the hydrogenation of oils.** A BAO *Maslobeino Zhirovoe Delo* 1929, No 5, 32-4. *Chimie & industrie* 23, 428.—In the regeneration of Ni catalyst the Fe being present in the $Fe^{++}$ state ppts as $FeCO_3$ along with the $NiCO_3$ instead of with the Al and Zn This is overcome by aerating the soln before pptn to convert $Fe^{++}$ into $Fe^{+++}$ A more active catalyst is obtained by pptg. the Ni by adding the $NiSO_4$ soln to the mixt of kieselguhr and $Na_2CO_3$ soln, instead of *vice versa* A PAPINEAU-COUTURE

**The effect of supports on the catalytic activity of nickel.** CHARLES R GLASS AND LOUIS KAHLENBERG *Trans Electrochem Soc* 59, preprint(1931).—Those support materials which inhibit the catalytic activity of Pt and Pd have been found to effect Ni similarly The behavior of the supports with relation to the hydrogenation of cottonseed oil by Ni can be classified as follows Reducible heavy metal oxides completely inhibit the activity of Ni The salts of those metals that decompose on heating in a stream of H completely inhibit activity Substances with corrosive properties retard but do not completely inhibit activity The salts in every case have been found to yield more active supports than the corresponding oxides The more inert the support becomes toward Ni the greater is its tendency to enhance activity The less inert the support becomes toward Ni, the greater is its tendency to retard activity. The oxides of Si, Al, Cr, Mn, Ti, Ce, U and Mg and the phosphates and borates of Al, Cr, Mn, Ce, U, Mg, Ca, Sr, Ba and Li proved very beneficial as supports for Ni in hydrogenation C. G F.

**The bleaching of waxes.** J DAVIDSOHN *Allgem. Öl- Fettztg* 27, 261-2, 276-7, 312-3(1930).—A review W. F. BOLLENS

**Sodium chloride determination in soaps.** STRANCHEN. *Seifensieder-Ztg* 58, 112-3 (1931).—S combines the NaCl detn with that of the total alkali and the fatty acids, using Volhard's KCNS method for the NaCl detn Decompose 5 g with known $HNO_3$, shake out with ether, wash the ether soln for fatty acid detn To the $HNO_3$ soln add 5 cc ether per 100 cc. soln, shake out, add 5–10 cc 0 1 *N* $AgNO_3$, shake well and set aside for 5 min in the dark; add Fe indicator in $HNO_3$ soln and titrate back with KCNS to a light rose tint P. ESCHER

**Properties of soap solutions. I. Estimation of detergent capacity.** B. TYUTYUNNIKOV. *Allgem Öl- Fettztg* 27, 241-3(1930).—The ideal way of expressing detergent capacity would be to express it in terms of the energy, which a known soln. of known concn and temp. exercises toward the overcoming of the attaction between the substrate and soil, and toward the suspension of the soil in the soln. This energy would be measured by phys. and colloidal chem methods, rather than by the highly standardized exptl washing tests. II. The influence of saponin on soap solutions. B. TYUTYUNNIKOV, N. KASSYANOVA AND R GVIRZMAN *Ibid* 273-6, 291-8(1930).—The influence of the addn of successive portions of saponin soln to soap solns is divided into 3 stages In the 1st stage the lathering power is reduced until it is 0. During the 2nd stage the lathering power remains at 0 while during the 3rd stage lather is again produced Curves showing the influence of addns of saponin on the lathering properties of Na soaps of various fatty acids and of rosin are given Tables are also given showing the influence of addns of saponin to these soaps on the lather vol. (cf. *C. A.* 24, 3668), the property of carrying ppted $MnO_2$ through a filter, and the surface tension. It is supposed that the saponin is adsorbed by the soap, and that the adsorbing power of the soap is not completely satisfied until the beginning of the 3rd stage. This may be numerically expressed by the amt of saponin required just to bring forth a lather after having destroyed it, expressed in multiples of the wt of soap present in the soap soln The no. is called the saponin no Saponins of different origins were found to give somewhat different results, and as yet no method for the evaluation of the various saponins has been developed W. F. BOLLENS

**Evaluation of detergency.** JAMES G. VAIL. *Soap* 7, No. 3, 29–30(1931).—The

trend in soiling tests has been in favor of simple pigments, carbon black and umber being preferred. Two methods of applying pigments in water give fairly even colors. In one 5 g. of umber in 100 ml. of water is used with 5 × 12 in. of cloth which is passed through a clothes wringer and the treatment repeated until the cloth color is const. The second method involves the use of the Launderometer, a machine with a round bottom metal tank supported in an open frame and having a shaft bearing 16 threaded posts. By means of clips and wing nuts 20 jars may be attached. A motor drives the shaft at 40 r. p. m. Heat is applied by a gas burner underneath. A cloth bag contg. 50 No. 1 metal balls is rotated for 1 hr. at 60° in a suspension of 1 g. of umber in 100 ml. of water. This machine is also used for the washing tests. For judging results a color chart was devised but results did not agree and another plan was to print the color in stripes across the cloth. Washing was to be continued until the marks were invisible but it was difficult to judge when they disappeared. At present no procedure has been adopted. F. Schertel

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[Fatty acids of the resins of jack pine (Phillips) 23. The oxidation of the fat used in oiled wool. Salomone 25. Floating factories [for whale oil] (Hauptvogel) 15. Calculating viscosity and flash point in compounded oils (Kadmer) 2. Report of the oil and fat commission (Auerbach) 29. The higher alcohols of the paraffin series [as waxes]. Schrauth 10. Wax emulsions [for soaps] (Brit. pat. 328,176) 18. Solvents for fats and waxes. Ger. pat. 517,097) 13. Thickening oils (Brit. pat. 337,639) 22. Method and plant for separating waxy and fatty substances from oils (Ger. pat. 517,198) 22. Rotary impeller agitating device and filter for treating oils (U. S. pat. 1,794,916) 1. Apparatus for extraction with liquid solvents (U. S. pat. 1,794,874) 1. Unactivated 'prefiltering medium' for treating oils (U. S. pat. 1,794,862) 1. Distillation of volatile substances [in refining oils and fats] (Ger. pat. 514,749) 13. Apparatus and procedure for spraying desiccation of soap (U. S. pat. 1,794,978) 1.

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**Fat separators.** Wilhelm Steinmann. Swiss 142,451, Nov. 2, 1929. A fat separator for a plant for working up animal waste, carcasses, etc., is described.

**Extracting oils and grease with solvents.** Imperial Chemical Industries, Ltd., and F. F. Rogers. Brit. 337,770, Aug. 1, 1929. Various details of app. are described for use in a process such as described in Brit. 278,891 (*C. A.* 22, 2851). A condenser and the means for heating the app. are interconnected so that the cooling of the condenser ceases when the heat is shut off.

**Organic peroxide for oxidizing or decoloring.** Henry B. Faber (to S. G. Turnbull). U. S. 1,793,917, Feb. 24. Substitution of O for Cl in material comprising an aliphatic dicarboxylic acid chloride and an aromatic monocarboxylic acid chloride (such as the reaction products from heating fumaric acid with benzotrichloride at 140–170°) is effected by treatment with $H_2O_2$ in the presence of an alk. substance such as $Na_2CO_3$. The product may be used for oxidizing or decolorizing oils, cereals, cereal products, etc.

**Leaching materials such as in extracting oil from seeds.** Jesse M. Coaxran. U. S. 1,793,465, Feb. 24. Various details of app. and procedure for countercurrent extn. are described.

**Obtaining oil, protein material, starch and cellulose from seeds.** Louis F. David and Georges Felizat. U. S. 1,794,105, Feb. 24. Seeds are crushed and the crushed mass is mixed with a slightly alk. aq. soln. such as $Na_2CO_3$ to dissolve protein material, swell the cellulose and suspend the starch and oils (the latter being in emulsion), the cellulose is sepd. by screening, the screened liquid is centrifuged at slow speed to sep. suspended starch, and the liquid is then centrifuged at higher speed to break the emulsion and sep. the oil; the liquid from the second centrifuging is treated with acid to ppt. protein material.

**Apparatus for separating solvent from extracted seeds.** Karl Löffl. Ger. 514,915, Feb. 6, 1929. The greater part of the solvent is recovered by blowing non-condensable gas through the seeds, and the remainder by squirting the seed through a nozzle into a chamber.

**Scouring composition.** W. J. A. Huyzer. Brit. 337,355, July 26, 1929. Soap powder is mixed with 1–3 times its quantity of natural magnesite ground to approx. 50 mesh per linear in.

**Dry soap.** Albert Ruf. Swiss 142,452, May 13, 1929. A good ordinary soap is dissolved in boiling water. Calcined soda and a water fixing stabilizing agent are added. The whole is reboiled and spirit added during violent agitation. On cooling, the whole is worked up to a creamy mass. In the example palm-olive soap forms the starting material.

**Apparatus for molding soap.** L. H. Nelles. Brit. 337,430, May 2, 1929. Structural features.

**Cold press for soap, with heat-absorbing plates.** August Jacobi A.-G. Ger. 514,620, Dec. 20, 1929.

## 28 SUGAR, STARCH AND GUMS

J. K. Dale.

**A hundred years ago.** X. B. O. v. Lippmann. *Deut. Zuckerind.* 56, 18–9(1931); cf. *C. A.* 24, 1556.—A history of beet sugar. J. F. Liebr.

**Cuba's five-year plan.** Earl L. Symes. *Intern. Sugar J.* 32, 612–4(1930).—A description of the operation of the governmental control method for sugar production in Cuba which became effective Nov. 16, 1930. W. L. Owen.

**Technical notes from Usina Cucau Pernambuco.** N. P. Lamont. *Intern. Sugar J.* 32, 629–31(1930).—The use of "Sumaphos" in clarification applied at the rate of 200 g. per ton of cane at the liming and sulfuring tanks results in an improved decantation and an increased yield of sugar, while the massecuites are freer working and the washed sugars are much more easily filtered. Expts. made on the purging of second massecuites with warm dil. exhausted molasses showed that the purity of the resultant molasses was on an av. 1% lower than without this aid and the actual time gained in curing each charge was reduced 20%. Expts. on the influence of $p_H$ on ale. recovery showed that the closer the initial $p_H$ to that of the final fermented wash, the higher is the efficiency of yield. An increase of 18% in yield was obtained by introducing the fresh wort on a footing of sour wash. W. L. Owen.

**Factory results in Java during the last seven years.** R. J. Prinsen Geerligs. *Intern. Sugar J.* 32, 631(1930). W. L. Owen.

**Dilution in relation to comparative purities.** Noel Deerr. *Intern. Sugar J.* 32, 616–7(1930).—D. discusses Hill's article (cf. *C. A.* 24, 6023) and replies to the exception taken by the latter to the statement that "*to be strictly comparable, gravity solids detns. should be made in solns. of the same nonsugar concn.*" Taking the formula sugar recovered $S(J - M)/J(S - M)$, where $S$, $J$ and $M$ are the purities of the sugar recovered, the original impure material, and the residue or molasses, resp., D. demonstrates that an accurate Brix or gravity solids balance can also be made where nonsugars are detd. in equal concns. The identity of the values obtained from the use of absolute and gravity purities shows what is meant by the word "comparable" in the official Direction of the Hawaiian Sugar Technologists. W. L. Owen.

**Cylindrical or centrifugal pumps (in the sugar industry)?** V. Sázavský. *Z. Zuckerind. Tschechoslovak. Rep.* 55, 127–8(1930).—A discussion. S. states that centrifugal pumps are suitable even for mud liquors. J. F. Liebr.

**An improvement in the testing of press mud for sugar.** P. Brückner and Th. Brattfisch. *Centr. Zuckerind.* 38, 1349(1930).—The authors find that foaming and dark colored filtrates are avoided by substituting a soln. contg. 8% $NH_4NO_3$ and 2% $Al(NO_3)_3$ for the 10% $NH_4NO_3$ soln. in the method of the Institut für Zucker-Industrie. Numerous expts. indicate that no errors are introduced by the change. J. F. L.

**The calculation of the amount of massecuite in a white sugar factory.** E. Dohn. *Deut. Zuckerind.* 55, 1031–2, 1080–1(1930).—A math. discussion. J. F. Liebr.

**Charring of sugar in centrifuging.** W. C. Bridgno. *Arch. Suikerind.* 38, 250(1930).—Sugar which was gray was found under the microscope to be permeated with particles of C, because of the fact that it had been washed with superheated steam which had been produced from boiler water contg. sugar. B. C. A.

**Precipitation of lime by sulfurous acid in sugar solutions.** Emile Saillard. *Compt. rend.* 192, 178–80(1931).—This study was undertaken to decide whether $SO_2$ added to limed juices combines first with the lime, with the alkalies, or with both at the same time. Solns. contg. 10 and 20%, resp., of sugar were prepd. One g. CaO and increasing quantities of NaOH were added to each. Then $SO_2$, amounting to less than its CaO equiv., was passed into the solns. The alky. and the % $SO_2$ in the filtrates were detd. It was found that the $SO_2$ combines with both the CaO and the NaOH. As the quantity of NaOH increases, more $SO_2$ is taken up by it. At equal alky., more $SO_2$ combines with the CaO if the soln. contains a large % of sucrose. F. W. Zerban.

**The use of the refractometer in cane-seedling selection work.** N. Craig. *Intern. Sugar J.* 33, 14–18(1931).—The refractometer can be used to advantage in cane seedling work, the results obtained being very reliable. The method of sampling is rapid, re-

liable and easy of application Whenever possible it is advantageous to take 6 borings from each stool, although the analysis of 3 borings is sufficient to give a fairly good indication of the sugar producing capacity of a cane seedling The final choice of a seedling should be decided by the weights of the cane in the stool, and the richness in sucrose and of these two the latter, which shows no correlation with the wt, is the more difficult to det. W. L Owen

Recent investigations into sugar-beet problems 1. Storage of sugar beet. G R Clarke L F Newman and A W Ling *J Ministry Agr.* 36, 950-60(1930); cf *C A* 24, 2029 —Beets were stored in various types of clamps during one season, in the next season only the mangold type of clamp was used, with free circulation of air Samples were removed at stated intervals, and the following detns made loss in wt dry substance in pulp, and % sucrose by Sachs le Docte method, the latter was checked by other methods The results are shown in 8 tables Conclusions: Under adverse climatic conditions beets lose both moisture and dry substance Beets crowned before storage may seriously deteriorate Secondary growth may start in imperfectly cut or in uncrowned beets The net result is a decrease in the corn sugar yield With normal weather conditions the loss is very small, and in favorable seasons beets can be stored without serious damage *F. W. Zerban*

Increasing the daily production or lengthening the (beet sugar) campaign. P Hirschfelder. *Deut Zuckerind* 56, 41-2(1931) —A discussion H. points out 3 reasons in favor of a longer campaign; the low price of sugar, high interest rates and good storage facilities for beets Reply. E Troje *Ibid* 95-6 J F. L.

Comparative determination of the marc content of fresh and stored (sugar) beets by the methods of Claassen and of Thielepape and Meier. Matschiky. *Centr. Zuckerind* 38, 1112(1930) —M describes and discusses his methods The exptl data show agreement within 0 10% by the 2 methods in most cases The greatest discrepancy found was Claassen 5.31%, T and M 4 76% *J. F. Leete*

The determination of the natural alkalinity (in sugar-beet juice): the method of the Institut für Zucker-Industrie or that of Düwell and Solon. K. Downing *Deut. Zuckerind* 55, 1051-82(1930) —D gives comparative results for the 2 methods and concludes that the D and S method is sufficiently accurate for factory control when only natural residual alky. and residual lime are to be detd, provided $NH_3$ is boiled out before carbonation, but recommends an occasional check by the method of the Institut J. F. Leete

The sugar losses of beet-sugar manufacture. H Claassen *Intern Sugar J.* 32, 580-1, 626-9(1930), cf *C A* 24, 2912 —The total losses in the usual method of working in beet-sugar manuf amounts to 1.2-1 5% of the roots when all calcns are carried out by correct methods The correct estn of the wt. of roots entering the factory is of prime importance. Through faulty detns this error may have a value of from −0 05 to −0 10 When returning the best wastes (tails) into the process, the quantity of sugar so introduced should be calcd. Because of inadequate sampling too low figures are usually found for the detd loss, while with proper sampling they amount to from 0 4 to 0 6% of the roots Undetd losses, or losses undeterminable according to the usual methods, reach up to 0 75–0 90% of the roots, and are composed of apparent losses due to incorrect tares, increase of polarization of the beet slices through drying, polarization increases from the action of lime, too low results from the sugar content of the scums, sugar losses from decompn, and mech sugar losses Hence of the 0 75-0 90% undeterminable losses from 0 3 to 0 4% can be explained, while the remainder cannot be accounted for. W L Owen

Action of different decolorizing products in beet-sugar refining. C. Grossi *Ind Saccarif Ital* 22, 489-94(1929) —When decolorizing beet sirups with animal charcoal an excess of alkali is not beneficial, but increases the ash of the sugar As the absorption of good charcoals is only 0 002%, alky between 0 01 and 0 015% is a sufficient protection against inversion during a first and second refining 0 3% CaO does not cause sirups contg a min of invert sugar to become strongly colored, even when these are kept for more than 1 hr at 90°. It often causes a slight ppt Turbidity takes away a part or all the decolorizing power of the animal C. Only a limited portion of the color is removed by the animal C, an excess causing no further color removal 0 035% gives good results There was no improvement when the amt. was doubled The addn. of hyposulfite always gave satisfaction In reasonable amt., no inversion took place in slightly alk. massecuites Fifty g of hyposulfite is effective with 14 tons of first refining massecuites, while 14 tons of 2nd refining massecuites require 100 g Most of the hyposulfite decoloration resists subsequent oxidation. R S.

The question of the applicability of the conductimetric method for the official

determination of ash in raw (beet) sugars. J Pucherna *Z. Zuckerind. cechoslo Rep.* 55, 205-6(1931), cf *C A* 25, 1400.—A discussion with statistical data. recommends the adoption of the conductimetric method J F. Leet

The conductometric ash apparatus (for beet sugar) in the practical field. Q J Liška *Z Zuckerind cechoslovak Rep* 55, 227-8(1931).—A discussion with statis from 3 campaigns J prefers this method J F Leet

Measurement of turbidity with a spectrophotometer, with especial reference sugarhouse products. R T Balch *Ind Eng Chem., Anal Ed* 3, 124-6(1931) Previous methods, none of which has come into extended use, are reviewed present method is based on a direct spectrophotometric comparison the transmitta is detd., with the turbid soln in one cell, and a filtered portion of the same soln in other Filtration through paper with the aid of a slow filtering type of kieselguh satisfactory Kieselguhr does not cause true adsorption Solids and semisolid pr ucts are dild to approx 50 Brix, any similar products to be compared should be d always to the same concn The transmittancy measurements may be made at convenient wave length, such as 560 mμ, but it was observed that the transmittan at the red end of the spectrum are higher than those at the blue end Beer's law d not hold exactly, but the approximation is close enough to permit expression of turbidity in terms of $-\log t$ Expts with bentonite suspensions showed that eq turbidity concentrates in a water white medium and in one colored strongly with cara give the same transmittancy readings The results of turbidity measurements o no of granulated and raw sugars are given in a table, and it is also shown that the bidities found are roughly proportional to the % of suspended matter obtained weighing F W Zerba

Working of molasses in the experimental molasses station at the sugar plan Gniezno. Ielks Polak *Przemysl Chem* 15, 37-43(1931).—This work is ba chiefly on the sulfite fermentation of molasses The app and processes are discus The experimentation has reached a semi-plant stage in its development and inclu fermentation and distn of ale and AcH oxidation of the aldehyde to HOAc, oxidat of the sulfite to sulfate and distn and purification of glycerol A. C. Zachli

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Acetone compounds of the sugars and their derivatives (Ohle, Lichtenstein) Sugar-beet root rot control (Young) 15. The use of excess molasses (Claassen) The use of sugar for motor fuel (Šandera, Zeman) 21. Report of the most import work in the field of pure sugar chemistry published during the first half of the year 1 (v. Lippmann) 10. Unactivated "prefiltering medium" for treating sugar soluti (U. S. pat. 1,794,862) 1. Rotary impeller agitating device and filter for treating su solutions (U. S. pat. 1,794,916) 1. Obtaining starch from seeds (U. S pat. 1,794,105)

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Sugar. Raffinerie Tirlemontoise Soc. anon Ger 514,713, Mar. 6, 19 Air currents are prevented from circulating through the sugar crystals sepd. in a cen fuge, to prevent air drying of mother liquor adhering to the crystals before comp sepn.

Sugars from cellulosic material. Robert Griessbach and Ernst Koch (to I. Farbenind. A.-G.) U. S. 1,793,084, Feb. 17 Various details are given of a proc involving treatment of cellulosic material such as pine sawdust with a mixt. of str $H_3PO_4$ and conc conced HCl

Filter suitable for sugar solutions, etc. John J Armstrong U. S. 1,792,7 Feb. 17. Structural features

Rotary filtering apparatus for filtering sugar solutions, etc. John J. Nauc U. S 1,793,289, Feb 17 Structural features

Crystallization apparatus for sugar, etc. Fernand Lafeuille. Ger. 517,1 May 3, 1928. See Brit. 301,453 (*C. A.* 23, 4095)

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## 29—LEATHER AND GLUE

ALLEN ROGERS

Bibliography of papers on the physical properties of leather. III. C. H Spie *J. Intern Soc. Leather Trades Chem* 15, 61-7(1931); cf. *C. A.* 24, 4951, 5178.—' references are classified under: *gaseous permeability* (13 titles), behavior to *bend* forces (30); *cracking* of grain (46); pipiness, *break* (14), *tinniness* (5); resistance

*tear* (17) *behavior on compression* (6), *hardness* (3), *resilience* (3), *other phys properties* (4 classes—6 titles) H B MERRILL

**Report of the International Commission on Leather Analysis.** R FARADAY INNES *J Intern Soc Leather Trades Chem* 15, 6–12(1931).—Current problems and recent advances are discussed. Topics include the detn of $H_2O$, ash, fat and acidity in vegetable tanned, and of basicity of Cr salt, fat, $H_2O$-sol matter and N in Cr tanned leathers. The theoretical basis of the Atkin-Thompson method (*C. A* 23, 4913) for acidity of vegetable tanned leather—namely that the leather contains free amino groups that enable it to function like a gel with respect to acid—is questioned. Infusions of leather in $H_2O$ and in 0.1 *N* KCl do not differ appreciably in $p_H$ value. Failure of petr. ether completely to ext. sulfonated oils and Al soaps is pointed out. H B M.

**[Methods employed in] Chinese leather centers.** H A. BRAUNSTEIN *Hide and Leather* 81, No. 4, 30 (1931). H B MERRILL

**Emulsions and suspensions in the leather industry.** A A CLAFLIN *J. Am Leather Chem Assoc* 25, 544–50(1930).—An address. H. B MERRILL

***Photomicrographic methods for determining the kind of leather and its defects.*** F FEIN *Collegium* 1930, 503–8.—The method is briefly described. Eight photomicrographs (×28) of sheep, horse, calf and goat leathers are reproduced. I D C.

**The international commission on the analysis of artificial bates.** V. KUBELKA. *Collegium* 1931, 16–21.—The literature since 1928 is reviewed and the problems yet to be solved are stated. A number of substances have been proposed as substrates but casein is most used. The casein method is not yet satisfactory. Also in *J Intern Soc Leather Trades Chem* 15, 56–60(1931). I D CLARKE

**Enumeration (counting) of bacteria in soak waters.** GEO F ROCKWELL *J Am Leather Chem Assoc* 26, 2–7(1931).—In sampling, a piece of skin should be included. Correct dilu may vary from 1 10 to 1 1,000,000, depending upon the type of soak water. In plating, 1 cc of a fresh meat ext. is added to the dish, followed successively by 1 cc dil. soak water and the agar. Incubation at 37° for 24 hrs., followed by 24 hrs. at room temp., is advised. H B MERRILL

**The problem of improving the quality of the hides.** A GANSSER *Boll ufficiale staz sper ind pelli mat concianti* 8, 110–5(1930). G SCHWOCH

**Contribution on hide damages by M. Bergmann and collaborators. IX. Bacteriology of the reddening of salted hides.** WILLI HAUBAM *Collegium* 1931, 12–6, cf. *C A* 24, 262.—A description is given of bacteria, other than those described previously, which have been isolated from red stained hides. I D CLARKE

**Raw-skin defects and their effect on leather.** FRITZ STATHER *Collegium* 1931, 3–12.—A summary of present knowledge of skin defects and damages. I D C

**Use of sulfide-lime liquors in the sterilization of hides infected with anthrax.** M E ROBERTSON *Leather World* 22, 407, 488, 590, 670, 792(1930), *J Am Leather Chem Assoc* 26, 120, cf. *C A*, 24, 4653 and following abstr. H B MERRILL

***Use of sulfide-lime liquors in the sterilization of dried hides infected with anthrax. IV. Experiments on China hides.*** DOROTHY JORDAN LLOYD AND MADGE E ROBERTSON *J Intern Soc Leather Trades Chem* 14, 641–57(1930), cf. *C A* 24, 4653.—Pieces of hide known to be infected (from guinea pig inoculations) were treated with lime sulfide soln. at various temps. for different time periods, neutralized, triturated, extd., the ext. was centrifuged, and guinea pigs were inoculated with the deposit. The proportion of positive results increases with the vol. of ext. taken for centrifuging showing that a relatively small no. of organisms are very resistant to treatment. Complete sterilization, with little or no damage to hides, was attained by treating them for 8 hrs. at 32° in a soln. contg. 1.0% $Na_2S\cdot 9H_2O$ + 1.2% CaO followed by a 4 day treatment at room temp. Higher temps. and (or) sulfide concns. ruined the hides. Fairly certain disinfection results at temps. down to 20° if the time is increased, but below 20° disinfection is very slow and uncertain. Cf. preceding abstr. H B MERRILL

**Estimation of total sulfuric acid in hides. X.** K. A BUSHMAN *Ukrainskii Khem Zhur* 5, Tech. Pt., 113–5(German Abstract 116)(1930).—The method is based upon the chlorination principle applied by A. P. Sementzev and V. L. Pavlov to the detection of As in the intestinal tract of animals and man (*Arch. Crim. and Med. Jurispr.* 1, 43(1926)). Place 4–5 g. of finely cut hide in a 1.5-l. flask, add 25 cc. distd. water and 10 g. NaOH, heat gradually to boiling and when the hide is almost dissolved add 80 cc. water and continue boiling till the hide is completely dissolved. Cool in ice water and introduce a moderate stream of $Cl_2$ gas for about 15 min. From time to time, add distd. water until a final vol. of about 150 cc. is reached to prevent sepn. of NaCl crystals. At the end of 15 min., acidify with HCl and remove the $Cl_2$ gas by bubbling air through the soln. Filter and to the filtrate add a 3% soln. of hot $BaCl_2$. B. S. L.

**Hydration of goat skin.** Edwin R Theis and Adolf Grunkraut *J Am Leather Chem Assoc* 26, 171-83(1931) —Hydration during soaking and liming is followed by the dilatometer method (*C A* 23, 2119) With $H_2O$ max hydration was attained in 14 hrs, followed by degenerative dehydration ascribed to bacterial or enzyme action HCOOH in soak decreases and delays attainment of max hydration, this effect increases with increasing HCOOH concn the onset of degenerative changes is correspondingly postponed but not otherwise affected NaOH in soak delays the attainment of, but does not decrease the extent of max hydration and does inhibit degenerative dehydration Extent of max hydration and time required for its attainment are both decreased by increasing the temp of the soak Hydrations produced in soaking and in subsequent liming are largely additive In soaking dried skins hydration seems to take place in 2 stages the second of which is shorter and results in more hydration than the first H B Merrill

**Principles of the liming process.** R H Marriott *Leather World* 22, 305 (1930), *J Am Leather Chem Assoc* 26, 110 The liming process has 2 functions to remove the hair and to plump and sep the fibers in prepn for tanning The conditions of liming should be regulated so that both aims are achieved simultaneously Plumping of the fibers results in a characteristic "weave" which is described as flat or steep; the optimum condition depends upon the kind of leather Unhairing results from the action of alkali on keratin which is promoted by reduction of cystine linkages before the alkali has acted H B Merrill

**[Some] details of leather manufacture** Ing G A Inna *Hide and Leather* 80, No 11, 21(1930) Soaking green salted skins prior to liming is unnecessary NaCl, blood, etc, carried into lime when soaking is omitted are without detrimental effect Omission of soaking avoids bacterial damage For dried hides, neither acid soaking nor alk. soaking is to be recommended Salts are effective in the order $NH_4Cl > (NH_4)_2SO_4 > CaCl_2 > NaCl$ Some tanners put dried hides directly into strong $Na_2S$ and lime, for combined soaking unhairing with good results a soln contg 1.25% $NH_4Cl$ and 1.25% $Na_2S$ (60 %) is an effective softener H B Merrill

**Processes of patent-leather manufacture** P G A Inna *Leather World* 22, 30, 110, 106, 412, 593(1930), *J Am Leather Chem Assoc* 26, 118 A description H B Merrill.

**Hazards in the manufacture of patent leather** E H Merrill *Hide & Leather* 80, No 14, 19(1930); *J Am Leather Chem Assoc* 26, 30 — The naphtha fire hazard is discussed H B Merrill

**Acidity of leather.** H G Bennett *J. Intern Soc Leather Trades Chem* 15, 31-8(1931) —The "acid figure" of Atkin and Thompson (*C* 1 23, 4813), which is believed to be the $p_H$ value of the coned soln of tannin on the outer part of the fibers, can be obtained arithmetically as well as graphically from measurements of $p_H$ value at known dilns. in 0.1 *N* KCl $p_H$ (at any dilu) = tan $\theta$ log $d$ + $F$, where tan $\theta$ = slope of the $p_H$ dilu plot, $d$ = dilu and $F$ = acid figure, or $p_H$ at zero dilu Tan $\theta$ is thought to be fully as important as $F$ Two points are sufficient to det the $p_H$ dilu plot, and calcns are simplified if these 2 $p_H$ values whose logs are simple integers are detd at fixed dilns., *e. g.*, dilu = 100 fold and 1000 fold log $d$ = 2 and 3 To find the proper wt of leather to take to obtain these dilns when the leather is soaked in 100 cc of 0.1 *N* KCl, det the % $H_2O$ (*H*) and weigh 101.*H* g for 100-fold, and 10.1*H* g. for 1000 fold dilu If $p_H$ values of these solns are $(p_H)_2$ and $(p_H)_3$ then $F = 3(p_H)_2 - 2(p_H)_3$, and $p_H$ (at any dilu) = $[(p_H)_3 - (p_H)_2]$ log $d - F$ Examn of many leathers (chiefly sole) selected as representative com products showed only 1 leather for which $F < 2.5$, and av. value of $F$ was 3.5 Generally a high value for $F$ is assocd with a low value for tan $\delta$; that is, with a well buffered leather and this is due often to the presence of appreciable amts of Na salts H B Merrill

**Application of the Atkin-Thompson method for acidity to vegetable-tanned calf leather.** Henry B Merrill and Reuben G Henrich. *J Am Leather Chem Assoc* 25, 511-7(1930), cf *C A* 23, 4813 —Data are presented which indicate that the method gives results on leathers tanned with so-called spruce ext (which is high in sulfonated bodies) that are rational and self consistent, in contrast to results given by the Procter-Searle method H B Merrill

**Present state of the determination of wear resistance of leather and methods for bettering it.** U. J. Thuau *J Intern Soc Leather Trades Chem* 14, 602-23(1930); cf *C. A.* 23, 1768, 4096; 24, 2031, 4654 —An improved wear test machine is described. For standardization, a plate of pure Cu, previously heated to 600° for 15 min., is employed, and all wear resistances are expressed in terms of this standard taken as 100. Soles are rubbed across a Carborundum plate under pressure of 70 kg (av human wt),

Accessory gadgets assure a clean and uniform wearing surface at all times Results are expressed in cm.$^2$ of abrasive surface with which 1 cm.$^2$ of leather must be brought into contact in order to wear off a layer 1 mm. thick As the ratio of abrasive surface to leather surface exposed at a single revolution is 1 1, the coeff of resistance is directly proportional to the no of revolutions and inversely proportional to the thickness removed The latter is obtained from wt loss and density measurements *The coeff.* of resistance varies with time, generally increasing after the grain layer has been worn away, curves are given for numerous leathers Results are given for numerous kinds of sole leather and substitutes Wear resistance of vegetable tanned leather is increased by retannage with chrome, by previous acid swelling of the pelt, and by increasing its resistance to extn by $H_2O$. The superiority of leathers tanned by the "slow" process is ascribed to their relatively low content in matter extractable by $H_2O$ *Hardness* is measured by the Brinell machine H B Merrill

Little trips to tanneryland. I. Wild grain. John A Wilson *Hide and Leather* 81, No 7, 8(1931) —Wild grain is caused by overdevelopment of the blood vessel system supplying the sebaceous glands. It can be minimized by proper control of all tannery operations H B Merrill

Report of the commission on qualitative analysis of tannins. O. Gerngross. *Collegium* 1930, 524–32. cf *C A* 25, 230 —The aniline-HCl, cinchonine and fluorescence tests for sulfite cellulose were generally in agreement. Pine and malet to bark exts interfere with the fluorescence test in its present form I. D Clarke

Report of the commission on quantitative tannin analysis. M. Bergmann *Collegium* 1930, 573–4; cf *C. A* 23, 4502 —A review I D. Clarke

Rapid tanning. Max Bergmann, Willy Münz and Ludwig Seligsberger. *Collegium* 1930, 520–4 —Neradol N D and $\alpha$ and $\beta$ naphthalenesulfonic acid solns pass through skin more rapidly than $H_2O$ does, therefore they enlarge the skin capillaries But the total $H_2O$ of swelling and imbibition is less and so the $H_2O$ of swelling must be less ($H_2O$ of imbibition is greater since the capillaries are larger) in these solns than in $H_2O$ Agents to increase the speed of tanning may not only decrease the size of the tannin particles but may act on the hide to decrease resistance to penetration Also in *J. Intern. Soc Leather Trades Chem* 15, 67–72(1931) I D Clarke

The enzymes of tanning chemistry and the structural-chemical explanation of their action. Max Bergmann *Collegium 1930, 516-20* —Studies of some reactions of protein building units are reviewed, these studies should aid in explaining the mechanism of those reactions of proteins which are catalyzed by enzymes. I D Clarke

Filtration of tannin solutions for the determination of insolubles. A. L. C. A. Committee Report, 1930. J S Rogers, *et al* *J. Am Leather Chem. Assoc* 25, 493–510(1930) —For the purpose of this investigation, "insolubles" are defined as substances which render the tannin soln., of analytical strength, at 18°, cloudy, turbid or opalescent by either reflected or transmitted light. Methods studied are (1) the International Method and the methods of (2) Turnbull (*C. A* 23, 2596), (3) Riess (*C A* 23, 3369, 4592) and (4) McCandlish Atkin (*C A.* 23, 3368); solid quebracho, chestnut, hemlock and "valex" exts were used *In all cases the solns.* were filtered until a clear filtrate was obtained, after which 2 successive portions were collected, pipetted, evapd. and weighed Results (regarded as preliminary) indicate that the International Method returns too low insolubles and does not always give clear filtrates, that the other 3 methods do give clear filtrates, and that of these the Riess method is most promising from the standpoint of app and manipulation. H B Merrill

The tannin balance in the extraction of pine bark. E Belavsky and G Wanek. *Ledertech. Rundschau* 23, 1–4(1931) —The tannin balance for pine bark and the ext. showed a gain of 8.38% if the raw and spent bark were analyzed by the International Method but only 0.39% if the method was modified to give max results. Completeness of extn is affected by many factors such as temp., time and the percentage which the ext. is of the raw material but the greatest loss of tannin is always in the extd bark. I D. Clarke

Determination of the copper content of tanning extracts. Committee report. D. Burton *J. Intern Soc. Leather Trades Chem* 15, 99–106(1931) —Cu in exts is even more objectionable than Fe. Cu is always estd in the ext. ash. Of numerous procedures tested, electrolytic deposition from $H_2SO_4$ soln. is recommended. *Procedure.*—Dry 50 g ext. in an oven, ash at min temp., moisten with $H_2SO_4$, expel chlorides, dissolve in 10 cc. 2 *N* $H_2SO_4$ and dil. to 100 cc. Electrolyze overnight at 2 v. Wash with $H_2O$, then with EtOH (abs.), dry at 100° and weigh. H B. Merrill

**The determination of the color of tanning extracts.** G. Baldracco. *Boll. ufficiale staz sper. ind. pelli mat concianti* 8, 100–9(1930).—The different methods are reviewed. The Pulfrich stage photometer is considered as the instrument most suited for the detn. of the color of tanning exts G Schwoch

**Determination of the $p_H$ (value) of tanning extracts.** D Burton, *et al.* *J. Intern. Soc. Leather Trades Chem* 14, 597–601(1930) —The quinhydrone method is unsuitable. The bubbling $H_2$ method gives accurate results with exts that are not sulfited The glass electrode method (*C A* 23, 4365) is suitable for use in all types of tannery liquors Working directions for the 2 latter methods are given H B Merrill

**Importance of the $p_H$ of the pelt in tanning.** G Pl ace *J Intern Soc Leather Trades Chem* 15, 22–4(1931) —It is a mistake to assume that the pelt speedily assumes the $p_H$ value of the tan liquor in which it is placed, and to center attention on the $p_H$ value of the liquor Heavy hides, especially, should be brought to the optimum $p_H$ value (which generally lies in the $p_H$ range 5 to 3) before entering the tan liquors This procedure makes it unnecessary to add acid to the tan liquors, permits rapid tannage and satisfactory plumping in liquors of moderate acidity, greatly simplifies control and makes for numerous operating economies. H B Merrill

**Determination and control of the buffer index of tan liquors.** Winnifred B Pleass. *J Intern Soc Leather Trades Chem* 15, 73–8 *Leather World* 23, 35(1931) — The detn of effective acidity ($p_H$) should be accompanied by that of reserve acidity (buffer index) The latter is defined as "the no of cc of *N* NaOH or HCl required to be added to 100 cc of a tan liquor of 20° barkometer (sp gr. = 1.020) to alter its $p_H$ value by 1 unit" The buffer index should be estd on a portion of the titration curve covering at least 2 $p_H$ units, in the $p_H$ range 2.5–5 This involves titration with NaOH for liquors of low $p_H$, and with HCl for liquors of high $p_H$, liquors of $p_H$ value = 3.0–4.5 must be titrated with both If the barkometer of the undiluted liquor is less than 20°, the buffer index at 20° is obtained by simple proportion Generally speaking, a high buffer index is given by old, mellow liquors, rich in non tannin or sol Ca salts (such as bottom suspenders) The buffer index should decrease from the oldest liquor in a series to about the mid point, and should be approx const. for the remaining (fresher) liquors. Sharp differences in buffer index between successive liquors are objectionable. The buffer index increases with increasing non tannin/tannin ratio in the tanning materials used, is increased by adding lactic acid, and decreased by adding $H_2SO_4$. A high buffer index results in the production of a soft, full leather; a low buffer index results in a firmer, harder leather H B Merrill

**Determination of $p_H$ value of tannery liquors.** W. B. Pleass. *Shoe & Leather Reporter* 80, No 12, 21(1930), *J Am Leather Chem Assoc* 26, 111.—The glass electrode is recommended as most reliable, with the capillator second H. B. Merrill

**The basicity concept of one-bath chrome liquors.** E. Stiasny. *Collegium* 1930, 574–7.—The basicity of the Cr salt in a one-bath Cr liquor is greater than that of the liquor as a whole because of "olation", the complex ol. compds. react with the free acid only very slowly. It is important to know the basicity both of the liquor and of the Cr salt. The former is given by the formula $[(a-b)/b]100$ and the latter by $[(a-b+c)/a]100$, in which $a$ is the no of cc of 0.1 *N* $Na_2S_2O_3$ used in the iodometric detn. of Cr (in 25 cc of liquor), $b$ is the no of cc of 0.1 *N* NaOH used in titrating the liquor as usual (to phenolphthalein) and $c$ is the no of cc of 0.1 *N* NaOH used in a cold titration to $p_H$ 3.0 with *p*-benzenesulfonic acid azo-benzylamide At $p_H$ 3 only the free acid in soln is detd I. D. Clarke

**Origin of ammonia found in lime liquors.** R. H Marriott. *J. Intern Soc. Leather Trades Chem* 15, 25–30(1931).—Collagen from oxhide and degreased oxhair was treated with satd $Ca(OH)_2$ for periods of 8–72 days Total N and volatile N were detd. in the used liquors. The undissolved proteins were washed and hydrolyzed by 20% HCl Hydrolyzate was analyzed for $NH_3$ and total N With collagen, the amt. of $NH_3$ found in the liquor agrees almost quantitatively with the observed decrease in amide N in the protein, with hair, more $NH_3$ is formed than can be accounted for by the decrease in amide groups, the excess is supposedly due to breakdown of cystine groups. Amide N is removed very much faster both from hair and from collagen than is non amide N. H. B. Merrill

**Preparation and preservation of sheepskin skivers for color tests [on tanning materials]. Committee Report, 1929–30.** C. A Blair, *et al.* *J. Am Leather Chem Assoc.* 25, 550–61(1930) —Two methods for depickling and preservation are investigated with pickled skin as the starting material (1) The skin is suspended in 5% NaCl soln and the acid titrated repeatedly to the neutral point, until the skin no longer swells when placed in $H_2O$ The skin is preserved in satd NaCl soln (2) Excess

borax is used and the excess neutralized with dil AcOH The $p_H$ is adjusted to 4.8 with acetate buffer the skin is preserved in phenol boric acid soln $p_H$ values of solns in equil with skivers prepd according to (1) are not very uniform *Method 2 is gen* erally preferred, although the borophenol causes some darkening of the skiver on long storage H B Merrill

Treatment of tannery wastes. *Condensed report to the Sanitary Water Board.* Tannery Wastes Disposal Committee of Pennsylvania *J Am Leather Chem Assoc* 26, 70-110(1931).—Two main plans of waste treatment were developed and given long tests *under full scale operating conditions in a small vegetable leather tan*nery Depending upon the degree of purification required, which in turn depends upon the type of wastes type of stream and vol of wastes compared to stream vol., *1, 2, 3 or all 4 of the following steps may be required: mixing and settling, primary* filtering and settling chem coagulation, secondary filtering and settling The above is a general scheme believed to be applicable to any tannery A special scheme con*sists in segregating and chemically pptg certain wastes, followed by filtering and settling* Spent tan liquors and bleaches are the forms of pollution most difficult to treat, and arrangements should be made to discharge them at a uniform day to-day rate Sludge should be removed at regular intervals, cinder bed drying is satisfactory. Cost data and detailed drawings of the exptl plants are given H B Merrill

Tanning shark skins. F A Coombs *Hide & Leather* 80, No 11, 24(1930), *J Am Leather Chem Assoc* 26, 110.—A description H B. Merrill

Nature of water solubles in leather tanned with wattle bark extract. IL. R O Page and H C Holland *J Am Leather Chem Assoc* 26, 143-56(1931), cf *C A* 23, 541.—Soaked, limed and bated steer hide was tanned for 6 weeks with wattle bark ext. at $p_H$ 4; thereafter it was tanned at $p_H$ values of 4, 3 and 2 for periods up to 2 yrs Analyses were made at the end of 3, 6, 26, 52 and 104 weeks, the authors' method for free and combined $H_2O$-sol matter being used At the outset, fixed tannin rises rapidly to 30 g per 100 g collagen, with little combination of $H_2O$-sol matter, in the 2nd stage, tannin slowly increases and combined $H_2O$-sol matter rises to about 30 g per 100 collagen, in the final stage (3 months to 2 yr) fixed tannin continues to rise, *approaching a max of 60 parts per 100 collagen, while combined $H_2O$-sol matter re*mains stationary The $p_H$ value in the 2nd and final stages is without effect on com bined $H_2O$-sol matter, fixed tannin increases slightly with decreasing $p_H$ value in the *range studied In expts with hide powder, with different ratios of wattle ext solids* to collagen, the ratio, fixed tannin: combined $H_2O$-sol matter, declines steadily with increasing ratio of ext to collagen the percentage of the total ext. solids removed from the soln is nearly independent of the ratio of the ext to collagen, decreasing slightly in the more concd solns., which show the presence of tannin by the gelatin salt test after tanning is complete, for the more dil solns., the % of the total ext solids thus removed as fixed tannin and combined $H_2O$-sol matter is very nearly the % of tannin in the ext. according to the A L C. A Method These results are explainable on the assumption that collagen combines with tannin to form a compd highly resistant to washing (fixed tannin), then with more tannin to form a compd less resistant to washing (combined $H_2O$ sol matter) The fixed tannin and combined $H_2O$-sol matter are thus the same substances differently combined The A. L C A Method for detg tannin is approx correct, that of Wilson and Kern is in error The effect of the $p_H$ value was studied at 15° and 35° for 6-weeks' tannage At 15° both fixed tannin and combined $H_2O$-sol matter are at a min at $p_H = 5$ at 35° this min vanishes, and fixa tion decreases from $p_H = 3$ to $p_H = 8$ Fixed tannin is much greater, and combined *$H_2O$ sol matter somewhat less at 35° than at 15° By* treatment with dil $H_2SO_4$ at temps from 35° to 60°, most of the combined $H_2O$-sol matter is fixed as tannin When a leather so treated is retanned, fixed tannin does not increase but combined *$H_2O$-sol matter reassumes its former value (before the heat-acid treatment). The* change of state of combination is ascribed to changes in the collagen and not in the material fixed originally as combined $H_2O$-sol matter The recurrence of the factor 30 in the ratios of fixed tannin and (or) combined *$H_2O$-sol matter to collagen suggests* that the combining ratio of wattle tannin to collagen is 100 30, giving a combining wt. of 225 (if collagen is 750) for wattle tannin Conclusion: Combined $H_2O$-sol matter is tannin, combined in a manner different from fixed tannin H B. Merrill

Deterioration of vegetable-tanned leather in storage. R. Faraday Innes *J Intern Soc Leather Trades Chem* 14, 624-40(1930).—Old book bindings were analyzed for $H_2SO_4$ (Procter Searle method), "difference figure" (*C A*. 23, 4367), sol N and grease Comparison of backs (exposed) and sides (less exposed) showed that large amts of $SO_3$ are absorbed from the atmosphere, particularly in industrial cities Ex-

amination of books kept side by side for many years shows that leathers differ in their absorptive capacity for $SO_3$, the absorption may be a result rather than a cause of the rotting All rotted bindings were very high in $H_2SO_4$, but not all leathers high in $H_2SO_4$ were rotted an extreme case is a leather contg 4.7% $H_2SO_4$ which was sound after 42 yr Sol N is proportional to $H_2SO_4$, and like it is not directly related to deterioration It is thought that the kind of tanning material dets whether or not a large $H_2SO_4$ content is harmful Other factors may be phys condition of fibers resulting from pre-tanyard operations lack of grease overtannage It is advised that bookbinding leathers be tanned with oak bark or sumac only, and that $H_2SO_4$ be not used after tannage is complete The use of $H_2SO_4$ for deliming and pickling has no ill effect. H B MERRILL

**The action of pickles of different compositions. II. Acid absorption and swelling of collagen in sulfuric acid and formic acid pickles.** A KÜNTZEL AND W PFEISENTANZ. *Collegium* 1930, 577–93 cf *C A* 24, 4654 A $H_2SO_4$ pickle, whether it contains NaCl or $Na_2SO_4$, behaves like a HCl pickle The absorption values for $H_2SO_4$ are the same as those for HCl, the calcns given previously for HCl apply to absorbed $H_2SO_4$ in $H_2SO_4$ $Na_2SO_4$ pickles without reservation but for $H_2SO_4$ NaCl pickles the NaCl influences the absorption of $H_2SO_4$ so that a correction (max absorption is 0.6 instead of 0.7 equivs.) must be applied The swelling weights of collagen are analogous to those in HCl-NaCl pickles the abs values, however become smaller as Cl is replaced by $SO_4^{--}$ (swelling in HCl NaCl > in $H_2SO_4$ NaCl > in $H_2SO_4$ $Na_2SO_4$ pickles) Systems contg weak org acids are entirely different the rising portion of the absorption curve is not linear and the absorption of acid is either greatly decreased (lactic) or greatly increased (acetic, formic) by the salt content of the pickle The pickling or de swelling actions of NaCl and Na formate on formic acid are exactly the same although the former has no, and the latter a great, influence on the $p_H$ These results disprove Procter's theory that all pickles contg NaCl, regardless of the kind of acid, behave like HCl pickles They also disprove the theory that the swelling action of weak org acids can be repressed by buffering Salts repress swelling because of their pickling action and regardless of whether they have a buffering action or not I D CLARKE

**Report of the oil and fat commission.** M AUERBACH *Collegium* 1930, 532–4 — A brief discussion of general methods I D CLARKE

**Dyestuffs and leather.** W F NORTON *Leather Trades Rev* 63, 640, 739(1930), *J Am. Leather Chem Assoc* 26, 51 —Uneven coloring on Cr leather is ascribed (1) to uneven acid distribution in leather due to prolonged "horsing" before coloring and (2) to the presence in the dye mixt of dyes that penetrate and fix at different rates Over-mordanting increases rubbing of the color Sufficient penetration must be secured so that the leather does not appear lighter in shade when it is stretched Penetration is secured by using acid dyes, adding acid to the dye bath and slow drying of the dyed leather Basic and direct dyes should be used for topping off—not for bottoming, and they should never be used in a bath with acid dyes Practical working directions are given for various types of leather and special color effects H B M

**Osage orange and yellow wood extract.** G DESMURS *Leather World* 22, 201 (1930), *J. Am Leather Chem Assoc* 26, 116 —Formulas are given for using yellow or Cuba wood ext. in dyeing Cr leather The following test is used for differentiating osage orange from wood Measure 10 cc of 0.4% ext into a test tube, and add 2.0 cc. of a 1.0% U nitrate soln Colors produced are osage orange, a full orange-red, Cuba wood, yellow-orange Other tests are given H B MERRILL

**Technical preparation of glue and gelatin.** D GURIAN *Kolloid-Z* 54, 239–43 (1931); cf *C A.* 25, 1408 —A review of German patents A FLEISCHER

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Influence of pancreatin on collagen in the absence of neutral salts and buffer mixtures (KÜNTZEL, DIETSCHE) 11A. Tests on artificial leather (HESSE) 26. Glass electrode and vacuum-tube potentiometer [in tannery analyses] (CAMERON) 1. Treating fibrous materials with rubber, etc. [for making artificial leathers] (Brit. pat. 337,359) 25. Protein products resembling horn (Brit. pat. 338,015) 25. Apparatus for continuous filtration and dehydration of pulp for artificial leather manufacture (Brit. pat. 337,346) 23.

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Dressing leather. OTTO L. STEVEN Ger 514,723, July 23, 1927. See U. S. 1,750,732 (*C A.* 24, 2635).

Leather. HERMANN BOLLMANN and BRUNO REWALD Ger 517,353, Dec 8, 1927, and 517,354, Feb 24, 1928 A substitute for yolk of egg in the manuf of glacé leather comprises an aq soln of an aromatic or aliphatic sulfonic acid or sulfonate and a phos-

phatide of vegetable or animal origin with or without a vegetable albumin, *e. g.*, soy-bean albumin. An example is given (517,353). Alternatively there may be used an emulsion of vegetable or animal albumins and phosphatides prepd. by dissolving the albumins in water contg. *a small quantity of alkali and then adding the phosphatides*, which may be first dissolved in a fatty oil (517,354).

*Leather.* CARL H. TRÖGER, JR. Ger. 517,102, July 26, 1928. Vegetable tanned leather is treated before drying, with a bleaching bath to which substances promoting fermentation *e. g.*, yeast, have been added. In this way the time required for drying is considerably reduced.

*Tanning.* W. SADLER. Brit. 337,377, April 30, 1929. Hides are treated with a liquor prepd. by treating sulfite cellulose lyes with oxidizing compds. such as perborates or persulfates followed by treatment, about 2 hrs. later, with Cl or Br. Pelts may be preliminarily treated with the liquor and then depilated. Cf. *C. A.* 25, 2019.

*Rotary-drum apparatus for tanning skins.* F. G. WILSON. Brit. 337,408, July 22, 1929. Structural features.

*Tanning agents.* I. G. FARBENIND. A. G. (Ludwig Teichmann and Hermann Noerr, inventors). Ger. 517,446, Jan. 3, 1929. See Fr. 687,411 (*C. A.* 25, 839).

*Tanning agents.* J. R. GEIGY AKT.-GES. Swiss 141,788 and 141,789, July 30, 1928. Addns. to 138,884 (*C. A.*, 25, 839). A weakly acid powerful gelatin depositing tanning agent is obtained by the reaction on ω-chloromethylenesalicylic acid in dil. AcOH suspension with Na naphthalene β sulfonate or Na *o*-cresol *p*-sulfonate. Cf. *C. A.* 25, 839.

*Tanning hides.* O. RÖHM. Brit. 337,524, Dec. 6, 1928. A substitute for egg yolk suitable for use in the manuf. of glacé leather consists of an oil emulsion and one or more esters formed from di- or poly hydric alcs. and $H_3PO_4$. These constituents may be used in a tanning liquor together with meal, alum and NaCl.

*Tanning skins.* J. R. GEIGY A.-G. Ger. 514,874, July 7, 1925. The depilated skins are treated with mineral acid and neutral or basic Cr, Al or Fe salts. They are then treated, *in the same bath or in a separate soln., with neutral synthetic tanning* material, the solv. of which, in water, depends on the presence of the $HSO_3$ group. *Sulfite cellulose lye may be also used for further steeping of the skins. In an example*, the skin is pretreated with Cr alum and tanned with the condensation product of $CH_2O$ and cresolsulfonic acid. Other examples are given.

*Moistening and "wetting out" leather and hides.* FRIEDRICH POSPIECH (to Chemische Fabrik Pott & Co.). U. S. 1,794,920, March 3. Thorough moistening is effected with an aq. soln. contg. sulfonic acids of a compd. obtained by condensing naphthalene or a ring substitution product of naphthalene such as naphthalenesulfonic acids in the presence of condensing and oxidizing agents such as $H_2SO_4$ with an alc. of the aliphatic series contg. over 2 C atoms such as Pr or Bu alcs., cyclohexanol, etc.

*Glue.* BENNO NORDON. Ger. 517,098, Dec. 30, 1928. Glue liquid in the cold is prepd. by treating animal glue with $HClO_4$. Thus animal glue 10 dissolved as usual in water 15 may be stirred with 20% $HClO_4$ 3 parts.

*Glue and gelatin.* HERMANN STREIDL. Ger. 514,721, Feb. 7, 1928. App. for molding is described.

## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

*The preparation of plantation rubber.* G. MARTIN. *Bull. Imp. Inst.* 28, 440–50 (1930).—A description is given of the methods of prepn. of plantation rubber used in Ceylon, Malaya and Java, with tables to show the differences in detail between the procedures followed in the 3 countries. Also in *Trop. Agr.* (Ceylon) 76, 18–26(1931).
A. PAPINEAU COUTURE

*Liquid rubber compounding.* WEBSTER NORRIS. *India Rubber World* 83, No. 5, 53–5, 64(1931).—An illustrated description of recent developments in the preservation, dilu., stabilization and neutralization of latex, mixing operations, typical compds. and industrial applications.
C. C. DAVIS

*Action of nitrogen oxide on rubber.* ADOLF GORGAS. *Ber.* 63B, 2700–5(1930).—Various observers have reported the formation of definite products by the action of $NO_2$ on rubber (Weber, $C_{15}H_{16}N_2O_4$, Emden, $C_{15}H_{16}N_2O_5$, Harries, Alexander, products of more complex compn.). These workers paid no particular attention to the purity of the $NO_2$. The best results were obtained with the gaseous decompn. prod-

ucts of $Pb(NO_3)_2$, I mdcn used the product obtained from $HNO_3$ and starch G, on the other hand, carefully purified his $NO_2$, which was prepd from HClO and coned. $HNO_3$. The resulting mixt of $N_2O_3$ and $N_2O_4$ was liquefied in a freezing mixt, completely converted into $N_2O_4$ with air, frozen repeatedly crystd and fractionated by distn. For the reaction with rubber the $N_2O_4$ was used in $CCl_4$ soln satd at room temp. Total rubber, prepd from "Revertex" according to Pummerer and Pahl by treatment with alkali at 50° and subsequent dialysis was used in 1% soln in $CCl_4$. This rubber, as has been described elsewhere (*C. A.* 23, 1525), gave by the modified Hanus method I nos. agreeing well with the calcd. values and the sol and gel rubbers prepd. from this total rubber also gave normal I values (1 mol. I per $C_5H_8$ group). Contrary to Pummerer and Mann, G. found for the gel rubber with HgI an I no. about 10% too low instead of too high. By the Kaufmann ($SCN)_2$ method, the 2 rubbers showed no appreciable difference. The nitrosation was effected by adding the rubber soln. to 5 parts of the $N_2O_4$ soln. at 0° and letting the mixt. stand 15 min. in 1 series of expts. and 24 hrs. in another. The compn. of the resulting products did not correspond to any of the formulas given by earlier workers, even after pptn. from $Me_2CO$ with $Et_2O$, and the expts. showed decisively that abs. pure $NO_2$ does not form homogeneous products with purified rubber. As already pointed out by Alexander, the addn. of $NO_2$ is accompanied to a considerable extent by oxidation. The addn. reaction apparently does not give $NO_2$ derivs.; at least, G. has thus far been unable to effect a reduction to $NH_2$ derivs., but he did observe that when the product of the 24 hr. treatment with $NO_2$ is heated with coned. alkali about 1/3 of the N is split off as $NH_3$, which makes it probable that the N is present as an NOH group (probably as an isonitroso ketone). In view of the strongly oxidizing action of $NO_2$, expts. were made with NO. As it reacts much more slowly than $NO_2$, the well purified NO was passed for 4 hrs. through a very dil. soln. of rubber in $CCl_4$ at 20°. The product was non pulverizable, and had a compn. (about $C_{15}H_{19}N_3O_{16}$), indicating that oxidation to a marked degree accompanied the addn. reaction. The product was also no more homogeneous or const. in compn. than that obtained with $NO_2$, and gave $NH_3$ with hot coned. alkali. With $HNO_3$ it is possible to keep the 2 reactions sep. Dil. $HNO_3$ and rubber give a N contg. product which, however, is partially insol. in $Me_2CO$, and this insol. portion is N free while the N in the sol. portion is split off as $NH_3$ by boiling alkalies. The formation of the N contg. product can be prevented by complete removal with urea of the $HNO_2$ which is formed. The yellow pulverizable product is sol. in $PhNO_2$, $PhNH_2$ and dil. alkalies. G. hopes soon to be able to report its compn., mol. wt., etc. C. A. R.

**The rubber era.** T. L. Garner. *India Rubber J.* 80, 643-8(1930).—An illustrated description is given of modern technical applications of rubber. C. C. Davis

**The trend of American rubber development research.** Arnold S. Smith. *India Rubber J.* 80, 664-7(1931).—An English version (slightly abbreviated) of *C. A.* 24, 4954. C. C. Davis

**Industrial uses of rubber.** H. E. Fritz. *Paper Mill* 54, No. 3, 14, 16-7(1931).—An outline of the widening applications of rubber rendered possible by the discovery of the Vulcalock process of bonding rubber to metal, which permits of utilizing to better advantage the corrosion resisting and abrasion resisting qualities of rubber. A. P.-C.

**Preparation of sheet rubber.** R. O. Bishop. *Malayan Agr. J.* 19, 14-21(1931).—A discussion is given of present-day methods for the collection and handling of latex, its coagulation, handling of the coagulated rubber and drying and packing of the rubber. C. C. Davis

**Toxic substances in the rubber industry. XIX. Sulfur and its derivatives.** P. A. Davis. *Rubber Age* (N. Y.) 28, 513-4(1931); cf. *C. A.* 25, 1117.—With proper ventilation, choice of individuals and cleanliness, no trouble is likely with S. Fifteen yrs.' experience showed no serious cases of conjunctivitis, dermatitis, etc., from exposure to S. C. C. Davis

**Technical note on the use of certain solvents in solutions.** H. Coulanghon. *Caoutchouc & gutta-percha* 27, 15274-6(1930).—When a film of cement dries, the evapn. of the solvent causes a lowering of the temp., which may be great enough to reach the dew point and thus cause moisture deposit on the rubber. This results in poor adhesion when the surfaces are united. Since the lowering of the temp. varies with the solvent, it is possible to avoid this condensation of moisture by the proper choice of solvent for the conditions. Data were obtained on the lowering of temp. (wet bulb) of cements of the same viscosity made with solvent naphtha, toluene, aviation gasoline and benzene, resp., with the atm. at different temps. (10–30°) and humidities. By plotting the results graphically, the resulting chart shows under what conditions of temp. and humidity cements made with the various solvents can be used successfully without re-

course to warming, and under what conditions and to what extent warming is necessary
C C. Davis

**Paragutta, a new insulating material for submarine cables.** A R. Kemp. *J. Franklin Inst* 211, 37–57(1931).—*Gutta percha and balata have proved themselves* eminently suitable for insulating long deep sea telegraph cables, but their dielec losses *are too high to meet the requirements of submarine telephone cables for long distances* or for shorter cables with carrier currents Accordingly an extensive investigation was *made of the causes of elec defects of submarine insulation, including a search for an* improved material One result was the development of a new material called *paragutta, and the present paper describes its properties and tests for detg its utility. Paragutta* consists essentially of the purified balata or gutta percha hydrocarbons, with a small *proportion of waxes In developing this mixt, it was necessary first to purify the* rubber, especially to remove proteins, in order to increase its elec stability on prolonged *immersion in water Rubber from which water sol substances have been removed* absorbs no more water than does gutta percha (cf Williams and K., *C A* 21, 1372, *Lowry and Kohman, C A 21, 1372, Boggs and Blake, C A. 20, 2092), but when im*mersed in water it fails completely as an insulator To explain this elec instability, *rubber hydrocarbon freed of proteins, resins and other impurities was prepd and tested* The product absorbed very little water, and on prolonged immersion in water it showed *practically no change in elec properties Many expts showed that the only practical* method for removing proteins from rubber is to heat the rubber in an autoclave in *water alone, which hydrolyzes the proteins to water sol products Subsequent washing* removes nearly all N Sheet rubber or latex can be used for prepg N-free rubber in *this way Thus ammoniated latex is diluted by addn of 4 vols of water, heated 10 hrs* at 150° in an autoclave, cooled, coagulated with AcOH, washed thoroughly and dried *The N content is then under 0 1% When vulcanized, this deproteinized rubber is* superior to ordinary rubber in its elec stability in water The deproteinized rubber *is also more easily plasticized and mixed with gutta percha than is ordinary rubber.* Paragutta is prepd by blending deproteinized rubber with purified gutta percha hy*drocarbon, with the optional addn of special hydrocarbons or montan wax* The proportions of the 3 components may be varied to suit the conditions Thermoplastic *insulators thus prepd are almost like gutta percha in mech and elec properties in* water, and they are cheaper Data show tensile, compression, flexibility, plasticity, *brittleness, water absorption and elec tests of paragutta in comparison with gutta*-percha These data prove conclusively that paragutta behaves in almost the same *way as gutta percha in all these respects* It has the *desirable* thermoplastic and mech properties of gutta percha, and its superior insulating properties render it par*ticularly adapted for transoceanic telephone cables Paragutta is also of advantage for* shorter deep sea carrier telephone cables and for ocean telegraph lines C C Davis

*Reconditioning air bags by burning.* Charles E Maynard *Chem Met Eng* 38, 91, *Rubber Age* (N Y) 28, 565(1931).—A new machine is described for recon*ditioning air bags used in the vulcanization of rubber tires It removes the hardened* surface layer of used bags by burning and scraping, thus leaving a smooth surface and *thoroughly reconditioning in one operation* C C. Davis

**Accelerators of vulcanization. Mercaptobenzothiazole.** F. Jacobs *Caoutchouc & gutta percha 28, 15350–4(1931), cf. C A. 25, 1118.—The prepn. and properties of* mercaptobenzothiazole are described, including its behavior and utility in rubber mixts. **Mercaptides** *Ibid* 15394–6.—*By mercaptides are meant combinations of mercapto*benzothiazole with other accelerators having basic properties, *e g*, with hexamethylene*tetramine, diphenylguanidine, di-o tolylguanidine and ethylideneaniline. The behavior* of some of these com substances as accelerators is described, with examples to show their utility C C Davis

**Oxidation of vulcanized rubber mixtures extracted with acetone.** T. Yamazaki and K. Okuyama *Caoutchouc & gutta percha* 28, 15359–60(1931).—*See C A* 24, 4664 C. C. Davis

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Activated carbons (Simonin) 18 Modifying the properties of resins [for rubber substitute manufacture] (Brit pat. 337,733) 26. Modifying isocolloids for rubber-substitute manufacture (Brit pat. 337,732) 26 Improving elasticity of knitted artificial silk fabrics [*for* waist bands, garters, etc.] (Brit pat 337,400) 25. Waterproof coatings (Swiss pat 142,172) 18 Rubber-coated fabric (U S pat 1,795,199) 25. Means for heating or intensively cooling hollow rolls or drums for working rubber (Ger pat. 517,361) 1. Rubber surfaced paving blocks (U S pat 1,794,220) 20. Solvents for

rubber (Ger pat 517,097) 13. Treating fibrous materials with rubber, etc [for making tire fabrics] (Brit pat 337,370) 25.

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Rubber. I G Farbenind A G (Julius Eisele and Johannes Stöhrel, inventors). Ger 517,490, Sept 13, 1927 Rubber latex is rapidly mixed with sufficient acid to establish a hydrion concn greater than $p_H$ 2, preferably greater than $p_H$ 1, and a compd. reducing the surface tensions is then added, *e. g.*, Na β naphthalenesulfonate or Turkey-red oil The mixt sets to an irreversible gel with sepn of a small quantity of clear serum Vulcanizing agents, accelerators or fillers may be added before or after the formation of the gel Examples are given Cf *C A* 25, 1706

Rubber. Società Italiana Pirelli Ger 517,208, Oct 12, 1929 The aging properties of rubber are improved by addn of about 5% of the evapn residue of latex serum from which quebrachitol has been removed, *e. g.*, by crystn Albumins may also be removed from the serum to be evapd., *e. g.*, by pptn with tannic acid

Rubber deposition Imperial Chemical Industries, Ltd., and R B P P Clarke Brit 317,946, Oct 21, 1929 A hollow gas permeable vessel, filled with $CO_2$ under pressure, is immersed in latex, and rubber is deposited on it as the $CO_2$ diffuses through the walls of the vessel and effects coagulation of the rubber deposit Material to be impregnated may be wrapped around the vessel and the vessel may be shaped to produce sheets or articles of other desired form

Rubber composition. Pellwood B Spear and Robert L Moore (to Thermatomic Carbon Co) U S 1,791,658, March 3 A C black of the kind designated as "P 33" is used in making a rubber compn having an ultimate tensile strength approx the same as a similar rubber compn contg an equal wt of "common com C black" but having a stiffness materially less than such a rubber compn An app is described suitable for making the C from hydrocarbon gas Cf *C A* 24, 212

Rubber compositions. E O Cowper Brit 338,247, June 5, 1929 Compns suitable for covering athletic grounds, for use as *expansion joints, wall and roof coverings*, machinery beds, etc., are formed of latex from which the serum constituents have not been removed, mixed with waste rubber, rubber scrap, old tire stock or the like and with breeze, ashes, clinker, brick dust, baked clay, slate dust or the like, vulcanizing materials, pigments and bituminous or portland cement, etc., may also be added, as may also fibrous fillers The material may be placed on a backing such as cloth or paper coated with bituminous material Various details and examples are given

Rubber composition suitable for tire treads, shoe soles, etc. Arthur B. Cowdery and Theodore A Bulifant (to Barrett Co). U S 1,793,161, Feb 17. There is incorporated in a rubber mixt a coal tar substantially free from cryst material at 25° having a sp gr above 1.00 at 38° and b. above 200°. Cf. *C. A* 24, 1545

Coloring rubber. I G Farbenind. A G (Rudolf Krech, inventor) Ger. 517,470, Sept 5, 1926 Rubber is mixed with an insol metal salt of Patent Blue A, which may be deposited on a substrate The colors obtained are fast to vulcanization Examples are given.

Coloring rubber. Dunlop Rubber Co., Ltd., D F Twiss, E A. Murphy and R. G James Brit. 338,303, Oct 11, 1929 Rubber articles obtained from aq dispersions by dipping, spreading, painting, extruding, spraying, electrophoresis impregnating or molding are colored, locally or generally, after formation, by reaction between successively added substances which together form a desired coloring substance and one of which if desired may be added to the initial dispersion, *e. g.*, β naphthol may be initially added and subsequently combined with a diazo soln., or the formed article may be dipped in indigo white soln and subsequently oxidized, or an article formed by use of acid may be dipped in an alk sulfide soln of a S dye

Preserving rubber. Marion C Reed (to B F. Goodrich Co). U. S 1,793,635, Feb 24. *Asym*-diphenyl- or other diaryl hydrazine (suitably in the proportion of about 0.1–5.0%) is added to rubber compns as a preservative

Rubber dispersions, etc. Douglas F Twiss and Edward A. Murphy (to Dunlop Rubber Co., Ltd) U S 1,793,265, Feb 17 For the production of substantially reversible compns of pasty consistency from aq dispersions contg rubber or similar materials and a protective colloid, the dispersions are evapd in the presence of one or more substances such as glycerol, glycol or a glycol alkyl ether, having as their principal function to serve in place of water as a medium in which the protective colloids, both naturally occurring and artificially incorporated, will continue to function when the water in the dispersions is substantially removed

Making thin rubber bathing caps. Melvin S Lower (to Sun Rubber Co) U. S.

1,791,192 Feb 24 App and various details (mainly of mech character) are described

Rubber footwear. James B Crockett (to Cambridge Rubber Co). U. S. 1,795,075, *March 3* A last is dipped into an aq rubber-contg material contg a coloring agent to form a deposited coating on the last, and the coated last is then dipped in an aq rubber compn of different coloring and the sole portion of the article is selectively dipped in an aq rubber compn contg fillers for increasing the resistance of the sole to wear

Molded rubber footwear. H C L Dunker Brit. 337,831, Aug 9, 1929 Articles such as galoshes or "seaside shoes" are formed by molding over a prevulcanized lining drawn onto the last and there covered with unvulcanized rubber to be molded

Rubber battery boxes, etc. *J Ferguson & Sons, Ltd., and J. E Ferguson.* Brit 338,114, July 10, 1929 Boxes are formed in such a way that the sides are harder than the base (as by subjecting the sides to a higher heat than the base in the vulcanization), they may be made of raw rubber or of waste rubber from old tires, mixed with S, ZnO, an accelerator such as diphenylguanidine and a lubricant such as paraffin. Various details of manuf are given

Rubber cement. Theodore Whittelsey U S 1,793,083, Feb 24 Rubber latex is used with a solvent such as $C_6H_6$ and a small quantity of an emulsifying agent such as Na oleate, which facilitates dilu of the cement with water

Synthetic rubber I G Farbenind A.-G Brit 337,460, Aug 2, 1929 Alkali metal such as Na used in effecting polymerization of diolefins is enclosed in a small perforated container (which may be formed of glass or metal) placed within the reaction vessel When the small perforated container becomes filled with polymerizate the latter with some assocd alkali metal is forced out into the main reaction vessel to promote further polymerization of its contents The process may be carried out in 2 stages and a diluent such as diethylene dioxide may be used

Synthetic rubber. I G Farbenind A.-G Brit 338,152, May 14, 1929 Polymerization of diolefins such as butadiene is effected with at least 30% of an inorg O-contg acid or an org deriv of such an acid (without addn of any other substance influencing the reaction) Among the substances which may be used are: $H_2SO_4$, $H_3PO_4$, benzenesulfonic acid, toluenesulfonic acid, *p* toluene sulfonylchloride and benzene sulfonylchloride. Products of varying character are obtained by varying the conditions of the reaction, and they may be suitable for adhesives, as addns to paints or lacquers, manuf of threads, films, molded articles, etc Several examples with details of procedure are given

Rubber-like product. Jean Baer. Swiss 142,456, Jan 8, 1929 A rubber-like mass is obtained by treating an isoprene halide with alkali or alk. earth polysulfides. In the example, isoprene dibromide is treated with $K_2S_4$. Cf. *C A* 24, 1545

Factice. Jean Baer. Swiss 142,354, to 142,357, June 10, 1928. Addns to 137,477 (*C A* 24, 4420) Factice sol in hydrocarbons is prepd. by heating the rubber-like mass from $CH_2Cl_2$ and a polysulfide soln with an oil such as rapeseed oil The $CH_2Cl_2$ may be replaced by $C_2H_4Br_2$, $CH_2Br_2$ or $CH_2O$

Rubber vulcanization accelerators. Albert M Clifford (to Goodyear Tire & Rubber Co) U S 1,792,819, Feb 17. As an accelerator, there is used the reaction product of cyclohexylamine and an aldehyde such as aldol, butyraldehyde, crotonaldehyde, heptaldehyde or formaldehyde.

Rubber vulcanization accelerators. Lorin B. Sebrell and Dexter N Shaw (to Goodyear Tire & Rubber Co) U S 1,792,770, Feb 17 *o Tolylamidoxime or other* compds of the general formula $RC(NOH)NH_2$, in which R represents a benzene group, are used as accelerators

Rubber vulcanization accelerators. Jan Teppema (to Goodyear Tire & Rubber Co) U S 1,792,780, Feb 17. Vulcanization with S is effected in the presence of the reaction product of mercaptobenzoxazole and a basic amine such as diphenylguanidine. Cf *C A* 24, 3135

*Apparatus for vulcanizing lengths or sheets of rubber or rubberized material.* Harry Willshaw and Walter G Gorham (to Dunlop Rubber Co., Ltd.). U. S. 1,793,269, Feb 17. Structural features

**The Stroboglow.** W. Andrews Bahls and D D Knowles. *Elec J.* 28, 250-3 (1031) —This instrument is a rugged portable stroboscope The true behavior of the various parts of a machine having periodic motion can usually be learned only when the machine is in normal running operation The Stroboglow is designed to permit the study of moving parts in out-of the way places It is portable, self-contained, and is packed in two large size suitcases. There are no moving parts and expert service is unnecessary. It has a broad speed range The requisites of the ideal stroboscope are summarized as (1) ruggedness, (2) portability, (3) simple and effective control of large currents, (4) exceedingly short duration of light pulsations, (5) very intense light pulsations, (6) minimum of moving parts, (7) simplicity of operation and (8) accuracy of timing light flashes The Stroboglow, it is claimed, fulfils these requirements It consists essentially of the oscillator or interrupter and the light unit. The heat of the light unit is the power grid glow tube The instrument is illustrated and the oscillator circuit shown in a diagram Various applications are indicated W. H. Boynton

**Color pyrometry.** Gerhard Narser *Mitt Kaiser-Wilhelm Inst, Eisenforsch Düsseldorf* 12, 299-316(1930) —An instrument has been constructed for selecting 2 widely sepd spectral colors by means of a double prism Light from an unknown source is then compared with light from a Pt strip by adjusting intensities on a half-shadow field. The combination of red (0 65μ) and green (0 53μ) was found to be the most sensitive combination for several different observers, the max error amounting to 4°. The instrument could also be used as an intensity pyrometer, and the const. in Wien's formula was measured and found to be 1 4235 cm /degree in red and 1 4179 cm /degree in green On comparison with Pt, W and oxidized Fe, it was found that the instrument registered 60° low for Pt, 20° low for W and very nearly correct on Fe. Elimination of the comparison lamp was found to be possible, but the max error was somewhat larger H. C. D.

**Determination of color with F. Herzfeld-Hoffmann's polarization-photometer.** I B Mintz and A K Kartashov. *Nauk. Zapiski Tsukrovoi Prom* 10, 257-67(1930) —The app and its use are described V. L. Baikow

**Material requirements and material testing for heavy-duty chemical apparatus.** Ernst Franke *Chem Fabrik* 1931, 133-5 —A brief review of the demands placed on construction materials in regard to aging, embrittlement, durability at high temps., etc., with remarks on methods of taking test pieces and making tests for phys properties J H. Moore

**The classification of wet materials.** C. H S Tupholme *Mech World* 88, 228-331(1930) —An outline of some of the more prominent devices for screening wet materials E I. S

**Chemical apparatus and their relation to the provisions of the Berufsgenossenschaft of the chemical industry and to the steam-vessel regulations.** Scheffel. *Chem Fabrik* 1931, 109-11 —A discussion is given of the lack of uniformity of regulations for steam vessels in the German states, the desirability of having national regulations, the effect of new materials and specifications and the use of autogenous and elec. welding. J H Moore

**Simple calculations for reciprocating compressors.** Jos. Immerschitt. *Apparatebau* 43, 62-5(1931) —A table of values is given to simplify the selection of the proper size of compressor for gases An example is worked out to show how the table is to be used M. C. Rogers

**Transfer of heat in recuperators.** I. E Terres and W. Besecks *Heat Treating and Forging* 16, 1573-6, 1579(1930) —See *C A.* 23, 3378 J. Balozian

**Furnace-door arches and air-cooled walls.** Wm C. Reifuss. *Heat Treating and Forging* 16, 1571-2(1930) —The construction of a double furnace (for heating for steam hammers) is briefly described, a party wall with an air passage sepg the 2 furnaces This method of construction conserves space and gives very satisfactory results A method of constructing furnace-door arches with tongued and grooved radial blocks is briefly indicated J. Balozian

**A precision cryostat with automatic temperature regulation.** R B Scott and F G Brickwedde *Bur Standards J. Research* 6, 401-10(1931) —A detailed description is given of the construction and operation of an app that will, by means of a photo-elec.-cell thermo-regulator, automatically hold any desired temp between 0 and —170° const. to 0 001° The temp is easily adjusted, and the degree of refrigeration is controlled by varying the gas pressure in the double-walled bath which is surrounded by a Dewar flask contg liquid air J. H Moore

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Introducing alkali or alkaline earth metals or O into sealed glass vessels (Austrian

pat 121,033) 4. Purifying inert gases in electric-discharge tubes, etc. (Austrian pat 121,056) 4. Stoneware in the chemical industry (WEINREB) 19.

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APPLETON, E V The Thermionic Valve. London Methuen. 2s 6d, net.
WÜNSCH, G Regler für Druck und Menge. Berlin R Oldenbourg 207 pp Bound, M 13 Reviewed in *Eng Progress* **12**, 96(1931)

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**Filter.** CHRISTIAN HÜLSMEYER Ger 515,852, Oct. 4, 1925 A filter for mechanically and chemically purifying liquids, especially water, contains a pad of steel wool.

**Leaf filter for filtering liquids.** E A ALLIOTT and MANLOVE, ALLIOTT & Co, LTD Brit. 338,567, Aug 15, 1929

**Leaf filter for filtering liquids.** E A ALLIOTT and MANLOVE, ALLIOTT & Co, LTD Brit 338,510 Aug 15, 1929

**Submerged drum filter.** ERNEST J SWEETLAND (to Oliver United Filters, Inc.). U S 1,796,491, March 17

**Submerged continuous filter.** ERNEST J SWEETLAND, JOSEPH V ZEYTHOEFER and JOHN T HOYT (to Oliver United Filters, Inc) U S 1,796,492, March 17

**Air filter.** DEUTSCHE LUFTFILTER BAUGES M B H Ger 518,439, Sept. 8, 1928

**Vacuum seal for continuous rotary vacuum filters.** ROBERT O BOYKIN (to Alex Mills) U S 1,795,634, March 10

**Pressure filter.** N A VOSTOKOV Russ appl 71,047, May 31, 1930.

**Continuously working filter press.** DANIEL BALLET Fr 695,177, Aug 20, 1929

**Scraper for cleaning filter presses.** V I BORISOV Russ. appl 69,890, May 12, 1930

**Separating dust, etc., from air, etc.** PLATEN MUNTERS REFRIGERATING SYSTEM AKTIEBOLAG Ger 518,087, June 10, 1927 See Brit 292,479 (*C A* **23**, 1452)

**Device for separating dust from air by baffling and centrifugal action.** HECTOR RABEZZANA (to A C Spark Plug Co) U S 1,795,858, March 10 Structural features

**Baffle-screen device for removing dust from air, etc.** GLENN P HEATH U. S 1,796,946, March 17 Structural features

**Centrifugal separator.** AKTIEBOLAGET SEPARATOR. Brit. 339,566, March 4, 1929. In an app for sepg liquids from solids, a layer or stream of Hg serves for a carrier of the solids Various details of construction and operation are described

**Gas separator suitable for separating liquid particles from steam, etc.** GRANT D BRADSHAW and RALPH N ROBERTSON (to Blaw-Knox Co). U. S. 1,796,435, March 17 Structural features

**Separator for oil and water, etc.** DAVID SAMIRAN and PHILLIPS MELVILLE. Ger. 518,149, Jan 1, 1929 See Brit 322,654 (*C A* **24**, 2643)

**Calorimeter.** HERMANN SANDVOSS Ger. 515,712, Nov. 20, 1926 Addn. to 491,954 (*C A* **24**, 3402)

**Pyrometer (suitable for indicating the failure of a railway or other signal lamp).** C W COOKE Brit 339,200, June 11, 1929 When a lamp flame is burning properly, the expansion of metal strips in the device serves to complete an indicator circuit which is broken when the flame is extinguished or becomes too low Various details of construction are described

**Apparatus and method for reducing the temperature of air by dehydration and saturation.** WALTER L FLEISHER (to Cooling & Air Conditioning Corp) U. S. reissue 17,998, March 10. Reissue of original pat. No 1,749,763 (*C. A* **24**, 2012)

**Bimetallic strip thermometer suitable for ovens.** THERMOSTATICS, LTD, O MILLER and T MILLER Brit. 339,237, Sept 30, 1929

**Automatic level regulator for liquid containers, etc.** WM MONCHEN. Ger. 515,677, Feb 13, 1930

**Drying apparatus for pasty or gelatinous materials, especially pigments.** FRITZ HAAS Ger 518,379, Aug 3, 1929

**Cascading apparatus suitable for drying crystals, cereals, etc.** REGINALD V. FARNHAM U S 1,796,324, March 17. Structural details of an app for drying with gaseous media

**Automatic control system for apparatus for drying materials by recirculated air.** GEORGE B BAILEY U S 1,795,418, March 10 Structural features and details of a thermostatic control system are described

**Rotary drum for cooling or drying chemicals or raw materials.** BERNHARD SÄGEBARTH Ger 515 834, July 28, 1927.

**Tube-cleaning device for rotary-tube drying apparatus.** MASCHINENFABRIK BUCKAU R WOLF A.-G. Ger 518,380, Dec. 6, 1929.

Means for inspecting the interior of evaporators. HANS WOLLENBERG Ger 518,314, Mar 10, 1929

Röntgen-ray apparatus. SIEMENS REINIGER VEIFA GES FÜR MEDIZINISCHE TECHNIK. Brit 339,212, March 1, 1929 Structural features

Röntgen-ray apparatus. C H F. MÜLLER A.-G Brit. 339,215, March 9, 1929 Structural features

X-ray tubes. SENDLINGER OPTISCHE GLASWERKE G. M. B. H. (Fritz Eckert, inventor). Ger. 518,172, Aug 14, 1923 Hot-cathode x-ray tubes are made of glass contg up to 8% of rare earths, with or without $TiO_2$ and (or) $V_2O_5$. A suitable compn. is $SiO_2$ 70, $Al_2O_3$ 2, MgO 3, $Na_2O$ 20 and $Ce_2O_3$ or other rare earth 5%

Electric-discharge lamps. PATENT-TREUHAND-GES. FÜR ELEKTRISCHE GLÜHLAMPEN (to General Electric Co., Ltd.) Brit. 338,844, May 2, 1930 Some modifications of construction are described, relating to devices such as those of Brit. 315,391 (C. A. 24, 1550)

Electron-emission device. JOHN W. MARDEN (to Westinghouse Lamp Co.) U. S. 1,795,730, March 10 Various structural details of sealed devices contg alkali metal Cf. C. A. 25, 622.

Electron-emitting cathodes of discharge devices. GRAMOPHONE CO., LTD., and G. B. BAKER. Brit. 339,451, Nov. 14, 1929. A refractory core or oxide-coated filament is coated with a substance which on heating in the absence of appreciable O leaves a residue contg the oxide of an electron-emitting metal, such as Cs tartrate or Ba tartrate, and free C. Various details of manuf are described.

Electron-emitting cathodes for discharge tubes. GRAMOPHONE CO., LTD., W. F. TEDHAM and F. ELLINGTON Brit. 339,057, Oct. 16, 1929 Cathodes are formed with a core or layer of Al provided with an oxidized surface having on it an electron-emitting coating which may comprise Cs, Ba or other metal deposited electrolytically or otherwise on the Al (which may have been preliminarily oxidized by making it anode in a dil. chromic acid soln.) If desired the oxidized Al may be carried on a core of other material such as W or kaolin.

Rotary-hearth furnace. ERNEST G. DE CORIOLIS, JESSE R. MOSER and ARNOLD L. LARSEN (to Surface Combustion Corp.) U. S. 1,796,144, March 10

Movable-hearth furnace with automatic dumping mechanism suitable for heat treatments. JOHN F. BAKER (to Westinghouse Elec. & Mfg. Co.) U. S. 1,795,921, March 10 Structural features

A two-chamber furnace with movable roof. YA. A. FRANTZUZ Russ. appl. 56,402, Oct. 15, 1929

Continuous-chain furnace. SOC. ANON. DES APPAREILS DE MANUTENTION ET FOURS STEIN Fr. 695,230, Aug. 30, 1929

Refractory furnace or retort setting SOUTH METROPOLITAN GAS CO. and W. T. SEACH. Brit. 339,268, Sept. 3, 1929

Inclined-grate furnace. ERNST VÖLCKER. Ger. 518,429, July 15, 1928 Means for advancing the fuel is described.

Step grate for low-grade or pulverulent fuel. FRANZ HOLZINGER. Austrian 121,290, Sept. 15, 1930

Traveling grate. HERMANN KRÖNAUER Ger. 518,430, Oct. 27, 1929

Oil burner (open-dish type) OTTO SCHIEDEK and BERTHOLD OSTER Ger. 518,425, Sept. 25, 1929 and 518,426, April 24, 1929

Regenerative gas furnace. FRIEDRICH SIEMENS A.-G. Fr. 37,175, July 2, 1929 Addn. to 591,158

Gas burner JAY M. AXTELL. U. S. 1,796,915, March 17.

Gas burner suitable for ovens. A. H. CLUTTERBUCK and S. W. HUMPHREY. Brit. 338,806, Jan. 30, 1930

Diaphragm-controlled gas-valves for heating systems. PAUL F. SHIVERS (to Minneapolis-Honeywell Regulator Co.) U. S. 1,796,544, March 17. Structural features

Fuel-distributing means for annular or chamber kilns. MICHAEL BOHN Austrian 120,993, Aug. 15, 1930

Movable feeding device for annealing ovens. A.-G. BROWN, BOVERI & CIE Ger. 518,218, Jan. 11, 1927

Rotary-tube oven for treating cork with hot gases. NICOLO MASSA. Austrian 121,253, Sept. 15, 1930

Pressure-operated valve-actuating means for blast heaters, etc. ZIMMERMANN & JANSEN G. M. B. H. Ger. 518,413, Dec. 17, 1929

ESSENCES ET PÉTROLES. Fr 37,243 Mar 14, 1929 Addn to 673,063 (C A 24, 2514-5) In the treatment of gases and vapors with purifying or catalytic agents a vessel of annular cross section is used having the catalytic or purifying material between 2 false bottoms, the spaces between the false bottoms and the bottoms serving resp as admission chamber for the gases to be treated and exit chamber for the treated gases. Cf C A 25, 1125.

Apparatus for carrying out physical and chemical reactions. I G FARBENIND A G (Hans Bahr inventor) Ger 514,500, Sept 10, 1929 Addn to 502,935 (C A 24, 5541) The charge mentioned in Ger 502,935 for circulating the reacting substances pass through tubes of various lengths.

Apparatus for testing gases or liquids by thermal conductivity measurements. CHARLES ENGELHARD, INC Ger 515,177, Oct 18, 1927 See Brit 288,978 (C A 23, 551)

Apparatus for converting concentrated solutions into granulated solids. I G FARBENIND A-G Fr 37,364, Aug 19, 1929 Addn to 673,135 (C A 24, 2341) The app consists of a rotating plate beneath a circular distributor provided with notches so as to form a circular opening between the two.

Apparatus for the distillation of solids and liquids. HENRY DUTTY Fr 37,244, July 23, 1929 Addn to 532,349

Filling for reaction and washing towers, etc. ERNST BERL U. S. 1,704,501, March 17 A filling device is formed from a circular blank of any suitable material, folded in a crosswise reversed manner to resemble a riding saddle, the height and breadth being substantially equal.

Apparatus for liquefying chlorine by compression. KREBS & Co. G M B H (Wilhelm Lehmann, inventor) Ger 515,929, Oct 11, 1929

High-speed mixer for making emulsions, effecting chemical reactions, etc. GASTON S. P DE BÉTHUNE. Ger 514,290, Mar 14, 1925 See Brit 272,532 (C A. 23, 1514)

Pump and high-speed emulsifier system for making emulsions such as those of bituminous materials. G C. HERRELL and ROAD DEVELOPMENT Co., LTD Brit 338,496 Aug 13, 1929 Various details of construction and procedure are described

Acid-resistant apparatus. H FRISCHER. Brit. 339,052, Sept 25, 1929 Vessels or app. resistant to $HNO_3$ comprise an Al alloy contg Mg, Si, etc., where exposed to acid liquid and a more resistant alloy such as Fe-Si or Cr Ni alloy where exposed to the fumes.

Apparatus with an immersed propeller) for mixing acids, etc. MASCHINENFABRIK ATMOSFERO-NIENBERG A G Brit. 338,440 Sept. 6, 1929 Various structural details are described

Float for determination of the specific gravity of accumulator electrolytes. TUDOR ACCUMULATOR, LTD Hung 101,225, Feb 4 1931 "Kunstwachs" is mixed with $BaSO_4$ to form balls having different sp. gravities. These balls are not influenced by gas bubbles as are those made of natural wax.

Apparatus for casting films. RADEBEULER MASCHINENFABRIK ARTHUR KOEBIG G M B. H Ger 518,067, Dec 23 1928.

Apparatus for making films from masses which harden in the air. RICHARD MARIOTTI Austrian 121,508, Oct 15, 1930.

Sheet metal articles coated with corrosion-resisting material which can be hardened by vulcanization or other treatment. P. PICK. Brit. 337,320, July 23, 1929. Various details of manuf are given, mainly of mech character, for making funnels, drums for holding chemicals, etc.

Annealing pot. OSTERREICHISCHES SIEMENS-SCHUCKERT-WERKE. (Erwin Häuser inventor) Austrian 120,850 Aug 15, 1931.

Acetylene generator AUTOGENWERK SIRIUS G. M. B. H Ger 518,335, Feb. 6, 1930 Addn. to 474,145 (C A 23, 2858)

Apparatus for distilling water by heat from the exhaust of an internal-combustion engine. H J WILSON Brit. 338,953, Aug 27, 1929 Structural features.

Mercury boiler B P COMPSON (to British Thomson-Houston Co., Ltd.). Brit. 339,237, June 14, 1929

Aluminum-coated steel soot-blower tubes for boilers, etc. WHITEMORE, HULBERT, WHITEMORE & BELKNAP and H. G C. FAIRWEATHER. Brit. 338,877, Aug 21, 1929 A tubular steel core is coated on both sides with a thin layer of Al which is adapted to alloy with the steel when the tube is placed within the boiler and subjected to heat. Various details of manuf are described.

Safety gas valve for cutting off gas on flame extinguishment. LOUIS KREUTZKAMP U S 1,796,998, March 17 Structural features

Thermostatic electric switch. HILTON I. JONES. U S. 1,795,400, March 10

Thermostatic electric switch (containing mercury). THEODORE M BURKHOLDER (to Engineering Products Corp ) U S 1,795,831, March 10 Structural features

Thermostatic control device for electric circuits. EDMUND SCHIFRER U S 1,796,726, March 17 Structural features

Thermostatic control device for electric circuits. HARRY L. BRADLEY and GUSTAV O WILMS (Wilms to Lynde Bradley ) U S 1,797,126, March 17. Structural features

Snap-action thermostatic device suitable for controlling electric circuits. ADOLPH A THOMAS U S 1,795,907, March 10 Structural features

Thermostatic device suitable for controlling the flow of steam, etc. GLENN H. NIELY (to Bristol Co ) U S 1,796,124, March 10 Structural features

Thermostatic control device suitable for control of fluid fuel supply to burners. EDWARD L FONSECA (to Wilcolator Co ) U S 1,796,196, March 10 Structural features

Thermostatic valve suitable for controlling the flow of heating fluids. FREDERICK W JAEGER U S 1,795,860, March 10

Thermostatic valve H N ROBINSON, G W WORTLEY and R & A MAIN, LTD. Brit 339,341, Sept 4, 1929

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Chemists, chemistry and people. E T STERNE *Can Chem Met* 15, 71–3 (1931) —An address W H BOYNTON

Eduard Cramer. HIRSCH *Z angew Chem* 44, 230–1(1931) —Obituary. E H.

Fritz Pregl. H LIEB *Mikrochemie* 3, 105–16(1931) —Obituary W. T. H.

Edgar Fahs Smith: Provost, chemist, friend. CHARLES F THWING *Science* 73, 331–3(1931) E H.

In memoriam—Henry Leffman—1847-1930. IVOR GRIFFITH *Am. J Pharm.* 103, 118–9(1931). W. G GAESSLER

Dr. Henry Leffman—life story. CHARLES H. LAWALL. *Am J. Pharm* 103, 113–17(1931) —Biography with portrait. W G. GAESSLER

The scientific work of P. A. Levene. OTTO FOLIN *Chem Bull.* 18, 99–101, 121 (1931) E. H.

Rudolf Dietz on his seventieth birthday. F. FOERSTER *Z angew. Chem.* 44, 229–30(1931) —A portrait is included E H

The work of Marcelin Berthelot and his influence on modern chemistry. JEAN PEPIN LEHALLEUR *Ann soc pharm chim Sao Paulo* 2, 38–44(1931) E. H.

Lord Melchett and his accomplishments. JAROSLAV JELÍNEK. *Chem Listy* 25, 34–7(1931) FRANK MARESH

The achievements of Josef Schneider. E TEYROVSKÝ *Chem. Listy* 25, 49–53 (1931) —A brief biography is followed by a bibliography of Schneider's contributions covering all branches of chemistry FRANK MARESH

Some scientific-instrument makers of the eighteenth century. I, II. ROBERT S. WHIPPLE *J Sci Instruments* 7, 241–53, 273–81(1930); *Science* 72, 208–13 E J C.

Recent advances in science: Physical chemistry. R K SCHOFIELD *Science Progress* 25, 398–403(1931) —Recent work on contact catalysis is reviewed J. S H.

Discoveries and investigations in the older chemistry up to the phlogiston theory of Stahl. HOFFMAN *Sitzb preuss Akad Wiss* 1931, lviii–lxvi E. H.

The activity of the general chemistry laboratory [at the University of Gand, Belgium]. F. SWARTS. *Bull soc. chim Belg* 39, 444–53(1930) —A review dealing more especially with work on org fluorides A. L. HENNE

What conclusions must classical physics and chemistry draw from the principle of greatest simplicity? L ZEHNDER *Z Physik* 63, 706–12(1930) —Ten postulates are given based on the principle of greatest simplicity Classical physics must either obey these or be wrong in its fundamental suppositions. B. C. A.

Multiple preparation of hydrogen electrodes. V. RICHARD DAMERELL. *J. Chem. Education* 7, 1664–7(1930) —A rubber stopper was bored to take 6 electrodes, 2 reference electrodes and a H-inlet tube This was used to stopper all beakers in which the operations required by Clark's method took place Platinization is best at 2 5 v. It is not

necessary to bubble the H gas directly on the foil, for Pt black readily absorbs the gas in soln ANN NICHOLSON HIRD

*The equilibrium between matter and energy.* I. PETRYANOV. *J Russ Phys-Chem Soc*, Phys Pt 62, 241–5(1930).—The conditions of equil between matter and energy were investigated The following equation was derived $W_T = RT\ln K_T - ((M_2 - M_1)c^2/3)$, where $W_T$ is total work done, $M_1$ and $M_2$ are mol wts of true gases, $c$ is the velocity of light and $K_T = -c_2/c_1$, where $c_1$ and $c_2$ are the concns of gases in the system V. VESSELOVSKY

The molecular structure of triatomic gases. II. $H_2O$, $H_2S$ and $N_2O$. P C. MAHANTI *Physik Z.* 32, 108–10(1931), cf *C. A* 24, 276.—Data on dipole moments, Raman spectrum, and infra red absorption indicate that $H_2S$ has a triangular structure like $H_2O$, while $N_2O$ has a symmetrical linear form. T. H CHILTON

Recent advances in the interferometric determination of the form of molecules. H MARK *Z angew Chem* 44, 125–30(1931).—Recent significant developments in the exptl methods and the theory of the x ray interferometric detn of the structure of crystals are summarized These have been of particular value in elucidating the structure of the more complex and less sym org mols. Recent applications of x ray methods and of streams of electrons to the detn of the structure of mols in gases are discussed The results of numerous x-ray interferometric studies of simple $CH_4$ derivs are correlated to show the extent to which they substantiate the regular tetrahedral symmetry of $CH_4$ demanded by classical theory R. H LOMBARD

Dielectric constants of liquefied gases. J C MCLENNAN, R C JACOBSEN AND J O WILHELM *Trans Roy Soc Can* [3] 24, Sect 3, 37–46(1930).—The dielec consts of liquid $N_2$, A, $CH_4$ and $N_2O$ were detd in a specially constructed flask and at various temps at and above their f ps The dielec consts referred to vacuum and at selected temps are as follows $N_2$ at 70.5°K 1.478, A at 87.1°K 1.520, $CH_4$ at 106.7°K. 1.694 and $N_2O$ at 70.8°K 2.023 J W. SHIPLEY

The dielectric constant of supercooled sulfur and several sulfur solutions. STEFAN ROSENTAL *Z Physik* 66, 652–6(1930).—For the examn of liquids that attack metal plates, a glass condenser was made, consisting of concentric glass vessels On the inside surface of the inner vessel was a sheet of Ag, on the outside of the app a sheet of Cu The liquid was admitted between the glass vessels through connecting tubes The dielec. const of S was 3.720 ± 0.003 at 130° Values were obtained from 135° to 95°. At 107° a sharp change was observed Liquid S followed the law of Clausius-Mossotti (polarization, $p$ = const.), $p = 0.26280 \pm 0.00006$ This law was also followed by S in $C_6H_6$ and $CS_2$ L P HALL

The dielectric constant of liquid bromine. DONIESLAW DOBORZYŃSKI *Z. Physik* 66, 657–68, *Bull intern acad polonaise* 34, 97–111(1930), cf *C A* 22, 1897.—With the condenser described in the preceding abstr., the dielec const of Br was measured from 0° to 53.8°, 3.334 ± 0.010 was found at the lower, and 2.964 at the higher, temp Polarization was a function of temp. Thus, Br followed the Debye theory for dipoles and the dipolar moment was calcd as $0.49 \times 10^{-18}$ e. s. u. L. P. HALL

Thermodynamic properties of dichlorodifluoromethane, a new refrigerant. I Equation of state of superheated vapor RALPH M BUFFINGTON AND W K GILKEY *Ind Eng. Chem* 23, 254–6(1931).—The consts. of a Beattie-Bridgeman equation of state for superheated $CCl_2F_2$ vapor were detd from measurements of isometrics between vols of 1.4 and 4.21 per mol In this region the isometrics are straight. The final equation is $p = [RT(V + B)/V^2] - (A/V^2)$, where $A = 23.7[1 - (0.305/V)]$ and $B = 0.59[1 - (0.622/V)]$ The units are atms., degrees abs and l per g.-mol. The equation fits the observed data with an av. error of 0.5% A L H.

The most important methods for determining surface tension. E HIEDEMANN *Z. physik chem Unterricht* 44, 1–12(1931).—The various methods of surface tension measurement are discussed from the standpoint of their adaptability as student expts in physics labs Four methods are suggested (1) the torsion balance method of Lenard (cf *C A*. 18, 2827), (2) capillary-rise method in a specially designed simple app; (3) a differential capillary rise method using an app in which 2 capillary tubes and a tube (a) of wider bore are attached to a horizontal tube and fitted with a close fitting thermometer which serves as a piston to regulate the height of the liquid in the capillary tubes, (4) a compensation method of Ferguson and Dowson (cf *C A* 16, 2436) Bibliography E R. SCHIERZ

The density of liquids OSCAR DE SOUZA VIEIRA *Rev brasil. chim* 1, 92–6 (1929).—A study of the methods of operating the hydrostatic balance in the detn. of the d of liquids JOHN M. LADINO

The critical anisotropic point of ferromagnetic crystals. N S AKULOV. *Physik*

*Z.* 32, 107–8(1931).—The relative change of elec. resistance of a ferromagnetic crystal under the influence of magnetization is expressed by an equation of the same form as that previously given for the change in phys. properties (*C. A.* 24, 2345) The following law is deduced If 2 curves of the relative change of elec. resistance *vs* magnetization, derived for 2 different angles between the magnetization vector and chief axis of the crystal, intersect, then curves for any angles must also pass through this point. An example is given from data of Webster (*C A.* 21, 204, 1748) T. H. Chilton

Translation-gliding in crystals of the sodium chloride structural type. M. J. Buerger. *Am. Mineral* 15, 174–87, 226–38(1930). *cf C A* 24, 4680.—For crystals of NaCl-like structure, the translation direction, *t*, is detd by the densest rows of like-charged ions The translation plane, *T*, is a function both of ion radius ratio and of the polarizabilities of the constituent ions Translation along (001) is assocd with high polarizabilities, translation along (110) with low polarizabilities; with intermediate values both (001) and (110) may function as translation-gliding planes under favorable conditions of load If the original lattice coördinates of the geometrical crystal structure theory are retained, it is found that translation direction, unit translation, direction of closest equiv lattice points and direction of closest like charges are identical The correlation, with minor modifications, extends to other crystals such as magnesite and other carbonates, barite, fluorite, anhydrite. It is pointed out that the translation direction is sp for a given structural type because the translation direction has the structural character alignment of closest like leptons for all leptons in the structure An adequate mechanistic explanation of the gliding direction is presented on the assumption that the leptons are individually charged and thus have the character of ions. The actual translation direction is the one resulting in a min loss of cohesion A M Brant

The mechanism of activation of thoriated tungsten and molybdenum. A Gehrts *Z tech Physik* 12, 66–71(1931).—A math treatment The mechanism derived on the assumption of Th migration by slip along the crystal surfaces to the surface of W and Mo wires agrees with the exptl results The grain-size-diminishing action of thoria in wires may be due to adsorption and migration of Th on the crystal surfaces A F.

Addition centers as coördination centers. The crystal structure of veronal. Eduard Hertel. *Z physik. Chem.*, Abt B, 11, 279–90(1930).—The crystal structure of veronal, 5,5-diethylbarbituric acid, was detd crystallographically and roentgenographically. Crystals, m 191°, d 1.220, formed by slow growth from aq soln., were rhombic-bipyramidal, with axial ratios $a:b:c = 0.491:1:0.688$, translation group $I_a'$, space group $V_h^{17}$, 4 mols forming the elementary group Models are depicted The arrangement of the mols is attributed to secondary valences L. P. Hall

Growth and solution of nonpolar crystals. I N Stranski *Z. physik Chem.*, Abt. B, 11, 312–9(1930); cf *C A.* 22, 4289.—Soln of homeopolar crystals begins at the corners and edges and growth occurs more easily at the face. Metals in electrolytes, however, grow from the corners. Since homeopolar crystals present more active centers than heteropolar, they should be more effective catalytically. L. P. Hall

Explanation of the electrocapillary Becquerel-phenomenon. A correction. H. Freundlich and K Söllner *Z physik Chem.*, Abt. A, 152, 313–4(1931); cf. *C. A.* 23, 4394.—The only condition necessary for the sepn. of metal in the Becquerel phenomenon is a pos value for the decompn. potential, with the convention of a circular current going in one direction through the salt soln., in the other through the metallically conducting membrane W. W.

Method of obtaining a single crystal of aluminum of any desired crystallographic orientation. T Sano *Mem Coll Sci Kyoto Imp Univ* 13A, 307–9(1930).—An Al crystal of any desired orientation can be obtained by bringing another crystal into contact with molten Al and lowering the temp very slowly. B C A.

Crystal structure of metallic lanthanum. J. C. McLennan and R. W. McKay. *Trans Roy. Soc. Can.* [3], 24, Sect 3, 33–5(1930).—The x-ray spectrum of powdered La was examd and La found to crystallize in the hexagonal system The coördinates of the atoms referred to hexagonal axes are $\frac{1}{3}, \frac{2}{3}, \frac{1}{4}$ and $\frac{2}{3}, \frac{1}{3}, \frac{3}{4}$ The side of the unit cell is 3.72 A. U. and the axial ratio is 1.63 This arrangement is the same as that of the hexagonal close packing of spheres J. W. Shipley

Crystal structure of uranium. J C. McLennan and R. W. McKay. *Trans Roy. Soc Can.* [3], 24, Sect. 3, 1–2(1930).—An x-ray analysis of the crystal structure of metallic U was made by the powder method. The calcd. spacings are for a body-centered cubic arrangement with the side of the unit cell equal to $3.43 \times 10^{-8}$ cm. The lines corresponding to the 222 and 004 planes were not observed Calcd from the data obtained the d. is 19.6 J W Shipley

New forms of crystalline ice. N Altberg and W. Troschin *Naturwissenschaften* 19, 162–4(1931).—In the Kungur caverns (Ural mountains) natural temp and satn conditions are such that the growth of large ice crystals (up to 50 cm. in size) is promoted A few photographs of specimen are presented B J C. van der Hoeven

Structure of silicon tetrafluoride. G Natta *Gazz chim ital* 60, 911–22(1930).—A survey of the literature shows that the lattice structures of very few binary compds. of the $AB_4$ type have been studied by x rays It was of interest therefore to exam. compds. of this type, particularly those with a non ionic structure The form and symmetry of the cryst. lattice of the latter depend, to a greater degree than for ionic compds, upon the form and symmetry of the individual mol, which maintains its structural unity and behaves as a fundamental constructive element of the cryst. edifice, like the single ions of ionic compds The present paper deals only with $SiF_4$, but is part of a more extended series of expts on the halides of C, Si and Ti Most of them give excellent x ray photographs, all of which show the cubic or tetragonal system. $SiF_4$ has the simplest structure Since most of the halides have a very low m p, the app already used in examg liquids and gases was again employed (cf *C A* 24, 4973) Pure $SiF_4$ was prepd by freezing out at —60° the *HF* from the gas evolved from a mixt. of $K_2SiF_6$ Al silicate and concd $H_2SO_4$ The $SiF_4$ was then liquefied by liquid air The powder method was used for the x ray examn. The lattice of the Si atoms in $SiF_4$ is body-centered cubic. The elementary cell contains 2 mols, with $a = 5.41 \pm 0.01$ A. U. and $v = 158 \times 10^{-24}$ cc. at —170° The d is 2.17. $SiF_4$ is not an ionic compd., and it possesses a "mol lattice" It belongs to the $O^1$ spatial group The position of the atoms in the cell is defined by the coördinates

Si 0 0 0, $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
F $u$ $u$ $u$, $u$ $\bar{u}$ $\bar{u}$, $\bar{u}$ $u$ $\bar{u}$, $\bar{u}$ $\bar{u}$ $u$
$\frac{1}{2}+u$ $\frac{1}{2}+u$ $\frac{1}{2}+u$, $\frac{1}{2}+u$ $\frac{1}{2}-u$ $\frac{1}{2}-u$
$\frac{1}{2}-u$ $\frac{1}{2}+u$ $\frac{1}{2}-u$, $\frac{1}{2}-u$ $\frac{1}{2}-u$ $\frac{1}{2}+u$

The closest agreement between the calcd and exptl intensity was found for values of $u$ around 0.17 The radius of the neutral F atom is approx 0.50 A. U. C. C. Davis

An x-ray study of mannitol, dulcitol and mannose Thora C. Marwick. *Nature* 127, 11–2(1931).—Results

| | Space group | *a* A. | *b* A. | *c* A. | Density g./cc | Molecules per cell |
|---|---|---|---|---|---|---|
| Mannitol | $Q_4$ | 8.65 | 16.90 | 5.56 | 1.497 | 4 |
| Dulcitol | $C_{2h}^5$ | 8.61 | 11.60 | 9.05 | 1.466 | 4 |
| Mannose | $Q_4$ | 7.62 | 18.18 | 5.67 | 1.501 | 4 |

In all three compds. the long dimension of the mol probably corresponds to the *a*-axis C. J Humphreys

The crystallographic character of the amides of methylbutenoic acids. J. Thoreau *Bull sci acad roy Belg* [5], 16, 823–8(1930), *Bull soc. chim Belg* 39, 412–6.—The amide of tiglic acid gave orthorhombic crystals with 8 faces The amide of angelic acid gave long crystals but could not be measured by the goniometer The amide of α-ethylacrylic acid gave long monoclinic crystals, and that of methylethylglycolic acid gave monoclinic crystals Wallace R. Brode

Conductivity of the crystals of sodium chloride A K. Walther and B M Hochberg *J Russ Phys Chem Soc*, Phys Pt. 62, 399–408(1930).—The cond. of NaCl crystals was investigated for the temp range 25–800°. Polarization and its influence on the cond were studied The change in the cond with temp above 550° is attributed to the transport of electricity by Cl ions. The cond. between 25° and 550° was expressed by the equation $\delta = Ae^{-B/T}$, where $\delta$ is the sp conductance, $T$ the abs. temp and $A$ and $B$ are consts for a given substance and are connected with the work done in the sepn. of ions from the crystal lattice. The deviation from the above equation at temps higher than 550° is attributed to migration of Cl ions. V V.

Zero volumes of crystalline organic substances. W Biltz. *Z Elektrochem* 36, 815–8(1930).—A discussion of the mol vol and its relationship to the additivity and constitutional properties of the at. vol Plotting the mol vol of homologous series against the no of C atoms gives a value of 13.7 cc. for the $-CH_2$ group, and 33 cc. for the aromatic $-C_6H_3$ group The empirical increment for the individual groups thus permits the zero vols. of the elements to be calcd $C_{(aromatic)} = 5.4$ = graphite; $C_{(aliphatic)} = 3.4$ = diamond, H = 5.8 = $\frac{1}{2}$ H atom, O′ = 10.9 = $\frac{1}{2}$ O atom, O″ = 3.6 = $\frac{1}{3}$ O atom The zero vols of the oxides of N are discussed The calcd zero vol for the $-CH_3$ group is 15.0 whereas the av observed value is 13.7 The energies

of decompn and the spatial requirements are roughly proportional The exceptionally large zero vol of $CH_4$, calcd 20 6, observed 30 05, needs to be clarified Staudinger's study of polyoxymethylene diacetates is considered L. L QUILL

Relations between thermal force, thermolysis and ionic mobility in solid salts and mixed crystals. H RHINHOLD *Z. physik Chem* Abt. B 11, 321–41(1930), cf. *C. A* 22, 3358.—Chiefly math L. P HALL

Some reactions that take place in the solid state. MME MATHIEU, MATHIEU AND PAIÉ *Compt rend* 192, 416–8(1931).—Reactions take place readily in the solid state but they are difficult to follow unless there is a change in color or evolution of gas The changes in x-ray spectra before and after reaction prove that the following reactions take place when the mixts of solid powders are heated (*1*) $Hg + I_2 \longrightarrow HgI_2$ (*2*) ZnS (wurtzite) $\longrightarrow$ ZnS(blende), (*3*) $3K_2SO_4 + Na_2SO_4 \longrightarrow Na_2SO_4 3K_2SO_4$, (*4*) $HgSO_4 + 2HgO \longrightarrow 3HgO\ SO_3$, (*5*) $HgSO_4 + HgI_2 \longrightarrow HgSO_4\ HgI_2$, (*6*) $(PbI)_2CO_3 \longrightarrow PbI_2 + PbCO_3$, (*7*) $[3HgO\ 2SO_3\ 2H_2O] + 3HgO \longrightarrow 2[3HgO\ SO_3] + 2H_2O$ Reactions *1*, *4* and *6* take place with increase in mol vol, reactions *2* and *3* with decrease, and reaction *5* with no change in mol vol Application of thermodynamics to reactions in the solid state is not yet practicable F L BROWNE

Spiral-shaped cracks in the drying of precipitates G SCHIKORR *Naturwissenschaften* 18, 370(1930).—$Fe(OH)_3$ was pptd from $FeCl_3$ soln with $NH_3$, filtered and washed and about 50 g of the moist ppt was placed on a glass plate and allowed to dry in the air After 8–10 days, there was formed in the course of a few hrs on the bottom surface a regular spiral shaped crack This spiral formation takes place also with $Al(OH)_3$ No explanation of the observed phenomenon is given L T C

Spiral formation in chemical precipitation. R ED LIESEGANG *Naturwissenschaften* 18, 645–6(1930).—Spiral cracks during the drying out of gels recently described by Schikorr (preceding abstr.) are a modification of ordinary rhythmic ring formation in ppts., etc Its exact cause has so far not been explained B J C VAN DER HOEVEN

The density of atmospheric air and its variations. E MOLES, M PAYA AND T. BATUECAS *Rev acad cienc Madrid* [2], 25, No 10, 05 170(1930).—An historic review of the studies of the d and chem constituents of air followed by extensive original investigations Methods used to det the individual factors are described in detail, and drawings are presented of the app used Air samples were taken from various localities B S LEVINE

Change of density of ethyl ether with temperature. J. MAZUR *Nature* 127, 270 (1931), cf. *C. A.* 25, 627.—The d of very pure $Et_2O$ increases from 0 6904 at 35° to 0 8595 at —105 4°, below which the rate of increase of d is much slower This checks the transition temp found in the detn of sp heat and dielec. const At the m p —117 2° d. is 0 8854 ARTHUR FLEISCHER

The nature of specific properties of molecular surface fields The structure of active carbons and the inversion of the effects of adsorption and wetting heats. B. IL'IN AND I SIMANOV. *Z Physik* 66, 813–8(1930).—Exptl data are given on an inversion of the adsorption from aq fatty acid solns and also an inversion of the wetting heat in the homologous alc series by two modifications of active carbon prepd from sugars The Debye figures of these carbons are considered. M. MCMAHON

Interface potential and reactions at surfaces. I. Reduction of permanganate by charcoal. A WASSERMANN *Z. physik. Chem*, Abt A, 149, 223–39(1930).—The actions of different charcoal prepns on $KMnO_4$ soln were comparatively investigated. If the velocity of reduction of the $KMnO_4$ is a measure of the diffusion of the $MnO_4$ ion to the interface, the surface charge on the charcoal should influence the velocity of decompn The effect of $p_H$ on the reaction velocity in the acid region confirms this assumption Also $KMnO_4$ is reduced about equally readily by normal and by activated sugar charcoal in alk soln where both charcoal surfaces are negatively charged, whereas in acid soln. the positively charged active charcoal is the more active. The fact that the velocity of reaction in alk. soln is independent of the concn. of the alkali is explained by supposing that the C adsorbs OH ions only in small amts. B C. A

Note on the adsorption theories of Frenkel and Hückel. A. GANGULI *Z. Physik* 66, 704–7(1930); cf. *C. A* 24, 2056.—The adsorption equations of F. (*C. A.* 18, 3302) and H. (*Adsorption und Kapillarkondensation*, p. 172) are identified with G.'s statistical derivation of the Langmuir adsorption isotherm. CHANNING WILSON

A study of adsorption processes. II. V. N. KREITINSKAYA *J. Russ Phys.-Chem. Soc.* 61, 2111–32(1929); cf. *C. A.* 22, 9.—Prolonged sorption by C of acetic and benzoic acids is not due to the formation of solid solns or to chem. reactions. It is merely an adsorption, which is conditioned by a slow diffusion of dissolved substances Benzoic and acetic acids are adsorbed by charcoal in equiv. quantities V. V.

**The adsorptive bond.** H Cassel and F. Salditt. *Naturwissenschaften* 19, 110–1 (1931).—The surface tension, $\sigma$, of pure Hg was measured by the method of maximal drop pressure in the absence of air and impurities and in the presence of its own vapor and several other vapors at different $p$ and $T$. The $\sigma$-$p$ isotherms allow calcn of the adsorbed amts by the Gibbs method. This procedure is an ideal one for testing the dipole theory of adsorption (Debye, *Physica* 1, 362(1921), Lorenz and Lande, *C. A.* 17, 3818; Magnus, *C. A.* 21, 844). In accordance with London and Polanyi (*C. A.* 25, 1715; and London, *C. A.* 25, 1715) the dipole moment plays only a secondary role in adsorption. $H_2O$ vapor, between 0° and 50° and at pressures up to 62 mm Hg, had no effect at all on the surface tension of 0.1% accuracy; this means that it is not adsorbed below satn. pressure. Considerable adsorption was found for $Et_2O$ with a much smaller dipole moment, more still for hexane, cyclohexane and benzene in the order mentioned (different from the order for mol. refraction) which are without dipole moment. MeOH, EtOH, and PrOH are adsorbed more strongly with increasing chain length. The S-shape of the $\sigma$-$p$ curves proves that the adsorbed state is an assocd one. Nitromethane shows the same behavior. It would seem that dipole qualities by themselves even act as a deterrent to adsorption.
B. J. C van der Hoeven

**Occlusion of hydrogen by platinum black.** A. Sieverts and H Brüning. *Festschr. Heraeus* 1930, 97–114.—For a particular temp. and pressure the sorption of H by Pt black depends on the previous treatment of the latter. The isobars exhibit a change of direction between 0° and —20°, becoming again rectilinear between —20° and —120°.
B. C. A.

**Desorption of gases from molecularly plane glass surfaces.** James R Curry. *J. Phys. Chem.* 35, 859–73(1931).—The desorption of air, $CO_2$, $C_6H_5CH_3$, $NH_3$, $H_2$, CO, and $C_2H_4$ from glass surfaces was studied, in an app. with a large ratio of surface vol. and a plane surface. The adsorbed gas covered only a fraction of the surface. Desorption was complete at temps. below 220°.
S. Lenher

**The heat of adsorption of certain organic vapors by charcoal at 25° and 50°.** J N Pearce and G H Reed. *J. Phys. Chem.* 35, 905–14(1931); cf. *C. A.* 24, 3690.—The heats of adsorption of $CH_3Cl$, $CH_2Cl_2$, $CHCl_3$ and $CCl_4$ on charcoal were detd. at 25° and 50°. There does not appear to be a temp. coeff. of the heats of adsorption. The mol. heats of adsorption increase with the no. of Cl atoms in the mol.
S. L.

**Chemical sorption. IV. Complex sorption processes and hydrolysis.** S Lipatov and N Sokolova. *Z. anorg. allgem. Chem.* 192, 383–90(1930); cf. *C. A.* 24, 766, 2355.—The adsorption of NaOH by salt free cellulose films was detd. Corrections were made for swelling. Na ions are adsorbed at the positions of the OH groups of the cellulose. Max. adsorption shows 3 NaOH combined with each $C_6H_{10}O_5$. The swelling of cellulose reaches a max. at 10% of NaOH. $H_2O$ covers the cellulose in NaOH solns. with a monomol. film.
Arthur Fleischer

**Adsorption in solutions in relation to the dielectric properties of the solvent. I.** E Heymann and E Boye. *Z. physik. Chem.*, Abt. A, 150, 219–56(1930); cf. *C. A.* 25, 13.—The relation between dielec. properties of solvents and adsorption of solutes is discussed theoretically and investigated exptly. Purified almost ash free wood charcoal was the adsorbent. Adsorption of BzOH, AcOH, $CH_2O_2$, butyric acid and I (violet solns. only) is weak from strongly polar solvents and strong from weakly polar solvents. This antibatic relation between dipole moment and adsorption is not universal, however, and is probably influenced by the mutual affinities of solute and solvent. This suggestion is supported by the observation that I is much more weakly adsorbed from brown solns. in alc., $Et_2O$ and $C_6H_6$, where it is solvated, than from violet solns., where there is practically no solvation. A definite and const. relation between dielec. properties and adsorption occurs only in solvents that are closely related chemically, such as a homologous series of alcs. The adsorption of BzOH or picric acid in alc. soln. by charcoal decreases with increasing mol. polarization of the alc., i. e., with increasing deformability of the mol. A similar relation is found between adsorption and dipole moment in the adsorption of I from the series of chloromethanes. An investigation of adsorption in solvent mixts. was also made, and a connection established between the adsorption curve (relating percentage adsorption to the compn. of the mixt.) and the mol. polarization curve. In general, there are two types of behavior. Adsorption curves are linear when both components of the solvent mixt. are non polar ($C_6H_6$—$CCl_4$) or when one component is polar but when its sp. polarization is not altered appreciably by the presence of the non polar solvent (mixts. of $C_6H_6$ with PhMe, $CHCl_3$ or PhCl). Complicated curves showing one or more minima are obtained when the sp. polarization of the polar component is altered by admixt. with the non polar component ($C_6H_6$ with $PhNO_2$ or alc., $CCl_4$ with alc. or $Me_2CO$), or when both components are polar. In such

cases the max. polarization corresponds with the min. of adsorption. Adsorption in solvent mixts is further discussed in relation to vapor pressure and soly. B. C. A.

Oxide hydrates. XXXV. The crystallized oxides and oxide hydrates of aluminum as adsorbents for organic dyestuffs. Gustav F Hüttig and Alfred Peter. *Kolloid-Z* 54, 140–7(1931), cf *C A* 24, 2075, 5654.—The adsorption of methyl violet, methyl blue, Congo red, eosin and Bordeaux red *R* by artificial hydrargillite, boehmite, γ-$Al_2O_3$ (Willstätter), corundum and natural hydrargillite, bauxite and diaspore was detd In neutral solns. the adsorption follows Freundlich's isotherm. With the natural ores the accessory minerals play an important part in the adsorption. The oxides in order of decreasing adsorption are boehmite, γ-$Al_2O_3$, diaspore, artificial hydrargillite, corundum. Selective adsorption is greatest for corundum, while boehmite shows hardly any selective effect. Arthur Fleischer

Direct measurement of the adsorption of soluble substances by the bubble method. David M Gans and Wm D Harkins. *J. Phys Chem* 35, 722–39(1931).—The adsorption of *p*-toluidine and isoamyl alc. in the air soln. interface was measured by the bubble method. The adsorption exceeds that deduced from the equation, $u = (1/RT)(\delta\gamma/\delta \ln a)$, in agreement with measurements of McBain and Davies (cf *C. A.* 21, 3510) although the adsorption is, in general, smaller. As the adsorbing bubbles grow smaller adsorption appears to decrease, approaching the value for the solute obtained from the adsorption equation S Lenher

Separation and size distribution of microscopic particles. An air analysis for fine powders. Paul S Roller Bur Mines, *Tech Paper* 490, 46 pp (1931), cf *C A* 25, 364.—The various methods for the particle-size analysis of a microscopic powder are described. The principle, construction and operation of an improved air separator are described Results for the sepn of portland cement and chrome-yellow pigment in steps of 0–5, 5–10, 10–20, 20–40, 40–60 and 60–100μ are given in detail A closer sepn beginning with 0–3μ was made for gypsum and anhydrite For soft powders only, in the 0–5μ range, there is an attrition of the grains Quant. methods for correction are described A size distribution analysis of the particles of each of the fractions made under the microscope showed that Stokes' law is closely obeyed. In each fraction there is a small overlap of a few μ due to irregularities in the shape and surface of the grains, inhomogeneity of the density of the grains, and incompleteness of fractionation. The most important particle-size properties of a powder are those that relate to the surface per unit wt. The mean diam. is defined therefore in relation to the sp surface. The surface mean diams. for the cement powder and chrome-yellow pigment are 9 6 and 6 1μ, resp. The dispersion is a measure of the extent of the distribution of the particle diams. about the mean diam. of the microscopic powder. The surface dispersion, related to the surface diam., is calcd. as 13 3 and 6 1 for the cement and pigment, resp The latter is therefore twice as homogeneous as the cement. General graphic methods are described with reference to a frequency distribution of the particle diams The method in which the area under the curve between 2 diams. gives the surface area of the particles per g of powder between these diams is described in detail Alden H Emery

Triangular diagrams for the graphic representation of colloidal systems. A Dumanskii. *Kolloidchem Beihefte* 31, 418–33(1930).—By the use of triangular diagrams the effect of such peptizing agents as polyhydroxy alcs., sugars and hydroxy acids upon the reaction between $FeCl_3$ and NaOH or $NH_4OH$ is shown clearly. By this means it is possible to show the range of stability of the pos sol, the stability of the neg sol and the concns. at which pptn. takes place Peptization conditions for the pptd $Fe(OH)_3$ by peptizing agents are shown well by this means Sensitized and stabilized regions of such hydrated sols as gelatin due to the addn. of org substances like EtOH are also represented by these diagrams. The coagulation of hydrophilic and hydrophobic colloids under changing concns. of solvents having 3 components, *i. e.*, water, alc. and ether are shown by the same method. The diagrams also find useful application in representing emulsification and foam formation in the realm of colloids. L. H. R.

A note on the complexity of the magnetic properties of elements in the colloidal state. S S Bhatnagar. *J. Indian Chem Soc.* 7, 957–8(1930).—Both powd and colloidal Bi contain oxide. BiO is weakly diamagnetic or even paramagnetic. A strip of Bi tarnished by dipping in $HNO_3$ is less diamagnetic than the original That colloidal metals such as Bi are less diamagnetic than crystals of the metal (see Vaidyanathan, *C. A.* 24, 3149) is at least partly due to the presence of oxides. O. T. Q.

Observations on the dielectric behavior of dispersed systems. R. Fricke and L. Havestadt. *Z. anorg. allgem Chem.* 196, 120–8(1931); cf. *C. A.* 24, 3183.—Changes of dielec. const were measured for suspensions of $ThO_2$ hydrate, $Al(OH)_3$ hydrate and

stannic acid, on adding small quantities of NaOH and HCl. The dielec. const was decreased in each case. This decrease can be correlated with changes in the characteristics of the suspensions. The relationship is not as clear as F. and H. previously thought. The time change of the dielec. const. was measured for a gelatin soln.; the results apparently disagree with the data for stannic acid. Colloidal Au suspensions show practically the same dielec. const as pure water. The theory of Szegvari and Wigner (*C. A.* 18, 492) is criticized. E. J. ROSENBAUM

**Preparation of an electrolyte-free sol of manganese dioxide.** SHRIDHAR S. JOSHI AND T. SURYA NARAYAN. *J. Indian Chem. Soc.* 7, 883–5(1930).—$MnO_2$ sol was prepd. by adding concd. $NH_4OH$ drop by drop to boiling $KMnO_4$ soln. Although the sol coagulated slowly when in contact with unglazed porcelain, animal charcoal, celluloid, glass wool, filter and parchment papers, it could be successfully purified by dialysis with a parchment membrane by either of two methods. Application of a sufficiently high neg. potential to the membrane prevented coagulation until the sol became practically electrolyte free. In one expt. a pos. potential of 200 volts caused coagulation in 10 min.; zero potential allowed coagulation in 30 min., a neg. potential of 200 v. prevented coagulation for over 13 hrs. Sols purified by dialysis at high neg. potentials were very sensitive to added electrolytes. The impure sol could also be purified by hot dialysis. If coagulation were caused by chem. reaction with the membrane substance, hot dialysis would have been impossible because of the temp. coeff. of reaction rate. The increased stability in hot dialysis is ascribed to diminution of the adsorption of colloid by the parchment. OSCAR T. QUIMBY

**Colloidchemical studies of dye sols. II. The solution of Congo acid sols by neutral salts.** R. TANAKA. *Kolloid Z.* 54, 156–64(1931), cf. *C. A.* 25, 631.—The color of the soln. and the ppt. was noted on adding varying amts. of KI, KCl, $Ca(NO_3)_2$ and $CaCl_2$ soln. to Congo red sol. A change of color to red appears at the soln. max., a point independent of the $p_H$ of the soln. $CaCl_2$ showed the greatest effect. A. P.

**Dispersoidal investigations on selenium. I.** KIYOSHI JUNA. *Bull. Chem. Soc. Japan* 6, 23–4(1931).—Se sols are formed when Se solns. in hydrazine hydrate are poured into $H_2O$, $C_2H_5OH$, or glycerol in the presence of air, $O_2$, or $CO_2$ but not in a $N_2$ atm. ARTHUR FLEISCHER

**The effect of stirring on the rate of coagulation of gold sol.** EMLYN JONES. *Trans. Faraday Soc.* 27, 51–8(1931).—The effect of stirring was detd. by calcg. $\beta$ in the von Smoluchowski formula from coagulation expts. with $BaCl_2$ on a Au sol made by acetone reduction. For fast coagulation, $\beta$ increases with increasing rate of stirring, for slow coagulation, $\beta$ decreases with increasing rate of stirring. ARTHUR FLEISCHER

**Coagulation.** G. WIEGNER. *J. Soc. Chem. Ind.* 50, 55–62T(1931), cf. *C. A.* 22, 4311, 4312, 23, 750, 1552.—The work at Zurich on rapid and slow perikinetic coagulation of monodisperse systems, rapid perikinetic coagulation of polydisperse systems, rapid and slow orthokinetic coagulation, rapid and slow perikinetic coagulation of needle-shaped particles and the coagulation of oppositely charged colloids is reviewed. ARTHUR FLEISCHER

**The measurement of permeability of porous alundum disks for water and oils.** HOLBROOK G. BOTSET. *Rev. Sci. Instruments* 2, 84–95(1931).—Lab. expts. were conducted to gain a more accurate knowledge of the flow of liquids in underground reservoirs. The app. consisted of a vertical brass tube in which a porous disk was placed. The flow through the disk was collected and measured in a graduate. The first expts. with water indicated that the decrease of the rate of flow with time was due to hydrolysis of the glass reservoir by the water in which $H_2SiO_3$ was formed. With kerosene the decrease in the rate depends on the presence of unsatd. hydrocarbons. This is also true for a light lubricating oil. Expts. with a crude oil showed that dissolved $O_2$ decreases the rate of flow. It is concluded that when both $O_2$ and unsatd. hydrocarbons are present the rate of flow of an oil through a porous disk decreases, but the removal of either one permits a const. rate, because clogging of the disk is caused by the oxidation products of the unsatd. hydrocarbons. Permeability measurements applied to field conditions are questionable unless it is known that the oils tested contain no unsatd. hydrocarbons or are tested in the absence of air. ALLEN S. SMITH

**Membrane and osmosis. I.** F. A. H. SCHREINEMAKERS. *Rec. trav. chim.* 50, 221–9(1931), cf. *C. A.* 24, 4686.—Theoretical. When a membrane, permeable only to $H_2O$, separates two liquids that differ in *O. W. A.* (osmotic water action), the direction of osmosis depends upon the W-amt. given to the membrane by the liquid. If the pressure is the same on both sides of the membrane, $H_2O$ diffuses toward the liquid giving the membrane the smaller W-amt. If the membrane is homogeneous, water diffuses

toward the boundary plane with the smaller H' amt Through a heterogeneous membrane, however, diffusion in the opposite direction is possible P. J. Browne

**Disturbance of neutrality of solution in electrodialysis, the facts and the explanation.** Shumpei Oka *J. Soc. Chem. Ind. Japan* 34, Suppl binding 4 B(1931) — A soln tends to lose neutrality during electrodialysis unless special precautions are taken. The prevailing theory is that the electrokinetic potential of the diaphragm membrane, the ζ potential alters the mobility of the ions while passing through the capillary pores of the membrane Parchment paper and collodion membranes decrease the transport no. of anions and increase that of cations With a pair of such membrane diaphragms in a compartment cell cations are removed more rapidly than anions, and the soln becomes acid Solns of 0.005 *N* KCl were electrodialyzed in a glass container having 3 chambers sepd by 2 similar diaphragms The $H_2O$ in the electrode chambers was not renewed during an expt The diaphragms were parchment or filter paper impregnated with collodion or with chromatrol gelatin The ζ potential of the diaphragms against 0.005 *N* KOH, KCl and HCl were detd With a const applied voltage the current at first increased, reached a max., then decreased The $p_H$ of the soln decreased promptly, reached a low and nearly const value, then increased gradually The current time and current $p_H$ curves for parchment and for collodion, with 50 V., nearly coincide, although the ζ potential of collodion was 10 times that of parchment When the $p_H$ of the soln is plotted against total watts consumed for expts at different const voltages with a given membrane the curves coincide, showing that change in $p_H$ with a given membrane depends solely upon the amt of current passed Current is carried by $K^+$ ions from the central to the anode chamber, by $H^+$ ions from the central to the anode chamber, and by $OH^-$ ions from the cathode to the central chamber The acidity or basicity of the soln is detd by the relative amt of $H^+$ ions coming from the anode, and of $OH^-$ from the cathode The prevailing theory is modified by attributing the change in $p_H$ to two variables instead of to one only, (1) the ζ potential of the diaphragm, and (2) the concn of ions in the diaphragm I. M. Summers

**Physicochemical properties of clays. I. Base exchange or ionic exchange.** O. Wiegner, *J. Soc. Chem. Ind.* 50, 43–7 T(1931) — Permutites and clays with exchange properties are micelles consisting of an ultramicron, an inner layer of anions, and an outer swarm of cations The displacement of ions by exchange depends on the attractive forces between the inner and outer layer as well as upon the hydration of the ions The ionic exchange determines the electr. potential of the micelles and also their behavior on coagulation The water content and viscosity as well as the plasticity and cohesion of clay are in accord with the hydrations of the ions in the outer swarm I. G. Browne

**The optimum conditions for the formation of silica gel from alkali silicate solutions. II.** R. C. Ray and P. B. Ganguly, *J. Phys. Chem.* 35, 3001–9(1931); cf. C., 1, 24, 2158 — The optimum conditions for formation of $SiO_2$ gel by the action of HCl on $Na_2SiO_3$ of 1:3.3 and 1:4 ratios were studied. The limiting $p_H$ ranges in which gel formation takes place were detd The large amt of $SiO_2$ in the higher ratio does not affect the conditions of gel formation The amts of heat evolved when 1 mol of HCl reacts with $Na_2SiO_3$ solns of different ratios were also detd, the heat of reaction decreases with increase in the ratio of $SiO_2/Na_2O$ from 1:2 to 3:4. The reaction between HCl and $Na_2SiO_3$ solns. results mainly in the formation of ferric silicates H. W. Irwin

**Molecularly dispersed, dissolved silicic acid and titanic acid. II.** Ehrenfeuchter and W. Ehrenfeuchter, *Z. anorg. allgem. Chem.* 196, 41–9(1931); cf. C., 1, 24, 11. Tetraethyl orthosilicate was sapond. by 0.005 *N* HCl In 24 hrs. of the dialyzed soln of portions of the resulting soln that had stood for different lengths of time made it possible (1) to det whether one or several species of mol of silicic acid were present after a given time, (2) to det the mol wt when a single species was present and (3) to follow the condensation of the silicic acid from the rapidly diffusing disilicic acid, through the more slowly diffusion molecularly dispersed forms, to the colloidal ones, which no longer pass through cellophane membrane The soln of the freshly sapond ester contained disilicic acid, $2SiO_2.2H_2O$, mol wt, 184 After standing 1 day this had condensed to $4SiO_2.3H_2O$, mol wt 390 After 1 more day the silicic acid was present as $8SiO_2.4H_2O$, mol wt 840 After 4 days the mol wt was 840 For many subsequent days the soln seemed to contain a mixt of differently aggregated acids In the 45 day old soln a silicic acid of mol wt 8,500 seemed to be stable, but interpretation of the results for solns of such high mol wt is uncertain 0.001 *N* HCl sapond the ester more slowly than did 0.005 *N* HCl, so that drops of unsapond ester persisted for a considerable time Local action at the surfaces of the drops tended to produce nonuniformity of the species of silicic acid mol present in the soln However, the 0.001 *N* HCl seemed to stabilize

the molecularly dispersed silicic acid less readily than did the 0.002 *N*, because the change in state of mol. aggregation was more rapid. Even so, the presence of silicic acids of mol. wt. 8260 and 32,870 were noted. Orthotitanic acid tetraethyl ester, dissolved in MeOH, was saponified in $H_2O$ and in 0.001 *N*, 0.01 *N* and 0.1 *N* HCl. The dialysis coeff. indicated that titanic acid is capable of forming molecularly dispersed acids, but that they are only slightly stable and alter rapidly to colloidally dispersed $TiO_2$ hydrate. The soln. of sapond. titanic acid ester stiffens to a jelly after 6 to 22 hrs. Gelatinous silicic acid is formed as the result of the sapon. of Et orthosilicate in a mixt. of $H_2O$ + EtOH (10:1) after several weeks, providing opportunity is afforded for the alc. to evap. Cf. *C. A.* 24, 1812, 3191. R. H. Lombard

Changes in the viscosity of gelatin sols in the process of gelation. S. N. Banerji and S. Ghosh. *J. Indian Chem. Soc.* 7, 923-31(1930).—Gelatin sols of various concns. (2-10%) were prepd. and divided into 2 parts. Part I was kept at 50° and part II was allowed to gel and then kept at 25°. Parts I and II were then brought to an intermediate temp. at which viscosity measurements were made with an Ostwald viscometer. The viscosity of I increased and that of II decreased with time. Such effects are greatest near the gelation temp. Inoculation of gelatin sols near the gelation point with gel of the same concn. causes an abrupt increase in viscosity which is greater the nearer the temp. is to the gelation point. Oscar T. Quimby

Simultaneous action of electrolytes and alcohol on gelatin below the isoelectric point of Michaelis. St. Prevelecki. *Compt. rend. soc. biol.* 106, 134-6(1931); cf. *Compt. rend. soc. biol.* 104, 1079(1930).—In a study of the action of salts and acids on gelatin solns. to which alc. had been added the following results were obtained. (*1*) Action of acids. HCl impedes the coagulation up to a certain limit. The action of $H_2SO_4$ is much less marked. HCl added to the sulfate of the gelatin diminishes the $H_2SO_4$ coagulation. (*2*) (*a*) Action of salts on the chloride of gelatin. NaCl, $MgCl_2$, $CaCl_2$, $AlCl_3$ or $FeCl_3$ added in varying amt. to a soln. of 10 cc. of gelatin contg. 5 millimol. of HCl ($p_H$ 1.8) causes no opalescence. $MgSO_4$, $Na_2SO_4$ or $Fe_2(SO_4)_3$ causes a strong coagulation in solns. varying from 0.5 to 6 millimol. The addn. of HCl to this gelatin does not affect the coagulation phenomena. If $Na_2SO_4$ is replaced by $H_2SO_4$ merely a simple opalescence is observed. The differences between the action of $Na_2SO_4$ and $H_2SO_4$ do not depend on the differences of $p_H$ but on the differences of the influence of the particles of gelatin on the potential. The $SO_4$ ion perhaps causes this potential to fall below the minimum necessary to stabilizing the sol so that salts with multivalent cations protect the sol against the coagulation provoked by $Na_2SO_4$. (*2*) (*b*) Action of salts on the sulfate of gelatin. The coagulating action produced by large doses of $H_2SO_4$ is diminished by HCl, $MgCl_2$ or $AlCl_3$ (a peptizing action depending on the valence of the cation). Albert L. Rawlins

Thermal disaggregation of gelatin. (Röntgenographic study of its degradation.) O. Gerngross, O. Triangi and P. Koeppe. *Ber.* 63B, 1603-14(1930).—Electroosmotically purified gelatin contg. 0.13% of ash is heated in Jena glass vessels in 25% soln. of exactly isoelec. reaction for 24, 72, 75 and 336 hrs. at 100° and 48 hrs. at 121°. Possible peptide degradation is examd. by measurement of increase of the free amino groups according to Van Slyke (*C. A.* 23, 5207) by alkalimetric detn. of free carboxyl groups according to Willstätter and Waldschmidt Leitz (*C. A.* 16, 944), and by the $CH_2O$ no. Phys. changes are followed by measurements of the viscosity of the solns. and observations on mutarotation and the gelatinizing power of the heated sols. Even after 75 hrs. at 100° there is no sign of a chem. valency degradation by rupture of peptide linkings, whereas the gelatinizing power is completely destroyed, the viscosity reduced to 18.8%, and the mutarotation to 28.4% of the initial value of the intact gelatin. Protracted heating at 121° or exposure for 336 hrs. at 100° causes distinct, true hydrolysis. In slightly acid soln. ($p_H$ 1.8) much more pronounced peptide degradation is observed after 8 hrs. at 100°. On the basis of detns. of mol. wt. and x ray diagrams, the following picture of the structure and thermolysis of gelatin is drawn. Intact gelatin gels consist of extended structures that arise from extra mol. union of the gelatin particles. In aq. soln. of concn. lower than 0.5% at 20° these individual particles, according to the previous history of the prepns., have a mean mol. wt. of 50,000-90,000 if the reaction is isoelec. The particles undergo an almost completely reversible distribution into mols. of mean mol. wt. of a few thousands when the solns. are heated for a short period at 100°, but, even under these conditions, an irreversible change that reduces the mol. wt. of the intact material is also obvious. Protracted ebullition causes the formation of individual mols. (mean wt. 4500), which do not recombine to aggregates when cooled; the power of forming gels or viscous, adhesive solns. is lost. It is assumed that the mols. of the intact gelatin are not united to the structures of mol. wt. 90,000 by main

valency forces, but this is not established with certainty. Reaggregation of the thermolyzed particles is observed to a certain degree if the solns are evapd to dryness and the residue is dissolved in water B. C. A.

Swelling of cellulose in perchloric acid. K. Andress and L. Reinhardt. *Z physik Chem.*, Abt. A, 151, 425–32(1930), cf. *C. A.* 22, 4795.—Adsorption of $HClO_4$ by cellulose from aq. soln. at 0° indicates that above the limiting concn., 9.3 *M*, an addn. product is formed, $2C_6H_{10}O_5 \cdot HClO_4$, which shows a characteristic Röntgen diagram, the elementary unit having the dimensions $a = 16.5$, $b = 10.3$, $c = 10.7$ A. U., $\beta = 93°$. Below this concn. the product after being washed with water gave diagrams characteristic of the native fiber. At higher concns. esterification begins, and above 10.6 *M* the fiber is destroyed. W. L. Hill

Structure of the crystal lattice of cellulose. W. T. Astbury and Thora C. Marwick. *Nature* 127, 12–3(1931).—It is reasoned from crystallographic data for native and hydrated cellulose and sugars, that the six-atom sugar ring in the cryst. state possesses certain approx. const. linear dimensions, and that at least one of these dimensions usually corresponds to one of the axial lengths of the unit cell. The structures of native and hydrated or mercerized cellulose may differ in that the plane of the hexagonal glucose residues in native cellulose lies parallel to the *a* axis, while in hydrated cellulose the plane of the rings lies more nearly parallel to the *c* axis. C. J. Humphreys

Cellobiosan and cellulose. K. Hess and E. Garthe. *Naturwissenschaften* 19, 180–1(1931).—Freudenberg (*C. A.* 24, 1213) claimed that the f. p. depressions of AcOH solns. of cryst. biosan acetate (Hess and Friese, *C. A.* 23, 1118), which is identical with acetylcellulose II (by x-ray), are caused by heat losses due to retarded crystn. of the solns. Recent expts. on the velocities of crystn. indicate that Freudenberg's retardations depend on the choice of exptl. conditions (11° to 15° bath, 0.08° to 0.15° undercooling) which favor heat losses. If sufficiently great undercooling and a bath temp. equal to the "convergence" temp. are used (Raoult, Nernst, Abegg conditions) these abnormal delays do not occur. This reëstablishes the validity of the depressions previously measured. B. J. C. van der Hoeven

The change in x-ray spectrum of insulin on swelling in water. J. R. Katz and J. C. Derksen. *Rec. trav. chim* 50, 248–51(1931).—Inulin contg. amts. of water varying from the equil. moisture content in satd. air down to equil. over $P_2O_5$ at 100° was examd. with $K_\alpha$ rays from Cu. A distinct crystal pattern, made up of concentric rings, was obtained. The spectra for inulin satd. with water and air-dry inulin (15% water) are identical. As the moisture content is reduced below about 8%, however, the spectrum changes, both with respect to diam. of rings and their relative intensity. The change in spectrum is therefore connected with the first portions of water taken up by dry inulin, that is, with the first bend in the S-shaped hygroscopicity curve (*C. A.* 11, 3141). Over much the greater portion of the hygroscopicity curve the spectrum remains unaltered. Conclusion, the swelling of inulin involves not only formation of shells of water around the micelles, but also an absorption of water within the crystal lattice. F. L. Browne

Preliminary study of the sol and the coagulum of ichthyocoll. H. G. Bungenberg de Jong and N. F. de Vries. *Rec. trav. chim* 50, 238–47(1931).—The ichthyocolla (I) was obtained as a white, amorphous product by extg. the drug ichthyocoll with hot water, centrifuging, filtering, adding enough NaOH to reduce the "alc. no." to a min., pptg., washing with alc. and drying in air. Warm water dissolves I completely. The 0.73% soln. at 37° obeys Poiseuille's law. The curve of $p_H$ vs. viscosity is similar to that for gelation within the range $p_H$ 1–4 but differs markedly above $p_H$ 4. Between $p_H$ 5 and 10 the curve for I is very flat, with a min. at $p_H$ 8–9. Sols in the range $p_H$ 6.7–9.3 become turbid on cooling, with a max. turbidity near $p_H$ 9. The isoelec. point also lies between $p_H$ 8 and 9. Above $p_H$ 9 the viscosity increases to a relatively low max. at $p_H$ 12. The viscosity of pos. sols at $p_H$ 4.70, 3.16 and 1.51 is strongly affected by anions of electrolytes according to their valence, but is not affected materially by cations. At $p_H$ 3.16 coagulation is brought about by 10 milli-equivs. of $K_4Fe(CN)_6$. Simple coagula of I can be prepd. with alc., resorcinol, $MgSO_4$, etc. Complex coagula with I as pos. component can be made with gum arabic, yeast nucleate, egg lecithin and soy bean lecithin. Coagula with I as neg. component can be made with clupein. However, complex coagulation of I with gelatin does not result in aq. medium in the $p_H$ range 5–9, where it was expected. The failure to coagulate is attributed to the flat course of the $p_H$-viscosity curve. The drawing together of the 2 sorts of particles under the influence of elec. forces is perhaps too weak to overcome their powerful solvation. F. L. B.

Actual prevision of the solubility of substances. Freitas Machado. *Rev. brasil. chim* 1, 151–69(1929).—In studying the possibilities of prevision, consideration is

Electrolyte–water systems. Distribution of the ions of two salts after diffusion through a membrane. H BRINTZINGER AND W BRINTZINGER *Z. anorg allgem. Chem* 196, 61–4(1931), cf. preceding abstracts —In a soln of a binary salt the dialytic coeffs. of the anion and cation are necessarily equal (if the concn is expressed in mols). However, if the soln contains 2 salts, the faster anion and faster cation tend to pass through the membrane together and, in general, each ion will have a different dialytic coeff Thus, with tenth-normal solns and a cellophane membrane, the following coeffs were obtained for LiCl and $K_2SO_4$ in solns contg a single salt, 0 739 and 0 574, resp , for Li, K Cl and $SO_4$ ions in a soln contg all 4 ions, 0 409, 0 728, 0 882 and 0.361, resp With 0 1 *N* solns and a parchment membrane, the following coeffs were obtained for LiCl and KI in solns contg a single salt, 0 165 and 0 274, resp , for Li, K, Cl and I ions in a soln contg all four ions, 0 142, 0 301, 0 205 and 0 219, resp O T Q.

Experiment to show the removal of ions in double decomposition. FRANK D MCCLELLAND *J Chem Education* 7, 1579(1930) —The reactions are carried out in an ordinary cond cell in which the decompn of the electrolyte is indicated by the glowing of an elec lamp ANN NICHOLSON HIRD

Conductivity data of aqueous mixtures of hydrogen peroxide and organic acids. W H HATCHER AND M G STURROCK. *Can J Research* 4, 35–8(1931) —Cond. changes on adding $H_2O_2$ to aq solns of formic, acetic, propionic and glycolic acids were observed Propionic acid gave a sudden increase in cond. on adding $H_2O_2$, which became const. within 3 hrs The other 3 acids gave a sudden sharp decrease followed by a gradual increase to a const. value within 4 or 5 hrs The const values attained indicated the presence of peracids whose cond is of the same order as that of the complexes supposed to be formed during the oxidation J W. SHIPLEY

The conductivity of electrolytes in nitromethane. C P WRIGHT, D M MURRAY-RUST AND HAROLD HARTLEY *J Chem Soc* 1931, 199–214 —The elec conductivities of LiCNS, NaCNS, KCNS, $NH_4CNS$, $LiClO_4$, $NH_4ClO_4$, $TlClO_4$, $AgClO_4$, $HClO_4$, LiI, KI and $Et_4N$ nitrate, iodide, thiocyanate and picrate were measured at 25° in 0 0001 0 002 *N* nitromethane (I) soln , by Frazer and Hartley's method (*C A* 20, 136) Of these electrolytes, only the $Et_4N$ salts show a linear relation between $\Lambda_0$ and $\sqrt{c}$, the other solutes give curves represented by the empirical equation $\Lambda_e = \Lambda_0 - xc^{3/4}$ Extrapolating these curves, the following $\Lambda_0$ values are obtained

| Salt | $\Lambda_0$ | Salt | $\Lambda_0$ | Salt | $\Lambda_0$ |
|---|---|---|---|---|---|
| KI | 122 | $AgClO_4$ | 116 5 | $N(C_2H_5)_4CNS$ | 119.7 |
| LiI | 117 5 | $TlClO_4$ | 124 5 | $N(C_2H_5)_4ClO_4$ | 113.4 |
| KCNS | 130 | $NH_4ClO_4$ | 128 5 | $N(C_2H_5)_4NO_3$ | 114.3 |
| $NaClO_4$ | 122 5 | | | $N(C_2H_5)_4I$ | 111.2 |
| | | $(HClO_4)$ | 127 | $N(C_2H_5)_4Pic$ | 93.5 |

The observed and calcd (from the Debye-Hückel Onsager equation) results for the $Et_4N$ salts agree closely, showing little tendency to ionic assocn in soln Those salts that deviate greatly from the ideal are probably highly assocd This ionic assocn is not entirely controlled by the elec. forces between the ions $HClO_4$ is a strong electrolyte in I, while $H_2SO_4$, HCl, $HNO_3$ etc., are very weak electrolytes therein On the addn of $H_2O$ to I the elec. cond of electrolytes that deviate widely from the ideal is increased greatly. At 25°, the soly of $H_2O$ in I is 2%, while the soly of I in $H_2O$ is 10%. The d and viscosity of I at 25° are 1 1312 and 0 00627, resp J BALOZIAN

The conductivity of electrolytes in nitrobenzene. D M MURRAY-RUST, H J HADOW AND HAROLD HARTLEY *J Chem Soc* 1931, 215–19, cf preceding abstr — The elec conductivities of 0 0001–0 002 *N* nitrobenzene (II) solns of $Et_4N$ picrate and perchlorate, $AgClO_4$ and $HClO_4$ were measured at 25°. As an ionizing agent II behaves similarly to $CH_3NO_2$, but very differently from hydroxylic solvents The deviation of each of the electrolytes from the ideal is somewhat greater in II than in $CH_3NO_2$, indicating that in the former the tendency for ionic assocn is greater. $Et_4N$ picrate and perchlorate are strong electrolytes, and give $\Lambda_0$ values that closely approx. the ideal These 2 salts give results that agree with those calcd from the Debye-Hückel-Onsager equation, while those for $AgClO_4$ do not agree $HClO_4$ is an electrolyte intermediate in strength between the $Et_4N$ and the Ag salts, being appreciably assocd in II solns It is a much stronger electrolyte than any other acid, approx cond. measurements for HCl, $C_6H_5SO_3H$ and trinitrobenzoic acid showing that these are only very slightly dissocd. Extrapolation to infinite dln of the graph of $\Lambda_0$ against $\sqrt{c}$ give the following values for $\Lambda_0$; $Et_4N$ picrate = 32 7; $Et_4N$ perchlorate = 37 6; $AgClO_4$ = 38 4; $HClO_4$ = 43. J BALOZIAN

Influence of the strength of aromatic amines on their reactions. EDUARD HERTEL AND KURT SCHNEIDER *Z. physik Chem.*, Abt. A, 151, 413–9(1930).—Cond. curves were obtained for aniline HCl (I), α (II) and β naphthylamine (III), 4 bromo(or chloro)-1 naphthylamine (IV) and 1-bromo(or chloro) 2 naphthylamine (V) in acetone water soln., and for the same compds. with the addn. of free amine until further addns. were without effect. Accordingly, if the capacity of the amine to bind H ions be taken as a measure of its strength, II and III are strong, IV is medium strong and V is weak. The addn. reaction between amines and phenol derivatives in pure acetone as measured by a similar cond. method in conjunction with mol. wt. detns. indicate the same order of reactivity. In the addn. of phenol derivs. to amino groups in the crystal lattice the bond, —O—N—, is favored, while the weak ones favor the bond, —N—C—. Medium strong amines with medium strong phenol derivs. yield *complex isomers* (*C. A.* 21, 1802). The reactivity of amines with ethers (*C. A.* 25, 855) is parallel with their capacity to add H ions. W. L. HILL

The relative strengths of bases in non-aqueous solutions. III. ERIC I. JOHNSON AND JAMES R. PARTINGTON *J. Chem. Soc.* 1931, 86–92.—The influence of dimethyl-, diphenyl-, phenylmethyl- and γ pyrone on the rate of esterification of $PhCH_2CO_2H$ in alc. HCl soln. is studied by calcg. the ratios of the equil. consts. for the formation of complex ions between the H ion and by each pyrone and by $H_2O$, resp., applying Lapworth's theory (*C. A.* 3, 738). The reaction is retarded in the order given by the following compds., $H_2O$, γ pyrone, diphenyl-, phenylmethyl- and dimethyl pyrone, the last named having the greatest effect. Alc. free from aldehyde, ketone and $NH_3$ is prepd. by refluxing 96% spirit for 6 hrs. with half its vol. of well burnt lime and 2 sticks of NaOH per l., distg. into a flask contg. a lime and soda mixt., refluxing again, distg. into a dry flask the exit of which is guarded with a $CaCl_2$ tube, dropping clean, fresh Ca turnings into it, letting stand for a day, refluxing for 6 hrs., distg. off through a 12 bulb fractionating column and collecting the middle fraction. The esterification is slightly accelerated by small amts. of benzil and furan, and not affected by small amts. of dipropyl and diisopropyl ethers and glycerol. J. BALOZIAN

The dissociation of strong electrolytes in nonaqueous solution. RUDOLF SCHNO-NITZ *Z. Elektrochem.* 36, 861–74(1930).—The data on nonaq. solns. are reviewed. The Nernst Thompson rule is valid for all solvents investigated. A more quant. relation for solvents whose dielec. const. is above 6.7 is given by the equation $1 - \alpha = 65.7/(D A_\infty \eta_\infty \sqrt{v})$. The behavior of the cond. found by Martin (cf. *C. A.* 23, 1802), which leads to the assumption of incomplete dissocn., appears to be generally true for other solvents. This action is shown by the fact that the curves for $\sqrt{c}$ are higher than would be expected from the assumption of complete dissocn. On the other hand, the influence of dielec. const. and of ionic charge follow closely the Debye Hückel theory. Likewise the values of the coeffs. are proportional to the square root of the concn. JOHN R. HILL

The problem of electrolytic dissociation. KARL FREDENHAGEN *Z. physik. Chem.*, Abt. A, 152, 321–79(1931).—The true state of affairs does not agree with the assumptions that (*a*) the dissocg. compds. are composed of charged particles held together by *Coulomb forces*, (*b*) the solvents exert a dielec. action on the solutes, according to their dielec. const., (*c*) ions in soln. are solvated gaseous ions. Dissocn. and soly. do not run parallel to the dielec. const. of the solvent. The electrostatic theory of *electrolytic dissocn.* is untenable. A new theory is proposed. Electrolytic dissocn. is caused by the selective chem. affinity of the solvent's secondary valence forces for the polar components of the solute. A thermodynamic relation between dissocn. in the gaseous and liquid phases is given, by means of which liquid dissocn. may be calcd. from the dissocn. in the gas phase and the distribution no. The new theory reconciles the contrast between strong and weak electrolytes, explains the *dissocn. of pure solvents and molten salts*, focuses attention on *soly. forces* and the *mechanism of electrolytic conductance*. FRANK URBAN

Simple deposition of reactive metals on noble metals. A. S. RUSSELL. *Nature* 127, 273–4(1931).—U, Ti, W and Mo are deposited on a Hg surface, as expected according to the Nernst theory of electrode potential, when acidified solns. of their salts are shaken with Hg amalgam. The presence of the very slight concn. of metal is detected by their catalytic effect on the evolution of $H_2$ from $H_2SO_4$ solns. by pure Zn. The deposited metals are quite insol. in Hg. ARTHUR FLEISCHER

Contact potentials. I. Measurement of the contact potential between metals and insulators. FREDRICH POLEDNIK. *Z. Physik* 66, 619–31(1930).—The potentials between certain metals and glass and quartz were detd. by an electrometer method

A filament of glass or quartz in a clip of the metal being investigated, was held between charged plates and the deflection measured From standardizations with known charges contact potentials were calcd for Pt, Fe, Cu, Au, Ag, Al, Mg, Zn, Pb and Sn against quartz as +2 22, 1 99, 1 60, 1 60, 1 42, 0 93, 0 93, 0.45 0 16 and —0 30, against glass +1 15, 1 15, 0 58, 0 58, 0 58, 0 14, 0 14, —0.29, —0 60 and —1.14 v. These potentials were a function of the m p of the metals. II. The potential difference between salts and their saturated solutions. MARIANNE LEDERER *Ibid* 632–45 —An electrometer, in which quadrants cut from salts moved over satd solns permitted measurement of the charge of the double layer for pairs of salts The contact potential for solid salt against satd soln was —0 18 ± 0 08 v for NaCl-KCl —0 04 ± 0 07 v for NaCl-$NaNO_3$ and —0.21 ± 0 06 v for $NaNO_3$-$Ba(NO_3)_2$ L. P. HALL

The theory of Nernst. OSCAR DE SOUZA VIEIRA *Rev brasil chim.* 1, 193–200 (1929).—Nernst's theory is outlined with particular attention to the difference of potential created between the electrode and the saline soln In the case of $ZnSO_4$ with a Zn electrode the osmotic tension of the ions emitted by the electrode is added to the tension of the preëxisting ions, in order to equalize the tension of the soln of the metal The effect of high concn. and successively decreasing concn. in a series of solns. is also discussed The results conform to the Nernst formula for calcg the p d J M L.

The propagation of flame in electric fields. I. Distortion of the flame surface. ERNEST M GUÉNAULT AND RICHARD V WHEELER *J Chem Soc* 1931, 195–9 — The effect of an elec. field on the shape and speed of the flame-surface during its propagation is studied. The gaseous mixts (CO and air or $O_2$ dried over $CaCl_2$ and $H_2SO_4$), contained in a spherical explosion vessel of glass, were ignited electrically, and a photographic study (by the "snapshot" method of Ellis and Robinson, *C A* 19, 2747) made of the flame spread, with and without an elec. field (3000 and 5000 v /cm.) The field was produced between two parallel plates of a condenser, placed at the center of the vessel. Photographs show that the normal symmetry of the flame spread is destroyed by an elec field *As soon as the flame touches the condenser plates the system tends to discharge itself, the elec. field being almost entirely destroyed and consequently the flame-surface suffering distortion* The photographs indicate that the movement of the flame-surface may be due to the movement of the heavy pos ions dragging the flame-surface with them. Transverse to the field there is no change in the rate of growth of the flame, while longitudinally to it the speed of the flame is apparently increased toward the neg plate of the condenser by the elec field J. BALOZIAN

Periodic process in a chemical reaction. W T. GIBSON *Nature* 127, 13(1931).— The peculiar manner of slow oxidation of the K layer in a photoelec. cell that had developed a leak in the glass bulb contg the material is described. Instead of oxidizing uniformly, sharply marked rings were attacked first. The rings were roughly circular with centers at the crack. These rings remained visible throughout the entire oxidation process C. J. HUMPHREYS

Chemical reaction between metallic magnesium and salt solutions. (Quantitative Part, II.) ICHIRO IITAKA *Tetsu-to-Hagané (J Iron and Steel Inst Japan)* 16, 1056–63 (1930).—Metals of the alkali and alk. earth groups undergo hydrolysis in acids of concn. *less than $10^{-3}$ N, instead of forming salts of the acid The present paper deals with Mg* in dil. HCl, the $Cl^-$ concn. of which is kept at $10^{-3}$ *N*. The concn. of $H^+$ was varied from 0 to $10^{-11}$. Conclusions The reaction velocity diminishes with diminution of $H^+$, but does not vanish when $H^+$ becomes 0. The velocity remains const. between $H^+ = 10^{-4}$ and $10^{-11}$, being independent of $H^+$. Therefore, hydrolysis must take place here, too, though some replacement of $H^+$ by metallic Mg occurs, especially when the soln. is stirred. The stirring effect is explained by auto-catalytic action, forming an unknown compd. between Mg, $H_2O$ and $Cl^-$. Cf. *C. A.* 25, 863. M KURODA

The study of chemical reactions from potential-energy diagrams. AXEL R OLSON. *Trans Faraday Soc.* 27, 69–76(1931) —Potential-energy diagrams for *cis trans* isomers are used to predict the effect of temp , pressure, solvents and light frequency on the stability. ARTHUR FLEISCHER

The decomposition tension of anhydrous uranyl nitrate and of anhydrous thorium nitrate. P. MISCIATELLI *Gazz chim ital* 60, 882–5(1930) —Anhyd $UO_2(NO_3)_2$ was prepd , not by the method of Markétos (*Bull. soc. chim* 11, 244(1912); *C. A.* 6, 3376) or of de Forcrand (*C. A.* 9, 1882) but by treating $UO_2(NO_3)_2$ $6H_2O$ with liquid $N_2O_5$ by the procedure used by Guntz and Martin with $Mn(NO_3)_2$ and $Cu(NO_3)_2$ (cf. *C. A.* 4, 427). The *app* is described and illustrated According to the literature pure anhyd. $Th(NO_3)_4$ has not been prepd heretofore except in an expt. by Kolb, which could not be repeated (cf. *C. A* 8, 306). In the present work, a product contg only 0 6% excess $N_2O_5$ and no $H_2O$ was obtained The tensions corresponding to the equil.:

$Th(NO_3)_4 \rightleftharpoons ThO_2 + 4NO_2 + O_2$ and $2UO_2(NO_3)_2 \rightleftharpoons 2UO_3 + 4NO_2$ were measured by the dynamic compensation method of Centnerszwer and Krustinson (*C. A* 21, 689, Krustinson *Acta Univ Latviensis* 17, 665(1928)) Following are the temps. and the pressures (mm of Hg), resp $UO_2(NO_3)_2$, 87°, 95, 131°, 157; 141°, 119, 150°, 340, 160 540 $Th(NO_3)_4$ 121°, 82, 134°, 119, 145°, 119, 161°, 359 The same results were obtained with partially decompd nitrates and with those contg only 4% $N_2O_5$ Therefore in this thermal decompn, basic salts are not formed and 2 phases are present in the systems at equil riz, anhyd nitrate and oxide From the decompn tensions the heats of decompn can be calcd by the approx formula of Nernst. For $UO_2(NO_3)_2$, $Q$ has a mean value of 39,442 and for $Th(NO_3)_4$ a mean value of 81,823. C C. Davis

Reduction of nitric acid by nitric oxide. I. Equilibrium. Hans Bodr. *Z. anorg allgem Chem* 195, 195–200(1931) —The equil const. for the reaction $H^+ + NO_3^- + 2NO + H_2O \rightleftharpoons 3HNO_2$ was detd by measuring the pressure of NO above the system Activities of the $HNO_2$ are considered At results· $K_{18°}$, 29 4, $K_{25°}$, 50 8, $K_{35°}$, 80 1 II Electrochemical potential. *Ibid* 201–6 —Measurements of the e m f of the equil system, $HNO_3$–$HNO_2$–NO gives as the normal potential for the reaction $NO + NO_3^- \rightleftharpoons 2NO_3^- + \oplus$, 0 517 ± 0 003 v and for the reaction $NO + 2H_2O \rightleftharpoons NO_3^- + 4H^+ + 3\oplus$, 0 960 v William E Vaughan

What are chain reactions? R. H Crist *J Chem Education* 8, 504–9(1931) — Consecutive reactions that repeat their cycle many times after being initiated are called chain reactions Several examples are given, such as the reactions between $H_2$ and $O_2$, the formation of HCl from $H_2$ and $Cl_2$ and the thermal and photochem formation of HBr These require an initial process yielding an "active" substance that proceeds through a set of individually known or assumed consecutive reactions to the regeneration of the active product, which repeats the process The termination of a chain occurs when one of the components of the set is removed permanently or suffers an energy loss sufficient to prevent its continued reaction In case the number of chains initiated per unit time is greater than the no of those terminated the reaction may increase to explosive proportions Chains may be initiated by a variety of methods, photochem, particle and electron collisions, and chem. The photochem equivalence law affords a means of estg the number of chains started R. H. Carter

A pressure stabilization process for crystalline hydrates. Maurice Aumeras. *Compt rend* 192, 229–31(1931) —The equil conditions under which $Na_2SO_4.10H_2O$ can be kept in hydrated state for an indefinite period of time were investigated This hydrate can be maintained in a desiccator contg $H_2SO_4$, provided the concn of the $H_2SO_4$ is such that its vapor pressure is between that of a satd soln of $Na_2SO_4$ and the dissocn pressure of the hydrate $Na_2SO_4.10H_2O$ Below 30° variations in temp. do not affect the hydrated state of the Na salt. 24 26% $H_2SO_4$ is the optimum concn M McMahon

The dissociation of mercuric halides. H Braune and S. Knoke *Z. physik Chem* 152, 409–31(1931) —The dissocn of $HgI_2$, $HgBr_2$ and $HgCl_2$ was measured over a wide temp range Heats of formation from the equil measurements were compared with the calorimeter detns and were found to agree well By comparing the measurements with theoretical calcns of the equil, the moment of inertia of the halides was detd On the basis of fixed assumptions as to sp heat values were obtained which for $HgI_2$, $HgBr_2$ and $HgCl_2$ are in the proportion 1 0 48 0.22, which is in close agreement with data estd from gas kinetic data The app used is similar to that used with $NH_4Cl$ (*C A* 22, 3570) M McMahon

Statistical treatment of reaction-velocity data. I. Critical review of current methods of computation. Lowell J Reed and Emery J Theriault. *J. Phys Chem* 35, 673–89(1931) —The usual methods of computing rate consts is reviewed Unimolecularity of rate cannot be tested by the consistency of a series of $K$ values The least squares procedures described in chem literature are not applicable to unimolecular data Systems of weighting unimolecular const. are inapplicable in presence of const errors S Lenher

The solution velocity of oxygen in water IV. Susumu Miyamoto and Akira Nakata *Bull Chem Soc Japan* 6, 9–22(1931), cf *C A* 25, 635 —$O_2$ gas was passed into a stirred vessel contg $Na_2SO_3$ soln. The rate of oxidation of the $Na_2SO_3$ was independent of the concn of the $Na_2SO_3$ and dependent only on the surface area exposed and the temp (The rate of stirring was const and only pure $O_2$ was used) The theory is proposed that only those mols of $O_2$ dissolve whose component of velocity normal to the surface is greater than a threshold value about 3 4 times the root mean square velocity T. H Chilton

Kinetics of heterogeneous formate formation Gustaw Birstein and Nikolaus

spectra superposed The powder method did not allow a decision as to the similarity of structure of $Bi_2Se_3$ and BiSe C. C. DAVIS

The two-component system: iron-vanadium. FRANZ WEVER AND WERNER JELLINGHAUS *Mitt. Kaiser Wilhelm Inst. Eisenforsch. Düsseldorf* 12, 317-22(1930) — The liquidus solidus curves correspond to those of other investigators, showing a min. at 1405° with 31% V. The α mixed crystals from 0° to 100% V are cubic centered with lattice parameters that increase from $2.86 \times 10^{-8}$ cm. for 0 atom % V to $2.89 \times 10^{-8}$ for 50 atom % and $3.04 \times 10^{-8}$ for 100 atm. %, thus departing from Vegard's law. The γ + e field is bounded by a closed curve beginning at 1400° extending to 1.15% V and 1150° and then back to 900°. The α mixed crystals are transformed at 1234° to a homogeneous friable crystal mass that corresponds to FeV. This combination dissolves both Fe and V. The crystals are non magnetic at room temp. V at first increases the magnetic transformation temp. and then decreases it after passing a max. with 17% V., and approaches room temp. with 58% V. H. C. DUUS

Making a three-component liquid-vapor chart. JOHN HAPPEL AND JOHN GRISWOLD *Chem. Met. Eng.* 38, 92-3(1931) — An alignment chart is described from which the vapor liquid equil. relation may be detd. for a 3-component system. A chart for benzene, toluene, and xylene at one atm. is given. L. W. T. CUMMINGS

The system water-potassium nitrate-calcium nitrate. MOHAMMED ABDUL HAMID AND RAM DAS. *J. Indian Chem. Soc.* 7, 881-2(1930) — The isotherm was detd. at 25°. The soly. of $KNO_3$ is 27.30 and that of $Ca(NO_3)_2$ 57.98 g. per 100 g. soln. O. T. Q.

The acid-basic-catalysis according to J. N. Brønsted. I. M. KOLTHOFF *Chem. Weekblad* 28, 110-21(1930); cf. *C. A.* 24, 3097. — A review. E. SCHOTTE

Thermal dissociation. J. KRESTINSONS. *Acta Univ. Latviensis Rem. Fakultat. Serija* 1, Fasc. 1, Burtnieca, (in German, 63), (in Lettish 29-62)(1929). — Dissocn. phenomena of $Tl_2CO_3$, $LiNO_3$, $NaNO_3$, $KNO_3$, $RbNO_3$ and $CsNO_3$ are discussed. The isochores of liquid compds. between 200 and 900 mm. approach a straight line. Single compds. with a common ion dissolved in $Tl_2CO_3$ show a mol. raising of the dissocn. temp. Nitrates dissolved in the corresponding nitrite show a strong initial rise. Binary mixts. of unlimited soly. show a min. dissocn. temp. dependent upon the mol. compn. ANN NICHOLSON HIRD

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Refrigerants show similarities (STARR) 13. Obtaining anhydrous $AlCl_3$ from natural Al-containing raw materials (SPITZYN, GVOSDEVA) 6.

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## 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Recent advances in science: physics. L. F. BATES. *Science Progress* 25, 383–9 (1931).—A review is given of recent work on $\alpha$ particles, ionic mobilities and related subjects. JOSEPH S. HEPBURN

Analytic atomic wave functions. C. ZENER. *Phys. Rev.* 36, 51–6(1930).—Math. BERNARD LEWIS

The specific charge of the electron according to wave mechanics. FRITZ SAUTER. *Naturwissenschaften* 19, 165–6(1931).—The suggestion of Page (*C. A.* 24, 5602, *Phys. Rev.* 36, 1418(1930)) explaining on the basis of wave mechanics the difference between spectroscopic and magnetic values of $e/m$ is erroneous (cf. also Eckart *Phys. Rev.* 36, 1014, 1514(1930), Uhlenbeck and Young, *Phys. Rev.* 36, 1721(1930)). B. J. C. VAN DER HOEVEN

Interaction between excited and unexcited hydrogen atoms at large distances. E. C. KEMBLE AND F. F. RIEKE. *Phys. Rev.* 36, 153–4(1930).—Quantum mech. calcns. on the energy of different quantum states are given. The exact first-order computations of Kemble and Zener (*C. A.* 23, 4878) are extended to internuclear distances $R$ = 5, 6, 7, 10. BERNARD LEWIS

Calculation of energy values. C. ECKART. *Phys. Rev.* 36, 149–50(1930).—Calcd. by a modification of the Ritz method for characteristic nos. in quantum dynamical problems, the results are given for the $2P$ and $3D$ states. BERNARD LEWIS

Physical and chemical principles that underlie the interpretation of novae. A. C. GIFFORD. *Scientia* 49, 169–82(1931).—A crit. review of existing theories of the formation of novae. G. finds the only satisfactory explanation to be that they arise from the grazing collision of 2 stars. J. B. AUSTIN

Stellar structure. F. A. LINDEMANN. *Nature* 127, 269(1931).—The assumption of a temp. of $mc^2/k$ in the inside of a star is not necessary to explain the generation of energy by the annihilation of matter. In stars the important factor is the rate at which protons and electrons disappear as radiation. If an equil. state is attained matter can be annihilated in stars with interiors at temps. of $1.1 \times 10^{11}$°. A. F.

A new measurement of the temperature in the arc. ALFRED V. ENGEL AND MAX STEENBECK. *Naturwissenschaften* 19, 212–3(1931).—By detn. of the weakening of an x-ray passing through hot arc gases the d. of the gas and hence its temp. for known pressure is calcd. The x ray intensity decreases for density $\delta$ by $I/I_0 = e^{-\alpha l \delta}$ for $\alpha$ the (known) absorption coeff. and $l$ the electrode distance. For air at atm. pressure the measurements were made with 1600 to 3300 v., 1 ma., Cu anode, x-radiation filtered through 7$\mu$ Al and passed through a 1.5-mm. hole in the water-cooled Cu electrode of the arc. Through an aperture in the other arc electrode the x ray reaches a Geiger point counter ($p$ = 100 mm. Hg). The d. c. arc with stabilization was rectilinear inside a 5-cm. glass tube. The gas d. was found by measuring the no. of counter impulses on evacuating the cold arc tube and recording the d. at which the no. of impulses equaled that from the hot arc. With proper corrections for edge effects, etc., was found from 45 000 counted impulses a gas temp. of the 2-amp. air arc of 5250° abs. (±300°). A measurement by the carbon pencil method in the middle of the arc gave 3100° abs. The former figure is considered to be better. B. J. C. v. D. H.

A charge exchange effect during the passage of protons through helium. R. DÖPEL. *Naturwissenschaften* 19, 179–80(1931).—A study of the passage of H canal rays through He revealed a charge exchange effect. The canal ray is deviated by passing through condensers $K_1$ and $K_2$ and subsequently its energy is measured. For a no. of protons $n_1$ at $K_1$, $n_2$ at $K_2$ will hold $n_2 = n_1 e^{-\alpha a}$ with $\alpha$ a measure for the active radius for charge exchange, $a$ the condenser distance. It is assumed that the He pressure is low enough to prevent repeated charge exchanges of the neutral atoms between $K_1$ and $K_2$. The active radius $\alpha$ has been detd. as a function of the proton

velocity $v$ $a$ increases with decreasing $v$ and decreases again after reaching a max at about $10^4$ cm. per sec. (analogous to the Ramsauer effect) B. J. C. v. d. H.

Mobility of sodium ions in hydrogen. L. B. Loeb *Phys. Rev.* 36, 152–3(1930).—The mobilities of $Na^+$ ions were measured in purified $H_2$. It is found that within $2 \times 10^{-4}$ sec. after their liberation the ions have more than twice the mobility of the normal ions. Bernard Lewis

Electron diffraction. F. Kirchner *Physik. Z.* 31, 1025–8(1930); cf. *C. A.* 24, 3002.—Electron diffraction patterns are sharper than x ray patterns, because the nucleus governs the scattering of electrons, and the electrons affect the scattering of x rays. In electron diffraction patterns the 2nd-order spectra due to the (111) planes of NaF are not entirely extinguished, since the nuclear charges of $Na^+$ and $F^-$ are unequal. Debye-Scherrer diagrams due to electrons diffracted by comparatively large crystals sometimes show interference points at the ends of a diam. of one or more of the rings. These can be ascribed to a mosaic like structure of the crystal. Sublimation under vacuum of $HgCl_2$ from a heated Pt strip to a celluloid surface gives a cubic instead of a rhombic crystal. Diffraction by gaseous N, O or $CO_2$ gave patterns in accord with Debye x ray patterns. A. L. Hennie

Electron diffraction and molecular structure. R. Wierl. *Physik. Z.* 31, 1028 (1930).—This is a detn. of the distance between at. nuclei in a mol. as measured by electron diffraction. In $CS_2$, the distance S-S is 3.20 A. U.; in $CO_2$, O-O is 2.26 A. U.; in $N_2O$, N-N is 2.38 A. U., in $SO_2$, the distance S-O is doubtful, on account of the triangular shape of the mol.; the value 1.37 A. U. is proposed. A. L. Hennie

Emission of electrons caused by an electric field when the surface of a metal is exposed to the light. L. Rozenkevich. *J. Russ. Phys.-Chem. Soc.*, Phys. Pt., 62, 229–30(1930).—It is pointed out that a study of the emission of electrons caused by an elec. field when a metal is exposed to the light may lead to a new conception of electronic energy. V. Vesselovsky

The photoelectric effect from sodium chloride in various gases. N. Gedris and L. Kulikova. *J. Russ. Phys.-Chem. Soc.*, Phys. Pt., 62, 247–50(1930).—The photoelec. effect from dielectrics is highly stimulated by the presence of the vapors with high dielec. consts. in the vicinity of the surface investigated. It seems that the mols. of such gases having a high dipolar moment may disengage ions from the surface of the crystal. When the vapors dissolve the crystal (water vapor) this can also take place inside the lattice, which would also increase the intensity of the photoelec. current. In the other gases the photoelec. effect is similar to that in air. V. Vesselovsky

Photoelectric effect and electron reflection at hydrogenated potassium surfaces. W. Kluge and E. Rupp. *Physik. Z.* 32, 163–72(1931).—An app. is described which permits photoelec. and electron reflection measurements to be made on the same K surface. The surfaces studied were: pure K, K in $H_2$ atm. (I), K subjected to weak glow discharge in $H_2$ (II), and K subjected to strong glow discharge in $H_2$ (III). The colors of these layers were: K, metallic; I, metallic; II, reddish violet; and III, greenish. With the pure K surface, the voltages causing max. electron reflection corresponded to planes in the K lattice only. With I only electron reflection max. for KH were observed. With II and III max. for both K and KH were observed, those for KH predominating in the case of II. In all cases the photoelec. effect showed a pronounced max. in the region 4000–4500 A. U. This "selective" effect increased in the order K, I, III, II. The electron reflection max. led to a value 7.3 v. for the inner potential of K and 5.4 A. U. for the lattice const. of KH (assumed cubic). O. T. Q.

A thermal theory of cathodic disintegration. H. P. Waran. *Phil. Mag.* [7], 11, 237–404(1931); cf. *C. A.* 16, 1043, 17, 3643.—The sputtering of cathodes is due to the evapn. of small masses of metal under localized intense heat due to proton bombardment. The observed relative sputtering of various metals agrees qualitatively with those expected from the thermal conductivities of the metal and gas surrounding the cathode, the sp. heat of the metal and the gas, the gas pressure, metal d., b. p. and latent heat of the metal. Arthur Fleischer

Measurement of capacity for reflection of glowing tungsten in the ultra-violet part of the spectrum. E. Speller. *Z. Physik* 64, 39–42(1930).—The relative intensities of emission at different wave lengths from a lamp with a W filament heated to 2873° abs. were found, a special microphotometer being used. The emission departs from black-body radiation. The energy distribution was measured over a wave length range of 400–340 mμ. The values of the emission coeff. for wave lengths from 436 to 270 mμ for a filament at 2100° abs. are tabulated. B. C. A.

Photo-ionization of salt vapors. A. Terenin. *Phys. Rev.* 36, 147–8(1930).—The photo-ionization of the halides of Tl was investigated with wave lengths longer than

in the study of the relative reflecting power of the 2 crystals in a given spectral region R. H. LOMBARD

The construction of an experimental x-ray tube to furnish the homogeneous *K* radiations of uranium. WARNFORD MOPPETT *J. Cancer Research Comm Univ Sidney* 2, 147–52(1930).—Constructional details of the app are given and the method of operating it is described. G. SCHWOCH

Partial absorption of x-rays. B B RAY *Z Physik* 66, 261–8(1930).—The Compton effect is studied by means of $CuK_\alpha$, $NiK_\alpha$, $NiK_\beta$, $WK_\alpha$ and $FeK_\beta$ radiation sent through C, N and O. A possible mechanism for the Raman effect is worked out at some length GREGG M. EVANS

The paramagnetism of polychromates. FRANCIS W. GRAY AND JOHN DAKERS. *Phil Mag* [7], 11, 297–314(1931), cf *C A* 24, 5613.—The mol. susceptibilities were detd. in the app. of Gray and Dakers (cf *Phil Mag* [7], 9, 81). The values ($\times 10^6$) are $K_2CrO_4$ 0 0, $K_2Cr_2O_7$ + 54 0, $K_2Cr_3O_{10}$ + 95 0, $K_2Cr_4O_{13}$ + 193 0, $CrO_3$ + 41, $Na_2CrO_4$ + 19 4. The av. susceptibility of $CrO_3$ in solns. with 1 mol. $CrO_3$ to from 39.27 to 18.89 mols $H_2O$ was +0.39. A small paramagnetism due to the interchange of electrons and consequent fluctuation of angular momentum gave the best interpretation of the exptl. results ARTHUR FLEISCHER

A synchronous film drum for recording periodic spectra. DONALD C. STOCKBARGER AND CARL G. SELIG *Rev Sci Instruments* 2, 211–6(1931). E. H.

Studies in peculiar stellar spectra. I. The manganese lines in α Andromedae. W. W. MORGAN *Astrophys J* 73, 104–17(1931).—The spectrum of α Andromedae is of Class $A_2p$, the peculiarity being due to the presence of many lines of ionized Mn. An examn. at the Yerkes Observatory of spectrograms of stars belonging to Classes $B_8$ to $A_0$ has revealed the presence of enhanced Mn lines in 13 other stars. The lines probably belong to Mn III, indicating that the element is present in the 2nd stage of ionization. If the high abs. magnitudes of these stars are taken into consideration the presence of enhanced Mn lines seems to be a normal feature of their spectra, the lines reaching their max. in stars of Class $B_8$. C. C. KIESS

Influence of an inhomogeneous electrical field upon the fine structure of hydrogen-like atoms. SISIRENDU GUPTA *Z Physik* 66, 246–56(1930).—The frequencies and intensities of the lines for the inhomogeneous Stark effect are derived math. and the sepn. is found to be of the order of 0.001 A. U., even for a field gradient of $10^6$–$10^7$. This sepn. is so small as to be discernible only as a slight broadening of the lines. GREGG M. EVANS

The radiation emitted by compressed substances under high potentials. ISAY A. BALINKIN *Phil Mag* [7], 11, 315–22(1931), cf Reboul, *C A* 21, 20.—The expts. of Reboul were repeated for compressed potash alum, NaCl and other powders. The factors controlling the emission were the applied potential, relative humidity, size of cryst. grains and the pressure used in compressing the powders. The very absorbable radiation is due to the escape of air from the bottom of the cell and belongs to the same class as "Entladungsstrahlen." ARTHUR FLEISCHER

Experimental evidence for the existence of quadripole radiation. R. FRERICHS AND J. S. CAMPBELL. *Phys Rev* 36, 151–2(1930).—The green auroral line at 5577 A. U. was found to be resolved into 4 components by means of the Zeeman effect. This indicates that the line is quadripole radiation. BERNARD LEWIS

Regularities in the second spectrum of xenon. C. J. HUMPHREYS, T. L. DE BRUIN AND W. F. MEGGERS. *Bur Standards J Research* 6, 287–93(1931).—The ground doublet ($^2P^\circ 1^1/_2$, $^1/_2$) in the spectrum of ionized Xe (Xe II) has been identified, the levels are sepd. by 10,540 wave nos. This spectral term has been connected with others which combine so as to give most of the intense lines in the visible Xe II spectrum. The abs. values of the terms have been fixed by extrapolating series forming terms to their limits, and from these spectroscopic data the ionization potential of $Xe^+$ is found to be about 21.1 v. W. F. MEGGERS

A study of stellar hydrogen lines and their relation to the Stark effect. C. T. ELVEY AND O. STRUVE. *Astrophys J* 72, 277–300(1930), cf *C. A.* 24, 3950.—The contours of the H absorption lines in early type stars have been detd. from microphotometer measurements of stellar spectrograms. The lines exhibit extensive wings which are evidence for the existence of a Stark effect. The theoretical contour of a line subject to an elec. field in an atm. in which the pressure increases with depth is detd. and is found to be very similar to those actually observed. C. C. KIESS

Probabilities of recombination into the $1^2S$ state of cesium. C. BOECKNER. *Bur Standards J Research* 6, 277–85(1931).—Measurements are made of the intensity distribution in the continuous emission band, appearing at the $1^2S$ series limit of Cs, a

low-voltage thermionic discharge in the vapor is used as a source The wave-length range covered lies between the series limit 3184 A U. and about 2750 A. U. The methods of photographic densitometry are employed, a W-strip lamp in quartz being used as a comparison source From the variation of intensity with wave length and the velocity distribution of the discharge electrons are computed the relative probabilities of recombination of free electrons into the $1^1S$ state as a function of their initial velocities Previous work has shown that the probability of recombination into the $2^1P$ and $3^1D$ states of Cs varies approx inversely as the square of the velocity of the free electron, a relation which is also predicted by quantum mechanics for recombination into any level of a H atom The present measurements show that the probability of recombination into the $1^1S$ Cs level falls off much more rapidly with the velocity, for electron energies greater than 0 15 v , more nearly as the inverse 4th power W. F. M.

Structure of the iron spectrum. M A Catalán *Anales soc españ fis quím* 28, 1239–385(1930) —Previous data on the at structure of Fe are summarized and new advances given More than 2350 lines are classified in the spectrum of Fe I, in 304 levels The most intense lines originate by addn of a valence electron to the at residue in one or both spark configurations $3d^64s$ and $3d^7$ Lines produced by a double jump are frequently intense E. M. Symmes

The raies ultimes in the arc spectrum of rhenium Herbert Schober and Josef Birke *Naturwissenschaften* 19, 211–2(1931) —The raies ultimes of the Re arc spectrum as observed from varying concns of Re salt on C, s e , those lines that originally have the largest intensity, are at 3452 02, 3460 61 and 3464 87 A U Intensity and wave length are given for 23 other Re lines B J C van der Hoeven

Resonance radiation of manganese vapor. J Fridrichson *Z Physik* 64, 43–7 (1930) —The fluorescence in satd Mn vapor at 700–900° was examd , the light of the Mn spark being used for excitation The triplets $1S-2P$ and $1S-2P'$ of the Mn spectrum correspond with the resonance lines With rise of temp , and consequently less dense vapor, the triplet $1S-2P'$ becomes much more intense, whereas at a lower temp only the triplet $1S-2P$ is found The resonance lines found are in agreement with Catalan's analysis (*C A* 17, 1586, 22, 1901) of the Mn spectrum and indicate that $1S$ is the lowest state of the Mn atom B C. A.

Spectrum of the tungsten mercury arc. W E Forsythe and M A Easley *Phys Rev.* 36, 150–1(1930) —The pressure of Hg vapor in a Hg arc lamp is increased by external heating between W electrodes and the effect on the absorption bands in the region 2100–4000 A U. is described The absorption spectrum is compared with that of Hg in another quartz absorption cell Bernard Lewis

Note on the spark spectra of chlorine. Kiyoshi Murakawa. *Sci Papers Inst Phys. Chem. Research* (Tokyo) 15, 105–9(1931) —About 30 lines between 2469 A. U. and 4695 A U. are classified as members of the quartet system of Cl III. A few corrections and extensions of the analysis of Cl II, previously reported (*C. A.* 25, 1157), are noted. C. C. Kiess

Spectrum of doubly ionized iodine. J. B Seth *Nature* 127, 165(1931) —A short table is given of some new measurements on doubly ionized I in the visible and the ultra-violet regions Malcolm Dole

Temperature classification of the stronger lines of columbium, with preliminary notes on their hyperfine structure. Arthur S King *Astrophys J* 73, 13–25(1931) — The spectra of Cb, as excited in arcs and in spark discharges, and in the vacuum elec furnace at temps ranging from 2500° to 2900°, were examd in the region from 3094 A U. in the ultra violet to 6918 A U in the red Temp classifications have been detd. for 646 lines in this interval, of which approx 200 appear with furnace excitation. The others, consisting of lines of both the neutral and ionized atoms, require the higher excitation energy of the arc and spark for their appearance. About 40% of the lines examd. are complex, the hyperfine structure consisting of 2, 4, 6, and in some cases, more components C. C. Kiess

Calorimetric and electric measurements in the mercury arc. Józef Kawa *Sprawozdania z Prace Polskiego Towarzystwa Fiz* 4, 27–58; *Chem Zentr* 1929, II, 2979.— The Fe anode of a Hg-arc lamp of Pyrex glass was constructed in such a way as to serve as a calorimetric vessel, which was filled with $H_2O$ The Hg cathode and the glass wall of the lamp up to the anode were immersed in water in order to obtain const. temp and const. Hg-vapor tension during the arcing period The calorimetric measurements carried out with various c ds and arc lengths gave the following results with regard to the mechanism of the Hg arc Ionization occurs in the 1st part of the pos column on account of the greater field strength The pos and the neg. space charges are formed Between these originates a reverse elec. field which brakes the speed of

the electrons accelerated in the 1st part of the column Because of this also the heat formation at the anode is diminished Between the pos space charge at the front of the pos column and the neg space charge in the Faraday dark space an increased pos field strength is developed With further increase of the arc length, under suitable conditions there occurs a 2nd max These results are supported by spectroscopic investigations The arc was mixed with some He, whose lines appear only in places of higher field strength on account of the higher excitation potential G Schwoch

Different spark spectra of mercury R Ricard *Compt rend* 192, 618–20 (1931) —A no of new lines have been found in the spectrum of the electrodeless discharge in Hg These lines fall into the 3 spectra, Hg II, Hg III and Hg IV. A no of these lines in the Hg II spectrum can be interpreted by admitting the existence of doublets and quadruplets J R Adams

Influence of pressure and temperature of added neon on the absorption in excited mercury vapor Osami Masaki *Z Physik* 66, 229–40(1930) —Ne purified by passing over liquid air and through discharge tubes with Mg electrodes was circulated through an emission and an absorption tube contg Hg excited by 10 ma. at 8000 v The beam from the emission tube was split, one beam passed through the absorption tube reunited in a spectrophotometer, and the absorption measured The $2^1P_{2,1,0}$–$2^1S$ transitions were studied The absorption of lines 4047 and 5461 A. U diminishes slightly with increasing pressure 4358 shows a slight increase A satn is shown with increase in temp, 4358 and 4047 increasing toward about the same value, while 5461 decreases to reach a satn value slightly under that of the others. Gregg M. Evans

The crystal structure of parahydrogen at liquid-helium temperatures. W. H. Keesom, J de Smedt and H H Mooy *Nature* 126, 757(1930) —See *C. A.* 25, 873 A. L. Henne

Spectroscopic isotope determinations R Schmid *Magyar Chem Folyóirat* 36, 185–91(1930) —General description of present theory and methods S S de F.

The interpretation of molecular spectra. V. The excited electron terms of molecules with two equal nuclei (H, He, Li, N, O). F. Hund *Z Physik* 63, 719–51 (1930), cf *C A* 21, 3310 23, 564 W. F. Meggers

A new band system of hydrogen and the conditions for its production. Z. Bay, W Finkelnburg and W Steiner *Z physik Chem*, Abt B, 11, 351–62(1931) — A strong condensed discharge (1/2 mf capacity) produces a yellow band group of the many lined spectrum and a no of other strong lines, while the remaining many-lined spectrum vanishes From the variation of intensity with gas concn in the discharge tube it is concluded that the yellow group belongs to the $H_2$ mol The group was not completely analyzed, because the weak lines were missing, but it appears to be 2-band systems with a common initial or final term This term is not one of the known $H_2$ terms The electron jump has the values 2 1 and 2 6 v, which excludes a transition between the 2nd, 3rd and 4th levels J. B Austin

Some relationships between the continuous and the many-lined spectrum of hydrogen I. Yosisige Hukumoto *Science Repts Tôhoku Imp Univ* 19, 773–92 (1931) —The behavior of the $H_2$ spectrum under different conditions of pressure was observed and the relative intensities were estd Most of the lines which are enhanced at high pressure when the continuous spectrum is intense are classified as the transitions $3^1\Pi \longrightarrow 2^1\Sigma$, $4^1\Pi \longrightarrow 2^1\Sigma$, etc These exptl facts favor the theory that the continuous spectrum arises in the transition from any one of the excited triplet levels to the unquantized ground state $1^1\Sigma$ W. F Meggers

Nitric oxide $\delta$-bands. R. Schmid *Z Physik* 64, 279–85(1930) —In order to produce the $\delta$-bands of NO in sufficient intensity to be photographed special means of excitation must be used With a Tesla app and other devices for special excitation it was found possible to produce the bands in the afterglow in the production of active N mixed with air. The rotation analysis of the band $\delta(0.3)$ is given, and the rotation const of the $\delta$-bands for the $^2\Sigma$ initial level is calcd to be $B_v = 1.995$ cm.$^{-1}$ Also in *Matematik és Termeszettudományi Értesitö* 47, 534–42(1930) B. C A

Nitric oxide $\beta$- and $\gamma$-bands R Schmid, D Fareas and T. König *Z Physik* 64, 84–120(1930) —The NO lines previously measured were classified and ordered. In this way some 3000 $\gamma$- and 1000 $\beta$-lines were arranged. The rotation and vibration consts were in some cases calcd afresh The doublet splitting of the levels $^2\Pi_i$ was obtained as a function of rotational and vibrational states The potential-energy curve for NO was obtained, as well as Condon's parabola Also in *Matematik. és Természettudományi Értesitö* 47, 485–532(1930). B C A.

The structure of the spectra of sulfur. Contribution to the study of the relations between spectra of the same multiplicities M Gilles *Ann Phys* 15, 267–408

(1931).—Grating and prism spectrographs were employed to observe the spectra of singly and doubly ionized S from 2089 A. U. in the ultra-violet to 7654 A. U. in the red. The Zeeman effects of some of these lines have also been observed with fields of 31,700 gausses. These new observations together with other available wave-length data have permitted an analysis of S II into doublets and quartets, and of S III into triplets and quintets. For the most part the spectral structures which have been established in these spectra conform to the quantum-theoretical requirements. A few exceptions are noted. The terms of S III are compared with the corresponding terms of Si I and P II by means of the irregular-doublet law, similarly those of S II are compared with Cl III. Certain numerical relations between the sepns. of the terms of the isoelectronic systems N II and O III, and P II and S III are shown to correspond to the nuclear charges of the resp. ions. C. C. Kiess

High-frequency discharges in nitrogen in the presence of mercury. R. Zorkendorfer. *Compt. rend.* 192, 409–11(1931).—The spectra of N in the presence of Hg were obtained by excitation with high-frequency currents ranging in wave length from 10 m. to 570 m. The spectra were principally the bands of $N_2$, $N_2^+$ and CN, and numerous lines of at. Hg. The neg. bands of $N_2$ corresponding to low vibrational quantum nos., were very feeble for high-frequency currents but became very intense for currents of frequencies corresponding to wave length 570 m. The neg. bands of high quantum nos. were apparently unaffected by changes in the exciting currents. The pos. bands always appeared strongly. Likewise the Hg lines representing the P ⟶ S transitions were unaffected, whereas those representing P ⟶ D transitions were more intense for the higher frequency currents. C. C. Kiess

The band spectra of scandium, yttrium and lanthanum monoxides. Wm. F. Meggers and John A. Wheeler. *Bur. Standards J. Research* 6, 259–75(1931).—The ordinary arc spectra of Sc, Y and La show, in addn. to lines characteristic of neutral and ionized atoms, complex banded structures which are ascribed to a mol. compd. of the atoms with O. These bands have the same general appearance as those due to well known diatomic mols. and are, therefore, attributed to ScO, YO and LaO, rather than to the chemically stable oxides $Sc_2O_3$, $Y_2O_3$ and $La_2O_3$. The band spectra of these oxides are so complex that the fine structure of the individual bands has not been sufficiently well resolved to permit analysis of the rotational energies, consequently only a description of band heads and their classification in various systems resulting from transitions between a no. of vibration levels of initial and final electronic states can be given. The ScO spectrograms showed 129 band heads which have been divided into 5 systems, the 0, 0 transitions being represented by band heads at I, 4557.79 A. U., 4558.09 A. U.; II, 6017.07 A. U.; III, 6036.17 A. U.; IV, 6064.31 A. U.; V, 6079.20 A. U. The YO spectrum closely resembles that of ScO; 120 bands have been described for YO and divided into 5 systems with 0, 0 transitions at I, 4517.28 A. U., 4518.20 A. U.; II, 5909.08 A. U.; III, 5972.04 A. U.; IV 6096.78 A. U.; V, 6132.06 A. U. The spectrum emitted by the LaO mol. is exceedingly complex; more than 300 bands have been observed. The analysis of LaO bands agrees in the main with that given earlier by Jevons (*C. A.* 23, 5414). W. F. Meggers

Theoretical value of the fundamental vibration quantum for gaseous alkali iodides. H. J. van Leeuwen. *Z. Physik* 66, 241–5(1930).—A math. calcn. from the standpoint of wave mechanics, on the assumption that the cation is small with respect to the anion, and neglecting polarization effects. The fundamental frequency $\omega_0$, $10^{-13}$ in sec.$^{-1}$ is for LiI 9.59, NaI 4.99, KI 3.53 and RbI 2.57, which gives $\omega$ (2πc) as 509, 265, 187 and 136, resp. These agree with expt. only in the case of the first 2. G. M. E.

Rotation oscillation spectrum of acetylene. I. Band analysis. K. Herzfeld and R. Mecke. *Z. Physik* 64, 151–61(1930).—In order to study the configuration and form of oscillation of simple gaseous mols. the spectrum of $C_2H_2$ has been investigated. The spectrum was photographed in the range 9000–7000 A. U. with large dispersion (2.6 A. U./mm.). Three absorption bands were found at wave lengths 7857, 7556 and 8620 A. U., of which the 1st was by far the most intense. The absorption lines were measured to 0.01 A. U. The spectrum was analyzed. The *P* and *R* branches were very simple, no fine structure of the lines being visible within the above limit of error. There were marked intensity changes. The simple structure of the bands leads to the conclusion that the 4 atoms of the mol. are arranged in a straight line, so that the method of rotation of a diat. mol. has to be dealt with. The fact that only 1 line $|P(0)|$ is missing in the spectrum is in agreement with the usually accepted electronic structure of $C_2H_2$ and shows the analogy of the $C_2H_2$ mol. HC-CH to the $N_2$ mol. N:N. The moment of inertia of the mol. in the fundamental state is $23.509 \times 10^{-40}$. The nuclear distance for C—H is $1.08 \times 10^{-8}$ cm., in agreement with that arrived at for the $CH_4$

The Raman effect in certain substances with a new apparatus. B VENKATESACHAR AND L. SIBAIYA *Indian J Physics* 5, 747–54(1930) —A new app was designed to meet the following requirements (1) It must permit the use of solids; (2) it must use a strong ultra-violet line for excitation, (3) it must allow the use of elevated temps This was accomplished by enclosing the specimen in a capsule which is placed in a fused silica tube which in turn is fixed inside a larger Pyrex tube. The exciting arc is formed in the annular space between the tubes. The temp is changed by blowing heated air through the inner tube With increasing temp the lines become more diffuse and the intensity of the anti-Stokes lines is enhanced as is also that of the anti-Stokes side of the wings accompanying the unmodified lines. The spectra of calcite and aragonite are given Halite and fluorite gave neg results $C_2H_2$ gas gives lines corresponding to the infra red absorption bands at 2 45$\mu$ and 7 5$\mu$ The band at 13 7$\mu$ has no corresponding Raman line J. B. AUSTIN

The Raman spectrum of nitric oxide. F RASETTI *Z Physik* 66, 646–9(1930); cf *C A* 24, 5627 —NO appears to be the only chemically stable diat. mol with a $^2\Pi$ term as its ground state The Raman spectrum of NO was observed and shows a pair of lines sepd by the same $\Delta\nu$ as are the components $^2\Pi_{1/2}$ and $^2\Pi_{3/2}$, as detd by observations on the absorption spectrum of NO The Raman lines corresponding to the rotation spectrum of NO were also observed, and although only partially resolved, are in qual agreement with those required by theory C. C KIESS

Raman effect in solutions of sodium nitrate of varying concentrations. V STERLING AND E R LAIRD *Phys Rev* 36, 148–9(1930) —The Raman spectrum of 5, 10, 30% satd solns of $NaNO_3$ shows a line with a frequency difference of 1049 ± 6 cm.$^{-1}$ It is attributed to the $NO_3$ ion. BERNARD LEWIS

Studies in Raman effect. X. The Raman spectra of organic substances. A. DADIEU AND K. W F KOHLRAUSCH *Sitzb Akad Wiss Wien*, Abt. IIa, 139, 459–72(1930), *Monatsh* 57, 225–40(1931), cf *C. A* 25, 875 —Measurements of propyl-, diethyl, diphenyl-, trimethyl and triethylamines, aniline, formamide, dicyanodiamide, methylnitroamine, chloral, ethyl chloroformate, chloracetyl chloride, dimethyl and diphenyl ethers The spectra of 16 amines are compared L. ONSAGER

Raman effect in methyl halides. GAJENDRA NATH BALL *Z. Physik* 66, 257–60(1930) —The 2 bands at 16 8 and 19 6$\mu$ for $CH_3Br$ and $CH_3I$ which were beyond the range of Bennett and Meyer (cf *C A* 23, 2657) but which were predicted by them, have been found Complete measurements to 0 001 mm. have been made of Raman spectra for all of the methyl halides, and are compared tabularly with B. and M. and Kohlrausch GREGG M. EVANS

Raman effect in trimethylethylene. D FRANKLIN AND E R. LAIRD. *Phys Rev.* 36, 147(1930) —Raman lines in trimethylethylene were found which correspond to infra red lines at 3 44 ± 0 05$\mu$ and 8.4 ± 0.2$\mu$. An anti-Stokes line was found at 8.4$\mu$ BERNARD LEWIS

Raman spectra of organic sulfides. V N THATTE AND A. S GANESAN. *Nature* 127, 306(1931) —The Raman spectra detd are as follows, expressed in cm$^{-1}$: $Et_2S$ 652, 1061, 1282, 1439, 2923, allyl sulfide, 410, 588, 741, 917, 1011, 1101, 1210, 1291, 1312, 1420, 1534, 1636, 3007, 3088 The frequency 652 seems characteristic of satd. sulfides; the frequency 751 a characteristic of unsatd sulfides A. F.

Color and constitution from the standpoint of recent electronic theory. IV. Various types of anomalous nitration; chelation; complex salt formation; unusual stability of substituted aminophenols; direct diacetylation of amines; inhibited hydrolysis of sulfonic acids; reaction of caustic potash with benzaldehyde. H H HODGSON. *J Soc Dyers Colourists* 46, 183–8(1930), cf *C A* 24, 4223 —The reaction of $HNO_2$ with dimethyl *p*-toluidine to give monomethyl-*p*-toluidine-*N*-nitrosoamine and 3 nitrodimethyl-*p*-toluidine is described and explained. It was observed in a series of isomeric and homologous compds that the picrates in which the greatest salt formation occurred had the higher m. ps, while those where the union was of a more chelate type had lower m ps. The anomalous behavior of the picrate of dimethyl-*p*-toluidine is explained. The direction of nitration of anilides and phenols, *o* or *p*, is detd by the strength of the cation of the nitrating agent used. Strong cationoid reagents cause para nitration and weak ones ortho. The stability of the 3-halo-2(4, and 6)-aminophenols is considered to be due to the prevention of inner salt formation by the constraint imposed on the electrons of the N by the halogens. The fact that acetylation of 2,6-dichloro-4-nitroaniline produces always the di- instead of the mono-acetylated product is explained by assuming a mol rearrangement after the introduction of the first acetyl group which greatly facilitates further acetylation The effect of other ring substituents on the ease of hydrolysis of sulfonic acids is explained. The reaction of caustic potash with

BzH is explained by assuming the formation of an isomeride of benzoin which subsequently decomposes to form benzyl ale. and BzOH. T. C. HAWLEY

Chemical decomposition by radiation. G. HARKER. *J. Cancer Research Comm. Univ. Sidney* 2, 111–8, 160–81(1930).—A review with bibliography. Radiation as applied in therapeutics is also discussed. G. SCHWOCH

Mechanism of the chemical action of x-rays in aqueous solutions. O. RISSE. *Strahlentherap.* 34, 578–81(1929), cf. *C. A.* 24, 5602.—Ultra violet irradiation of water whether in presence or absence of O, did not lead to the formation of $H_2O_2$ unless Zn oxide was present. x or $\beta$ irradiation of pure water leads, however, to its formation. $H_2O_2$ is decomposed by all 3 radiations. The reaction depends on the dissolved O; hence the presence of dissolved O in irradiated solns. may cause changes dependent on the primary formation of $H_2O_2$. The conversion of ferrous into ferric salts is an example. The mechanism of the formation of $H_2O_2$ is discussed. B. C. A.

A new method of preparation of phosphorescent zinc sulfide. JOSEF EINIG. *Chem.-Ztg.* 55, 31(1931).—After illumination, ZnS becomes phosphorescent if it be otherwise as nearly pure as possible, but mixed with a small quantity of a heavy metal, particularly Cu, and heated to above 900° to convert the ZnS to cryst. form. Very nearly pure ZnS contg. less than 1/100 000 per 1000 parts of heavy metals does not phosphoresce. The amt. of Cu required to make ZnS phosphoresce is 0.00001–0.001 part, outside these limits there is no phosphorescence. The new process consists in purification of $ZnSO_4$ soln. by causing a slight pptn. by addn. of $H_2S$ or $Na_2S$, then heating to ppt. all metal sulfides less sol. than ZnS. Sulfides more sol. than ZnS remain in soln. and can only be removed later, since they form during the reaction. ZnS so formed does not phosphoresce, but can be made to do so by addn. of the required amt. of Cu. The product is superior in luminosity to the com. product. E. M. SYMMES

Extinction of fluorescence of solutions of dyes by electrolytes. A. V. BANOV. *Z. Physik* 64, 121–34(1930), cf. *C. A.* 24, 2052.—The application of the theory of Vavilov concerning collisions of the 2nd kind to the extinction of fluorescence in solns. of dyes by adding electrolytes does not agree fully with exptl. results. This leads to the search for some other cause of extinction which is to be found in the "salting-out" effect of the electrolyte on the dye. Exptl. work supports this view. Calcns. of the sum of the radii of the mol. of the dye and of the ion of the electrolyte give results in agreement with those arrived at by other methods. The extinction curves reveal a connection between the concn. of the electrolyte, $c$, and the intensity ratio after and before adding the electrolyte, which can be expressed in the form $L/L_0 = e^{-k\sqrt{c}}$. B. C. A.

Photoreaction of hydrogen and iodine monochloride. S. E. ASHLEY AND WILLIAM WEST. *Nature* 127, 308(1931).—Impurities reduce the rate to a small but measurable value, confirming Mellor and Iredale (cf. *C. A.* 25, 1736) but not agreeing with Rollefson and Lindquist (cf. *C. A.* 24, 4224; 25, 1736). The photoreaction between $CH_4$ and ICl is very rapid. ARTHUR FLEISCHER

Photochemical kinetics of chlorine detonating gas. Oxygen-free gases. MAX BODENSTEIN AND WALTER UNGER. *Z. physik. Chem.*, Abt. B, 11, 253–78(1930); cf. *C. A.* 8, 452, 20, 3646, 21, 3527.—H was prepd. O-free by passage over heated Pd asbestos and diffusion through Pd. Cl was liquefied and swept out with pure H. Fractionation under low pressure was also used. The reaction between H and Cl was followed by the methods of Dux and Thon in a quartz vessel, illuminated with light of 4360 A. U. Without O the reaction followed the mass law, $d[HCl]/dt = k[H_2][Cl_2]$ and considering the intensity, of the absorbed light $d[HCl]/dt = kI[H_2]$. The breaking of reaction chains by reactions on the vessel walls was found proportional to [Cl]. To account for this the hypothesis of diffusion of Cl atoms to the walls and recombination there appeared untenable. This effect was due to formation of a volatile compd. of Cl and Si from the container walls. The influence of temp. was studied from 30° to 167° by a streaming method. The effect of small amts. of O was further investigated. L. P. HALL

Cystine and its absorption spectra. D. BARNÉS. *Anales soc. espaü. fis. quím.* 28, 1386–1406(1930).—A spectrographic study of the absorption spectra of cystine and alanine in HCl soln. was made by a sector photometer with a small quartz spectrograph to analyze the light absorbed by the amino acid in a Baly tube. The light source was a discharge through pure $H_2$ at a pressure to give a continuous spectrum. The results are shown graphically by plotting the mol. absorption coeff. against wave length. They agree with Ward (*C. A.* 18, 1117) within exptl. error. Curves obtained with cystine and alanine are similar, and show no selective absorption. The alanine absorption begins further in the ultra violet, and the curve is incomplete because of limited instrument sensitivity. Intensity of absorption increases with short wave lengths.

From the detn of wave length at which absorption begins, energy of dissocn or $h\nu$ = 4 9 × $10^{-12}$ ergs per mol, and the heat of dissocn = 70,800 cal per g-mol, and for alanine $h\nu$ = 5 75 × $10^{-12}$ and $H$ = 83,000, resp The structure of cystine is aliphatic Cystine is more easily dissocd than alanine. E. M SYMMES

Absorption spectra of bibenzyl and its derivatives. MME RAMART-LUCAS AND J HOCH *Compt rend* 192, 53–5(1931)—Bibenzyl and its derivs, prepd. by the action of Mg or Na on BzCl or similar compds gave compds with 2 absorption bands, (*a*) between 3300 and 2700 A U and (*b*) between 2700 and 2300 A U Similar compds prepd by the action of $PhCH_2CH_2Br$ on benzene in the presence of $AlCl_3$ gave compds with a band at 2700–2300 A U only Further investigation showed band *a* to be due to stilbene WALLACE R. BRODE

The action of radiation on colloids. III. Action of ultra-violet light on emulsions. P C SINHA AND B G GANGULI *Kolloid-Z* 54, 147–50(1931) cf. *C A*. 24, 540, 3632—Emulsions of $C_6H_6$, benzine and $CS_2$ in water with Na oleate as the emulsifier sepd. into 2 layers on illumination The $p_H$ of the illuminated emulsion increased, indicating that the breaking is due to a partial destruction of the emulsifying agent. A. F.

Colloidal nature of the coloring substance in colored rock salt. M SAVOSTYANOVA. *Z Physik* 64, 262–78(1930)—Mie's theory was applied to the system Na–NaCl, and the absorption and diffusion spectra for different particle sizes were calcd and compared with the exptl curves obtained for colored rock salt The absorption spectra of the following kinds of colored salts were detd by the spectrophotometer method. (*a*) natural blue salt, (*b*) additive (in liquid Na) colored salt and (*c*) salt obtained from yellow salt by the action of heat and pressure under the influence of light The exptl data agree with the assumption that the colors are due to particles of colloidal Na. Besides the absorption maxima due to the presence of colloidal Na, a further max. was found for yellow salt in the infra red, the explanation of which is not clear B. C A.

The influence of light on the flocculation of colloidal solutions in fluorescent media. Role of antioxygens. AUGUSTIN BOUTARIC AND JEAN BOUCHARD *Compt rend* 192, 357–8(1931), cf *C A*. 1738—In continuation of the work previously described, the parallelism between the effect of some electrolytes in depressing the fluorescence of fluorescein solns and their effect on the flocculation of $As_2S_3$ sols by light in presence of fluorescein is studied The difference $\Delta t$ between the time required for flocculation in the dark and in daylight or ultra violet is approx proportional to the logarithm of the fluorescing power of the mixt of fluorescein and the electrolyte $H_2SO_4$ gives the greatest effect, LiCl none Tannin, hydroquinone, phenol and cresol in presence of LiCl also reduce both fluorescing power and $\Delta t$ Fluorescing power was detd. by the fluorometer of Perrin The possible biol significance is discussed K. V. T.

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Luminescence analysis (BEUTEL, KUTZELNIGG) 26. The molecular structure of triatomic gases (MAHANTI) 2. The propagation of flame in electric fields (GUÉNAULT, WHEELER) 2. Literature on the use of the x-ray (POLANSKY) 9. Separation of salts of Ra and Ba (Ger pat. 515,681) 18.

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Concentrating radioactive substances. KURT WEIL and KURT PETERS Ger. 518,205, Dec 21, 1929 The concn of active substance in radioactive carbonate mixts. is raised by fractional thermal decompn. followed by washing with water. Thus, a mixt of $RaCO_3$ and $BaCO_3$ may be heated to 400° *in vacuo*, cooled and washed with hot water, a residue richer in Ra than the initial mixt. being obtained.

Activating metals or alloys. OSKAR RIED. Austrian 121,243, Sept 15, 1930 Metals or alloys are subjected to radiations of suitable wave length, *e. g*., to ultra-violet radiations, whereby they are physically and biologically activated. Numerous applications of the invention are mentioned. Thus, the growth of yeast may be influenced by effecting the cultivation in irradiated metal vessels, or the stability of milk under trans-

port may be improved by using irradiated metal cans, or butter or cheese may be packed in irradiated metal foil

## 4—ELECTROCHEMISTRY

COLIN G FINK

The institute for technical electrochemistry in the Berlin technische Hochschule K ARNDT *Z Elektrochem* 37, 218–21(1931) G G

The present development of the electrochemical industry and electrometallurgy in Italy G MORSELLI AND G SCARPA *Trans 2nd World Power Conference* (Berlin) 1, 299–305(1930) E H

The application of electric heat in industry. H NATHUSIUS, *et al. Trans 2nd World Power Conference* (Berlin) 1 390–428(1930) E H

Theoretical consideration of the oxidation of pig iron during its transformation into steel MIKIO MUKOHYAMA *Tetsu to Hagané* (*J Iron and Steel Inst Japan*) 16, 1041–57(1930) —From the mass action law, M deduced the formula for the equil. const $K' = dx/dt(1/(a + M - x)(b - x))$, where $x$ is the density of C at time $t$, $a$ and $b$ are the initial contents of FeO and C, resp., and $M$ is the diffusivity of FeO when no reaction occurs To eliminate $M$, he obtained an approx value of $K' = 1/t \log_e b/(b-x)$ Expts were undertaken to obtain values for $b$ After heating the mixt of pig and hematite in a resistance furnace and an induction furnace, the products were examd by chem. analysis and microscopic observation. Results showed that $K' = 0.000$ at 1450° and 0.006 for 1500° in the induction furnace and 0.069 and 0.067, resp., for the resistance furnace M KURODA

High-frequency induction furnaces for making tool steel. J A STOCOP *Metal Progress* 18, No 6 40–4(1930) —A review W. A. MUDGE

A new cyanide furnace R. F JAMES AND GLENN COLEY. *J Franklin Inst* 211, 327–34(1931) —A new elec. resistance furnace has been constructed on the hypothesis that the maintenance of an oxidizing atm in the heating element chamber at all times is essential to the preservation of the elements A drawing is shown The test pot had an input of 43 kw After a service of 1800 work hrs., a check of the element showed a power input of 42.5 kw., which is a considerable improvement over the power-consumption curves from previous designs No scale was found on the heating elements, but the pot showed traces of leakage and a heavy deposit of what appeared to be cyanates on the floor of the element chamber. Elec. tests and phys examn showed no deterioration of the elements. This furnace consistently produced over 4 lb of work per kw. hr without any covering of the pot. A full charge of work was delivered in 18 to 20 min., which is well within the production speed desired. Appreciable quantities were lacking of the black sludge usually formed on the surface of molten NaCN. H. C. P.

Bright anneal in artificial atmospheres J C. WOODSON *Elec. J.* 28, 246–7 (1931) —Electrically heated furnaces are very successfully used for bright anneals. Partially cracked and purified coke-oven gas and treated blast furnace gas are not entirely satisfactory for the bright anneal of certain metals, H, dissocd. $NH_3$, natural or city gas (with or without water vapor), MeOH and butane are similarly used. Blast-furnace and coke-oven gas are used on low C, cold rolled steel, cracked butane is used on high C steel or roller bearing stock The artificial furnace atm will probably soon be adopted in fabricating and mfg processes W H BOYNTON

The electrolytic industry of Germany V. ENGELHARDT, *et al Trans 2nd World Power Conference* (Berlin) 1, 317–48(1930) E H

Operating data on electrolytic metal production and refining. C. L. MANTELL. *Eng Mining J* 131, 256–9(1931) —Operating data from the electrolytic plants of the U S and Canada show the compn of electrolytes, equipment, methods of applying the current and efficiency obtained from the power, raw materials used, and by products produced The tables cover the electrolytic refining of Cu, the electrolysis of Cu-bearing solns obtained by leaching processes, and the production of Zn, Cd, Pb, Ni, Sn, Ag and Au The high power cost of processes using insol anodes is indicated in the tables. The diaphragm used in Ni production causes an increase in cell voltage with attendant high power costs W. H BOYNTON

Factors affecting the smoothness and mechanical properties of electrodeposited copper A W HOTHERSALL. *J Electroplaters' and Depositors' Tech Soc* 6, 95–122, *Metal Ind* (London) 38, 343–6(1931) —Growth formation, unequal current distribution, maintenance of an adequate supply of Cu ions at the cathode, factors which tend to reduce the rate of Cu deposition in practice and the detn of the influence

of the more favorable depositing conditions on the mech properties of the deposits are discussed. From solns contg 200 g $CuSO_4 5H_2O$ and 50 g. $H_2SO_4$ per l. (Soln. *A*) (temp. = 26°), variations in c. d. from 15 to 200 amp /sq ft, with or without air agitation, caused little change in the Brinell hardness (from 42 to 52) of the deposited Cu. Increasing c. d. and increasing acid concn caused slightly harder deposits to be given. A hard deposit (Brinell no. 81) was obtained at 15 amp /sq ft. from a soln contg 200 g $CuSO_4 5H_2O$ and 20 g $(NH_4)_2SO_4$ per l and no free acid A very hard, smooth and exceedingly brittle deposit of polished appearance was obtained at 16° and 15 amp /sq ft. from a neutral soln. contg $CuSO_4$ and $NH_4NO_3$. The unequal current distribution (particularly marked in Cu deposition because of the steepness of the cathode potential-c. d curve), together with the formation of nodular growths, due to (*a*) irregular crystal growth of the deposit and (*b*) adherence of electrically conducting particles (formed in the soln) to the cathode surface, and the effect of agitation on the above factors, is discussed in detail Precautions (*e. g.*, warm solns, filtration, adjustment of agitation to c. d being used and correct pickling of cathode basis metal) which should be taken in solns contg no addn agents in order to secure smooth Cu deposits are reviewed The effects of various addn agents in Cu deposition, the control of such substances, the mechanism of their action and the mech properties of Cu deposited from solns contg addn agents are discussed Addns of $Al_2(SO_4)_3$ up to 32 g /l to Soln. *A* (above) had no effect on the mech properties of deposits obtained on a rotating cathode (peripheral speed 450 ft /min) at 50 amp /sq ft, nor on the cathode potential The ductility of the Cu deposited from Soln *A* upon the rotating cathode was considerably increased by the addn of 0.06 g /l Cl (as NaCl), the % elongation increasing from 33 to 48, and at the same time the tendency for finely divided Cu to form in soln was retarded Although beneficial in agitated baths, in still baths the Cl induced the growth of thin needle like single crystals The addn of the requisite amt of $Ag_2SO_4$ soln to remove the Cl from such baths caused them to yield satisfactory deposits subsequently Addns of gelatin and peptone to Soln *A* caused the deposits to have smaller crystals and to be smoother, harder and more ductile The Brinell hardness of the deposits from still baths increased from 42 to 83–93 by 2 p. p. m. of these substances, and 0.01 g /l gelatin raised the hardness to 128 Dextrin, up to 10 g /l, had little influence on the hardness and crystal size of the Cu from freshly prepd. solns, but when "aged," such solns gave harder and more brittle deposits Cu from freshly prepd solns (*A*) contg. up to 10 g /l phenol (as phenolsulfonic acid) was similar in properties to, but much smoother than, that from solns contg no addn agents On continued electrolysis the effect of the phenol and also of the gelatin and of peptone disappeared. The hard deposits given in "aged" solns contg phenol were more ductile than those formed without addn agents Dextrin is concluded to be the least suitable addn. agent; the pronounced effects of gelatin and peptone make it necessary for very small quantities to be used—with the consequent difficulty of estn. and control of the amt. present—whereas phenol can be used up to 10 g /l. and can be detd. analytically (Hull and Blum, *C. A.* 25, 460). Tables are given showing the hardness of the deposits from solns free from addn agents, and also the effect of addn agents on the hardness and tensile properties of the deposits from still and from air-agitated solns Cathode potential-c. d. curves for solns with and without addn. agents, both for freshly prepd and for "aged" solns, are given, as well as photographs of some deposits (including nodules and single crystals) and their micro-structures A bibliography is appended EDWARD B. SANIGAR

The reduction of arsenic acid and arsenates to arsine at the mercury cathode. I. WM V. LLOYD *Trans Faraday Soc* 27, 89–94(1931).—A rotary commutator was used to connect the cathode to the source of current and a potentiometer alternately 3000 times a min The overpotential decreased by 0.5 v. to that of As, although analysis of the Hg cathode showed no As present. The decrease in overpotential was less when an uninterrupted current was used, and varied directly with increasing concn of $H_3AsO_4$ The quantity of $AsH_3$ produced increased with increasing $H_3AsO_4$ concn The efficiency of the reduction process, based upon the H converted into $AsH_3$ at the cathode, varied from 1.71 to 14.1%. Cf. *C. A.* 24, 1582 CURTIS L. WILSON

Temperature measurements on working electrodes. IV. B BRUŽS. *Z. physik Chem.*, Abt. A, 153, 309–20(1931), cf. *C. A.* 24, 3179.—The electrolytic Peltier effect which occurs in working electrodes was evaluated with the help of a dynamic calorimetric method, a detailed discussion of the theory of the method being included. The Peltier effect is measured for $Hg \mid Hg_2^{++}$ in perchlorate and nitrate solns at different concns., and the results are applied to the calcn of the partial entropy of $Hg_2^{++}$ ion for the same concns. For solns. of unit activity this is 29 ± 1 cal /degree. H. STOERTZ

The composition of manganese amalgam and manganese-silver alloys in relation to

the electrode potential of manganese. HARVEY D ROYCE AND LOUIS KAHLENBERG *Trans Electrochem Soc* 59 (preprint) 23 pp (1931).—Four Mn Ag alloys were prepd from highly purified materials Electrode potentials and replacing power of these alloys have been measured The replacing power and potential of alloy D (31 at. % Mn) were correlated with alloy structure by means of photomicrographs and thermal diagrams None of the Mn Ag alloys yields electrode potential approaching that of Mn amalgam Mn amalgam consists of solid $Mn_2Hg_5$ in equil with a very dil soln of Mn in Hg (0.0032% Mn) The behavior of Mn amalgam in contact with Mn salt solns has been interpreted on the basis of these figures A new compd of Mn and Hg isolated from the dil amalgam by the application of pressures exceeding 150,000 lb per sq in (10,500 kg /sq cm ) and having the formula MnHg, is described MnHg constitutes the stable solid phase in the system Mn-Hg at temps between 86° and 100° Pressure concn curves are presented to justify the assumption that the solid phase obtained by pressure is MnHg contaminated with a small percentage of the liquid amalgam C. G. F.

Bright silver plating from the cyanide bath A preliminary note. L. C. PAN *Trans Electrochem Soc* 59 (preprint) 5 pp (1931).—A no of chemicals were investigated with regard to their brightening effect upon electrodeposits of Ag from the cyanide bath $NH_4OH$ was found to have a decided whitening effect upon silver deposits, and was especially effective in an electrolyte containing large amts of impurities Na thiosulfate at a concn of about 1 g /l was found to be a good brightener for the Ag bath, and more effective than $CS_2$ The combination of $NH_4OH$ and Na thiosulfate in a Ag bath produces a bright deposit similar to bright Cr, even in the presence of impurities which ordinarily cause dark yellow deposits With the above brighteners, bright deposits are possible at moderately high current densities C. G. F.

The change in reflecting power caused by tarnishing electrodeposited silver-cadmium alloys. LAWRENCE F STOUT AND WILLIAM G THUMMEL. *Trans Electrochem Soc* 59 (preprint) 13 pp (1931).—AgCd alloys can be deposited from a commercial Cd plating bath to which AgCN has been added The compn of the alloy depends on the Ag concn in the bath (if the Cd content remains const ) and on the cathode c d The co-deposition of Ag lowers the reflecting power of electrodeposited Cd The tarnishing of the alloys depends both on the compn and on the rate of deposition and is materially less than that of pure Ag A Ag Cd alloy contg about 24% of Ag recommends itself as the best general purpose reflector Its reflecting power is equal to that of pure Cd, and it is considerably harder and more resistant to abrasion than pure electrodeposited Cd C. G. F.

Progress of the hot nickel solution. OLIVER P WATTS. *Trans Electrochem Soc* 59 (preprint) 5 pp (1931).—A report is made of the vol and operating conditions of many of the hot Ni plating solns now in use in the U. S. and Canada Since there was a period of 5 years between the announcement of the advantages of heating the Ni plating soln and its commercial adoption, the reported growth to 158,000 gallons has occurred in 10 years Opinions of platers on the respective merits of the hot and cold Ni solns are included C. G. F.

Control of acidity in low-$p_H$ nickel-plating baths L C PAN *Trans Electrochem. Soc* 59 (preprint) 8 pp (1931).—For the control of acidity in Ni plating baths of low $p_H$, the titration method, including a "control chart" for direct readings, was found to be most practical in a commercial plant It is based upon the assumption that for a given bath, whose compn is kept approx const., the $p_H$ value will be the same as long as the acidity is maintained at the same point The "control chart" also provides a direct method of regulating and correcting the acidity or $p_H$ eliminating all labor of computation and all guesswork. C. G. F.

Chromium deposits directly on aluminum. HAROLD K. WORK AND CHARLES J SLUNDER *Trans Electrochem Soc* 59 (preprint) 7 pp (1931).—Thin layers of Cr which have fairly good resistance to salt spray and atm corrosion may be electrodeposited directly on Al Such deposits have a gray color on leaving the plating bath and must be buffed if a higher luster is required. These deposits protect Al to a marked degree from alkaline corrosion. Heavy deposits for abrasion resistance have also been applied to certain Al alloys C. G. F.

The electrodeposition of chromium and the influence of the cathode metal. J W CUTHBERTSON *Trans Electrochem Soc.* 59 (preprint) 24 pp (1931). cf *C. A.* 25, 35.—In Cr plating the best results and greatest flexibility and reliability in operation are obtained from a soln. of $CrO_3$ and $H_2SO_4$ The molarity of the $CrO_3$ should not be greater than 3.25, and the ratio of this to $SO_4$ normality should be about 58 to 60 The tank should be lined with hard Pb, the lining *not* being anodic to the soln except as a

temporary measure Pb is the only material that can be considered for anodes. The temp. should be reasonably high, but not above 45°, as then the $Cr^{III}$ equil conc. reaches too high a figure. Care should be paid to the ratio between anode and cathode surfaces The anode area should be 1 5 to 3 times that of the cathode, and anodes should be disposed with respect to the cathode size and shape Even under the best of conditions, the cathode current efficiency is not above 16%. The nature of the cathode is of the greatest moment It should be of a metal of high H overvoltage corresponding to that of Cr Ni is the material mostly used now, but it is far from ideal For many purposes Cu is a far better undercoating It is impossible to increase materially the throwing power of $CrO_3$ solns The best way to improve upon existing conditions is to increase the plating range in which bright plate is obtainable Except in the case of Cu little success has been obtained from Cr deposits direct on the base metal This may be due to the inherent porosity of these deposits Direct deposits can be improved by heat treatment, but this does not lend itself readily to commercial practice C. G. F.

Electrodeposition of chromium-iron alloy. G Fuseya and K Sasaki. *Trans Electrochem Soc* 59 (preprint) 24 pp (1931) —See *C A* 25, 1164(1931) C G. F.

Chromium-plated molds H E Stockfisch *Am Machinist* 73, 553–5(1930).—The advantages are given of Cr-plated surfaces in the molding of glass brick and micarta to reduce wear and improve finish, and the compn. and treatment of molds are discussed. E. I. S.

The electrodeposition of tungsten from aqueous solutions. Colin G Fink and Frank L Jones. *Trans Electrochem Soc* 59 (preprint) 23 pp (1931) —The W deposited from aq solns is smooth, hard and coherent and has a high luster Like Cr, it needs no polishing if the plated article was previously polished W has remarkable acid-resisting properties, which make it desirable as a protective coating for other metals. Several types of solns have been investigated in regard to their usefulness as W plating baths. Solns of W salts in org solvents are unsuitable. Aq solns of an acid nature do not give satisfactory metal deposits. Alk. solns contg alkali tungstates are preferably used as plating baths The temp., cathode c. d and H-ion concn of the soln. must be controlled Alloys of W and Fe, and of W and Ni, were electrodeposited from similar solns. contg very small concns of the ions of these second metals. The usefulness of highly alk. solns. as plating baths for the electrodeposition of other metals is pointed out. C. G F

The production of hydrogen at certain metal surfaces in relation to overvoltage. G. Raymond Hood and Francis C. Krauskopf. *J. Phys. Chem.* 35, 786–95(1931) — The efficiency of electrolytic reduction of $KClO_3$ (in 0 493 *N* soln.) was detd. concurrently with the cathode potential *V* (measured against a satd. calomel electrode with a KCl bridge), various metal cathodes and several c. ds. being used. The data for different cathode materials conform to the same relation between *V* and reduction efficiency; the efficiency decreases with increasing *V*, and is negligible for $V > 1.5$ v. Measurements of the decompn. potentials of $H_2SO_4$ (0.1 *N*), KCl (0.493 *N*) and $KClO_3$ (0 493 *N*) with Pt anodes and various cathodes are given and compared with the reduction expts. L. O

Electrolytic production of hydroxides and hydrogen. R. Saxon. *Chem News* 142, 85, 113–4, 149–50(1931) —These articles are statements of the phenomena occurring when pure $H_2O$ (contg no acid or salt for conduction) is electrolyzed, 240 v. being used, with Pt or C cathodes and anodes of various metals. The gas liberated at the cathode was collected over $H_2O$ and found to be H only. The solns. took on various colors depending on the metal used as anode, and metal hydroxides were formed in the solns. Expts. with the following metals as anodes are reported. *Fe* —The soln. turned umber, then green; green $Fe(OH)_3$ formed in the soln., while a scum of $Fe(OH)_3$ floated on the soln., even that in contact with the cathodic H. The soln. was acid to methyl orange but gave no test for Fe unless acid was added. It is concluded that the natural tendency is for $Fe(OH)_3$ to be formed, but that the nascent (not the molecular) H reduces this to $Fe(OH)_2$. *Cu* —The soln turned green and, later, green-blue to purple The nascent H reduced the $Cu(OH)_2$ first formed to CuOH and then to Cu which floated on the surface of the soln. The $Cu(OH)_2$ first formed was found to be electropositive. *Co.*—The soln. became pale bluish, a green-blue scum, thought to be $Co(OH)_3$, collected on the $H_2O$ in the tube over the cathode. Red-brown flakes of $Co(OH)_3$ appeared in the soln. followed by brown and black masses of $Co_2O_3$ and CoO. *Ni.* An apple-green film of $Ni(OH)_2$ was observed followed by a green scum of $Ni(OH)_2$ and, later, floating specks of $Ni_2O_3$, followed quickly by green NiO From the expts it is concluded that the reductions are brought about only by nascent H (not by molecular H), and that Ni is preferentially divalent, Fe preferentially tri valent, while Co is bi- and ter-valent without preference Edward B. Sanigar

The use of antimonial lead for accumulator grids a cause of self-discharge of the negative plates. J T Crennell and A G Milligan *Trans Faraday Soc* 27, 103–12 (1931).—It was observed that the neg plates of Pb accumulators at high temps and high acid concns. lost capacity as the cells became older The use of exptl cells with pure Pb grids and with grids of antimonial Pb indicated that the "aging" of the neg. plate was due to the soln of Sb from the alloy of the pos plate and its deposition on the neg plate The low H-overvoltage at an Sb surface reduced the current efficiency of the plate by allowing evolution of H Sb added to the electrolyte produced the same effects No quant. relation between the total Sb added and the rate of sulfation of the neg plate could be established. It is concluded that antimonial Pb should not be used for the pos grids of Pb accumulators Curtis L. Wilson

Diatomite as a filler in battery boxes. Paul Hatmaker Bur Mines, *Rept of Investigations* 3078, 2 pp (1931).—Diatomite for battery fillers must have < 8–10% acid-sol material and < 0.75% Fe and be low in clay and org substances Mn and MgO are objectionable Present consumption for this use is 10,000–15,000 tons annually. Alden H. Emery

Electricity in modern dairy plants. A J Dreux and H C. Brunner. *Elec Eng* 50, 285–7(1931).—The elec. current passes through the milk in the Electropure method of pasteurizing The application at the Rieck McJunkin Dairy in Pittsburgh, Pa., is described, also other uses of electricity in such plants W. H Boynton

Electrochemistry applied to glass. Alexander Silverman *Trans Electrochem Soc* 59 (preprint) 9 pp (1931).—Accessory applications of electrochemistry to glass manuf are discussed *e. g.*, cond as a control of viscosity, elec. pptn in purifying producer gas, Cr plating of molds, and electroplating of the finished product with various metallic coatings A review is given of studies that have been conducted on the electrochem. properties of glass, such as conductance through the glass in d. c. electrolysis C. G F.

Influence of traces of hydrogen on sparking potential of helium. A Güntherschulze and F Keller. *Z Physik* 66, 219–23(1930).—The disappearance of the last traces of H in glow lamp rectifiers caused an increase in the flash-over voltage from 182 to 330 v This is explained by reference to the four fold longer mean free path of the H ion over other positive ions. Gregg M. Evans

Current collection in hydrogen atmosphere. R. M Baker. *Elec Eng* 50, 266–7 (1931).—Test runs of commutators and slip rings operating in $H_2$ gas reveal interesting characteristics and lead to the following conclusions A commutator machine designed and adjusted for good commutation in air will operate satisfactorily and give good brush life in $H_2$. If a commutator machine must spark in $H_2$, the brush life may be increased many times by keeping the relative humidity below 10%. The contact resistance of C brushes on a commutator may be lowered by the introduction of $H_2$. C or graphite brushes cannot be operated satisfactorily on plain tool-steel slip-rings running in $H_2$ The contact drop between a C or graphite brush and a brass slip-ring may be 10 times as high when the ring is running in air as when in $H_2$. W H. B

The development of an electron-emitting alloy. O S. Duffendack, R. A. Wolfe and D W Randolph *Trans Electrochem Soc.* 59 (preprint) 17 pp (1931).—It was discovered that irregularities in the sparking voltage of spark gaps were due to nonuniformities in the compn. of the electrode materials. Small inclusions of Mg in the Ni alloy ordinarily employed for spark plug electrodes were found to be distributed at random through the wire and to affect the sparking voltages. A thorough investigation established a complete coördination between the sparking voltage of a gap and the work function of electron extn. from the cathode surface. The sparking voltage of a standardized gap increases when the thermionic electron emission of the electrode wire, measured under standardized conditions, decreases After many expts. a Ni alloy contg Ba has been developed which is homogeneous in compn. and readily reproducible. Spark gaps having electrodes made of this alloy have very const. sparking voltages The alloy has marked electron-emitting properties that make it valuable for use in various elec. devices. Its uses in several ways are being developed. C. G F.

The decomposition of iron oxide in vacuum tubes. E. R. Wagner. *Trans Electrochem Soc* 59 (preprint) 3 pp (1931).—An oxidized Fe anode in a vacuum tube, type "245," liberated large quantities of gas during the operation of the tube If the potential gradient is increased to 300 v., the emission of gas is almost instantaneous. The phenomenon does not appear to be a purely electrolytic one, but rather due to electron bombardment. C. G F

New photoelectric cells with potassium. Anon *Ann chim anal. chim appl.* 13,

72-5(1931).—In the new cells, the cathode is a deposit of K on the interior wall of the bulb, and the anode consists of straight or curved metallic filaments Each electrode is connected with an external circuit of high resistance (100,000 ohms to 100 megohms) and to a storage cell which creates between the electrodes an elec. field to accelerate the electrons emitted from the cathode In the dark, the cell presents infinite resistance and permits the passage of no current in the external circuit. The very feeble current produced by the action of light is amplified by a lamp with 3 electrodes, and its variations can be measured directly with a milli-ammeter The photoelec. cell and the triode amplifier are mounted in a metallic case, and the cells are preferably filled with a gas like A W. T. H.

Production of color from tungsten lamps. M. Luckiesh *Elec. World* 97, 645 (1931).—In order to obtain colored light from a lamp it is necessary to filter out the undesired colors, but it is impossible to obtain light of a pure, spectral color by means of filters W. H. Boynton

The condensation of hydrocarbons by electrical discharge A study of the M/N-ratio for methane, ethylene and acetylene. S. C. Lind and George R. Schultze *Trans. Electrochem. Soc.* 59 (preprint) 16 pp. (1931). cf. *C. A.* 25, 1440.—An accurate method is given for taking into account all temp. effects which have involved some uncertainty in judging the pressure changes during the expts. in the course of the earlier investigations The properties and the applicability of the system employed for the measurements, namely, the ozonizer type of discharge, are discussed For the acetylene condensation, a neg. catalytic wall effect of the solid reaction product on the condensation velocity has been discovered The condensation of $CH_4$, $C_2H_4$ and $C_2H_2$ was studied in an elec. discharge with respect to the yield of ionization as represented in the $M/N$ ratio of the condensation, where $M$ equals the no. of reacting mols. and $N$, the no. of pairs of charges The same proportionality was found for the $M/N$ ratios of $CH_4$ and $C_2H_2$ (2.20) whereas the value of the ratio for $C_2H_4$ is exactly twice as high (10 instead of 5) as has been found in the α-ray work of Lind and co-workers Recent investigations, which have been made since this paper was first written, indicate that the correlation between α-ray work and elec. discharge finds its best basis in the assumption that not the chem. yield per ion pair is the sole controlling factor, but the product of the yield ($M/N$ ratio) and the mol. ionization This brings the results for $CH_4$, $C_2H_2$ and $C_2H_4$ in agreement, whereas the results of the $C_2H_2$ runs now remain out of line, though it is believed that the low values found for $C_2H_2$ will be raised upon further purification of the gas from acetone or some other inhibitor C. G. F.

Cracking oil by electricity. Herbert R. Rowland *Elec. Eng.* 50, 288-90 (1931).—Low-grade oils formerly wasted are now "cracked" to form gasolines and other highly volatile oils Some of the problems involved are discussed Three theories have been advanced as to the part the silent corona discharge plays in the cracking process. It seems feasible to consider an electron moving through an appreciable distance in space and either carrying with it or driving before it a mol. of $H_2$ in the vapor form At last a surface is reached which permits no further movement of the oil vapor mol., but which readily absorbs the electron The violent agitation of the vapors by the silent corona discharge is undoubtedly of prime importance in the complete cracking of the vapors, which facts tend to support the electromech. theory The gasoline has high anti knock value and gives greater mileage than "doped" fuels. W. H. B.

Power cable technic. P. Dunsheath *Electrician* 106, 432-5(1931).—The best preventive of Pb-sheath *corrosion* is the provision of adequate, compounded, waterproof coverings over the Pb The principal cause, if not the whole explanation, of *ionization* (rise of power factor voltage) in impregnated paper cables is found in the presence of voids, or spaces not filled with solid or liquid dielectric Sheath and armor effects and armoring of single core cables are discussed For lower voltages the ordinary routine insulation resistance and pressure tests meet all requirements, but for higher voltages other tests are necessary Breakdown tests seem more reliable than ionization stability tests, though each has its place W. H. Boynton

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A new measurement of the temperature in the arc (v. Engl, Steenbeck) 3. Producing patterns in metals by photography and electrodeposition (Ger. pat. 515,900) 5. Purifying bitumen, etc., for use in "electrical contrivances" (Brit. pat. 339,470) 22. "Basing cement" for uniting lamp bulbs to bases (U. S. pat. 1,795,746) 18. Electric system for protecting boilers (U. S. pat. 1,796,715) 14. Extracting metals (Austrian pat. 121,523) 9. Alloys for sheathing electric cables (Austrian pat. 121,523) 9. Float for determination of the specific gravity of accumulator electrolytes (Hung. pat. 101,225) 1. Treating metals in ladles as in an induction furnace (Brit. pat. 339,579) 9.

MÜLLER FRICH. A Laboratory Manual of Electro-Chemistry. Translated from 4th ed. by H. J. T. Ellingham. London: Geo. Routledge & Sons, Ltd. 364 pp. 15s. Reviewed in *Chem. Trade J.* 88, 314(1931).

WEJNARTH AXEL. Beiträge zur Kenntnis der elektrothermischen Zinkgewinnungsmethode. Stockholm: Wilh. Hedbergs Tryckeri Aktiebolag. 146 pp.

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Electric batteries. C. DILLGER (trading as Hamburger Batterie-Fabrik C. Dillger) and D. SCHMIDT. Brit. 338,705, March 22, 1929. A battery of the Leclanche type has a depolarizer consisting of a double salt of $NH_3$ or an amine and Zn or other electropositive metal such as the double salt of $ZnCl_2$ and methylamine-HCl or *o m p*-toluidine-HCl or Zn $NH_4$ chloride.

Electric batteries. LOUIS F. J. ROUSSEAU. Fr. 37,261, Feb. 21, 1929. Addn. to 668,569 (*C. A.* 24, 1584). Electrolytes of strong acid concn. are immobilized by fibrous masses of animal origin such as wool or felt or by dissolving an appropriate amt. of cellulose in the liquid.

Electric battery. MARIE IRLE NÉE GAUJACQ. Fr. 37,211, July 12, 1929. Addn. to 674,622 (*C. A.* 24, 2077). To prevent the Zn being covered with Cu or like metal resulting from the diffusion of the depolarizing liquid into the liquid which surrounds the Zn a metallic screen is placed in the layer of sepn. of the 2 liquids. A salt of Hg may be added to the depolarizing liquid, which salt by diffusion comes in contact and amalgamates with the Zn.

Dry batteries. KUNO WOLF. Ger. 515,694, Oct. 25, 1929. The "dry" filling consists of colloidal $H_2SiO_3$ and concd. $H_2SO_4$. A 15% soln. of $H_2SiO_3$ is preferred.

Dry-cell electric-battery assembly. ELMER J. STROHL and EDWARD C. SMITH (to National Carbon Co.). U. S. 1,797,161, March 17. Structural features.

Storage battery. A. G. OWENS. Brit. 339,050, Oct. 9, 1929. Structural features.

Storage battery. JOSEPH L. WOODBRIDGE. U. S. 1,796,818, March 17. Structural features.

Storage batteries. SOC. ANON. DES ACCUMULATEURS MONOPLAQUE. Brit. 338,921-2, Jan. 29 and Feb. 26, 1929. Structural features.

Storage-battery hydrometer (attached to the vent plug). CHARLES E. LINEBARGER. U. S. 1,796,379, March 17. Structural features.

Battery container. EDWARD LYNDON. U. S. 1,796,034, March 10. Containers are made of permeable material non resistant to acids such as pressed wood pulp impregnated with prevulcanized rubber.

Depolarizers for galvanic batteries. NEUE ELEMENT-WERKE GEBR. HAAS & CO. Ger. 515,762, July 11, 1926. A depolarizer is made up by mixing together graphite and soot, compressing the mixt. and then mixing in $MnO_2$.

Galvanic elements. FIRMA AUGUST ALEXANDER. Ger. 515,693, July 3, 1929. Details of arranging the C rods and metal caps in dry batteries.

Selenium cell. F. H. CONSTABLE and RADIOVISOR PARENT, LTD. Brit. 339,245, Sept. 2, 1929.

Lead accumulator. JOHANN MATUSCHEK. Austrian 121,320, Sept. 15, 1930. The $PbO_2$ constituting the active mass of the pos. electrode is not exclusively generated during the manuf. of the electrode, but is included in a substantial proportion in the mass from which the pos. electrode or both electrodes is or are to be formed. Other oxides of Pb may be present also, and the mass is preferably supported on unalloyed Pb. Details of the charging are described.

Protecting layer for the electrolytes of accumulators. GY. DIAMANT. Hung. 100,891, Feb. 20, 1929. A layer consisting of loose particles of solid materials is located on the surface of the electrolyte, *e. g.*, charcoal particles impregnated with hydrocarbons or resins. This layer is afterward partly or totally solidified.

Dry rectifier with electrodes coated with metallic oxide. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 515,529, Nov. 19, 1926. Plates of Cu are coated on one side with $Cu_2O$ and on the other with Ag. Cf. *C. A.* 24, 27.

Electrodedeposition of metals such as chromium, etc. HARRY SCHMIDT, GEORG ERLWEIN and MARTIN HOSENFELD (to Metal & Thermit Corp.). U. S. 1,795,512, March 10. Solid adherent coatings are obtained by electrolytically depositing metals such as Cr at a temp. below their m. p. from a fused bath, the point of fusion of which is at least 100° lower than the m. p. of the metal to be deposited and which contains a B compd. such as mixed borates together with a compd. of the metal to be deposited.

Electrodeposition of chromium. WM. S. EATON. U. S. 1,795,481, March 10. The cleaned articles to be plated are immersed in an aq. electrolytic bath, the active ingredients of which consist solely of chromic acid and $Na_2CO_3$ in soln. in water.

Chromium plating LEON R. WESTBROOK (to Grasselli Chemical Co). U. S. 1,795,459, March 10 A bath for Cr plating contains chromic acid in aq soln together with a small proportion of the $SO_4$ radical (which may be supplied by use of $Na_2SO_4$) and a small proportion of the neg radical of molybdic or vanadic acid (suitably supplied by use of a molybdate or vanadate)

Electrodeposition of metals such as copper, nickel or cobalt on rotating cylindrical mandrels. S O COWPER-COLES. Brit. 338,487, May 15, 1929 Numerous details of app and procedure are described for the deposition of the metal and its consolidation by the action of rollers which may be formed of glass or of metal such as ferro-Si The mandrel is preferably of welded steel or iron sheet or turned and polished cast iron and to allow detachment of the deposit in tubular form the mandrel is first made passive by treatment with $HNO_3$ and then polished and treated with a stripping prepn An anode of Pb, C, ferro-Si or other material may be used and various details of electrolyte compns, etc., are given Deposition of Zn and Ag also is mentioned

Electrodeposition of metals on rotating mandrels. S O. COWPER-COLES. Brit 338,540, May 15, 1929 In a process such as described in Brit. 338,487 (preceding abs), the surface of the rotating mandrel is prepd to facilitate detachment of the deposit by forming on it a film of oxide or sulfide or by applying a film of Pb which is then polished with plumbago or other suitable polishing material The surface of the mandrel is preferably formed of Cu or brass

Electrodeposition of tin SIEMENS & HALSKE A G Brit 338,488, May 16, 1929 Thick, coherent, firmly adhering deposits are obtained in the electrodeposition of Sn from alkali metal stannate or stannite solns., sol anodes being used, by maintaining the free alkali content in the electrolyte (inclusive of that set free by hydrolysis, but not including alkali metal carbonate) below 1 5%. A Sn concn of 0 05% or more may be employed, and if the Sn concn is above 7%, the alkali content must be somewhat higher but should be not more than one-fifth of the Sn content Cf *C A* 25, 882.

"White gold" plating. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER (Leo Nowack, inventor) Ger. 515,579, Oct. 15, 1926 Objects to be plated in "white gold" are formed of a ground metal which is given a thin layer of metal which then alloys with the ground metal to form the "white gold" surface. Thus, a degreased 18 c. gold object (Au-Ag-Cu) is nickeled by electrolysis in the usual way The Ni plated object is then immersed in a fused salt mixt. and heated to 700° for 20 min. This causes the Ni to alloy with the gold to form a "white gold" surface. Further examples are given

Plating aluminum with other metals. M K DE TRAIRUP Brit 339,339, Sept 3, 1929. Al surfaces are prepd for plating with metals such as Ni, Cu, Ag or Au by a preliminary electrodeposition of an amalgam such as may be deposited from a bath formed of NaOH 200, sodamide 200, $SnCl_2$ 40, $ZnCl_2$ 10, $Hg(NO_3)_2$ 5, KOH 10 and water 20,000 parts.

Electroplating apparatus with a tumbling-barrel. CARL H HANSEN U. S 1,795,336, March 10 Structural features.

Mold for making articles by electrodeposition. G ROSENQVIST. Brit. 339,428, Oct. 24, 1929

Liquid seal for gas chambers of electrical precipitation plants. LODGE-COTTRELL, LTD, and L. LODGE. Brit. 338,827, March 4, 1930

Degasifying electrolytically deposited metals. JULIUS VON BOSSE. U. S. 1,795,-884, March 10 Electrodeposited coatings of metals are freed from absorbed H tending to cause embrittlement of the metal, by subjecting the metal coating to an elec. discharge in a vacuum tube in which the coating is made one of the electrodes.

Drying by electrolysis. *N. Altal. Hung. 100,547, Sept. 3, 1929. Moisture is* eliminated by electrolysis of material in its natural state or after grinding or pressing to briquets.

Electrolytic apparatus for removing salts from liquids. JEAN BILLITER. Austrian 121,039, Aug 15, 1930

Aluminum production by electrolysis of fused halide baths. I. G. FARBENIND A.-G Brit. 338,668, July 4, 1929 A fused mixt. which may be formed of NaCl 14, KCl 6 *and* $AlCl_3$ 80% *is electrolyzed at a temp of 100° with a graphite anode and a rotating* cylindrical cathode of graphite or metal (a compact deposit being obtained by use of a c. d. of 1 amp per sq dcm or even higher), or a mixt comprising NaCl 18 and $AlCl_3$ 82% may be electrolyzed at 160° with a W anode and an iron roller cathode. Various details of app. and procedure are described

Electrolytic refining of aluminum. UKRAINSKII NAUCHNO ISSLEDOVATELNUII

INSTITUT METALLOV "UKRINMET" Russ. appl 30,500, July 24, 1928. A complex ammonium aluminum halide is used as electrolyte.

Magnesium. DOW CHEMICAL Co Brit. 339,504, Dec. 16, 1929. See U. S. 1,749,210 (*C. A.* 24, 2064)

Recovery of tin SIEMENS & HALSKE A. G. Fr. 37,495, Oct. 7, 1929. Addn. to 650,579 (*C. A.* 23, 3173). In the electrolytic recovery of Sn from Sn residues not contg. plumbite, bismutite or other substances acting in the same way, the electrolysis is carried out without the addn. of colloid after quantitative transformation of all the Sn into stannate form.

Nitrogen fluoride. OTTO RUFF. Ger. 518,202, Feb. 2, 1930. $NF_3$ prepd. by electrolyzing fused $NH_4HF_2$, or by interaction of $NH_3$ and F, is freed from $NHF_2$ and $N_2O$ by passage over soda lime at 100°, followed by washing with warm acid KI soln. and fractionating.

Coating metal articles with lead peroxide electrolytically. JOHANNES FISCHER (to Siemens & Halske, A.-G.). U. S. 1,795,941, March 10. Metal articles such as iron or steel are made anodes in an alk. bath contg. Pb and at least one cyanide, sulfocyanide such as KCNS or dimethylglyoxime. The bath is free from heavy metals other than Pb.

Electrolytic condenser. JOSEPH SLEPIAN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,900, March 10. Various elec. and structural features of condensers with film forming electrodes immersed in an electrolyte are described. Cf. *C. A.* 24, 1302.

Introducing alkali or alkaline earth metals or oxygen into sealed glass vessels. VEREINIGTE GLÜHLAMPEN UND ELECTRICITÄTS A. G. Austrian 121,033, Aug. 15, 1930. This is effected by electrolyzing the wall of the vessel. A part of the vessel is coated on the inside with a very thin metal layer, which constitutes one electrode, and the coated part is heated and supplied with current. The external electrode may be a fused bath, *e. g.*, a salt of the metal to be introduced into the vessel. Numerous details are given of the application of the method to the manuf. of cathodes for electric discharge tubes and photo-elec. cells. Cf. Austrian 120,121 (*C. A.* 25, 1710).

Purifying inert gases in electric discharge tubes, etc. VEREINIGTE GLÜHLAMPEN UND ELECTRICITÄTS A.-G. Austrian 121,056, Aug. 15, 1930. Alkali or alk. earth metals are introduced into the vessel contg. the gas by the electrolytic method described in Austrian 121,033 (preceding abst.).

Electric furnaces and electrolytic vats. ALFRED FRANCHINI and PAUL GIROD. Fr. 695,216, Aug. 27, 1929. *Method of mounting and moving the electrodes is described.*

Electric induction furnace. PORTER H. BRACE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,827, March 10. Structural and elec. features.

Electric induction furnace. NEVILLE R. DAVIS (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,842, March 10. Structural features of a furnace, the lining of which has embedded in it a metal cage to effect its heating and drying by the heating from induction.

Electric induction crucible furnace suitable for melting metals. PORTER H. BRACE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,926, March 10. Structural and elec. features.

Coreless electric induction furnace suitable for melting metals. NEVILLE R. DAVIS and CECIL R. BURCH (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,934, March 10. A metal conduit is arranged to cool an inductor coil which is adjacent and coextensive in length. U. S. 1,795,935 describes various details of procedure for sintering a desired portion of the lining of an elec. induction furnace.

Electric resistance furnace for heat treatments. SVEN P. AXELL (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,819, March 10. Structural features of a muffle furnace provided with a conveyor.

Electric resistance furnaces and ovens. F. W. CUPPE. Brit. 338,816, Feb. 11, 1930. Structural features.

Electrical and mechanical control system for furnaces such as plural-hearth-tray rotary dumping furnaces. HARLAN S. GANO (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,945, March 10. Various structural and elec. features are described.

Electrode holder for electric furnace. SIEMENS-PLANIAWERKE A.-G. FÜR KOHLEFABRIKATE. Ger. 518,332, June 27, 1926.

Electric regulating device for ovens for baking lacquered wire. ELECTRICAL RESEARCH PRODUCTS, INC. Ger. 518,078, Nov. 16, 1927. The temp. is regulated in accordance with the hardness of the coating on the wire leaving the oven.

Electrically heating the contents of high-pressure vessels. SIEMENS-SCHUCKERTWERKE A.-G. (Günther Scharowsky, inventor). Ger. 515,944, Aug. 24, 1926.

Electric gas purifiers. METALLGESELLSCHAFT A.-G. (Walter Deutsch and Wilhelm Hoss, inventors). Ger. 515,928, Nov. 30, 1928. An arrangement for preventing damage to the electrodes by sparking is described. Cf. *C. A.* 25, 2061.

Apparatus for electrical precipitation of suspended particles from gases. INTERNATIONAL PRECIPITATION CO. and LODGE-COTTRELL, LTD. Brit. 338,796, Jan. 14, 1930. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. LODGE COTTRELL, LTD., and L. LODGE. Brit. 338,739, Nov. 29, 1929. Structural features.

Electrical purification of gases such as carbon dioxide. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 338,944, April 17, 1929. Various details are described for use of high-potential rectified a. c.

Use of silent electric discharges to facilitate catalytic gas reactions. FRITZ LECHLER (to International Precipitation Co.). U. S. 1,796,110, March 10. Apparatus and details of operation are described for promoting reactions by the combined action of contact substances and silent elec. discharge, in such manner that the elec. discharge acts not only to promote directly the reaction, but also to create an elec. wind in the gas so as to bring the gases into more effective contact with the contact substance. The process may be applied to the promotion of any reaction between materials in the gaseous phase, which is facilitated or promoted by the presence of a catalytic contact substance, for example to the oxidization of $SO_2$ to form $SO_3$ as in the contact process of $H_2SO_4$ manuf. or to the chlorination or hydrogenation of hydrocarbons or other org. gases.

Spark-discharge apparatus for producing a bleaching gas for corn, etc. FRITZ STUFF. Ger. 518,201, June 28, 1929.

Apparatus for heating "lyes and acids" by electrical resistances. VEREINIGTE ALUMINIUM WERKE A. G. Brit. 338,740, Nov. 29, 1928. Tubular coils (suitably formed of Pb) serve as elec. resistances and communicate with the interior of the vessel, the contents of which are to be heated. These coils are placed around the vessel, and are in turn surrounded by heat insulating material.

Protection of electrical apparatus such as switches, transformers, choke, coils, motors or dynamos. MAX BUCHHOLZ. U. S. 1,796,746, March 17. A cell, the wall of which is of such a degree of porosity as will permit osmotic diffusion of the products of decompn. occurring in the insulation of the app. such as a transformer under abnormal conditions, is assocd. with a device such as an alarm device which is influenced by products thus passing through the wall of the cell. Various structural details are described.

Electric ozone generator. MARIUS P. OTTO. U. S. 1,796,214, March 10. Structural features.

Special loading of long submarine cables. V. E. LEGG (to Electrical Research Products, Inc.). Brit. 339,049, Nov. 8, 1928. End sections of a cable are provided with loading of greater thickness than the central portion and which has a lower hysteresis loss, lower resistivity and a higher constancy of permeability for a wide range of magnetizing forces than the material of the central section loading. The central portion of the cable may be loaded with an alloy contg. Ni 45, Fe 23, Co 25, Mo 7, Si 0.47% or Ni 55, Fe 34 and Cr 11%. The end sections may be loaded with an alloy contg. Fe 27, Ni 45, Co 25, Mo 2.5 and Mn 0.35%.

Cut-out for series lamps. DANIEL S. GUSTIN and EWALD DIETZ (to the Canadian Westinghouse Co., Ltd.). Can. 309,241, Mar. 10, 1931. A cut-out medium for series lamps is produced by mixing powd. Cu with sodium silicate and dehydrating the mixt., then mixing the dehydrated mixt. with sodium silicate and applying pressure to produce a compact mass.

Electric incandescent lamp. LLOYD D. LOCKWOOD (to Westinghouse Lamp Co.). U. S. 1,795,785, March 10. Devices such as incandescent lamps are flushed with water gas during baking, in order to eliminate surface oxides on the metal parts. Cf. *C. A.* 24, 3958.

Decoration of electric incandescent lamps. K. MENESDORFER. Hung. 101,377, Nov. 12, 1929. Cellulose varnish is sprayed on the lamp as a base, and the decoration is produced by spraying various paints through stencils. The decoration thus produced does not crack off.

Coating for lamp bulbs. ALBERT F. LINDSTROM (to The Canadian Westinghouse Co., Ltd.). Can. 309,250, Mar. 10, 1931. A green coating compd. for the interior of lamp bulbs comprises sodium silicate, kaolin, hydrated chromic oxide and boric acid.

# 5—PHOTOGRAPHY

E. P. WIGHTMAN

Further advances in photographic science. S. O. RAWLING. *Science Progress* 25, 465–75(1931).—A review is given (with a bibliography of 23 references) of recent work on the chemistry of the photographic emulsion. JOSEPH S. HEPBURN

Formation of photographic images on cathodes of alkali metal photoelectric cells. A. R. OLPIN AND G. R. STILWELL. *J. Optical Soc. Am.* 21, 177–81(1931); cf. *C. A.* 24, 5614.—Both neg. and pos. photographic images on the cathodes of K and Na photoelec. cells in a vacuum have been obtained by focussing an image of the object to be photographed on the cathode during the treatment with a suitable dielectric. The necessary optimum constitution of the surface structure will thus exist though perhaps only momentarily. The images are well defined and can be permanently "fixed" by proper treatment with various materials such as S vapor, air, O and H in the ratio of 9 to 1, HF and Br. The photoelec. sensitivity of the exposed areas decreases approx. 30% during the formation of the image. There appears to be little difference in the sensitivity of the cathode area bearing the image and neighboring area after the image has been permanently fixed. The effect is undoubtedly photochem. but the great variety of materials which can be used in treating the exposed surfaces complicates the chemistry of the phenomenon. W. VANSELOW

Depression of density produced by the presence of bromide in the developer of photographic emulsions exposed to light and to x-rays. A. P. H. TRIVELLI AND E. C. JENSEN. *J. Franklin Inst.* 211, 335–47(1931).—The density depressions of sol. bromide in the developer were detd. with 2 different emulsions for light and for x-ray exposures with hydroquinone and with pyrogallol developer. Abegg's theory of the action of sol. bromide in the developer was the best explanation of the results obtained. This theory was connected with the speck growth theory of the latent image, and the results obtained were explained on the basis of the size and the distribution of the specks. It was shown that there are 2 depression factors. (1) The difference in sizes of developable centers formed by exposure will, with sol. bromide, give a greater density depression for light than for x-ray exposures. (2) The distribution of the developable centers throughout the thickness of the photographic layer will give, for light, a smaller density depression with sol. bromide than for x-ray exposures. A. P. H. TRIVELLI

The question of the metallic ("Mr") silver content and germ formation in photographic emulsions. H. ARENS AND J. EGGERT. *Z. wiss. Phot.* 28, 178–90(1930).—P. O. P. emulsions, according to Valenta, increase their amt. of free Ag with age. For ordinary photographic layers the results are not const., which shows that the $Ag_2S_2O_3$ complex is not entirely separable from metallic Ag, so that Weigert and Lühr's data (*C. A.* 23, 4900) are too high and consequently also the previous data of the authors. A. P. H. TRIVELLI

Cement for films (Hung. pat. 100,689). 23.

HERBERT, L. J. A Manual of Photographic Technique. 2nd ed. London: Pitman. 133 pp. 2s. 6d. net.

WALL, E. J. The Dictionary of Photography. 12th ed., revised by F. J. Mortimer. London: Iliffe. 681 pp. 7s. 6d., net.

Color photography. B. D. LUBOSHEZ. Brit. 339,511, Dec. 23, 1929. Various details are described of a color filter used with lenticular films.

Color photography. J. N. GOLDSMITH, T. T. BAKER, C. BONAMICO and SPICERS LTD. Brit. 339,238, Aug. 1, 1929. In the production of regular pattern multicolor screens by means of dye repellent resists, the dyes in a non-penetrative condition or medium are applied to intermediate surface layers only of a film support which may be formed of celluloid, cellulose acetate or other suitable cellulose ester or ether compn.; *e. g.*, a powd. dye or finely divided dyed substance may be rubbed or spread on the film, or a dye such as cochineal in suspension or a dye in a viscous soln. such as castor oil or gum arabic soln. may be applied. Cf. *C. A.* 25, 1748.

Color photography. MULTICOLOR FILMS, INC. Brit. 339,323, June 4, 1929. Fixed Ag images are treated with a basic dye bath and then with a U toning and mordanting bath, in a process for producing color films having color component images on opposite sides which are simultaneously printed in register from color component nega-

tives The printed positive is developed, fixed and washed and that side bearing the images printed from the orange-red negative is toned blue by application to that side only of an Fe toning soln which may be formed from ferric ammonium oxalate, $K_3FeC_6N_6$, $NH_4Cl$ and HCl The U toning bath may comprise K oxalate, U nitrate, $K_3FeC_6N_6$ and HCl Various details and modifications of procedure are described

Dye-impression color photography. J E Thornton Brit 339,206, July 3, 1929 In producing 2-color pictures by dye-impression printing, a duplex dye-printing plate is prepd as described in Brit 339,321 having upon its composite faces a pair of dye images of complementary character, produced by exposing in a camera from one side only a sensitive film bearing complementary color sensitive emulsions on opposite sides with assocd light filters, developing the images, treating them to render the gelatin dye-repellent in proportion to its Ag content, and dyeing with complementary colors the gelatin which remains dye receptive, also, pos images are printed simultaneously from the duplex plate as described in Brit 339,319, by pressure-contact upon 2 sheets of dye-absorbent non sensitive material provided with registration holds and placed one on each side of the duplex plate, and the printed dye positives are cemented together in register and face to face Numerous details of procedure are given both in this specification and in Brit 339,319 and Brit 339,321

Screens for color photography. Harold Wadf Ger 518,066, Jan 25, 1929 See Brit 322,432 (*C A* 24, 2681)

Screens for color photography. Anton Rysavy and Alois Grab Austrian 120,858, Aug 15, 1930 The screens are prepd from fabrics woven from colored fibers, each fiber comprising a no of differently colored filaments twisted together Various methods of prepg the screens are described

Photographic films. I G Farbenind A G (Hermann Lummerzheim, inventor). Ger 515,776, Dec. 23, 1928. Addn to 487,586 (*C A* 24, 1808) A roll film with opaque ends which are not affected by the developing bath, is coated with a layer of dye soln in aq or org solvents which is opaque to actinic rays

Photographic roll films. I G Farbenind A -G Brit 338,741, Nov 29, 1928 The sensitive layer of a roll film with a protective paper backing is covered with transparent foil (which may be made of gelatin, regenerated cellulose, a cellulose ester, ether or ether-ester) colored to serve as a light filter when the film is exposed Cf. *C. A* 25, 887.

Roll films from cellulose acetate. Kodak-Pathé Soc. anon Française. Ger. 515,533, Apr 20, 1927. The back of the film is colored by coating with an alc. soln of magenta and aurine, with or without addn. of naphthalene green.

Photographic negatives. Max Wolfram and Edwin Schaffer. Ger. 515,584, Dec. 20, 1929. Film negatives which can be easily detached from their glass, etc., carriers are prepd by giving the transparent carrier a layer of rubber, gelatin or celluloid soln., before giving them the light sensitive layer.

Paste for over-exposed negatives. Josef Pfeiffer. Austrian 121,139, Sept. 15, 1930 A paste for application to portrait and like negatives showing extremes of contrast comprises finely sifted kieselguhr 1 and tallow 3 parts, with a little $PhNO_2$ or wintergreen oil For landscape and like negatives, only 1 part of tallow is taken, and coarse kieselguhr or tripoli is used instead of fine kieselguhr. The paste is rubbed onto the over-exposed parts, and acts mechanically by removing some of the excess of reduced Ag

Photographic toned prints. Richard Michel. Austrian 121,141, Sept. 15, 1930 In the prepn of toned prints on development papers contg Ag salts by bleaching out, exposing and redeveloping, prints showing two or more tones are obtained by using a bleaching bath contg an iodide and at least one other halide A suitable bath is prepd by adding 0.25–1.5 cc. of 1% KI soln to a soln. of KBr 2, $CuSO_4$ 2 and citric acid 2 g in water 100 cc. Addnl. details are given

Photographic papers. Charles Emdé Fr. 37,318, Aug 8, 1929. Addn. to 676,317 (*C. A.* 24, 2682). Blue variamine salt in aq soln. is used as the diazo compd. to apply on the supports. A little sulfate of Ni or Al and a few g of an org acid may be added

Apparatus for developing photographic paper by use of ammonia. Knud Murck (to Charles Bruning Co.). U. S. 1,795,344, March 10 Structural features.

Photographic layers. I. G Farbenind. A.-G (Walter Frankenburger and Georg Rössler, inventors). Ger. 518,064, Jan 23, 1929 Light-sensitive substances and insensitive substances are suspended together in a colloidal material or a soln. thereof, and the suspension is distributed onto a support in the form of fine particles, *e. g.*, by atomizing the suspension into a hot atm so that a fine powder is obtained,

which is spread on the support. Different light-sensitive substances may be applied to a common support. Thus, for the prepn. of layers useful for color photography, three gelatin emulsions are prepd., each contg a silver halide sensitive to light in a primary color and a correspondingly colored pigment. The emulsions are atomized, and the resulting fine powders are mixed and applied to the support. Details are given also of the prepn. of layers for making anaglyphs.

Anti-halation layers for photographic plates and films. I. G. FARBENIND. A.-G. (Hermann Durr and Wilhelm Schneider, inventors) Ger. 518,363, Feb. 18, 1930. These layers contain dyes obtained by condensing a substituted aromatic aldehyde with a quaternary heterocyclic base contg a reactive Me group. Such dyes are irreversibly decompd. by the developing solns. A suitable dye is obtainable from quinaldine methyl bromide and *p*-dimethylaminobenzaldehyde, or from quinaldine methyl sulfate and piperonal.

Printing on photographic layers. I. G. FARBENIND. A.-G. Fr. 37,317, Aug. 12, 1929. Addn. to 671,009 (*C. A.* 24, 2072). The 2 ends of the band of film are provided on the whole surface of the side of the layer with a color (obtained by the method of the prior patent) impermeable to actinic rays and insol. in photographic treating liquid.

Photographic emulsions. V. L. MAKAROV. Russ. appl. 68,855, April 23, 1930. Photographic emulsion is sprayed on paper or plates with $NH_3$ or AcCl or with air satd. with these compds.

Thioxanthonium or selenoxanthonium dyes for the preparation of photographic bleach-out layers. I. G. FARBENIND. A.-G. (Bruno Wendt and Alfred Fröhlich, inventors). Ger. 518,065, Mar. 1, 1930. Examples are given.

Photographic etching. ALEX B. DAVIS (to Keystone Watch Case Corp.). U. S. 1,797,210, March 17. A photographic resist is prepd. by treating a hydrophobic colloid such as asphalt with a sensitizer comprising a soln. of S chloride in $CS_2$ in a single step, removing the solvent, washing the treated colloid with an ether to increase its sensitivity to light, and dissolving in benzene. U. S. 1,797,211 describes forming a light-sensitive hydrophobic colloid by the reaction of a $CS_2$ soln. of an asphalt-base material with a $CS_2$ soln. of S chloride *en masse*, removing non reacted light-sensitive portions, placing a film of the light sensitive residue on an object to be etched, projecting a design on it, developing and etching. Cf. *C. A.* 24, 2390.

Producing patterns in metal by photography and electrodeposition. OLIVE MILLER NÉE ASSINDER and FREDERICK MILLER. Ger. 515,900, Mar. 23, 1930. A photographic plate having a sol. light sensitive layer is exposed behind a diapositive of the pattern. An elec. conducting material in powder form is allowed to accumulate on the unexposed parts and this deposit is coated with an aq. insol. membrane, to which it adheres. The coatings are then removed and the conductor deposit of the desired pattern plated galvanically with metal.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Coördinated compounds of the alkali metals. III. FREDERICK M. BREWER. *J. Chem. Soc.* 1931, 361–8, cf. *C. A.* 20, 740.—The coördinated compds. of the alkali metals with salicylaldehyde (I) are prepd. The covalency nos. established for the metals in these compds. are Li, 4, Na, 4, K, 4 and 6 (the 6-covalent compd. is formed only with difficulty), Rb, 4 and 6 (only here the 6-covalent compd. is definitely more stable), Cs, 4 and 6 (only a slight difference in the stability of these 2 compds.). Of the compds. prepd. those contg. 4-covalent Na or K are by far the most stable. The compd. contg. 4-covalent Li ($C_7H_5O_2Li$, $C_7H_6O_2$, pale yellow solid) was obtained when dry LiOH was added to I and the mixt. warmed gently. Both the 4-covalent compds. of Na and K with I have been prepd. by Hantzsch (*Ber.* 39, 3089(1906)). Attempts to prep. the compd. contg. 6-covalent Na were unsuccessful. The compd. contg. 6-covalent K ($C_7H_5O_2K$, $2C_7H_6O_2$, pale yellow feathery crystals) was obtained by adding concd. KOH soln. to I, dissolving the resulting solid in a mixt. of alc. and I, crystg., and washing with alc. A mixt. of the compds. contg. 4- and 6-covalent Rb was obtained as almost colorless crystals when powd. $Rb_2CO_3$ was dropped into warm I. On heating these crystals under reduced pressure a residue of *rubidium salicylaldehyde* ($C_7H_5O_2Rb$) was obtained. The compd. contg. 4-covalent Rb($C_7H_5O_2Rb$, $C_7H_6O_2$, colorless crystals which melt indefinitely with decompn.) was prepd. by dissolving $Rb_2CO_3$ in a min. of $H_2O$, adding I contg. a small quantity of alc., warming until the $CO_2$ evolution ceases, cooling, recrystg. from alc. and washing with $Et_2O$. The compd.

contg. 6-covalent Rb ($C_7H_4O_2Rb$, $2C_7H_4O_2$, colorless feathery crystals) was obtained (*a*) by allowing the product of recrystn in the preceding to stand in I for several hrs in the cold, and (*b*) by recrystg. from I contg a min of alc to effect soln. below 100° The compd. contg. 6-covalent Cs ($C_7H_4O_2Cs$, $2C_7H_6O_2$) was prepd by carrying out the initial reaction without alc., recrystg using sufficient $H_2O$ to keep any excess $Cs_2CO_3$ in soln., filtering, washing with $H_2O$, keeping in I for several hrs, filtering and washing with alc. The compd contg 4 covalent Cs ($C_7H_4O_2Cs$, $C_7H_6O_2$, pale yellow cryst solid which melts with decompn at about 165°) was prepd from the initial product by (*a*) washing with $Et_2O$ until a slight decolorization begins, or (*b*) pptg from an alc. soln with $Et_2O$ In the compds prepd, Li alone forms a true coordinated hydrate *Rubidium benzoylacetone* ($C_{10}H_9O_2Rb$, $C_{10}H_{10}O_2$, bright yellow plates which melt to a red liquid at 131°) was prepd by dissolving $Rb_2CO_3$ in an excess of molten benzoylacetone, and recrystg from hot toluene J Balozian

Reactions in the solid state at elevated temperatures. VIII. Reactions of columbium pentoxide and tantalum pentoxide with metallic oxides and alkaline earth carbonates. Wilhelm Jander and Hermann Frey *Z anorg allgem Chem* 196, 321–34(1931), cf *C A* 24, 4974.—This work involved a study of the reactions between BaO, SrO, CaO, MgO, ZnO, CuO, $BaCO_3$, $SrCO_3$ and $CaCO_3$ on the one hand and $Ta_2O_5$ and $Cb_2O_5$ upon the other hand Heating curves, percent decompn and temp pressure curves were detd by different methods The following figures were given for the temp at which a perceptible reaction commenced MgO + $Ta_2O_5$ (485°), ZnO + $Ta_2O_5$ (500°), MgO + $Cb_2O_5$ (500°), ZnO + $Cb_2O_5$ (520°), $BaCO_3$ + $Ta_2O_5$ (480°), $SrCO_3$ + $Ta_2O_5$ (410°), $CaCO_3$ + $Ta_2O_5$ (400°), $BaCO_3$ + $Cb_2O_5$ (450°), $SrCO_3$ + $Cb_2O_5$ (420°) and $CaCO_3$ + $Cb_2O_5$ (380°) The following compds were prepd for the first time $2BaO\ Ta_2O_5$, $4BaO\ Ta_2O_5$, $2SrO\ Ta_2O_5$, $4SrO\ Ta_2O_5$, $4CaO\ Ta_2O_5$, $BaO\ Cb_2O_5$, $4BaO\ Cb_2O_5$, $SrO\ Cb_2O_5$, $4SrO\ Cb_2O_5$ and $5CaO\ Cb_2O_5$. $2CaO\ Ta_2O_5$ and $2CaO \cdot Cb_2O_5$ were also obtained H Stoertz

Obtaining anhydrous aluminum chloride from natural aluminum-containing raw materials. Vict I Spitzyn and O M Gvosdeva *Z anorg allgem Chem* 196, 289–311(1931).—The conditions for obtaining anhyd $AlCl_3$ from kaolin earth and argillaceous earth-coal mixts were studied Cl and HCl gas were used as chlorinating agents. The raw material must first be freed of Fe by heating in a current of HCl gas at 400–900°, wood charcoal was the most successful form of C used In the treatment with HCl gas an excess of C is essential, while with the treatment with Cl this is not necessary, nor is gas velocity of great influence In this reaction, silicic acid is likewise chlorinated Thermodynamic considerations indicate that $Al_2O_3$ acts as a catalyst in promoting the chlorination of $SiO_2$ The chlorination reaction begins at 600° and is accelerated at higher temps, the most favorable conditions occurring at about 800°. In an effort to diminish the chlorination of $SiO_2$, HCl was added to the gas, but this likewise decreased the yield of $AlCl_3$ $SiCl_4$, however, when added to the Cl, suppressed the chlorination of $SiO_2$ without appreciable effect upon the reactivity of the argillaceous earths. H. Stoertz

Crystallization of copper from molten cuprous chloride. V. Simonen *Z Elektrochem* 37, 80–2(1931).—Cu crystd out in dendritic form in the cooler portions of CuCl unevenly heated to 370–470°. The reaction taking place in the melt was $2CuCl \leftrightarrows Cu + CuCl_2$ G T. Motok

Some copper mercaptides and their reaction with carbon disulfide. W. E Duncan, Emil Ott and E Emmet Reid *Ind Eng Chem* 23, 381–4(1931).—*By the interaction of solns of mercaptides in* $C_6H_6$ *with an aq soln of* $(AcO)_2Cu$, the complete series of cuprous mercaptides from Me to *n* nonyl and from *sec*-Pr to *sec* nonyl was prepd They react with S in a way similar to that observed for the Pb salts (*C A*. 24, 4758) They add $CS_2$ to form alkyl cuprous trithiocarbonates No basic Cu mercaptides were formed Louise Kelley

Hydrogen fluoride and its solutions. J. H. Simons. *Chem Reviews* 8, 213–35 (1931), cf *C A* 25, 861.—S. discusses the following the prepn of anhyd HF; the technic of handling HF, the chem and phys properties of HF; its mol structure; the soly of substances in anhyd liquid HF, which acts as a polar solvent very similar to $H_2O$; the conductance of solns in anhyd. HF of salts, inorg and org acids, alcs, $Me_2CO$ and $Et_2O$, the system $C_6H_6$-HF. Louise Kelley

The decomposition of Carborundum by a mixture of hydrofluoric and nitric acids. N. Slomnesco *Compt rend* 192, 361(1931).—Finely divided SiC is decompd by treatment with concd HF and a little concd $HNO_3$ for a period of 15 days The liberation of gas marks the progress of the reaction. F. W. Laird

Thiophosgene and some of its strange derivatives. Albert Hutin. *Rev gén.*

*m et plastiques* 7, 95–7(1931) —A few of the reactions of $CSCl_2$ are very briefly outlined
A Papineau-Couture

Preparation of hydrocyanic acid by oxidation of ammonium thiocyanate or thiocyanic acid with nitric acid. W Gluud and K. Keller. *Ber ges Kohlentechnik* 3, 395–419(1931) cf *C A* 24, 2684 —In the oxidation of $NH_4CNS$ with $HNO_3$, to get a good yield of HCN it is necessary to count on a 10% loss of $NH_3$ and NO, because of the fact that $HNO_2$ is formed which in turn forms $NH_4NO_2$ and this is decompd into N and $H_2O$ If $NH_4CNS$ however, is first converted into HCNS by treatment with $H_2SO_4$, oxidation of the free acid to HCN can be brought about without this loss of N The reaction proceeds according to the equation $HCNS + 2HNO_3 \longrightarrow HCN + H_2SO_4 + 2NO$ A study made of the most favorable conditions of concn showed that if a soln of HCNS contg about 20 g per 100 cc is treated with $HNO_3$ soln contg. about 40 g per 100 cc a 95% yield of HCN can be obtained with very little loss of NO or $HNO_3$ This represents 3–4 moles of $HNO_3$ per mole of HCNS, or a 100% excess of $HNO_3$ Expts were made on a larger scale with the following results To manuf 1000 kg of HCN from 17% HCNS soln., 14,350 kg of the HCNS soln., 13,950 kg of $HNO_3$ (52.8%), 8.4 cu m of reaction water, 43.8 cu m. of cooling $H_2O$ and 10 kw hrs of elec. energy were required This yielded, in addn to the HCN, 2300 kg of NO gas and 3820 kg $H_2SO_4$
H Stoertz

Constitution of cyanogen halides II. Refractometric study of cyanogen chloride and iodide. Enrique V Zappi *Bull soc chim* [4], 47, 537–45(1930).—See *C. A* 24, 3248
E M. Symmes

Refractometric study of chromic acid reduction. Georg Grasser and Hiroshi Ohoki *J Faculty Agr Hokkaido Imp Univ* 27, Pt. 2, 289–94(1930) —Changes in *n* accompanying reduction by a wide variety of reducing agents are described
H B Merrill

Liquid hydrogen sulfide as a reaction medium. John A Wilkinson *Chem Reviews* 8, 237–50(1931) —Liquid $H_2S$ is discussed in regard to the following points its prepn its phys properties its action as a solvent for org and inorg substances, conductance of solns of org substances, particularly thiol and dithio acids, and inorg. substances in liquid $H_2S$ thiohydrolysis, or the metathetical reaction of $H_2S$ with other substances such as the chlorides of P, As, Sb, Bi and esters of $CH_3COSH$, its reaction with various substances, such as liquid $SO_2$ CaO, $CaC_2$, nitriles and Grignard reagents
Louise Kelley

The polysulfides of the alkali metals. II. Lithium. Thomas G Pearson and Percy L Robinson *J Chem Soc* 1931, 413–20, cf *C A* 24, 4724 —An attempt to prep Li polysulfides from soln (by the action of S on $Li_2S$ in alc., alc.-$H_2O$ and $H_2O$ solns (I), and on LiHS in anhyd alc. soln (II)) and by dry methods (by the action of S on $Li_2CO_3$ (or LiOH) (III), and on molten Li (IV)) In I polysulfide solns are obtained, which, however, could not be crystd. In II the primary product is $Li_2S_4$, providing the S is in sufficient quantity, as demanded by $2LiHS + 3S = Li_2S_4 + H_2S$ On crystn of the resulting soln. at room temps. $Li_2S_4.2C_2H_5OH$ is obtained, while at the b p $Li_2S_2.C_2H_5OH$ is obtained When S is used in smaller quantity than is demanded by the equation a mixt. of $Li_2S_4$ and LiHS results. In III a reaction first starts at 200°, giving thiosulfate and polysulfide, at 400° some S and thiosulfate are formed, and at 700° polysulfide, sulfate and small quantities of thiosulfate and sulfite are produced In IV there is no reaction until 0.5 g atom of S has been added to 1 g atom of Li, when it takes place with explosive violence, giving principally $Li_2S$ and small quantities of polysulfide A study of the system $Li_2S$–S shows that at atm. pressure only $Li_2S$ (stable at its m p, 900–975°) and $Li_2S_2$ (slightly decompd. at its m. p, 369.5°) are stable.
J. Balozian

Autoxidation of phosphorus in carbon tetrachloride solution. Bruno Blaser. *Ber* 64B, 614–9(1931) —Besson (*Compt rend* 125, 1033(1897)) found that when dry air was conducted through suspensions of colorless P in $CCl_4$ there was formed a pale yellow ppt. from which he obtained $P_2O$ Blaser has studied this reaction quantitatively, using suspensions of finely divided P and an app similar to that of Willstätter (*C A* 9, 308) With absorption of O, a pale yellow, voluminous ppt. began to sep The velocity of oxidation was found to depend very much upon the temp and the purity of the solns Analysis of the product gave a P.O ratio of 2:3. The same product was obtained when P was used in excess The compd. is not $P_4O_4$, but is probably a new trioxide, $(P_2O_3)_x$. Its lack of color and the fact that no P can be extd. from it with solvents indicate that it does not contain impurities, yet its lack of the essential outward signs of homogeneity—m p, b p, crystal form and soly—demands further expts to prove that it is a chem individual The new compd was very hygroscopic.

Dried *in vacuo* it became white. It did not decomp. at 100° *in vacuo;* at a higher temp. it decompd. but did not melt In air at room temp. the white compd turned yellow and smelled of H phosphide, at a higher temp the yellow portions became red and P was formed. When some of the compd., suspended in $CCl_4$, was added carefully to cold $H_2O$, a yellow ppt. was obtained which was apparently identical with the $P_2O$ described by Besson LOUISE KELLEY

The nature of hydrates of iron oxide. E YA RODE. *J Russ Phys-Chem Soc* 62, 1443–52(1930).—An investigation was made of temp.-dehydration curves of artificially prepd iron oxide gel, of samples of granular lake-ore (Lake Pialo, Olonetzk Gov.), xanthosiderite, brown ore (Ural, Baikal) and of göthite. The results agree with previous investigations in regard to the existence of 3 classes of natural hydrates of iron oxide, α-, β- and γ- S L MADORSKY

The mechanism of the formation of nitric esters. ROBERT C FARMER. *J Soc Chem Ind* 50, 75–8T(1931).—F discusses "pseudo acids," as designated by Hantzsch (*C A* 17, 2983), and shows that esterification is a property of the pseudo form and is complementary to the acidic or salt forming function. Dil $HNO_3$ solns. contain only small quantities of pseudonitric acid (I), $HNO_3$ solns more concd. than 78% ($HNO_3$-$H_2O$) contain large amts. of I. Addn of large amts. of $H_2SO_4$ may decrease the amt. of I, on account of the formation of nitronium sulfate, $(HO)_2N(SO_4H)_2$. F. shows that formation of cellulose nitrate occurs with $HNO_3$ of above 78% concn in the absence of $H_2SO_4$, or with concd $HNO_3$ in the presence of $P_2O_5$ or $N_2O_5$. F. states that the $H_2SO_4$ used in nitrations does not have the "pioneering" action of first forming sulfates, but acts only in dehydration The formation of cellulose nitrate takes place best when about 10% of $H_2O$ is present. With less than this, or in the presence of more than the usual amt. of $H_2SO_4$, the nitrating action is suppressed, because of the formation of nitronium sulfate The fact that with mixed acid principally nitrates are formed, the difficulty of formation of sulfuric esters, and the use of alkyl sulfates in alkylation are explained by the reluctance of $H_2SO_4$ to form the pseudo acid. It is pointed out that the nitration of aromatic compds. is a function of the I present, and is suppressed except at higher temp where nitronium sulfate is unstable, by the use of large proportions of $H_2SO_4$. Numerous references are given to the literature on pseudo acids and nitration of cellulose. G. R. YOHE

Contribution to the ebullioscopic study of complexes formed by the halides of cadmium and the corresponding alkaline halides. MLLE O HUN *Compt. rend.* 192, 355–6(1931), cf. *C. A.* 24, 5251.—Evidence is presented indicating the formation of $(NH_4)_2CdCl_4$, $(NH_4)_2CdBr_4$ and $Na_2CdI_4$. For the chlorides and iodides the stability of these complexes decreases in passing from K to $NH_4$ to Na, while in the case of the bromides there is an inversion between Na and $NH_4$. The affinity of these different complexes increases for the same alkali in going from Cl to Br to I. F. W. L.

Nitroso- and isonitrosoferropentacyanide derivatives from nitroprussiates. L CAMBI WITH A. CAGNASSO AND T RICCI. *Gazz. chim. ital.* 61, 3–13(1931).—The present paper deals with the ferropentacyanides which are formed by condensation of alk. nitroprussiates with substances which contain :$CH_2$ groups with mobile H. New reactions between nitroprussiates and aliphatic $NO_2$ compds., cyanoacetic acid esters, Ph$CH_2CN$ and its derivs. and indole, which are described, confirm the mechanism of the reactions and the structure of the colored complexes already suggested by C. (cf. *C. A* 7, 2551; 9, 451; 21, 1941), and data based on an x ray examn. of aq. isonitrosoferropentacyanide derivs. of MeAc, acetylacetone, PhAc, $AcCO_2H$ and indole confirm the structure of the complexes. $EtNO_2$ (2.37 g.) added to satd. K nitroprussiate (3.79 g.) in MeOH, cooled to 0° in an inert atm., EtOK (from 2.34 g. of K) added, the pptd. salt (which changes immediately from red to greenish gray) sepd. in an inert atm., dried, washed with MeOH and then with abs. $Et_2O$, dried *in vacuo*, dissolved in very dil. $H_2SO_4$, extd. with $Et_2O$, evapd. and the residue recrystd. from $CHCl_3$, yields ethylnitrolic acid, m. 81° (decompn.). The same procedure was used with Na nitroprussiate (7.83 g.), $NCCH_2CO_2Et$ (3.39 g.) and NaOEt (from 1.38 g. of Na). The bright red salt when dried became yellow, and it also turned yellow in contact with water. The dry salt was decompd. as before, the product was extd. with $Et_2O$ and purified from $C_6H_6$, which yielded NCC(:NOH)$CO_2Et$ (cf. *Ber.* 42, 736 (1900)). With $PhCH_2CN$, the Na salt formed in abs. MeOH is red and is still more unstable than the preceding ones, changing to yellow. Decompn. as before yields an oxime which m. 105° and which after again solidifying m. 129°, probably as a result of isomerization. The compd. which m. 105° also m. 129° after recrystn. from water. It is therefore PhC(:NOH)CN (cf. Zimmermann, *J. prakt. Chem.* [2], 66, 361(1855)). The yield is 100%. Under the same conditions, *p*-$O_2NC_6H_4CH_2CN$ forms a dark red complex compd. which

changes rapidly to green Decompd and dried, it forms an oxime, $C_8H_5O_2N_3$, m 95°, which confirms the data of Zimmermann (*loc cit*) for $p$-$O_2NC_6H_4C(:NOH)CN$ Similar results were obtained with other derivs of $PhCH_2CN$ The yields of isonitronitrile in all cases were 85%, based on the nitroprussiate Even in dil EtOH, indole condenses with nitroprussiates, with formation of intense blue complexes K (0.85 g) in abs MeOH (35 cc) added to K nitroprussiate (2.97 g) *and indole* (1.17 g) in abs MeOH (50 cc) and the product washed with MeOH and abs $Et_2O$ yields the *complex salt* $K_4[C_8H_6ON_2Fe(CN)_5]$, probably contg the residue of nitroso- or isonitrosoindole It is violet black and strongly hygroscopic and its concd aq solns, which are violet, become indigo blue when dild as a result of the formation of the *acid salt* $K_3[C_8H_7ON_2Fe(CN)_5]$, which is also deliquescent and is stable in water. Decompn did not lead to well defined stable complexes Under the same conditions as in the prepn of $K_4[C_8H_6ON_2Fe(CN)_5]$, α *methylindole gives a reddish product which was not identified* β Methylindole does not react, which makes it probable that in the formation of $K_4[C_8H_6ON_2Fe(CN)_5]$ and the reddish product above, the NO group enters in the β position of indole, as has been verified by Angeli in the reaction of ale nitrites The results of the x ray examn are shown graphically The examn was limited to the visible field because of the tendency to decompn The greater stability of $K_3[C_8H_7ON_2Fe(CN)_5]$ allowed measurements in the ultra violet region With MeAc, acetylacetone *and* $AcCO_2H$, the salts prepd in water were compared with aq solns of the same salts prepd in abs MeOH For comparison, the results with the PhNO complex (cf Cambi and Ricci, *C A* 20, 1769, 24, 4231) are also given The complex salts of $AcCO_2H$ PhAc and indole when in dil aq soln, corresponding to the acid salts, show absorption bands similar to that of the pentacyanide from PhNO, viz, from $\nu = 490 \times 10^{-12}$ to $640 \times 10^{-12}$ Because of the displacement caused by various radicals united to the N of the NO group, this band is probably evidence of the similar chromophore group in the salts in question The results show that alcoholates do not, as do alkalies, transform nitroprussiates into nitritocyanides, and that when the reaction can be carried out in water, the same products are obtained as in MeOH (except for $(H_2N)_2CS$ and arylhydroxylamines, cf C, *C A* 24, 4231) *The structure of the isonitrosoferropentacyanide derivs of nitroprussiates* A detailed discussion of the structural problem is included based both on the previous and present expts of C and on expts by others (cf C *loc cit* C and Szegö *C A* 22, 2722, C and Ricci, *loc cit*, Pfeiffer and Richarz *C A* 22, 1291, Tarugi *C A* 22, 1291, Zwikker, *C A* 24, 4259) In some cases the acid salts which are formed from primary nitroso complexes by weak acids or by great dilu of their aq solns are relatively stable They probably contain the oxime group thus $(NC)_5Fe{-}N{=}C{<}$, but in some salts at least the NO group may be present $(NC)_5Fe{-}NC{<}$ In this connection the facts are significant that the complexes obtained from arylnitroso derivs of the type $[(NC)_5Fe\cdot NPh]Na_2$ are comparable in all their properties to nitroso- and isonitrosopentacyanides (cf. *C A* 20, 1769 24, 4231), and that the great stability of $K_3[C_8H_7ON_2Fe(CN)_5]$ is comparable only with that of derivs of arylnitroso compds, which it resembles insofar as it contains the NO united *to the aromatic heterocyclic nucleus* The expts described in the present paper confirm the structures already suggested In the reaction of nitroprussiates with $EtNO_2$, $NCCH_2CO_2Et$, $PhCH_2CN$, etc, it is probable that the salts initially formed, which are intensely colored, isomerize with loss of the characteristic *chromophore* group $(NC)_5FeN{=}C{=}$, which passes to $(NC)_5Fe{-}O{-}N{=}C{=}$, which in turn undergoes cleavage, with loss of the oxime anion With $PhCH_2CN$, the transformation would be $[(NC)_5FeN{=}C(CN)Ph]Na_4$ (red) ⟶ $[(NC)_5Fe{-}O{-}N{=}C(CN)Ph]Na_4$ (yellow)

C C. Davis

The color reactions of *octacyanomolybdates*. *G A* Barbieri *Atti accad Lincei* 12, 148–53(1930).—There are 2 series of compds, $K_4Mo(CN)_8 2H_2O$ and $K_3Mo(CN)_8$, in which Mo has a valence of IV and V, respectively, which are analogous to ferro- and ferricyanides To bring out this similarity further their reactions with Fe salts have been studied $Mo(CN)_8^{IV}$ with ferric ions in acid soln gives a deep blue

color, while $Mo(CN)_6^{III}$ does not However, the blue is less stable, as no ppt. forms, the colored material being present in colloidal form Addn. of Cu or Ag salts ppts the corresponding salt Similarly, ferrous salts with $Mo(CN)_6^{III}$ give blue coloration (*Turnbull blue*) Uranyl acetate behaves in the same way, giving a red brown color with the IV-ion, but no color with the III ion. The Ag salt of IV is yellow, while that of III is red brown, corresponding to the ferro- and ferri-silver salts A. W. C.

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The decomposition tension of anhydrous uranyl nitrate and of anhydrous $Th(NO_3)_4$ (Misciatelli) 2.

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Canales Toro, María Metales de la tierras raras. Santiago, Chile Imprenta nacional 48 pp

A Text Book of Inorganic Chemistry. Edited by J Newton Friend Vol. VII, Part 2. Sulphur, Selenium and Tellurium. By R. H Vallance, D F. Twiss and A R. Russell. Philadelphia. Lippincott. 391 pp $14 Reviewed in *Chem. Trade J* 88, 314(1931)

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## 7—ANALYTICAL CHEMISTRY

W T HALL

An aid to calculations in gas analyses. Jürgen Schmidt *Chem. Fabrik* 1931, 137–8.—A nomogram for calcg $H_2$ and $CH_4$ is given J. H. Moore

Use of steam for Kjeldahl distillation of nitrogen. Jesse Green *Ind. Eng. Chem., Anal. Ed* 3, 160–1(1931).—Constructional details and efficiency data are given. B A Soule

Quantitative studies on the boric acid-alcohol flame test. Woldemar Stahl. *Z anal. Chem.* 83, 268–89(1931).—See *C A* 25, 1455. W. T. H.

Notes on qualitative microchemical analysis. J. Mika *Bányás. Kohás. Lapok* 63, 89–97(1930).—Present qual methods are described. S S de Finály

Importance of microanalysis. D Kiss. *Technika* 10, 146–7(1929).—The development of microanalysis and a summary of its advantages over macroanalysis are given. S S. de Finály

Microanalysis with an ordinary balance. I. Determination of nitrogen by micro-Dumas method. Wm J Saschek. *Ind Eng Chem., Anal Ed* 3, 198–9(1931).—A comparatively large sample of substance (0 1 g ) is ground up with a large amt. of finely pptd CuO and an aliquot portion of the mixt (about 0.2 g ) weighed on an ordinary analytical balance for analysis The error in sampling in practice is less than 0 01% as calcd. by the Baule and Benedetti-Pichler formula When the mixt. is weighed with an accuracy of 0 1 mg on an ordinary balance, the substance under analysis has been weighed to 0 001 mg , which is the accuracy of the microbalance. N detns. were made of *o* toluamide, acetanilide, azobenzene and benzamide by the Pregl-Dumas method with satisfying accuracy. L. T. Fairhall

Microacidimetric studies. I. J. Mika. *Mikrochemie* 3, 143–64(1931).—A theoretical discussion of the errors involved in microacidimetric work. The proper quantities of methyl red, bromothymol blue, phenol red, phenolphthalein, thymolphthalein and alizarin red for microchem work are worked out W. T. H.

Colorimetric investigations of indicators in presence of neutral salts. N. V. Sidgwick, W. J. Worboys and L A Woodward *Proc. Roy. Soc* (London) 129A, 537–49(1930).—The change of color exhibited by a definite concn. of an indicator in a soln of given $p_H$ on the addn. of a neutral salt is investigated by a colorimetric method An optical wedge is employed in conjunction with a Lindemann electrometer and a Rb photoelec cell, *the light absorption being measured by means of the wedge shift.* The photoelec effect enters into the method only as a null-point observation The Tizard relation $K = [H]\ (C_1-C)/(C-1)$ is used, where $K$ is the apparent dissocn. const. of the indicator acid, $C$ the color of a slightly alk soln of methyl orange at a given concn and $C_1$ the relative color, which is the ratio of the color of any other soln. to the unit color A correction is made for the part of the H ions combined with the indicator anions to form undissocd indicator acid Detns of $K$ are made in the absence of neutral salts with varying concns. of HCl, and a method is described for studying the possibilities that the neutral salt may alter the absorption bands of the colored forms of the indicator, and that it may affect the chem equil between these forms. The first possibility is studied independently of the second by dealing with solns. in which the indi-

cator is completely in the yellow or the red forms. Measurements are also made of the dissocn. const. of methyl orange in the presence of varying concns. of several salts (NaCl, NaBr, $NaO_3Cl$, $NaNO_3$, KCl and KBr), the concn. of the indicator being $N/40,000$. For NaCl, $K$ rises to a max. between 0.05 $N$ and 0.1 $N$ and afterward falls. A series of measurements was also carried out with a const. quantity of AcOH-$NH_4OH$ buffer, instead of HCl, at an indicator concn. of $N/53,000$, and the results were of the same type for all salts: the value of $[H^+_{free}]$ rises with increase of salt concn., passing through a max. at about 0.5 $N$. The theoretical significance of these results is discussed.
A. L. Henne

Determinations by Wood light. A. G. Nasini and P. De Cori. *Atti III congresso naz. chim. pura applicata* 1930, 668–78.—The use of eosin, coumarin, umbelliferone, quinine, naphtholsulfonic acids, fluorescein, acridine, dichlorofluorescein and β-methylumbelliferone as fluorescent indicators for dark solns. is reviewed. The $p_H$ of the soln. affects the intensity of the light emitted. Detns. were made on black liquor, sulfuretted oils, wines, beers, acid $FeSO_4$ solns. and com. indigo carmine, certain advantages as well as difficulties in the use of fluorescent indicators being shown.
L. M. Symmes

Volumetric determination of selenium. B. Ormont. *Z. anal. Chem.* 83, 338–9 (1931).—Benesch (*C. A.* 23, 790) proposed a method for detg. Se based upon titrating a $Na_2S$ soln. with KCN. It is pointed out that Se forms the compd. $Na_2SSe_2.5H_2O$ when it dissolves in $Na_2S$, instead of a colloidal soln. of Se as B. assumed. It seems probable that difficulties will be encountered in practice in attempting to det. Se by this method.
W. T. H.

The microchemical determination of strontium. L. de Zombory. *Technika* 10, 147–9(1929).—The Sr (4–5 mg.) is pptd. as $SrCO_3$ and weighed after drying at 150°; or the ppt. can be treated with $H_2SO_4$ and weighed as $SrSO_4$.
S. S. de Finály

Separation of iron-titanium-aluminum in tartrate solution. Erich Schwarz von Bergkampf. *Z. anal. Chem.* 83, 345–50(1931).—A satisfactory sepn. of Fe, Al and Ti (corresponding to 0.084 g. $Fe_2O_3$, 0.018 g. $TiO_2$ and 0.07 g. $Al_2O_3$) was accomplished by first reducing the $Fe^{+++}$ with $H_2S$ in acid soln., making slightly ammoniacal and pptg. FeS with $H_2S$, making acid with $H_2SO_4$ and pptg. Ti with cupferron, and finally pptg. Al with oxine acetate in ammoniacal soln. The presence of V caused trouble.
W. T. H.

Determination and separation of lead and bismuth by the volumetric filtration method. Hans Th. Bucherer and F. W. Meier. *Z. anal. Chem.* 83, 352–61(1931).—*B.* and *M.* (*C. A.* 25, 47) have shown the advantages of carrying out quant. pptns. with measurement of the vol. of reagent required to effect complete pptn. as detd. by filtering the soln. and testing with more reagent and also with a soln. contg. the ion to be pptd. For detg. Pb, pptn. as $PbSO_4$, as $Pb_3(PO_4)_2$, as $PbCrO_4$ and as $PbSeO_3$ was tested, and the last two methods proved suitable for this kind of an analysis. For pptn. of Bi, a 0.015–0.02 *M* soln. of $H_2SeO_3$ is suitable. The Bi selenite is formed in 0.05–0.08 $N$ $HNO_3$ soln., but $HNO_3$ prevents the pptn. of the corresponding Pb salt. For the detn. of Bi and Pb, therefore, make the soln. 0.05–0.08 $N$ in $HNO_3$ (0.15 g. Bi or less) and the vol. of soln. about 100 cc. Heat to 70° and add the $H_2SeO_3$ soln. with shaking. Toward the end of the reaction, heat to boiling. After the detn. of the Bi, add an excess of NaOAc, heat to 80–90° and ppt. the Pb (0.1 g. or less) with the same $H_2SeO_3$ soln. or with $K_2Cr_2O_7$ soln. The results obtained in 8 analyses all agreed within 0.23 mg. (1.5% of the Pb content).
W. T. H.

Separation of magnesium from potassium and sodium in the analysis for cations. G. Kalikinskii. *J. Russ. Phys.-Chem. Soc.* 62, 1355–6(1930).—After the pptn. and filtration of $MgNH_4PO_4$, the excess $PO_4^{---}$ is removed by adding $CaCO_3$, and the filtrate from the $Ca_3(PO_4)_2$ ppt. is divided into 2 portions and sep. tests made for $Na^+$ and $K^+$.
S. L. Madorsky

Microdetermination of calcium and magnesium in the presence of each other. K. L. Malyarov. *Mikrochemie* 3, 132–5(1931).—If not over 10 mg. of CaO or MgO (as carbonate, oxide or hydroxide) and only very little, if any, alkali carbonate is present, a satisfactory sepn. and detn. can be accomplished by taking advantage of the fact that CaO is quite sol. in water and MgO is not appreciably sol. Ignite the sample for some time, preferably over the blast lamp, cool in a desiccator over soda lime or KOH and then dissolve the CaO by means of 60–80 cc. of hot water free from $CO_2$. Filter and titrate the filtrate with 0.05–0.02 $N$ HCl with methyl orange as indicator. Dissolve the residual MgO in a measured vol. of the HCl and titrate the excess acid with NaOH.
W. T. H.

Determination of calcium and magnesium by titrating in the same solution. K. L.

MALYAROV *J. Russ Phys Chem. Soc.* 62, 1529–31(1930).—Ca is pptd. by means of oxalic acid, and then, without filtration, Mg is pptd. as hydroxide from the same soln. by means of KOH. The two can then be detd. microanalytically, without sepn., in the following way: Mg is detd. by titrating with $H_2SO_4$, and Ca is detd. by titrating with $KMnO_4$. The soln., however, must be free from $NH_4$ salts, and the amt. of MgO must not exceed 0.01 g. S. L. MADORSKY

Detection of gold, palladium and silver with dimethylaminobenzylidenerhodanine. F. FEIGL, P. KRUMHOLZ AND E. RAJMANN. *Mikrochemie* 3, 165–73(1931).—*p*-Dimethylaminobenzylidenerhodanine, $S\overline{CS.NH.CO}\,C{:}CHC_6H_4NMe_2$, can be used to advantage for the detection of Au, Pd and Ag. To detect Ag in the presence of Au, Pt, Pd and Hg, take a drop of the soln. on a spot plate, mix it with a drop of 10% KCN soln., add 1 drop of the reagent dissolved in alc. and make acid with a few drops of $HNO_3$; a violet ring forms if Ag is present. Cu must be absent, as it also gives a color reaction with the reagent. 0.001 mg. of Ag can be detected in the presence of 1000 times as much Hg, 4000 times as much Au and 300 times as much Pd. Au, like Ag, gives a colored ppt. with the reagent. The reddish violet ppt. can be used as a test in a test tube or on the spot plate. After adding the reagent, its excess can be removed by shaking with ether, and a red skin will form at the layer between the 2 solns. Palladous salts give a violet ppt. Of the other Pt metals, Pt and Ir also give tests with the reagent, but not so readily; so it is possible to test for Pd in the presence of other Pt metals. Pd can also be detected in the presence of Ag if the latter is first converted into $[AgBr_2]^-$. If Au is present, it can be reduced to metal by treatment with alkali nitrite in a soln. kept neutral by the addn. of an excess of $CaCO_3$. W. T. H.

Determining molybdenum in steel. H. C. WEIRICK AND C. H. MCCOLLAM. *Heat Treating and Forging* 16, 1145–6, 1155(1930).—In the detn. of Mo by the $PbMoO_4$ method 2 sources of error may appear: (1) the interference of elements other than Mo, (2) errors found in the method itself. If Al or V is indicated by sep. analysis, either the sulfide pptn. or the colorimetric method (Maag and McC., *C. A.* 19, 1675) should be used. In carrying out the procedure frequent blanks must be made on the reagents to check their purity; the Pb and the $NH_4$ acetate solns. should be reasonably fresh; the NaOH should be of high purity, and the correct amt. of HCl should be added. J. BALOZIAN

Detection of fluorine in plants and soils. PAUL RECKENDORFER. *Mikrochemie* 3, 126–31(1931).—The method depends upon the combustion in a calorimetric bomb with $O_2$ at a pressure of 25 atm. About 2 g. of the sample was compressed to a small pill, and this pill was covered with a cotton wick. A little 20% KOH soln. was also placed in the bomb. The combustion was effected as in the detn. of the heating value of coal. After the combustion the ash and the KOH soln. were examd. separately for F, the test depending upon volatilization as $SiF_4$ by treatment with $SiO_2$ and $H_2SO_4$ and carrying out the molybdate-benzidine test for the sol. Si compd. By means of soil and plant tests it was shown in one case that the F content of a plant was due to fumes and not to absorption from the soil. W. T. H.

Rapid determination of small quantities of boric acid by the intensity of the flame coloration. WOLDEMAR STAHL. *Z. anal. Chem.* 83, 340–4(1931); *Acta Univ. Latvensis Kim. Fakultat Serija* 1, 401–7 (in Lettish), 407 (in German).—With the aid of turmeric paper and standard solns., Bertrand and Agulhon (*C. A.* 8, 2005) detd. 0.0005 to 0.1 mg. of B. By means of the green flame test with $Me_2BO_3$ it is easy to det. 0.3 mg. of $B_2O_3$ or more with an accuracy of 0–15%. For this purpose it is necessary to have a colorimetric scale, produced with standard solns. of known B content, 3 Bunsen burners of the same size, and an app. suitable for introducing equal vols. of air through the soln. being tested and through 2 standard solns. The best mixt. consists of 100 vols. of MeOH and 20 vols. of $H_2SO_4$. Directions are given in detail and the results of many tests are included. W. T. H.

Titration of sulfate in the presence of ferric ions. L. DE ZOMBORY. *Technika* 10, 192–3(1929).—If 1–3 cc. of dil. $H_3PO_4$ is added to a soln. contg. $SO^{--}$ and $Fe^{+++}$, then an excess of 0.5 *N* $BaCl_2$ soln. should be added. The excess $BaCl_2$ can be detd. by titration with 0.2 *N* alkali or $NH_4$ sulfate soln. in the presence of 5–10 drops of 0.25% Na rhodizonate soln. as an indicator. The red color changes to a greenish white at the end point. S. S. DE FINÁLY

Method for the estimation of iron in biological material. ROBERT HILL. *Proc. Roy. Soc.* (London) B107, 205–14(1930).—Addn. of $\alpha\alpha'$-dipyridyl to a soln. of a ferrous salt between $p_H$ 3.5 and 8.5 yields an intense red complex ferrous ion. The color is not influenced by the presence of other metals unless they are present in great excess over the Fe

Their presence may be overcome by use of sufficient excess of the reagent to insure complete transformation of the Fe into its dipyridyl complex $Fe^{+++}$, except in high concn., gives no color and does not interfere with the reaction for $Fe^{++}$. Both $Fe^{++}$ and $Fe^{+++}$ may be detd. by addn. of dipyridyl and measurement of the intensity of the pink color both prior to and after reduction. The best reducing agent for this purpose is $Na_2S_2O_4$ prepd. as follows. To an almost satd. soln. of $Na_2S_2O_4$ at 40° add sufficient $\alpha\alpha'$ dipyridyl to produce the max. red color (traces of $Fe^{++}$), filter rapidly on a Buchner funnel, and ppt. $Na_2S_2O_4$ from the filtrate with alc. Let stand 20 min., collect the ppt. on a filter, wash with 70% alc. until colorless, then with 97% alc. Boil with 97% alc. for 10 min., filter immediately and transfer the salt at once to a vacuum desiccator contg. $H_2SO_4$. Hydrazine hydrate may also be used as a reducing agent at a temp. of 40°. $\alpha\alpha'$-Dipyridyl does not react with reduced hematin or pyridine hemochromogen and does not remove Fe from hematin, it inhibits the catalytic reactions of Fe ions. Iodides, tungstates, alkaloidal reagents and $Fe(CNS)_3$ + HCl tend to interfere with the development of the red color usually by causing formation of a ppt. Permanent standards are prepd. by sealing 5 cc. of a standard soln. in a tube 1.3 cm. in diam. and 8 cm. long. The standard solns. are prepd. from 2 stock solns., 0.01 *M* ferrous ammonium sulfate, and 0.03 *M* $\alpha\alpha'$ dipyridyl HCl, these solns. are equiv. from the viewpoint of the colored complex ion. The most concd. standard is 0.0001 *M* ferrous dipyridyl, contg. twice the theoretical amt. of the dipyridyl group, it is prepd. from the 2 stock solns., acetate buffer and a trace of $Na_2S_2O_4$. From this standard are prepd. 23 addn. standards, contg. from 0.0051 to 0.00056 mg. $Fe^{++}$ per cc., acetate buffer soln. being used as the diluent. $SO_2$ is passed into the Standards prior to sealing in order to insure their permanence. The $p_H$ of unknown solns. is brought within the proper limits by addn. of a soln. of Fe-free AcONa contg. AcOH. The ferrous dipyridyl may be adsorbed by proteins in neutral, slightly alk. or even slightly acid solns., this usually may be prevented by use of AcONa plus $SO_2$, or of 30% alc. These procedures may be used for the detn. of Fe in biol. material without previous incineration. Baker's yeast contained 0.0016% non-hematin $Fe^{+++}$, hen egg yolk 0.0085% $Fe^{+++}$ probably as colloidal $Fe(OH)_3$. At $p_H$ 7.3 low concns. of $\alpha\alpha'$-dipyridyl inhibit the catalysis of the oxidation of cysteine by Fe but have no influence on the action of Cu on this reaction.

JOSEPH S. HEPBURN

Determination of gold in animal substances. S. TUKATS AND M. LEINZINGER. *Magyar Gyógyszerészitud. Társaság Értesitoje* 6, 43–54(1930).—Treat the sample with concd. $HNO_3$, evap. and heat the residue in an elec. oven to about 300°. To the ash add 3 cc. HCl and 30 cc. of $CaOCl_2$ soln. and evap. to dryness. Add 1–2 drops of 25% $HNO_3$, 2 cc. of fresh $Cl_2$-water and 5 cc. of water. Add 1–2 drops $H_3PO_4$ and boil 10–15 min. to remove Cl. The soln. is now ready for an electrolytic, gravimetric or iodometric detn.

S. S. DE FINÁLY

The Nessler reagent and its action on reducing sugars. LIVIO PAVOLINI. *Chim. ind. agr. biol.* 7, 39–40(1931).—Instead of Fehling soln., which is blue and does not permit a good observation of the color changes, P. proposes Nessler soln. (alk. soln. of $K_2HgI_4$) for the detection of sugars. 5 cc. of cold soln. contg. 0.1–0.2 g. sugar are treated with 0.5 cc. of reagent and shaken; a yellow or green-yellow ppt. is obtained with glucose, lactose, fructose and dextrin. Sucrose does not give the test.

G. A. B.

Microdetermination of glucosides in plant materials, with emphasis on the difficulties. ANNELIESE NIETHAMMER. *Mikrochemie* 3, 136–42(1931).—Rosenthaler (*C. A.* 24, 3531) has indicated the advantages of sublimation tests for the identification of glucosides in plant materials. His work is confirmed by studies on the bark of the wild horse chestnut contg. esculin, seeds of the yellow wattle and of cow wheat contg. rhinanthin, bark and leaves of the elder contg. syringin, leaves of the common leek contg. saponarin, digitalis plants contg. digitonin and bark of the *Salix caprea* contg. salicin. The glucosides to be sure, undergo slight decompn. during the sublimation, but the sublimate usually yields crystals which can be identified, particularly after treatment with Br-KBr soln.

W. T. H.

The determination of arsenic in arsenobenzenes. UGO CAZZANI. *Giorn. farm. chim.* 79, 62–4, 67–70, 73–4, 77, 107–14, 117–8, 163–6, 169–72, 175–8, 181–3, 186–7 (1930), cf. *C. A.* 20, 263.—A complete review is given of the various methods employed in the detn. of As in arsenobenzenes. The methods are described in detail and their merits and defects are discussed. Lehmann's method (with slight modifications), De Myttenaere's method, and the bromometric method of Kircher and Ruppert are considered to be the best methods, analytical evidence is given in support of this view. The following modification of Lehmann's method is suggested. Mix 0.2 g. of arsenobenzene with 1 g. of finely powd. $KMnO_4$, add 5 cc. of 30% $H_2SO_4$ slowly, with gentle

agitation. Allow to stand 10 min., shaking occasionally. Then add 10 cc. of concd. $H_2SO_4$ and some $H_2O_2$ soln. Add 5 cc. of $H_2O_2$ in excess after the liquid has become limpid and colorless. Dil. with 25 cc. of $H_2O$ and gently boil the liquid until white heavy fumes appear. After cooling add 50 cc. $H_2O$, cool again, add 2.5 g. of powd. KI, cover the flask with a watch glass and shake until the KI is dissolved. Allow to stand in the dark for 1 hr. and then titrate with 0.1 *N* $Na_2S_2O_3$ without starch. Run a blank in the same way. C. prefers the following procedure. To 0.20 g. of substance add 10 cc. of $H_2O_2$ soln. and 10 cc. of concd. $H_2SO_4$. Heat gently on the sand bath until more gas is evolved. Remove from the sand bath, add 5 cc. more of $H_2O_2$ soln. and heat gently until no more gas is evolved, then heat strongly for 10–15 min. Dil. the resulting colorless liquid with 50 cc. $H_2O$, add dropwise 1% $KMnO_4$ until a rose color persists. Decolorize with oxalic acid soln., cool, add 2.50 g. of powd. KI and shake the soln. in a covered flask until the KI is dissolved. After 30 min. in the dark titrate with 0.1 *N* $Na_2S_2O_3$ soln. without addn. of starch. Then add 75 cc. of satd. $Na_2CO_3$ soln. and about 10 g. of $NaHCO_3$ and titrate with 0.1 *N* I until a light yellow color persists. Run a blank test in the same manner. Comparative results are shown with various procedure and 2 pages of references are given. G. Scheuch

**Critical study of the method proposed by G. Florence for finding alkaloids in viscera.** N. J. Joanid. *Bull. soc. chim. biol.* 12, 1001–13(1930); cf. *C. A.* 21, 3905.—Recovery of strychnine, morphine and cocaine from fresh and putrefied beef was much lower when the method proposed by F. was used, instead of the method of Kohn-Abrest (modification of Stas-Otto method). Recovery from the organs of a dog poisoned with strychnine was only 0.25 that recovered by the older method. C. G. King

**Detection of semen in legal cases.** J. Peltzer. *Chem.-Ztg.* 55, No. 7, 70(1931).—Microscopic examn. of an aq. or $H_2O_2$ suspension may disclose characteristic elements or spermatozoa. The suspected spots or flecks are moistened with $H_2O_2$. If semen is present, much foaming occurs. Microscopic mounts may be stained with 2% aq. soln. of eosin. If the mount is pos., long, lance like characteristic crystals (of Florence) appear. The addn. of I-KI soln. to the mount in very small amt. colors the crystals chocolate-brown at first, gradually the crystals disappear but are recrystd. by the addn. of a little more of the I soln. The presence of spermatozoa or of the Florence crystals is pos. evidence of the presence of semen. C. R. Fellers

**Titration of ethylenic nitriles.** G. Heim. *Bull. soc. chim. Belg.* 39, 458–61(1930).—Ethylenic nitriles, with a double bond in the $\alpha$–$\beta$ position, add Br much more slowly than nitriles with a $\beta$–$\gamma$ double bond. If the following conditions are respected, a mixt. of both forms can be titrated by bromination, because for practical purposes the $\alpha$–$\beta$ forms are not affected. Dissolve the nitriles in enough $CHCl_3$ to obtain 1/40 mol. in 100 cc. of soln. The brominating soln. is a 0.1 *N* Br aq. soln. contg. 100 g. KBr/l. For titration, add twice the quantity of Br soln. needed for the amt. of nitrile, shake vigorously for 10 seconds to emulsify, add a 10% KI soln. and titrate the I liberated. A. L. Henne

**Three new reactions of alanine.** Juan A. Sánchez. *Semana méd.* (Buenos Aires) 1931, I, 651–3.—(1) Heat 0.01 g. alanine with 20 drops of 1% $KMnO_4$ soln. to 100° for 1 min., cool, add 0.05 g. oxalic acid and then to the colorless liquid 2 cc. EtOH, 0.02 to 0.03 g. *o* nitrobenzaldehyde and 10 drops of 30% NaOH. Shake with $CHCl_3$, the $CHCl_3$ takes a blue color. The reaction is explained as being due to the formation of indigo. (2) Heat alanine with NaOCl for some seconds, add 2 drops of 30% NaOH and by drops a soln. of I in KI. A ppt. of $CHI_3$ is formed. The intermediate formation of AcH is supposed. (3) Heat dry alanine in a closed tube and dissolve the condensed vapors in dil. HCl. The soln., which contains $EtNH_2$, gives with the reagent of Bouchardat a reddish brown ppt., with Dragendorff's reagent a red one and with S's molybdic reagent a white ppt. A. E. Meyer

**Determination of benzene in alcoholic solutions.** Gy. Gróh and E. Faltin. *Magyar Chem. Folyóirat* 36, 156–9(1930).—Small quantities of benzene may be detd. by means of the characteristic absorption in the ultra violet spectrum. Extinction coeffs. of alc. benzene solns. were detd. by a Hilger's spectrograph in layers of various thickness, and it was found that the law of *Beer-Labert* holds. Sensitivity was found to be 0.01 g. per l. S. S. de Finály

**Color tests for some saturated and unsaturated carboxylic acids.** L. Ekkert. *Magyar Gyógyszerészitud. Társaság Értesitője* 7, 121–4(1931).—Color tests with different aldehydes were tried. Satd. monocarboxylic acids with few C atoms do not give tests with aldehydes in alc.-$H_2SO_4$ solns. Acids with more C atoms, *e. g.*, palmitic and stearic acids and unsatd. acids, *e. g.*, oleinic and ricinoleic acids, show, on the contrary, striking color reactions. S. S. de Finály

Examination of a new reaction of acetic acid. J Erdös *Magyar Gyógyszerésztud Társaság Értesítője* 6, 332–6(1930).—The color test with La nitrate described by Krüger and Tschirch (*C A* 23, 5129) was studied The minimum quantity of AcOH giving a blue color was found to be 0 1 mg as stated by K and T. The test fails if over 1 5 times as much lactic acid is present, no test was given in 1% soln by several mono-, tri and amido-substituted acetic acids, acetonitrile, aniline acetate, Et acetate, or iso butyl acetate NaOAc gave the blue color The following conclusions are drawn (1) Substitution in the Me rad cal of acetic acid, (2) esterification of carboxyl by org radicals and (3) substitution of a carboxyl group prevent the reaction, but (4) inorg salts of AcOH give a positive test S S de Finály

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Allen's Commercial Organic Analysis 5th ed, revised Vol. VIII Glucosides, Non Glucosidal Bitter Principles, Enzymes, Putrefaction Bases, Animal Bases, Animal Acids Cyanogen and the Cyanogen Halides, Proteins and the Digestion Products of the Proteins Edited by S S Sadtler, E C Lathrop and C A Mitchell Philadelphia P Blakiston's Son & Co 733 pp $7 50 Cf *C A* 22, 1303

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Lunge, G, and Keane, Chas. A Technical Methods of Chemical Analysis 2nd ed, revised and edited by C A Keane and P. C L. Thorne Vol III. London Gurney & Jackson. 608 pp £3, 3s, net Cf. *C A*. 23, 580

Sutton, Francis Volumetric Analysis 11th ed, revised by W. Lincolne Sutton and Alfred E Johnson Philadelphia P Blakiston's Son & Co, Inc $9

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## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T WHERRY AND J F SCHAIRER

Röntgenographic examination of remelted algodonite and whitneyite. Supplement. Felix Machatschki *Centr Mineral Geol* 1929A, 371–3, *Chem Zentr* 1930, I 957, cf *C A* 25, 1459.—The expts of Borgström (*C. A*. 12, 2507), on the re melting of algodonite and whitneyite were checked by x ray study. The results ob tained confirm the view of B that different products, namely $Cu_3As$ and Cu, are formed. G Schwoch

Two minerals from the Belgian Congo. I A non-pyro-electric tourmaline II A colorless chrysoberyl. J Melon *Bull. sci acad roy Belg* [5], 16, 996–1000 (1930).—The tourmaline occurs in fine needles, very pleochroic, d 3 0, *n* about 1 636 The chrysoberyl occurs in hexagonal prisms Measurements are given R. S Dean

Chemical and crystallographic investigations on lithidionite from Vesuvius. Guido Carobbi *Rend accad sci Napoli* [3], 36, 21–31(1930), cf *C A* 25, 1462.—Lithidionite occurs both in vitreous and cryst forms The cryst. phase is richer in Cu, and samples contg 13.29% CuO had sp. gr 2 737–2 742, the vitreous phase, contg 2 to 3% CuO had 2 483–2.373 Analyses of 3 samples ((*a*) vitreous, (*b*) vitreous plus cryst., and (*c*) cryst.) are given They establish its formula to be essentially $(Cu, Na_2, K_2)Si_2O_7$, with CaO, MgO, $Fe_2O_3$ and PbO present as minor constituents The lithidionite probably con tained $Fe_2Si_2O_8$ in solid soln It was microscopically heterogeneous, and small quanti ties of wollastonite, and possibly of rivaite, were sepd from it It is monoclinic, opti cally —, $2V = 124°$, the $n_D^5$ are $n_p = 1\ 548$ and $n_m = 1\ 574$ Selected crystals contg 13 29% CuO melted at about 780° to a blue glass which did not devitrify on cooling An analysis of a sample of *neocianite* agrees well with that of lithidionite, establishing their identity Arguments are advanced in support of the existence of *rivaite* as a defi nite mineral species R. H. Lombard

Genesis of Japanese acid clay. K. Kobayashi and K. Yamamoto *Chem News* 142, 116(1931), cf *C A* 24, 2352–3.—The acid clay is formed exclusively along an intrusion of liparite through pre-tertiary strata. Chalcedony, opal, pumice, primary kaolin and fine crystals of pyrite occur as impurities Its formation is attributed to the decompn. of interposed Na feldspar and Na silicate W. L. Hill

Quinquennial review of the mineral production of India for the years 1924 to 1928.

*Records Geol. Survey India* 64 (1930) Jadeite. J. Coggin Brown 146-54.—The jadeite occurs as large lenses (5–7 ft thick) in albite intruded into partially serpentinized peridotites. Alluvial jadeite is also produced Mica. Cyril S Fox. 233-54.—Most of the Indian mica comes from pegmatites traversing mica schists. The pegmatites usually have a quartz core with marginal feldspar Between these 2 are the largest mica books. Marketable mica is also found along the contact between dike and schist. The mica bearing pegmatites are recrystallized products of the schists. Less than 1% of the quarried rock is marketable mica Other associated minerals are biotite, tourmaline, garnet, apatite, beryl and rarely samarskite, pitchblende and monazite Ruby, sapphire and spinel. J. Coggin Brown 273-6.—The following gems are produced in Burma quartz (amethyst, etc.), apatite, beryl (aquamarine), chrysoberyl, epidote, garnet, iolite, lapis lazuli, feldspar (moonstone), olivine, phenakite, tourmaline (rubellite), topaz, zircon Most of the precious stones, and all the rubies and spinels, have been derived from bands of cryst. limestone in Archean gneisses. Zircon. W A K Christie 312-3.—Zircon occurs (6%) in the Travancore sands, worked chiefly for ilmenite Bauxite. C. S. Fox. 328-43.—India contains large deposits of bauxite, largely unexploited Uses are extensively discussed. Steatite. L. L. G Clegg. 437-40.—Steatite is one of the most widely distributed minerals in India. A. H. E

The Tadzhikistan phosphate region. B M Zdorik. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 504-16(1930).—Z gives the geology of the region, petrography and mineralogical components of the rocks and of the phosphate deposits, their extent and approx analyses. J. S. Joffe

Hydrargillite and sulfurous bauxite in Istria. T Kormos. *Bányds. Kohás Lapok* 63, 269-77(1930).—Bauxites of Santa Domenica and Portole show postvulcanic influences, e. g. a Lurch gray bauxite with 10% S. Hydrargillites of the same region are probably of secondary origin formed independently of the bauxites, since they contain no Ti nor S, but have $H_2O > 30\%$. Several bauxite analyses are published. S. S. de Finály

Coal formation, mountain formation and bauxite formation in Hungary. E. Vadász. *Bányds Kohás. Lapok* 63, 213-20(1930).—The largest coal occurrences of Hungary were formed in post-orogenic sinking periods. Coal formation generally took place during the change of earth surface caused by the orogeny; the formation of bauxites, on the contrary, is the dry-land formation product of an ended orogeny S. S. de Finály

The Kurějka graphite occurrence of the Tunguzka coal basin, Siberia. A. Pécseli. *Bányds. Kohás Lapok* 63, 242-52, 277-81(1930).—A coal basin covering about 900,000 sq km. consists of 2 types of rock deposits. Coal of younger formation (Angara-type) is weakly metamorphic, contg. rather considerable ash Coal of older formation (Jenisei type) is strongly metamorphic. The 14-m. amorphous graphite deposit of Kurějka lies on a 1.5 m. lime layer. The proved coal content of the basins is estd at 1,200,000 metric tons. S. S. de Finály

A new physicochemical explanation of the formation of humus, peat and coal. The significance of biological factors in these processes. J. Zolcinski *Wiss. Arch. Landw.*, Abt A, *Pflanze* 4, 196-228(1930).—Decompn of org material of both plant and animal origin follows the same basic laws as are observed for the decompn of rocks and minerals, in which simpler, more stable compds. are formed Seventy references are given. W. Gordon Ross

Comparison of the behavior to thermic action of rock from Ragusa and from Abruzzo. M G Levi and C. Collina *Atti III congresso naz. chim. pura applicata* 1930, 740-52.—The rocks studied were asphaltic calcites. They were subjected to fractional distn. to sep liquid, solid and gas. A plant design is shown to sep these substances commercially, a part of the rock being used for fuel The residue can be used for *CaO manuf* E. M Symmes

Sapphires. J W Howard *J. Chem. Education* 8, 613-24(1931).—The sources, mining, sorting, grading and properties of natural sapphires are described. Details of the prepn of synthetic sapphires are given and the methods of distinguishing natural and synthetic sapphires discussed. E. H

Classification of rocks. T Papp *Bányds Kohás Lapok* 63, 556-63(1930).—The classification of Hungarian rocks is discussed S. S. de Finály

Astrophyllite-bearing nephelite syenite gneiss—found as a boulder in Kiihtelysvaara, eastern Finland. Penttı Eskola and Th. G. Sahlstein. *Bull. comm. géol. Finlande* 1930, No. 92, 77-88.—The mineralogical composition of the boulder was nephelite 34.27, plagioclase 27.92, K feldspar 17.15, amphibole 13.86, aegirite 0.14, astrophyllite 2.30, cataplеite-like mineral 0.90, titanite 1.01, cancrinite 0.18, apatite

0.45%. It is accordingly highly alk. and unlike any outcrops in the vicinity.
R. S. DEAN

The disintegration of rapakivi. PENTTI ESKOLA. *Bull. comm. geol. Finlande* 1930, No. 92, 96–105.—The Finnish word rapakivi means crumbly stone and is used to designate certain granites which disintegrate spontaneously. The disintegration of rapakivi seems to presuppose the coincidence of several different circumstances. Its main condition seems to be a comparatively simple texture with rather smooth boundary surfaces between the mineral grains. The consistency of the rock may have been, and in some cases certainly has been, loosened by slight disturbances in the crust. Where layers thus predisposed become exposed to air and rain water and subjected to the influence of temp. changes, there the rock will break up into grit. At the same time chem. weathering sets in causing decompn. of the Fe rich lepidomelane and oxidation of its $Fe^{++}$ into rusty products. Part of the anorthite in the plagioclase, moreover, may be dissolved and some of its $Al_2O_3$ may remain in the insol. portion. From a rock which like the rapakivi is available in the form of loose grit the heavy minerals may be easily sepd. by means of panning. The rapakivi was thus found to contain considerable amts. of zircon and ilmenite, but no other minerals heavier than hornblende.
R. S. DEAN

Rocks of the upper Bargousin and Namama regions in Transbaikalia. PENTTI ESKOLA. *Bull. comm. geol. Finlande* 1930, No. 92, 100–40.—The following rocks occurring in the Bargousin region are described: graphite bearing limestone, amphibolites and gneisses, quartzite, granite. In the Namama region, cryst. limestone and dolomite, quartzite shale, greenschists and metamorphic andesites are described as supercrystal and quartz keratophyre, orthoclase porphyry, granite, granodiorite, hornblende gabbro and hornblendite are described as intracrustal. Cu ore also occurs in the cryst. limestone bounded on the east by quartz keratophyre and on the west by Namama diorite. The chem. nature of the igneous rocks of the Bargousin magmatic province is discussed in detail.
R. S. DEAN

The eruption of the volcano of the Kaménis (Santorini) in 1925. CONST. A. KTENAS. *Bull. volcan.* 4, 7–49(1927); cf. *C. A.* 20, 564, 21, 880, 24, 2086.—A general description is given of the eruption. Two analyses of fumarole gases and 4 of lavas are given.
H. S. WASHINGTON

Report on studies on the last eruption of the Kaménis (Santorini). CONST. A. KTENAS. *Bull. volcan.* 4, 171–6(1927).—An addn. is made to previous papers on the eruption without new analyses.
H. S. WASHINGTON

Report on the work of the Laboratory of Petrology of the University of Athens, relating to the study of the volcanoes of the Aegean Sea. CONST. A. KTENAS. *Bull. volcan.* 4, 182–7(1927)(map).—Brief notes are given on the petrography of some little-known Greek island volcanoes. The lavas are mostly dacites and andesites. H. S. W.

The basaltic volcanoes of southern Indochina. M. F. BLONDEL. *Bull. volcan.* 4, 193–4(1927).—Very brief notes are given. No analyses are included. H. S. W.

The chemico-mineralogic characters of the Tertiary intrusive and volcanic rocks of North Africa. A. LACROIX. *Bull. volcan.* 4, 199–204(1927).—A summary paper. Although no analyses are given, the rocks are classified according to the C. I. P. W. system.
H. S. WASHINGTON

First observations on the mineralogic and chemical composition of the Mesozoic and Tertiary lavas of eastern China. A. LACROIX. *Bull. volcan.* 4, 205–17(1927).—Brief petrographical descriptions are given with 20 chem. analyses.
H. S. WASHINGTON

The lithologic constitution of the South Central Pacific. A. LACROIX. *Bull. volcan.* 4, 218–31(1927).—A general petrological description is given, no analyses are included.
H. S. WASHINGTON

Collection of chemical analyses of Russian eruptive and metamorphic rocks. Z. NÉMOVA AND F. LOEWINSON-LESSING. *Mem. Com. Geol.* (Moscow), New series, No. 186, 361(1930).—The collection numbers 1676 analyses. The text is in Russian, except that rock names are also given in French.
H. S. WASHINGTON

Unusual depositional stalactites in a lava-tunnel at Mount Albert, Auckland. J. A. BARTRUM. *New Zealand J. Sci. Tech.* 12, 188–92(1930).—The material appears to consist of crust like layers of small white flakes of opal intermixed with kaolin and sepd. irregularly by similar discontinuous thin layers of granular white kaolin.
H. C. PARISH

Slippings of clay territories at Budapest. A. VENDL. *Magyar Mérnök Épités egylet Kozlonye* 64, 65–72(1930).—Slippings are caused by a thin water-contg. layer within the loess covering Kiscelli clay strata.
S. S. DE FINÁLY

Translation gliding in crystals of the NaCl structural type (BURGER) 2. Membranes of spores and pollen. IV Fossil sporopollenins from Tasmanite and Russian lignite (ZETZSCHE, *et al*) 11D.

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FARNHAM, C. MASON Determination of the Opaque Minerals. New York: McGraw-Hill Book Co., Inc 236 pp $3 50

NANNI, RAFFAELO I soffioni e i lagoni della Toscana e la industria boracifera. Rome Reviewed in *Analyst* 56, 215(1931)

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# 9—METALLURGY AND METALLOGRAPHY

D J DEMOREST, H W GILLETT AND RICHARD RIMBACH

Development and present state of metallurgy. F ALTNÖDER *Elsyds Kekks Lapok* 62, Supplement 3-4(1929) —A historical and descriptive treatise including a bibliography S S DE FINLAY

Origin of flotation L. MICHEL. *Rev. chilena minas* (Santiago) 5, 702–4(1930) —A historical review E. I S.

Properties of the bog iron ore from Hokkaidoh and of the brown iron ore from Chohsen as determined by thermal analysis. KATSUMI INOUE. *Tetsu-to-Hagané* (*J. Iron and Steel Inst. Japan*) 17, 99–105(1931) —From thermal analyses of these ores, the heat necessary to expel the combined water was calcd The amt of heat required for the bog iron ore was larger than that for the brown ore at the same rate of heating, though the decompn temp of the former was lower than that of the latter I attributed this to the internal strain in the grains of the Chohsen brown ore The sintering temp of the brown ore of Chohsen was higher. M KURODA

Investigation on the reduction processes of iron ore. III. BERTIL STÅLHANE AND TORE MALMBERG. *Jernkontorets Ann.* 114, 609–722(1930) —The reduction of Kiruna magnetite in $H_2$ and $H_2$-CO mixts has been investigated At 930° 0.2 mm. grains were completely reduced by $H_2$ in 2 min., 2.0 mm grains in 7 min. and 4.0 mm. grains in 17 min The rate falls off with the temp but there is a marked discontinuity at 910°, at which temp the time required is 2.5 times that at 880°. Addn. of CO to the $H_2$ slows up the rate quite markedly, the rate in 100% $H_2$ being 7 times as great as in 100% CO Pure CO also gives the same discontinuity as $H_2$ at 910°. Mixts show the same but less markedly The temp at which the reduction becomes exceedingly slow, 900°, corresponds to the transition point of α-Fe to γ-Fe. H. C. DIETS

Statistics on the Swedish iron industry during recent years. ARVID JOHANSSON *Jernkontorets Ann.* 114, 623–34(1930) —Consumption of charcoal decreased from 2.72 million cu. m in 1924 to 1.98 million cu. m in 1929. The production of Fe ore remained nearly const at 550,000 to 670,000 tons. The value of the export was 8.5% of the total value of all exports, and the value of imports 4.9% of the total. H. C. DIETS

Superroasting of zinc blende by different methods. E. PROST. *Rev. univ. mines* 72, 234–40, 269–77(1929) E. I. S.

Free energy of some copper compounds. MERLE RANDALL, RALPH F. NIELSEN AND GEO H WEST *Ind. Eng. Chem.* 23, 388–400(1931) —A review, intended primarily to aid Cu metallurgists, of the equilibria in various reactions of Cu compds. The free energies of various Cu compds important in the metallurgy of Cu are given. References (102) to articles in the literature used in obtaining the data are given. J. B

Sand tests in the foundry. J. HIRD. *Foundry Trade J.* 44, 191–3, 197(1931).—Methods for making sand tests and their application to foundry control are described for both facing and core sands. Data sheets are included showing various phys. properties of many types of sands found in several different districts in England. D. S.

Investigation of furnaces used in rolling mills. L. A. RICHTER. *Stahl u. Eisen* 51, 377–83(1931) —A review of the operating practice of the furnaces used in rolling mills in Austria The type of furnaces, the method of operation, the heat balance, the oxidation losses, the dependence of the fuel consumption on the type of material rolled and the ratio of the hearth surface to the total furnace surface are discussed J. A. SHILAD

Rotary-hearth furnace for heat treating. R. E. BARKER. *Heat Treating and Forging*, 16, 1189–90(1930) —A rotating hearth mounted on ball bearings in oil and motor-driven is described It burns producer gas, natural gas, oil or tar, is adaptable to all classes of steel and has proved ideal for "open" annealing of all types of material. J BALCHAN

Utilization of slag from blast furnaces in Japan. TAIZOH KURODA. *Tetsu-to-Hagane (J. Iron and Steel Inst. Japan)* 17, 118–22(1931).—Statistics of the production of pig iron and slag in Japan are given. The main uses for slag are in the production of cement, slag ballast, brick and slag wool. The analyses of slag and its uses in 8 main blast furnace works in Japan are given. M. KURODA

The slag in the basic open-hearth steel furnace. R. BACK. *Stahl u. Eisen* 51, 317–24, 351–60(1931).—In 19 melt tests carried out in the basic Siemens Martin furnace the basicity of the slag as characterized by the CaO : $SiO_2$ ratio was followed. During the melt-down period, with increasing basicity of the slag, the amt. of Fe in the form of oxides increased, while the $SiO_2$ content decreased. No definite relationship could be found between the Mn content of the slag and the basicity during the melt down period. Increasing amts. of Mn addns. caused increased Mn content in the slag during this period. During the boiling period, which, in the scrap-Fe process, is the time between the end of the melt-down and the addn. of the finishing flux, the Fe and Mn contents increased with the increasing basicity of the slag. Five different types of slag, classified according to the CaO : $SiO_2$ ratio, were investigated: acid slag with a ratio of 1.3–1.5; medium basic 1.5–1.8; good normal 1.8–2.0; basic 2.0–2.4 and highly basic over 2.4. The above ratios refer to the compn. of the slag at the end of the boiling process. For the regeneration of Mn from the slag the acid slags, contrary to expectation, gave very good results. The best results were obtained with the medium basic slags. Even with the good normal slag the Mn had the tendency to go back from the slag into the bath. In the basic slag the tendency for the reduction of Mn was found to be very slight. The highly basic slag gave the poorest results. At very high temps. the results with highly basic slag were somewhat better. The Fe content of the slag during the boiling period, as in the melt-down period, is a direct function of the basicity of the slag. The Mn content is governed by the Fe content; with increasing basicity more FeO and Fe ferrite are formed in the slag and these have an oxidizing effect on the Mn in the bath. It is emphasized that the basicity of the slag has a detg. role in the transformation of Fe and Mn. The slag test is described; it gives a good indication of the compn. of the slag and is of importance in cases where the P and Si contents of the raw materials are subject to great variations. J. A. SZILARD

Method of slag determination. H. KJERRMAN. *Jernkontorets Ann.* 1929, No. 4, 181–99.—A discussion of (1) the slag of different kinds in steel, (2) its microscopical detn., (3) the relation between slag content and strength and (4) the sulfate content in Cr ball bearing steel. E. I. S.

Some modern tendencies in siderurgy and the establishment of this industry in the Argentine Republic. SVEN WASSMAN. *Anales soc. cient. argentina* 111, 65–92(1931). E. H.

The preparation of the raw materials at the Röchlingen Iron and Steel Works in Völklingen (Germany). A. WAGNER. *Stahl u. Eisen* 51, 217–25(1931).—The parts of the plant for the prepn. of the raw materials including breaking, screening and sintering are described and their economies discussed. J. A. SZILARD

Choice of raw materials for malleable cast iron. I. II. III. J. V. MURRAY. *Metallurgia* 1, No. 3, 107–9; No. 4, 161–2, 165; 2, No. 9, 101–2(1930). E. J. C.

Statistical evaluation of pig-iron analyses. K. DAEVES. *Stahl u. Eisen* 51, 202–4(1931).—A method is shown for the evaluation of the daily analyses of 3 blast furnaces and one mixer during 3 months. The deviation from the av. values is greater for the blast furnaces than for the mixer. Curves are given which show the relationship between the S, Mn, Si and P contents. J. A. SZILARD

Advantages of fine-grain over coarse-grain pig iron for production of high-test cast iron. R. STOTZ. *Z. ges. Giessereipraxis* 51, No. 3, 25–8(1930); cf. *C. A.* 24, 42.—S. seeks to show that 2 pig irons with apparently the same chem. compn. do not necessarily possess the same phys. characteristics. E. I. S.

The manufacture of cast-iron rolls. E. PEIPERS. *Stahl u. Eisen* 51, 345–51(1931).—The manufacture of loam and chilled cast rolls is described, and also the development of alloyed rolls. J. A. SZILARD

The development of the research program of the steel-making processes on a physicochemical basis. H. SCHENCK. *Stahl u. Eisen* 51, 197–202(1931).—In the effort to reduce production costs and improve the quality of steel products, comparatively little attention was given to the basic chem. reactions involved in steel making. The unsolved problems of steel making are listed and a research plan is developed which would make coöperation between steel plants, exptl. stations and scientific research institutions possible, to obtain a better knowledge of the metallurgical processes. J. A. SZILARD

Refining of aluminum and its alloys by treatment with chlorine gas and nitrogen. W Koch *Metallwirtschaft* 10, 69-72, 85-8(1931) —Lab. expts were carried out to det. the influence of impurities in Al upon the temp. of chlorination The samples were heated in a Cl stream in combustion boats, the temp of the beginning of volatiliza tion was detd and the volatile matter analyzed The chlorination should conform with the following theoretical considerations (1) It is a function of pressure and temp and subject to the mass law (2) The chlorination temp of a pure metal must be re-duced by alloying it with another constituent of a lower chlorination temp The bigger the difference between the chlorination temp of the base metal and of the alloying con stituent, the greater will be the influence of such an addn (3) The volatility of the chlorides formed is an essential factor in the speed of chlorination. It is increased by the presence of compds. of a lower temp of volatilization Impurities act pro-portionally to the difference between the volatility of their chlorides and those of the base metal The expts. brought out that the temp of volatilization of pure Al is re-duced by impurities, especially Fe and Si. At the same time the volatility of $AlCl_3$ is being increased The impurities also interfere with the formation of a protective film, Si to a greater extent than Fe They form centers of corrosion, thereby rendering the metal less compact and increasing the surface, both of which factors interfere with the film formation and facilitate the attack Refining tests were made on a technical scale by introducing Cl into the molten metals and finally removing it by blowing N through the melt. Various types of com Al and of Al Fe, Al Si and Al-Cr alloys were thus treated In alloys contg 0.8, 1 6 and 1 86% Fe, the chlorination resulted in a fine and dense grain, while the original material was coarsely cryst. The plasticity and toughness of the alloys was also increased No change in the chem compn. of the alloys could be ascertained An alloy contg 3 52% Fe and 0 43% Si showed the grain refining effect of the chlorination especially distinctly In this case the treatment decreased the Fe by 0 37% In an alloy contg 11 7% Fe and 0 45% Si no refining effect of the chlorination could be found, except the removal of considerable quantities of gases The Fe was reduced by 0 67% In Al-Si alloys contg 0 8, 1 3 and 2 1% Si the chlorination had a dispersing effect upon the segregations found in these alloys which consist mainly of Al-Fe-Si compd. The *chlorination of silumin* had a slightly coarsening effect upon the metal grain, because of the chlorination and volatilization of the colloidal Na particles An Al Cr alloy contg. 2 8% Cr showed only a slight refinement of the Al Cr segregation. An alloy contg 1.9% Cr and 1 4% Fe showed a much more distinct improvement. The eutectic and the Al Cr segregation were finely divided and the Al grain was considerably refined. Expts made with com. grades of Al and Al scrap showed in each case that the chlorination had the effect of refining the grain and dispersing the impurities The chlorination has a favorable effect upon the mech properties of the treated materials The ductility and the bending properties are improved and the hardness is increased. The main field of application of the Cl and N treatment will probably lie in the refining of Al scrap While a selective volatilization of the impurities appears to be impossible, a no of valuable phys improve-ments are obtained, such as: removal of gases, clean grain boundaries, grain refinement and homogenization, and an increase of fluidity. The castings obtained show a dense structure, free of blow holes, and a smooth, shiny surface Most of the mech properties show distinct improvements. Leopold Pessel

An investigation of core oils. Carl H Casberg and Carl E Schubert. Univ Ill Eng Expt. Sta., *Bull.* No 221, 5–22(1931) —The oils investigated were those commonly used in core work, *i. e.*, the drying oils linseed, China wood and perilla, to-gether with the semi-drying and non-drying such as soy-bean and kerosene The object was (1) to det any possible relation between tensile strength of the cores and the chem. and phys properties of the oils and (2) to note the effect of moisture on tensile strength. Tests made on the oils included ash content, sp. gr., flash and fire points, sapon. and I nos Results showed that no definite relations exist between these proper ties and the av original tensile strengths of the finished cores, although the initial tensile strength was found to be proportional to both the sapon. and I nos.

H. L. Olin

Progress in metallurgical research. C. H. Desch. *Foundry Trade J.* 44, 105–6 (1931) —The impregnation of solid ores by C must play an important part in the re-actions of the blast furnace. Ore so impregnated with C is readily reduced at a higher temp., the fine solid C in the mass being a much more powerful reducing agent at 750° than is CO. The solid C may also form a somewhat impervious layer around the ore granules and hinder the reduction The exact conditions detg the form that the C will take have yet to be learned Endurance tests, rather than short-period tensile

tests, are necessary at high temps on metals, as creep under prolonged stress bears no const relation to the mech properties under static conditions. An abbreviated test, described by W H Hatfield has been found useful as an approx guide That stress is found which at the given temp, produces an elongation not exceeding 0.5% in the 1st 24 hrs, and produces no further change of length in the next 48 hrs., when measurements are made such as would detect an elongation of the order of 1 millionth in. per in per hr The safe stress is then taken as ⅔ of this limit. Both magnetic aging and strain etching are dependent upon the sepn of nitride from solid soln. There is no direct relation between them X ray analysis has greatly assisted in carrying out an immense amt of research work relating to changes which metals undergo during deformation App has been devised for measuring pressures developed at the rolls and at the dies and records have been kept of power consumption with different degrees of reduction By quenching in a blast of H and by using the string galvanometer cooling curves have been taken during the short period of quenching The evidence thus obtained indicates that martensite is a heterogeneous mixt. contg finely divided ferrite and cementite and not a supersatd soln of carbide in α iron H C. P.

**Literature on the use of the x-ray. II.** Victor S Polansky. *Heat Treating and Forging* 16, 1011-14(1930), cf *C A* 24, 5690.—A bibliography is given of the literature available in the *Carnegie Library of Pittsburgh* on x ray examn of ferrous metals and alloys for authors names from F to K, inclusive The list has been brought up to May, 1930 J Balozian

**The deformation of metals under prolonged loading I. Flow and fracture of aluminum.** D Hanson and M A Wheeler *J Inst Metals*, Advance copy No. 554, 29 pp (1931).—Al samples were subjected to static loads at room temps. and at 250°. The mode of deformation was detd by microscopic examn of the polished and unetched surface of the test specimens. Samples consisting of various sized crystals including single crystals, were used Conclusions "(1) The extension under a prolonged load that will ultimately break the metal may be conveniently considered as consisting of 3 periods (*a*) a period of primary extension, during which the rate of flow diminishes, (*b*) a period during which flow is very slow or even suspended, (*c*) a period during which the extension again continuously increases until fracture occurs (2) During the first period the flow of the metal is the result of slip within the crystals, and flow diminishes because of the hardening effect of slip (3) The behavior during the second and third periods varies with different specimens. (4) Three types of failure have been recognized under creep conditions (*a*) failure by intercryst cracking; cracks form while the elongation is low, and the metal fails with little reduction of area at the fracture (*b*) failure by the resumption of slipping within the original crystals, leading to a fracture of the normal type (*c*) failure through the recrystn of the metal, removing strain hardening and permitting further flow of the softened metal, the metal pulls out to a point fracture, with a high elongation (5) Al can fail to "creep" at room temp (6) Al consisting of uniform aggregates of crystals fails at 250° by intercryst. cracking (7) Al aggregates at room temp, and Al single crystal specimens at all temps., fail under creep conditions by shear along the slip planes. (8) In single crystals when flow recommences slip occurs only on some of the surfaces that had previously slipped during the primary flow (9) The prolonged action of a suitable stress can cause disintegration of a metal either at the junctions of the grains or on the surfaces of previous slip, and failure (*i. e.*, fracture) must be regarded as having commenced when this weakening occurs (10) Under suitable conditions, *e. g.*, in crystal aggregates with moderate rates of flow at 250°, or with very slow rates of flow in single crystals slip is distributed over a very large no of slip surfaces, and a polished surface of the metal may show little or no signs of slip bands (11) No change in density is believed to occur when a crystal is distorted by moderate amts.: changes in density in crystal aggregates are thought to occur at grain boundaries (12) The view is expressed that rupture of the crystals commences along slip planes formed at an early stage in the deformation of the metal. (13) The results are consistent with the theory of slip and rupture previously advanced by Gough, Hanson and Wright." Four references are included J L Gregg

**The mode of deformation of a single crystal of silver** H J Gough and H L Cox *J Inst Metals*, Advance copy No 552, 18 pp (1931).—A single crystal of Ag was subjected to alternating torsional stresses and the surface examd to det the mechanism of deformation Numerous slip bands were formed on the octahedral planes, but there was no definite evidence of twinning even when the stresses were applied until failure. The slip bands might have been narrow twins, but this appears to be improbable No twins could be produced by compression Because of the ease with which twinning

occurs in an aggregate of small crystals, the mechanism of deformation in a single crystal must be essentially different from that in the aggregate. J. L. GREGG

Microstructures of fifteen silver Greek coins (500-300 B. C.) and some forgeries. C. F FLAST *J Inst Metals*, Advance copy No 550, 10 pp (1931) —All of the genuine coins had been struck, while only one of the forgeries showed any indication of striking Some of the coins had apparently been struck hot Treatment differed at different mints Analyses indicate that Cu had been intentionally added J L GREGG

New uses for aluminum. L JAKÓBY *Bányás Kohás Lapok* 63, 236–41(1930)—A review S S DE FINÁLY

Some properties of metallic cadmium. C H M JENKINS AND G D PRESTON *J. Inst Metals*, Advance copy No 556, 32 pp (1931) —Hardness and tensile values of rolled Cd show that the temp of working has a pronounced effect on these properties In ordinary tests the worked Cd appeared to be stronger than the cast, but the conditions were reversed in the long-time ball test. Material in the cold rolled condition was completely recrystd In such material appreciable grain growth was found after 5 years No evidence was found of an allotropic transformation By x-ray examn the parameter of the unit cell was found to be $a = 2.9724 \pm 0.0005$ A U , with an axial ratio of 1.8854 $\pm$ 0.0005 In cold rolled Cd the (1011) plane tends to lie parallel to the surface, and the normals to the basal plane (0001) are inclined at about 65° to the normal to the surface of the sheet. In hot rolled sheet another preferred orientation is found Seventeen references are given J L. GREGG

Three crystalline modifications of electrolytic chromium. KUMAZO SASAKI AND SINKITI SEKITO *Trans Electrochem Soc.* 59 (preprint) 7 pp (1931).—See *C A.* 25, 1195 C G F.

The independence of the hardness and the hydrogen content of electrolytic metals. GUICHARD, CLAUSMANN, BILLON AND LANTHONY *Compt rend* 192, 623–5(1931) — The exceptional hardness of electrolytic Fe, long noted, has been attributed, on the one hand, to the fine state of diffusion of the metal and, on the other, to the presence of a compd of H and Fe having a characteristic metallographic structure. The authors have repeated the expts of Hugues (*C A* 20, 572) and reached an entirely different conclusion The results of their expts indicate that it is necessary to exercise considerable caution before attributing the remarkable mech properties of electrolytic metals to the presence of occluded gases O W. ELLIS

Notched-bar impact tests. E HÖEG *1st Communications New Intern. Assoc. for Testing Materials* 1930A, 213–6 —Notched bar impact tests of heat-treated steel contg 0.15% C showed the effect of the superheating after heating for 1, 2 or 3 hrs. at 1100°. Examn of plates from an exploded boiler showed the energy absorbed in fracture of notched bar test pieces after various heat treatments and at differen ttemps of the test bar during the impact test. E. M. SYMMES

Cyaniding and salt-bath working. J. W. URQUHART. *Heat Treating and Forging* 16, 989–93(1930) —The details involved in successful salt-bath hardening, and general heat treatment in salt baths are briefly described J BALOZIAN

Heat treatment of non-ferrous metals. A. H VAUGHN. *Heat Treating and Forging* 16, 1036–8, 1041(1930) —A brief survey is given of the present practice. J. BALOZIAN

Heat treatment of aircraft engine parts. R. R. MOORE *Fuels & Furnaces* 9, 279–89(1931) —The importance of proper heat treatment is outlined and methods of heat-treating steel and Al alloy parts are described The chem compn. and phys. properties of the Al alloys are tabulated. MORRIS SCHRERO

Variations in hardness of metals and alloys resulting from cold working. GUICHARD CLAUSMANN AND BILLON. *Bull soc chim.* [4], 49, 173–85(1931) —See *C. A.* 24, 4749. G. G

Some phases of heat treatment of cylinder and alloy irons. F. J. WALLS AND A. HARTWELL, JR. *Trans & Bull Am. Foundrymen's Assoc.* 2, No 3, 865–96(1931).—Tests were run to det. the relief of stresses in cylinder irons on heating to temps of 750° to 1150°F. The hardness of the irons as affected by air-, water- and oil-quenching was investigated Max relief of stresses is obtained with min growth and change in hardness by heating to 950°F , followed by slow cooling Similar tests were made on Cr-Mo and Cr-Ni Mn cast irons C. H LORIG

Wear resistance of nitrided nitralloy. V. O. HOMERBERG AND J. P. WALSTEAD. *Metal Progress* 18, No 6, 68–71(1930) —A study of the wear resistance of nitrided nitralloy against itself, gray and white cast Fe, Monel metal and 3 bronzes shows com. possibilities of nitrided materials in engine or machine parts which are subject to severe wear conditions and which are difficult to lubricate. W. A. MUDGE

Tests on the resistance of cast iron to wear. R. Spaeter. *1st Communications Int. Intern. Assoc. for Testing of Materials* 1930A, 64-73(in French).—There is no standard method in use for measuring resistance to wear of cast Fe, and no basis of comparison of results obtained by various methods of testing this property. Tests were made by pressing at 25 kg. pieces of cast Fe shaped like a brake shoe 1 cm. thick and 3 cm. deep against a steel disk 4 cm. in diam. and 1 cm. thick, revolving on an axle at 188 r. p. m. tangential velocity 0.395 m. per sec. Phys. tests of the samples were made previously. It was impossible to recognize any relation between hardness, resistance to traction, resistance to flexure and resistance to shock. In general, wear was inversely proportional to hardness. After a certain period of testing, due to the grinding action of abraded material, less hard cast Fe often showed less wear than harder samples. Wear is faster at first than near the end of the test. Wear of cast Fe is proportional to that of the steel disk. Wear is greater in a continuous than in an intermittent test. Wear increases with increase in graphitic C, and decreases with increasing P content. E. M. Symmes

Comparison of the physical properties of different sections of cast iron and of the standard arbitration test bar. M. V. Healey. *Proc. Am. Soc. Testing Materials* 30, Pt. 1, 229–42(1930).—A hollow box, cast in green sand with a dry sand core was made with one wall ¼" thick, one 2" and one nominally ½", but actually, from the flexure test table, ⅝". Standard 1.2"-diam. arbitration bars were cast from the same metal, in dry sand. In the different sections total C ranged from 2.74 to 3.06% combined, from 0.49 to 0.63%. Si from 1.95 to 2.19%, Mn 0.56%; P 0.37%. In flexure tests on 12" supports, with bars 1" wide by 4, 2, 1 and ½" with 1" dimension vertical, deflection ran from 0.165 to 0.19" on the specimens from the casting, with no marked effect of size, while the arbitration bars gave 0.12". The modulus of rupture of the 4" thick section was 45,000 lb. and for the thinner sections varied from 46,000 to 52,500 with no marked effect of size. Averages showed a decrease with the size of the section but individual figures for each size scattered over about the same range. The arbitration bars, however, gave 68,000. Tensile tests showed 32,000 for the arbitration bar and 23,500–30,000 for the castings with increase in strength as the section diminished. The ½" section was a trifle out of line, probably through insufficient feeding. Brinell tests showed 195 for the arbitration bar and 150–170 for the casting. Brinells showed fair correlation with strength. Micrographs are shown. H. W. Gillett

Comparative tests on cast iron in Czechoslovakia. F. Pisek. *1st Communications New Intern. Assoc. for Testing Materials* 1930A, 25–34(in French).—Strength tests and cutting tests are described. E. M. Symmes

Nitrogen in technical iron. III. The separation of nitrogen and carbon from α-iron as an example of the decomposition of a doubly supersaturated solid solution. Werner Köster. *Arch. Eisenhüttenw.* 4, 145–7(1930). cf. *C. A.* 25, 671 and following abstr.—The tempering isotherms were detd. for a no. of steels of varying N content for different quantities of dissolved C at 100° and the increase of the coercive force measured during the first rise. For any percentage of C there exists a linear relation between the total amt. of N and the coercive force. The isothermic sepn. of N from α-Fe supersatd. with it at 100° is interfered with if C in solid soln. is present at the same time. The quantities of N eliminated are smaller the higher the concn. of the dissolved C, and no sepn. takes place at all if a certain limit of C is exceeded. These limiting values can be plotted as a curve in the Fe–C–N system. The points along this curve indicate the amt. of N remaining in soln., these values depend on the amt. of C in soln. and are independent of the total amt. of N. The expts. give an example of the influence exerted by a constituent in a solid supersatd. soln. upon the sepn. of another. L. P.

Nitrogen in technical iron. IV. The combined action of cold working and nitrogen separation on the magnetic properties of technical iron. Werner Köster. *Arch. Eisenhüttenw.* 4, 289–94(1930). cf. preceding abstr.—The influence of various heat treatments on the magnetic properties of cold worked steels (0.012% N) is investigated. The coercive force is detd. of specimens (1) which have been cold worked (elongated 0–20%) and subsequently annealed at 100° up to 14 days, and (2) which have been treated as in 1 and then re-annealed for 1 hr. at temps. up to 700°. These expts. show that the coercive force is a result of (1) that attributable to cold working (increasing in this case with increasing elongation), and (2) that caused by N sepn. (decreasing here approxly. linearly with the elongation). The relation between the coercive force and the degree of straining is independent of the order of treatment. The change in the magnetic properties of cold-worked steel between 100° and 300° is the result of the sepn. and soln. of N. The observations in the literature are explained on the basis of the results of these expts. J. Balozian

The development of quality thin sheet iron. H KLEIN. *Stahl. u Eisen* 51, 189–96(1931).—A discussion is given of the increased demand for quality thin sheet iron, leading to improvements in the equipment of rolling mills, in the annealing and finishing of sheet iron The methods of galvanizing and tinning and the properties of rust resisting steels are also discussed J A SZILARD

Progress of the knowledge regarding slag (solid nonmetallic) inclusions in iron and steel. C BENEDICKS AND H LÖFQUIST. *1st Communications New Intern Assoc. for Testing of Materials* 1930A, 345–7 —A review with bibliography of the more important progress since the author's 1927 paper (*C A* 23, 75) E J C

Continuous load experiments on various construction steels at high temperatures. ERNST POHL, HANS SCHOLZ AND HUBERT JURETZEK *Arch Eisenhüttenw* 4, 105–10 (1930) —Normalized flat test pieces of low-C steel (0 1% C), Mo steel (0 15% C, 0 34% Mo) and Ni steel (0 28% C, 2% Ni) were subjected at const. temp , at intervals of 50° between 300° and 500°, to definite loads, successively increased The max extension reached at each load was recorded as a function of the time, and from the data obtained, curves were plotted giving the relation between load and elastic strain and between load and total extension Within the range of temps. investigated the Mo steel proved to be most resistant to permanent flow under the loads applied At 350° under a load of 175 kg /sq mm applied for 504 hrs the Mo steel had not yet attained the condition of plastic flow The elongation at rupture was 0 172%. H S VAN KLOOSTER

Steel hardening. H ESSER AND W EILENDER. *Arch Eisenhüttenw* 4, 113–44, *Stahl u Eisen* 50, 1616–7(1930) —After having proved in preliminary quenching tests that the heat effects occurring during the quenching of steel specimens in water cannot be detd accurately, the quenching was performed by means of gas The heating and quenching of the samples were performed in a vacuum in a container designed for this special purpose. The specimens used were either thin sheets (0 5 to 1 mm. thick, 1–2 mm wide) or small balls 1–2 mm in diam Quenching curves with varying cooling velocity were taken on C steels from 0 01 to 1 75% The results permit certain conclusions to be drawn as to the nature of Ar′ and Ar″ The heat effect occurring between 300° and 400° with cooling velocities of about 100° to 200°/sec. is assumed to be a tempering effect due to the essentially decreased cooling velocity within this temp range In considering these results, the authors arrive at a new explanation for the causes of temper brittleness. A hardening diagram for a cooling velocity of 1000°/sec is designed, indicating that the heat effects during quenching are similar to the transformations of the Fe–C diagram. It must probably be assumed that martensite is not a pseudo solid soln but a heterogeneous submicroscopical mixt. of $\alpha$-iron and cementite It is furthermore concluded that all Fe-C alloys, even those with very low C contents, are hardenable if they are sufficiently rapidly cooled The microscopical investigations are in accordance with the results of the thermal analysis. The development of a new theory of hardness is attempted, which explains the hardness in quenching the austenite with crit. velocity by the following 2 factors: (1) the high degree of dispersion of the cementite; and (2) the pronounced distortion of the $\alpha$ lattice during the $\gamma$-$\alpha$ transformation and the cementite pptn in the temp range of a decreased plasticity of the steel Both factors account for the hardness. G G NEUENDORFF

Stainless steels used in heavy machining. CHARLES E. HERD. *Metal Progress* 19, No 1, 44–9(1931) —Special applications in paper mill machinery and hydraulic turbines are described W. A MUDGE

Steels used in Ford industries. J. L. MCCLOUD. *Metal Progress* 19, No. 3, 32–9 (1931) —A general review. W A. MUDGE

Steel and its heat treatment for parts that must resist wear. H W. MCQUAID *Heat Treating and Forging* 16, 1159–62(1930), cf *C. A.* 25, 2090 —The different steels and treatments which can be used for obtaining hard surfaces are enumerated, discussed, and classified according to their relative cost J BALOZIAN

Creep of steel at elevated temperatures. P. G. MCVETTY. *Mech. Eng.* 53, 197–200(1931) —The principles underlying the creep of steel at elevated temps are discussed The phenomenon of creep is defined, typical creep curves are shown and interpreted, and the metallurgical significance of creep phenomena and its significance to the designer are pointed out. G G NEUENDORFF

Some long-time tension tests of steels at elevated temperatures. J. J. KANTER AND L W SPRING *Proc. Am. Soc. Testing Materials* 30, Pt I, 110-32(1930).—Very detailed evidence is given to show the value of a logarithmic method of plotting for comparing strain hardening effects and to bring out the fact that rates of creep are not necessarily const. Long-continued tests often show a decreasing rate because of strain-hardening.

Comparison of short time tensile and long time flow tests shows that at the higher temps the short time tests do not reliably reflect the properties At the higher temperatures large grain size whether obtained in cast as compared with wrought alloys, or by annealing as compared with quenching and drawing or with rolling without annealing, tends to reduce creep Step loading running awhile at one load and then increasing the load on the same specimen may give misleading results The discussion deals primarily with methods but the curves give much actual data on the flow properties of carbon and Ni Cr cast steels and on wrought carbon, Cr Mo, Ni Cr, stainless and 18-8 Cr Ni steels Some of the curves show results from observation of the same specimen for a year or more H W GILLETT

**Structural changes in annealed soft steel.** W HEIKE AND W. BRENSCHEIDT. *Arch Eisenhüttenw* 4, 99-103(1930) —Mild steel (0.16% C, 0.02% Si, 0.35% Mn, 0.065% P and 0.067% S) was cold rolled to different degrees (as far as 60% reduction in area) and annealed in limestone, in air and in a lead bath for periods up to 100 hrs. at temps between 730° and 800° Large columnar grains appear on the periphery at a degree of deformation around 3% The phenomenon disappears when the reduction in cross sectional area reaches 6% The columnar growth can be used as an indication of previous cold work deformation in conjunction with Fry's method of etching Grain growth occurs also in the interior but uniformly, as soon as the C has diffused towards the outside The loss of C, even in an annealing bath of lead, is about 40% Prolonged annealing slightly below $A_1$ in an oxidizing atm at degrees of deformation above 30% produces unusually large grains which originate in spots that are rich in P. When the annealing process is carried out between $A_1$ and $A_3$ the C is displaced from the spots that contain a considerable amt. of P and grain growth occurs as a result of the diffusion of P H. S VAN KLOOSTER

**Thermodiffusion of elements in steel** II. JOHN H HRUSKA. *Heat Treating and Forging* 16, 1530-3(1930) cf *C A* 25, 1200 —The thermodiffusion of C in carburizing and cyaniding and of O, and of decarburization as a thermodiffusion phenomenon are discussed J. BALOZIAN

**Nitrided steel and its properties** J H HIGGINS *Heat Treating and Forging* 16, 1527-9(1930) —The existing practical conditions confronting the com nitrider are discussed J BALOZIAN

**German versus American sheet steel.** EDWARD S LAWRENCE *Heat Treating and Forging* 16, 1156-8(1930) —The av processing of an extra-deep drawing auto-body sheet as manufd in this country and in Germany is compared J. BALOZIAN

**Characteristics of rimmed steel.** EDMUND C BITZER. *Blast Furnace Steel Plant* 19, 249-51 415-7 422(1931) —Rimmed steel is one which has been partially deoxidized either in the furnace or in the ladle and is poured in this condition C, Mn and S have a profound effect upon the rimming properties of the steel Too much Mn and C will cause the steel to grow without any indication of rimming action 0.06% S would cause the rimming action in an ordinary open hearth heat to be too weak and the blowholes in the ingots would be too near the surface Al facilitates the pouring of certain grades of rimmed steel whose C is low It is added in shot form according to the judgment of the pourer It makes the metal pour quietly, thus cutting down the pouring time Segregation is the principal evil in rimmed steels Since different heats of rimmed steel segregate to different degrees, it seems logical that a more detailed knowledge of the effect of FeO content in the metal would lead to the mfg of a better grade A method has been developed for detg FeO in liquid steel The importance of temp in the mfg of rimmed steel cannot be over-emphasized, as excessive temp has probably ruined more steel than the total amt spoiled from other causes The advantages of rimmed steel are its low cost and use of less deoxidizer, it contains a min. of non metallic inclusions the yield from ingot to finished product is greater because of the absence of pipe in properly made steel Better control is needed to decrease segregation, thin skinned ingots and over oxidation. H C PARISH

**Crystal structure of martensite.** E ÖHMAN *Nature* 127, 270-2(1931) —The present knowledge of tetragonal martensite is summarized and results of earlier investigators are reviewed with reference to C content and lattice dimensions Ö employed Cr K radiation and obtained photograms of quenched steel specimens in which the line (101) of the tetragonal phase is sepd from the $\gamma$-Fe line (111) It was thus possible to det. the lattice dimensions of the tetragonal structure Results are in agreement with those of Kurdumoff and Kaminsky that the tetragonal martensite is a supersatd soln of C in $\alpha$-Fe Ferrite and tetragonal martensite are thus one and the same phase, but as they are often present in one and the same specimen as sep constituents, it seems convenient to denote the tetragonal phase as $\alpha'$. Westgren and

Phragmen suggested that the C atoms dissolved in γ-Fe do not occupy any points of the face-centered lattice, but are statically distributed in the interstices between the Fe atoms Seljakow, Kurdumoff and Goodtzow suggested that the same might be the case in the α' phase, but Ö thinks this improbable as the space available for the C atoms would be extremely small Another probable explanation is that there is a complex substitution in such a way that a group of 2 C atoms is substituted for 1 Fe atom in the lattice These compds have a tetragonal structure in which the $C_2$ group is oriented parallel to the tetragonal axis, an explanation which holds equally well for tetragonal martensite By density measurements, it is shown that the assumption of a complex substitution of C atoms is in good agreement with x ray intensities The only suggested structure of tetragonal martensite which explains the observed density, the increase of vol with the C content, and the elongation of one of the crystallographic axes may be described as follows In the body-centered lattice groups of 2 C atoms statically distributed replace some of the Fe atoms. The C atoms are most probably oriented in such a way that the axes of the $C_2$ groups are parallel to the tetragonal axis of the lattice G L Craig

**Effects of alloys on rolled and cast steels.** R. C Good *Iron & Steel Can* 13, 121–2, 141–2(1930), *Can Machinery* 41, No 16, 39–40.—A brief summary is given of the reasons for using Cr, Ni, Co, Mo, Mn, V and Si, individually and in certain combinations as alloys, in rolled and cast steels. Downs Schaap

**Some lesser known facts concerning alloy steels.** J H Andrew. *Trans Inst. Eng. Shipbuilders Scotland* 73, 166–98(1929).—See *C A* 24, 810 A N H

**Relative merits of some different alloy steels with respect to certain mechanical properties.** Bradley Stoughton and Wilber E Harvey *Proc Am Soc. Testing Materials* 30, Pt II, 241–57(1930).—Data in the literature are studied by the application of various "quality factors," such as tensile times elongation, elastic limit times reduction of area, tensile times Izod, etc., in an effort to find a quality factor that will pick out superior steels The data are tabulated in various ways In one classification such widely varying compns. as C 0.47, Cr 0.51 and C 0.09, Cr 16.0% are classed together as Cr steels Variations in methods of testing for elastic limit, in notches used on Izod bars, etc., in size of bar from which a test specimen was taken, whether heat treated in test bar or larger size, etc., are not given and these variations probably affect the tabulations. No attention is paid in quality factors employed, to cleanliness of steel, ease of rolling, response to heat treatment, depth hardening, weldability, machinability or cost, though attention is called to the fact that some of these are important. Numerous data are recorded on Ni, Ni Cr and Cr-V steels of tensile strengths from 100,000 to 300,000 lb /sq in with references to the original sources of the data No conclusions are drawn as to which, if any, "quality factor" is to be preferred H. W. G

**Can residual analysis by decomposition with chlorine be applied to alloy steels?** Roland Wasmuht *Arch. Eisenhüttenw* 4, 155–9(1930).—In order to apply this method to the detn of metal oxides the alloy and any metal carbides which may be present must be completely decompd at temps at which the oxide is not yet attacked by the Cl A no of alloys and metal carbides and also a number of oxides, by themselves as well as in the presence of C, were investigated for their resistance against Cl at various temps. The oxides of W, Mo, Ni, Co cannot be detd. by this method, as they are attacked by the Cl at temps at which the carbide or the metallic alloy are not yet completely decompd It seems possible to det. Cr oxide if a decompn temp. of 500° is chosen. Such residual analyses were made on Cr steels and showed that the materials contained varying quantities of Cr oxide, from which conclusions could be drawn as to the behavior of the alloy. The use of chips or metal pieces as initial material for the analysis is briefly discussed. Leopold Pessel

**Alloy steels in the railroad field.** Charles McKnight. *Trans Am. Soc. Mech. Eng., Railroads* 52, 81–93(1930).—There is an increasing interest in the use of alloy steels for railroads They are used purely as a matter of economy. Better work must be done at the same cost or the same work at less cost. The use of alloy miscellaneous castings materially cuts down weight with the same strength and same cost as C steel castings C steels are used for special applications Semi-alloy steels are slightly more expensive than C steels and have slightly better properties Some of the uses include boiler materials, forgings and castings Corrosion-resisting materials, nitriding and miscellaneous materials are discussed and the economies of each are given. R. Rimbach

**Preliminary report on the behavior of copper steel rails.** Francesco Abbolito. *Rivista tec. ferrovie ital.* 37, 292–6(1930).—Cu steel rails (contg. 0.08–0.23% Cu and having 66–83.5 kg /sq. mm. strength) were examd. after 16 yrs.' service: a loss in the

breaking strength of 1 4 kg was found and an av loss of 4 2 sq cm on the original section of 47 sq cm G A BRAVO

**Results of laboratory tests and practical experience with rails on Swiss railways.** P LUCCHINI AND M ROŠ *1st Communications New Intern Assoc for Testing Materials* 1930A, 190-212(in German) —Simultaneous tests in the Swiss Federal Testing Laboratory and the Swiss Federal Railways on various mild steel rails of known compn, especially with regard to wear, showed that hard steel rails and heat treated rails of great hardness have a greater resistance to wear than older and newer rails of lower hardness and strength F M SYMMES

**Alloy cast iron and high-strength cast iron in the United States of America.** F. B COYLE *1st Communications New Intern Assoc for Testing Materials* 1930A, 35-48, cf C A 23, 4175 —The extent of development of alloy cast Fe in the U. S A. is described The alloying elements are carbide forming and graphitizing There is described the general effect of alloying elements on grains, tendency to chill, hardness, machinability resistance to wear, d and strength, and the strength limits of plain and ordinary alloy Fe are given To develop extremely high strength, superheating partial malleabilization low C cupola Fe and white cupola Fe graphitized by ladle addns may be used F M. SYMMES

**Alloy additions improve gray iron pressure castings.** F. J McGRAIL. *Foundry* 59, 52-5(1931) —Ni and Cr alloys in the form of shots are sprinkled into molten metal These 2 metals eliminate the use of expensive chills, and the grain structure is uniform to the center of the test pieces Photomicrographs are shown of test pieces which broke around 5000 lb on the transverse test H C DUUS

**The relations between structure and properties in metallic alloys** A GUERTLER *1st Communications New Intern Assoc for Testing of Materials* 1930A, 320-7 —A philosophical discussion of individual crystals of pure metals, of compds., of solid solns. and of aggregates H W GILLETT

**Heat-resisting alloys in furnaces** L J STANBERY *Heat Treating and Forging* 16, 1031-5, 1191-2 1195-6(1930) —The principles involved, the effect on the properties of the alloy of various chem elements and of heat treatment are discussed J B.

**The influence of silicon and manganese on the type of solidification of iron-carbon alloys** OTHMAR VON KEIL AND FRANZ KOTYZA *Arch Eisenhüttenw* 4, 295-7(1930) —The influence of Si and Mn on the type of solidification and the carbide decompn of Fe C alloys is investigated metallographically and by cooling-curve detns The fusions were made at 1350-1400° and the cooling velocity was 30°/min (av) At these cooling velocities Fe C Si alloys of hypo-eutectic compn show metastable solidification with subsequent carbide decompn, and only in the hypereutectic alloys does the stable solidification appear By addn of Mn the white solidification is more stable at low C contents, while at approx eutectic concns the stable phase is favored Also, the field of metastable solidification with subsequent decompn is smaller with increasing Mn content J BALOZIAN

**The alloys of iron and manganese.** V N KRIVONOK *Heat Treating and Forging* 16, 1538-40(1930) —The heat treatment and metallography of Fe-Mn alloys are discussed Micrographs (9) are shown J BALOZIAN

**Dimensional stability of heat-treated aluminum alloys.** J D GROGAN AND D CLAYTON *J Inst Metals*, Advance copy No 553, 28 pp., *Engineering* 131, 371-3(1931) —It was found that the change in length of both cast and forged heat treated Al alloys over a period of years was inappreciable Changes in length on machining these alloys however, may occur Samples of Y alloy, duralumin and 25S 3 in. in diam by 5 in long were heat treated and machined into dumb-bell form As the outer surface was removed appreciable shrinkage occurred in the fully aged alloys The shrinkage was greatest in those quenched in cold water, less in those quenched in oil and almost negligible in those quenched in boiling water The decrease in length in some cases amounted to almost 0 020 in Tensile and hardness tests indicated that the alloys quenched in boiling water were as effectively hardened as those quenched in cold water. Dimensional changes on machining did not occur in annealed alloys The corrosion resistance of the hot water quenched alloys may be low, and the greater resistance of the cold-water quenched alloys may result from compressive stresses in layers near the surface, which heal intercryst corrosion cracks J. L. GREGG

**A note on the silver-rich aluminum-silver alloys above 600°.** T. P. HOAR AND R K ROWNTREE *J Inst Metals*, Advance copy No 555, 6 pp (1931) —Alloys up to 15% Al were studied by thermal and microscopic methods The results substantiate Petrenko's diagram except that the diagram is shifted to higher temps The diagram is similar to the Cu Al diagram J. L. GREGG

Influence of heat treatment on resistance of aluminum-silicon alloys containing up to 2.5 percent silicon. L. Guillet and M Ballay *Rev métal* 27, 398–403 (1930) —See *C. A.* 24, 5702 E. J. C.

An air-hardening copper-cobalt alloy. Cyril S Smith. *Mining and Met* 11, 213–5(1930) —A Cu alloy containing between 1 and 5% Co when quenched sufficiently rapidly from a high temp remained in the soft alpha condition The quenched alloy on re-annealing at a suitable temp was hardened by submicroscopic pptn of the Co-rich solid soln. in a manner similar to duralumin The alloy softened again if the annealing temp was too high, as a result of the coagulation of the ppt. A peculiar scale resulted when the alloy was annealed in an oxidizing atm Underneath the usual black and red scale, there appeared a layer of tightly adherent metallic "sub-scale" which was detached only when the metal was very severely distorted It consists of polygonal grains continuous with the underlying metal but containing innumerable black particles of Co oxide F. W. Boech

Rolling of alloys of copper and phosphorus containing up to 5 percent of phosphorus. Owen W. Ellis *J Inst Metals*, Advance copy No 551, 6 pp (1931) —Contrary to recent reports, Cu contg as much as 5% P can be rolled Sheets for brazing have been rolled to 0 015 in The Cu P alloys were rolled at a temp of 450° or above to between 0 02 and 0 04 in , and then rolled cold A strip of the 5% P alloy 0 018 in. thick had a tensile strength of 88,000 lb /sq in and practically no elongation J L. Gregg

Nickel alloys. W R Barclay *Metal Ind* 37, 414–6, 437–40(1930) —A historical review of B 's 35 years of personal experiences in the manuf of Ni alloys The importance of const. study and research is insufficiently realized O M Smith

Etching nickel and its alloys. W A. Mudge *Metal Progress* 18, No 6, 72–3 (1930) W A. Mudge

The advantages of lead-antimony and lead-antimony-cadmium alloys over lead in the manufacture of sheaths for telephone cables. H Godin. *Rev univ mines* [8], 5, 106(1931) —The failure of cable sheath has been found to be largely a matter of fatigue On the basis of this property, an alloy of Pb 99.25, Sb 0 5 and Cd 0 25% has been found superior to the 1% Sb alloy and very much better than Pb R S Dean

Special bronzes. Willi Claus. *Metallborse* 20, 1769–70, 1825–6, 1881–2, 1937–8, 1993–4, 2049–50, 2105–6, 2161–2, 2217–8, 2274–6, 2331–2, 2386–7(1930), cf *C. A* 23, 5144.—Special bronzes are defined as alloys contg at least 78% of Cu and other metals besides Zn The special bronzes discussed are those contg Pb, Mg, Cd, Si, Mn, P, Al, Ni, Sb, As, Bi, Co, Ag, Fe, Cr, W, V, Mo, Ti and Be A complete discussion of the properties of these various special bronzes is given but no new data. R. S Dean

Carburizing with gas in underground retorts. W. F. McNally *Metal Progress* 19, No. 1, 39–43(1931) —Gas carburization with natural gas, propane and dehydrated city gas is superior to solid material carburization because of lower labor, fuel, carburizing media and container costs together with greater uniformity and flexibility W. A. Mudge

Pickling of metals. E Girard. *Rev chim. ind* 40, 7–12(1931).—A review P Thomasset

Some practical features of wire pickling. W G Imhoff *Wire* 5, No 3, 77, 79–80, 94–5(1930). E. I. S

How to select thin plate for deep drawing. H. T Morton *Metal Progress* 18, No. 6, 54–9(1930) —A discussion is given of chem compn , slag inclusions, surface decarburization and annealing upon drawing quality W. A Mudge

Coatings, corrosion protection and coloring of aluminum. Herbert Kurrein *Metallwirtschaft* 9, 1009, 1031–2, 1049–50(1930) —A review Leopold Pessel

Theory of the rust-protective action of protective coatings. W. Beck. *Korrosion u Metallschutz* 6, 229–30(1930), *Gas J* 193, 216–7(1931) —By means of colloid-chem considerations an attempt is made to explain the mechanism of the protective action of protective coatings An explanation is given of why, in spite of a very distinct lack of elec insulation, an effective rust protection may exist Adsorption layers may be formed on the surface of the metal which may have great protective value and yet, on account of their great thinness, only a very small elec. resistance. The impossibility is emphasized of drawing conclusions from the poor insulating qualities of the protective coating as to its protective value Leopold Pessel

Selective solution of magnesium corrosion products. L. Whitby. *J. Soc. Chem Ind* 50, 83–5T(1931) —A boiling 20% soln of pure $CrO_3$ may be used to remove corrosion products rapidly from Mg and Mg-base alloys. The soly. of the metal in acid is negligible for most purposes If $Cl^-$ is present its activating effect may be inhibited

by adding small quantities of $Ag_2CrO_4$ to the $CrO_3$ soln $SO_4^{--}$ exerts no activating action when present in small quantities B. E ROETHELI

Initial corrosion rates of metals R H BROWN, B F ROETHELI AND H. O FORREST *Ind Eng Chem* 23, 350–2(1931) —The initial corrosion rates of Al, Zn, Fe, Cu, Ni, Sn and Ag in oxygenated water were studied All the metals investigated were shown to have finite corrosion rates Tendencies of the metals to corrode (calcd as free energy decreases for the cells

$$\left( M(s) \;\middle|\; \begin{matrix} M(OH) \text{ satd} \\ \text{Satd soln } O_2(0.21 \text{ atm}) \end{matrix} \;\middle|\; O_2(0.21 \text{ atm}) \right)$$

were obtained and found to be in better agreement with the facts than tendencies obtained from consideration of the molal e m f series Corrosion rates decreased with immersion time This was attributed to the formation of films which reduced the rate of diffusion of ions and dissolved $O_2$ B E ROETHELI

Metal corrosion G CHAUDRON *La Nature* 1930, I, 172–4; *Wasser u Abwasser* 27, 171 —The electrochem corrosion theory as applied to metals and the importance of $O_2$ in corrosion are explained Corrosion is best detd on metals by detg the loss of wt during exposure under fixed conditions of temp , etc Protective alloys and coatings are discussed C R FELPERS

Influence of stress on corrosion D J MCADAM, JR *Am Inst. Mining Met Eng , Tech Pub* No 417, 39 pp (1931) cf *C A* 24, 2412 —Special attention is given to Ni, Al bronze, stainless Fe nitrided steel and Muntz metal Each expt. was in 2 stages (1) a corrosion stage, in which the specimen was corroded with or without cyclic stress (2) a fatigue stage, in which the specimen was tested to fatigue failure and the fatigue limit was estd The lowering of the fatigue limit is used as a measure of the "damage" due to corrosion Diagrams of 3 types are presented type 5 illustrating relative influence of stressless corrosion and corrosion under cyclic stresses in causing damage, type 10 illustrating influence of cycle frequency on net-damage; and type 11 a illustrating influence of stress range These diagrams, in addn to diagrams for steels, Al alloys and Monel metals presented in previous papers, illustrate the behavior of a great variety of metals under similar conditions of corrosion The rate of net damage varies as the third to at least the fifth power of the corrosion stress, depending on the metal, cycle frequency and corrosion conditions. The general conditions favoring intercryst. corrosion are discussed Application of stress-corrosion data to design, construction and operation of machinery and structures is discussed briefly C. L MANTELL

The effect of artificial aging upon the resistance of superduralumin to corrosion by sea water K L MEISSNER. *J Inst Metals*, Advance copy No 557, 15 pp ; *Engineering* 131, 406–8(1931) cf *C A* 25, 62 —Specimens of superduralumin (0.8% Si) that had been quenched from 500° and aged for 20 or 40 hrs at temps up to 200° were exposed in the North Sea for 3 months During exposure they were under water for 7 or 8 hrs and in the air for 4 to 5-hr periods The corrosion was detd by appearance, change in weight, change in tensile properties and microscopic examn The samples aged at 125° and 145° were badly pock marked Tensile tests indicated that these samples had been most severely attacked. Microscopic examn showed that these samples were corroding at the grain boundaries and that the pock marks were caused by chunks of Al falling off In such an alloy there is therefore a crit tempering range between 100° and 150° at which the corrosion resistance is at a min This range is just below the crit hardening temp J L GREGG

First report of the corrosion of pipes sub-committee. ALBERT STOKES, *et al Inst Gas Eng* 1930, *Communication* No 20, 10 pp —The effects of various coatings on wrought Fe and steel were detd in 2 types of tests (*a*) The coated metal was placed in soil and made the anode of a closed elec system The source of current was a 6-v battery The current was measured at different intervals of time and the resistance of the coating calcd (*b*) The e m f differences between a coated and uncoated specimen were measured at various times The resistance of the coating decreased with increasing $H_2O$ content while the e m f measurements showed increasing values Painted pipes showed much greater resistance to the flow of current than bare pipe. Pipes covered with paper wrappings and paints were about 50 times as resistant to the flow of current as paint coatings Deep pits occurred in the metal surfaces where the coatings were broken. Cement coatings were found temporarily resistant to stray current electrolysis Also in *Gas J* 192, 725–9(1930) B E ROETHELI

Error of averages and its application to corrosion tests. C H HUMES, R. F. PASSANO AND ANSON HAYES *Proc Am Soc Testing Materials* 30, Pt. II, 448–55 (1930) —If all samples of a given material in a corrosion test failed at the same time,

only one sample would be required When failures occur over a time range the no and area of samples that must be tested to give a true measure have to be detd by the methods of statistics The mathematics of the procedure needed to arrive at the no of samples required for reasonable assurance of a given desired accuracy in the mean of the exptl data are discussed H W GILLETT

Outline of welding and allied processes. F T LLEWELLYN. *Metal Progress* **18**, No 6, 95–104 19, No 1, 51–60(1931) —This is an outline of the practice recommended by the Am Soc Steel Treating comm W A MUDGE

Electric arc welding of aluminum. W M DUNLAP *Welding* **1**, 762-6(1930); cf *C A* **24**, 2975 5277 —A discussion of equipment, flux, electrodes, procedure control and advantageous application E I S

Metallurgy of the fusion welding process. F RAPATZ *Stahl u Eisen* **51**, 245-53 (1931) —The fusion welding process is reviewed The desirable qualities of welding rods are good melting off, that is the rod should form uniform drops in the arc and the cast should be free of pipes, then good fusing together, that is a good alloying of the weld with the rest of the material the deeper this "burning in" the better the weld For elec welding if d c is used with the electrode as the neg pole, bare rods or wires are required contg non metallic admixts best in the form of non-metallic cores. This method is best suited for soft ingot steel For steel with higher C content and alloy steels this welding on the neg pole cannot be used If the pos -pole welding is used for all types of alloyed steel, good melting off of the rods is obtained However, the alloying, the "burning in," is poor This method is best suited for high C steel. For a -c welding rods with an outside cover, consisting of either asbestos or a mixt. of Fe oxide, materials giving an exothermic reaction and metals readily combining with O, such as Al or ferromanganese, are used Wires or rods with non metallic core can be used also Plain steel rods or wires cannot be used In d -c. welding, with well-covered wires or rods, the electrode should be the pos pole In gas fusion welding the rods should be free of non metallic admixts The compn of the weld depends on the compn of the welding rods, on the gas absorption and oxidation of the various constituents of the material welded and on the alloyed "burnt in" layer The effect of the alloying elements, such as Ni and Cr on the characteristics of the welded part is discussed There is an overheated zone around the weld, then a normal annea'ed, a slightly affected and in some cases, a blue brittle zone The area of this heat affected zone is greater in gas fusion welding than in elec. welding The Brinell hardness figures for the various zones are given for both cases. In highly alloyed steel a very decided effect on the area around the weld is obtained, because of air hardening On account of the zones of different hardness, great care should be taken in the evaluation of the results of the various bending and tensile tests J A SZILARD

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Valves for blast furnace and producer gas (JOHANSSON) **21**. Corrosion reduced by new constructional materials (LEE) **23**. Boiler tube corrosion halted by hot-process treatment (COUGHLAN) **14**. The coking industry and its development in relation to the manufacture of Fe and steel (DICKIE) **21**. Oxidation of pig Fe during its transformation into steel (MUKOHYAMA) **4**. The critical anisotropic point of ferromagnetic crystals (Akulov) **2**. Special refractories for metallurgical research (TURNER) **19**. Piping materials for mineral water (MAURER) **14**. Special loading of long submarine cables (Brit. pat. 339,049) **4**. Enameled boilers and other vessels with heating or cooling coils in their walls (U. S pat. 1,796,123) **1**. Attaching rubber to metals (Brit pat 339,421) **30** Activating metals or alloys (Austrian pat 121,243) **3**. Combined gas-producer furnace for heating metals (Brit. pat. 338 893) **21**. Pb pigments (Brit. pat. 339,357) **26**. Charcoal for Fe metallurgy (Hung pat 101,960) **21**.

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Ore flotation. A. BORSIG G. M B. H. Ger. 515,757, July 24, 1926. Addn. to 446,086. App for sweeping out the slime from clarifying vessels is described.

Flotation apparatus for concentrating ores, etc. FRANK F ELMORE Ger. 518,301, Aug 13, 1927 See Brit 275,778 (*C A* 22, 2296)

Flotation apparatus for concentrating ores. LÉON C V. BENETT Fr. 37,243, July 22, 1929 Addn to 568,182

Extracting metals. RUDOLF SCHAUR and KLEMENS SCHUMACHER. Austrian 121,535, Oct. 15 1930 In extg metals from oxide ores by blowing reducing gases through the fused ore, *e g*, in effecting the reaction $FeO + CO \rightleftharpoons Fe + CO_2$, the metal is continuously withdrawn from the reaction, in order to shift the equil point in the desired direction This may be effected by maintaining such a reaction temp that the ore remains liquid but the metal solidifies Also a converter may be used to which the reducing gases are fed at points above the bottom, the metal sinking to the bottom out of contact with the gases Powd C may be blown in with the gases

Extracting metals RUDOLF SCHAUR and KLEMENS SCHUMACHER. Austrian 121 523, Oct 15, 1930 In the extn of Fe and other metals by blowing highly heated reducing gases through molten ore, the temp of the ore is maintained by passing an elec current and (or) high frequency current through it Suitably, the ore is melted in a hearth furnace and then transferred to a tiltable elec furnace to which the reducing gases are supplied

Treating ores or concentrates of copper and nickel, etc. E A ASHCROFT. Brit 338,556, Aug 20 1929 Material contg Cu or Ni sulfides or both, or Cu or Ni oxidized compds together with added S such as Fe sulfide, is treated with air or O at 600° to convert the Cu and Ni to sulfate (without disturbing or rabbling the materials during the reaction) The heat of reaction is usually sufficient to maintain the temp after the reaction is started, and the charge may be covered by a thin layer of inert material When Ni is present $FeSO_4$ or $FeCl_2$ may be added with advantage Most of the Fe present remains in the residue as oxide on leaching, together with sulfates of gang materials such as $CaSO_4$ O or air enriched with O may be used to start or assist the reaction, and various other details and modifications of app and procedure are described

Leaching copper and nickel sulfide ores I BÁLINT Hung 101,498, Feb 15, 1930 The ores are leached at a temp higher than 100°, under pressure, with $FeCl_3$ or $CuCl_2$ as solvent.

Leaching copper sulfide ores. I BÁLINT Hung 101,495, Oct. 5, 1929. The used CuCl soln may be regenerated by sepg it into part (1), contg as much Cu as was dissolved out of the ores, and part (2), contg as much as was originally used for leaching Cu is sepd from part (1) by cementation The remaining soln is united with part (2) and the mixt transformed to $CuCl_2$ by aeration The iron hydroxide ppt formed in the cementation can be sepd

Combined reduction of ores and hydrogenation of carbonaceous materials. J. L FOHLEN Brit. 339 276 July 25, 1929 Ores such as Ni ore are reduced to metals, and carbonaceous materials (such as lignite and its distn products) are hydrogenated to form volatile fuels, by first reducing the ore in the presence of the carbonaceous material or its distn products and H heated to about 350–400°, then allowing the temp to fall to 150–300° and hydrogenating the gaseous products of the reaction by contact with freshly reduced metal An arrangement of app and various details of procedure are described, and the process may be applied to the production of hydrogenated products from anthracene etc

Treating sulfide ores NATIONAL PROCESSES, LTD, and T. B GYLES Brit 338,886 Aug 27, 1929 Sulfide ores are blast roasted or sintered together with a coarse granular material, such as sintered ore, and a small porportion of sulfate or sulfite of a metal other than Fe or an alkali or alk earth metal (suitably sinter from a previous operation treated so that it contains $ZnSO_4$ with or without $ZnSO_3$) Sulfurous gases may be passed over the sinter (preferably moistened) as described in Brit 321,390 (*C A* 24, 2515) or the gas may be passed over the mixt of raw ore and diluent in a mixer from which it is fed to the sintering app (or $ZnSO_4$ liquors may be used instead of sulfurous gases)

Direct production of metals such as iron from ores. THOMAS ROWLANDS. U. S 1,795,681, March 10 Ore such as Fe ore is passed through preheating, reduction and cooling zones of a rotary furnace and carbonaceous fuel such as coal is subjected to low temp carbonization in the cooling zone by heat from the treated charge that has passed through the reduction zone but without direct contact with the charge; ore reduction in the reduction zone is effected at comparatively low temp. and considerably below melting temp by the reducing gases and solid fuel from the low temp carbonization App is described.

Production of pig iron from ores poor in iron and from iron-containing bauxites.

I PFEIFER Hung 100,509, March 12, 1929. Ores contg 30–35% or less Fe are mixed with slag forming materials, *e g*, silica or alumina, and heated in the presence of CO or hydrocarbons The iron produced is satd with C and the m p. is thus lowered to 1150–1200° The slag forming material should be so selected that the slag also melts at this temp and thus can be easily sepd from the melted iron For Fe-contg bauxites, the slag forming material should contain alkalies, *e g*, $Na_2CO_3$, which lowers the m p of alumina by formation of Na aluminate

**Direct production of cast iron from ore.** J E FLETCHER Brit 338,535, Aug 19, 1929 Reduction is effected in one or more primary rotary furnaces and the molten product is passed into a secondary furnace in which it is further heated with any ac companying slag and with desired addns of modifying or alloying materials Some mention is made of the applicability of the process to production of metals other than iron

**Preparing cast iron from ores.** A G KHOTYAN Russ. appl 24 991, Mar 27, 1928 A mechanical device is specified

**Extraction of iron from its ores.** VEREINIGTE STAHLWERKE A G Ger 518,392, Sept 17, 1927 See Fr 35,306 (*C A* 24, 3746)

**Reducing oxide ores of metals such as iron.** SAMUEL L MADORSKY (to Gathmys Research Corp) U S 1 796,871, March 17 A reducing gas is passed through molten ore in part of a furnace (details of construction of which are described), and the waste gas passing from the ore is passed over molten ore in another part of the furnace to effect partial reduction of the ore Cf *C A* 24, 4499

**Titanium recovery from ores** OSCAR T COPPELT U S 1,795,361, March 10 A Ti ore contg Fe is digested with acid such as 75–90% $H_2SO_4$ and the sol salts thus formed are dissolved, the Fe and some of the Ti are reduced (suitably by use of Fe or Zn) and an $NH_4$ halide such as $NH_4Cl$ is added in an amt. equal to the Ti present, water is added to double the volume, followed by boiling and maintaining the dilu until a ppt contg Ti in combination with O is formed, and this ppt is removed

**Tungsten from ores.** CHARLES V. IREDELL (to Westinghouse Lamp Co) U S 1,796,020, March 10 Alk solns such as may be formed by treating a W ore with alkali are treated to reduce their alkalinity to 0 3–0 7% free alkali (using phenolphtha-lein as indicator), and a Ca salt such as $CaCl_2$ is then added to the soln to ppt the W content A product of the formula $CaWO_4$ $H_2O$ may be obtained

**Acid extraction of metals such as vanadium and zinc from ores.** ROYALE H STEVENS, GERALD C NORRIS and WM N WATSON (to Rhodesia Broken Hill Develop-ment Co, Ltd) U S 1,795,412, March 10 The ore is leached with a soln of rela tively low acidity such as a spent electrolyte and the residue is sepd and releached with acid maintained at a concn equiv to not less than 4% $H_2SO_4$

**Reducing zinc, lead and like ores.** FREDERICK L DUFFIELD U. S 1,796,562, March 17. See Brit. 310,252 (*C A* 24, 581). U S 1,796,563 relates to an app similar to the one described in the preceding patent.

**Apparatus for reducing ores such as those of zinc.** HENRY E COLEY. U. S 1,797,130, March 17 Ore is fed into an internally heated reducing chamber provided with an outlet for gang and an inlet for introduction of hydrocarbon material to the ore in the reducing chamber, arranged so that the hydrocarbon material reaches the ore in substantially undecomposed condition, an inlet for combustion air is provided to effect combustion in the reducing chamber of products produced by the cracking of the hydrocarbon material Various features of construction are described Cf C A 24, 2711

**Obtaining zirconia from ores.** CHARLES O. TERWILLIGER (to Ward Leonard Elec Co) U. S 1,796,170, March 10 Finely ground ore is treated with $H_2SO_4$ and HCl of such strength as to dissolve impurities without dissolving the zirconia, and the soln is removed and the residue is washed.

**Treating metals in ladles (as in an induction furnace).** F. KRUPP A.-G Brit 339,579, April 30, 1929 When heating molten steel or other metal or alloy in a ladle by the heater described in Brit. 312,063 (*C. A* 24, 760), the ladle is placed in a chamber in which a vacuum is created Cf *C A* 24, 4468, 4502

**Mold for metal casting.** MASCHINENFABRIK ADOLF VIEBAHN Ger. 502,935, Feb 3, 1929.

**Mold for making tubes by centrifugal casting.** SOCIETÀ ALTI FORNI, FONDERIE, ACCIAIERIE E FERRIERE FRANCHI-GREGORINI. Austrian 120,888, Aug 15, 1930

**Vertical mold for making hollow bodies by centrifugal casting.** HEINRICH LENT, HERMANN J. SCHIFFLER and GUSTAV TICHY. Ger. 518,122, Mar. 26, 1929.

Core for centrifugal casting molds. Soc. anon des hauts fourneaux et fonderies de Pont a Mousson Ger 518,123, Nov 6, 1926

Machines for making hollow bodies by centrifugal casting. Societa alti forni, fonderie acciaierie e ferriere Franchi-Gregorini Austrian 120,889, and 120,890 Aug 15 1930

Two-part metal founding molds Henry T Richardson Ger 515,772, May 19, 1928

Cooling system for casting troughs such as those used in centrifugal casting. Frank G Carrington (to Lorme Engineering Co) U S 1,796,644, March 17. Various details of app are described U S 1,796,645 also relates to centrifugal casting app

Water-cooled die-casting machine Compagnie générale des conduites d'eau Soc anon Ger 515,799, April 21 1929

Metal-casting apparatus. Carl F Beckie U S 1,797,041, March 17. Structural features

Centrifugal casting apparatus suitable for casting belled pipes. Frank G Carrington (to Lorme Engineering Co) U S 1,795,637 March 10 Structural features

Centrifugal casting of metal pipes Soc. anon des hauts fourneaux et fonderies de Pont a Mousson Brit 329,095, Dec 10, 1928 App and various mech details are described

Casting metal bushings Otto Bergner. Ger 515,801 Sept 20, 1928

Casting flanged pipes. Heinrich Nolze Ger 515,800, Nov 10, 1928

Water-cooled slide-way for ingot-reheating furnaces. Friedrich C. Siemens U S 1,795,410, March 10

Bessemer converter L I Ignatovskii Russ appl 67,364, Mar 30, 1930 Mechanical features

Apparatus for charging the Martin furnace N G Gergesel. Russ. appl. 68,282 June 7 1930 Mechanical details.

Cowl reversible gear for Martin furnaces, etc. O Reiner. Brit 338,788, Jan 10, 1929 Structural features.

Regenerative oven, especially useful as a metallurgical smelting furnace. Walter, Alberts and Paul Zimmermann Ger 515,835, May 22, 1929

Oil-fired cupola furnace Peter Marx Ger 515,796, Feb 2, 1928.

Slag collector for cupola furnace Friedrich Schinke Ger 518,176, Jan. 28, 1927

Smelting metals such as iron and iron alloys. Carl Brackelsberg. U. S 1,797,125 March 17 In operating rotatable drum furnaces for melting metals by use of powd coal as fuel the fuel is burned directly in the melting chamber of the furnace by the aid of combustion air of such vol and pressure as to cause the fuel to be burned in suspension and the ashes of combustion to be blown through the outlet of the furnace App is described

Apparatus for charging retorts such as those for zinc production Walter F Naylor (to Beardsley & Piper Co) U S 1,796,802, March 17 Structural features

Modifying the properties of metals. E G Herbert Brit. 339,511, Aug 16, 1929 Metals (suitably after hardening by working or otherwise) or other substances such as rock salt, sugar or quartz are subjected to the action of a coned locally generated magnetic field "or like flux or vibration other than heat" (the magnetic field or the like being alternating or rotating)

Fusing refractory metals. Siemens & Halske A.-G Ger 518,400, Nov 2, 1926 Metals such as Ta W, Th or their alloys are completely fused in strongly cooled crucibles made of materials of lower m p than the said metals, *e. g.*, of quartz, Cu or Ag The metal to be fused may be heated by high frequency elec. current, and the crucible, if electrically conductive, may be made in a no of insulated segments.

Metal-reduction bomb suitable for use with calcium and calcium chloride. Wm. F Kiernan (to Westinghouse Lamp Co) U S 1,795,780, March 10 Various details of stopper construction and fastening are described The main portion of the bomb may be formed of an alloy resistant to heat and to oxidation such as "nichrome" or "hardite"

Coating metals. Otto Sprenger Patentverwertung Jirotka m b H. Fr 37,112 June 19 1929 Addn. to 655,786 (*C. A.* 23, 3894) The deposition of $MnO_2$ on Al, Mg or their alloys is accelerated by adding bi or ter valent salts of Mn or ferrous or stannous salts to the baths contg the permanganate and free acid Cf *C. A.* 24, 2097

Galvanizing pot. O Middermann Brit 339,384, Sept. 20, 1929. Walls of iron

galvanizing pots which come in contact with the molten Zn are freed from pores by melting their surface layers (suitably with a welding burner or elec arc)

**Rolling thin metal strips or sheets from bars.** L. E Broemel. Brit. 338,771, Dec. 18, 1929 Mech features.

**Pointed tubular metal articles such as hypodermic needles.** S. J. Everett. Brit 338,592, Aug 22, 1929 In a process involving swaging, rolling or drawing a tubular billet on a core of metal capable of extreme elongation and retention of tensile strength, such as Ni Ag or brass (as described in Brit 210,156), the cored tube is subjected to heat treatment to anneal the core and temper the tube while on the core Numerous details of procedure for the treatment of different specified metals are given

**Blow-pipe for cutting metals by fusion with the use of oxygen.** W Eberle Brit 339,161, Jan 15, 1930

**Pickling bath for metals.** James H Gravell and Alfred Douty (Gravell to American Chemical Paint Co) U S 1,796,839, March 17. See Can 302,397 (*C A* 24, 4253)

**Bright-annealing metals.** Siemens-Schuckertwerke A -G Brit 339,423, Oct 22, 1928 Various details of app are described relating to a chamber in which the treated metal is cooled in inert gas the expansion and contraction of which is provided for by connection with a bell gas holder

**Apparatus for annealing sheet-metal strips in coils or bundles.** Herman C Cappel and Otis C Gross (to Greer Steel Co) U S 1,796,082, March 10 Structural features

**Case-hardening composition.** Ernest C Moffett (to American Cyanamid Co) U S 1,796,800, March 17 See Can 302,499 (*C A* 24, 4253)

**Heat-treating wire and strip material.** L D Whitehead Brit 339,155, Jan 6, 1930 Wire or strip which is to be subsequently galvanized or otherwise surface-treated is annealed or cleaned (or both) by passing it through a horizontal metal tube arranged in a furnace and contg molten metal, salts or other suitable liquid material (the 2 ends of the tube being up turned to retain the contents) Various details of app are described

**Heat treatment of iron.** Link-Belt Co. Brit 338,924, May 31, 1929. Malleable cast iron is heated to a temp (suitably about 800°) sufficient to cause the formation of Fe carbide, cooled or quenched again heated to a temp (suitably about 650°) below the C-combining temp, and finally cooled or quenched (after heating to above the galvanizing temp if the product is to be galvanized by dipping). The first heating may be effected in the presence of a carburizing agent to form a hardened surface on the article. Brit 338,925 relates to metal similarly treated which is highly resistant to abrasion

**Deoxidizing iron.** Rudolf Schaur and Klemens Schumacher Austrian 121,530, Oct. 15, 1930 In deoxidizing Fe by blowing reducing gases through the molten metal, the reducing gases are strongly preheated, and the temp of the metal is maintained by electrically heating, *e g*, by means of high frequency current.

**Cementation of iron and steel.** Hermann Freudenberg (to Roessler & Hasslacher Chemical Co) U. S 1,796,248, March 10 Hardening of ferrous articles is effected by immersing them in a fused salt bath such as soda and NaCl to which is added finely divided C (suitably in the form of charcoal) and an alkali metal hydroxide which serves to enhance the hardening effect

**"Slushing grease" suitable for treating iron or steel to prevent rusting** Arthur H. Bransky (to Standard Oil Co of Ind). U S 1,795,993, March 10 A wax such as montan wax is used with Na soaps of sulfonic acid compds derived from the treatment of hydrocarbon oils with strong $H_2SO_4$ and with lubricating oil

**Apparatus for heat treatment of steel.** V. A Mozharov and I. V. Mozharov Russ appl. 20,409, Oct. 5, 1927; 32,405, Sept. 10, 1928 and 50,854, July 9, 1929

**Tempering steel strip.** Alfred M Remington (to Simonds Saw & Steel Co) U. S. 1,796,304, March 17. The stock is fed slowly through a hardening furnace and the forward end of the stock is fed rapidly into a drawing furnace a distance approx equal to the effective length of the furnace. App is described.

**Special steel for car wheels, brake shoes, etc.** H. J. van Royen. Brit. 338,528, Dec 8, 1928 Rails, wheel tires, etc, subjected to hard wear, are made of eutectoid steel contg double carbides with laminated pearlitic structure. The laminas may contain Fe carbide 75–85 and carbides of metals such as Mn, Cr, W, Mo and V 15–25%.

**Steel billets.** Samuel B. Sheldon. U S 1,795,519, March 10 An ingot is formed having an alloy skin which may contain Al alloy and the skin is subsequently removed so that surface imperfections are avoided in the billets formed from ingots thus prepd

**Manganese steel** TAYLOR-WHARTON IRON & STEEL CO Brit. 339,521, Dec. 31, 1929 For refining the grain structure and improving the properties of Mn steel, it is heated for 12–96 hrs. at 400–600°, slowly cooled, reheated to about 1060° and quenched Various compns. of steels suitable for this treatment are described

**Heat treatment of alloy irons and steels** P. R. KUPFNRICH and DARWINS, LTD Brit. 338,912 Aug. 28, 1929 Articles of alloy irons and steels contg. Cr 8–20 and C 1.0–3.5% with or without up to 6% Co and up to 1% each Ni, V, Mo, Si and Mn and contg. less than 0.05% each of S and P are hardened and rendered "stainless" and rustless by heating to 1150–1250° and then cooling at a definite rate corresponding to the rate at which steel in sheet form of about 18 gage cools in water at normal temp. Various details are given for treating spoons or other articles

**Alloys** SIEMENS & HALSKE A. G. (Bruno Eetkenheuer, inventor) Ger. 515,798 May 10, 1926 A speculum for medical use is made of an alloy contg. Co or Ni 20–60, W or Mo 15–50, Cr 30 and C, Si or B 1–5 parts

**Alloy for armoring alternating current cables.** FELTEN & GUILLEAUME CARLSWERK A. G. Brit. 339,383 Sept. 25, 1929 See Ger. 501,318 (*C. A.* 24, 5281).

**Alloys for sheathing electric cables.** VEREINIGTE TELEPHON- UND TELEGRAPHEN-FABRIKS A. G. CZEIJA NISSL & CO. Austrian 121,525, Oct. 15, 1930 An alloy contg. Cu 10–50 and Sb 90–50% is fused with so much Pb and, if desired, unalloyed Sb, that a product contg. Pb up to 0.5 and Sb 0.8–1.2% is obtained

**Alloys resistant to acids.** SOC. ANON. DES ANCIENS ÉTABLISSEMENTS SKODA À PLZEN Fr. 37,433 Sept. 12, 1929 Addn. to 681,578 (*C. A.* 24, 4254). Alloys of low content of Ti and Si are used

**Alloy for belt conveyors for high-temperature service.** WICKWIRE SPENCER STEEL CO. Brit. 338,951, Aug. 26, 1929 Various structural details are given of belts suitable for use up to temps. of about 870° which may be made of an alloy contg. C 0.16–0.24, Cr 17–18, Ni 25–26, Si 2–3 and Fe 55.84–52.76%.

**Bearing alloy** EMIL ABEL (to Jacob Neurath) U. S. 1,795,633, March 10 In forming a bearing alloy of Pb, Sb, Sn and Ni in which the Ni is present in the α-form, the Ni content is restricted to less than about 1% and Cu is added in an amt. at least 1.5 times that of the Ni content

**Antifriction alloy and its production** J. E. ENSLÉN and F. STEIN Hung. 101,303, May 14, 1928 In an antifriction alloy contg. less than 50% Sn harder Sn-Sb-Cu crystals embedded in the eutectic Cu may be partly replaced by one or more metals of the 3rd group Also graphite or similar substance can be added in fine dispersion To the melted Cu or its alloys with the metals of the 3rd group are added first Sn, then Sb and Pb, the liquid mixt. is cooled with stirring, graphite is added; and finally the alloy is solidified

**Aluminum alloys.** H. J. GARRARD Brit. 338,923, May 30, 1929 In the production of an Al alloy contg. Zn and Mg, with or without Bi, a preliminary alloy of part of the Al with the Zn and Mg is added to the remainder of the Al, and the Bi if used, is subsequently added Various details of proportions and procedure are given

**Aluminum alloys.** O. KAMPS Brit. 339,469, Nov. 25, 1929 Alloys are formed of Al together with Ni 0.3–1.5, Th 0.05–0.9, Mn 0.4–0.8 and up to 6.8% of a Cu-Ce alloy contg. 90% Cu The alloy is quenched from 480–535° to room temp. in a $BaCl_2$ bath and reheated to 50–300°

**Protecting aluminum alloys.** ALADAR PACZ Fr. 695,155, Aug. 14, 1929 Al alloys are protected by colored layers obtained by treating the alloys in alk. solns. of chromates or dichromates contg. not more than 0.25% by wt. of dichromates calcd. as $K_2Cr_2O_7$ and at least 1.5% of alk. substance calcd. as $Na_2CO_3$

**Alloys of iron and aluminum.** BRITISH & DOMINIONS FERALLOY, LTD., and J. W. BAMPFYLDE Brit. 338,688, Oct. 21, 1929 In making or remelting alloys of Fe and Al, fluorspar or $SrF_2$ is added Various details and modifications of procedure are described

**Iron alloys.** FERRANTI, LTD Ger. 515,700, July 11, 1925 An elastic alloy suitable for wire for low frequency windings of telephones consists of Fe 60.5, Ni 25.99, Cr 11.60, W 1.6 and C 0.36%

**Iron alloys hardened by nitridation.** H. A. DE FRIES (to Nitralloy, Ltd.) Brit. 338,655, Oct. 9, 1928 Alloys suitable for hardening by nitridation (suitably as described in Brit. 174,580, *C. A.* 16, 1738) contain Fe together with C 0.05–2, Al 2.1–6% and a total of 0.2–8% of one or more of the elements Si, Mn, Ni, Cr, Cu, Mo, W, V, Ti or Zr (the C content being about one third the Al content and the Si content not exceeding the Al content)

**Acid-resistant iron alloy.** V. F. DONAT and K. V. VLADIMIROV. Russ. appl.

31,146, Aug 9, 1928 An acid resistant alloy is prepd. from a 70–80% ferrosilicon and a 60–70% ferrochromium and iron scrap proportions to yield about 18% Si and 2–3% Cr in the alloy Cast iron melted in another furnace is then added to the above alloy

Iron and its alloys for chemical apparatus. I. G FARBENIND. A.-G Fr. 37,362, Aug 23, 1929 See Brit. 334,926 (*C A*. 25, 1213).

Copper alloys. G H WHITEMAN and IMPERIAL CHEMICAL INDUSTRIES, LTD Brit 338 676, Oct. 14, 1929 Alloys suitable for tubes contain Cu together with Ni 30 and 4% or less (suitably 2 5%) of Cr Some mention is also made of the use of larger proportions of Cr

Copper-aluminum alloys. ALADAR PACZ. Ger 515,805, Dec. 4, 1927. See Brit 318,802 (*C A* 24, 2421)

Lead alloys for bearings, etc. METALLGES. A.-G Ger 518,395, May 19, 1927 Li 0 03–0 05, Na 0 58–0 66, Ca 0 65–0 73, and Al less than 0.2%, the remainder being Pb

Acetylene. I G FARBENIND A.-G Ger 515,916, Aug 12, 1927 $C_2H_2$ for autogenous welding is stored and shipped in pressed solid form.

Autogenous welding. I. F KUBARZHEVSKII. Russ appl. 49,743, June 21, 1929 An explosive gas mixt. is admitted into the burner simultaneously with acetylene.

Welding composition. JOHN A. HEALY U S 1 796,329, March 17 A compn suitable for use in welding cutting tips to shanks comprises fused borax 30, ferro-Mn 60 ferro-Si 10 parts, together with high speed steel filings.

Solder. WILHELM RECSS. Fr 37,159, June 28, 1929 Addn. to 645,549 (*C. A* 23, 1866) The solder described in the prior case is used for soldering steel, Fe, Cu, etc

Treating flux-cored solder. PERRY C RIPLEY (to Kester Solder Co.) U. S 1,796,163, March 10 To prevent leakage of flux in storage, solder having a liquid flux core is subjected to a temp higher than that to which the solder will normally be exposed prior to actual use, to effect an expansion of the liquid flux, and the ends of a strand of the solder are sealed while the liquid flux is in the expanded condition App is described.

Soldering flux. DANA W BOWERS (49% to Charles T Asbury) U. S. 1,797,124, March 17. Beeswax 6–10, oleic acid 25–40 and Ag oxide 1–3 parts are used with a quantity of finely granulated solder about equal to the other ingredients.

Electrical resistance heating device suitable for use in soldering irons, pipes, etc. EDWIN L. WIEGAND. U. S 1,795,628, March 10. Structural features

## 10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J WEST

Recent advances in science: organic chemistry. J N E DAY *Science Progress* 25, 389–92(1931) —A review is given of recent work in org chem. J. S. H.

Oxidation of methane. I. The homogeneous oxidation of methane under ordinary pressure. KIYOSHI YOSHIKAWA. *Bull Inst Phys Chem. Research* (Tokyo) 10, No 3, 251–5(1931)(*Abstracts* 30–1(in English), *published with Sci. Papers Inst. Phys. Chem Research* (Tokyo) 15, Nos 289–91) —$CH_4$ is oxidized in the presence of air at 600° to CO, $CO_2$, $CH_2O$ and $HCO_2H$ At 700° $H_2$ is formed. $HNO_3$ promotes the start of the reaction to 500°, yielding more $CH_2O$ $PbEt_4$ has the opposite effect. The reaction is a homogeneous gas reaction of the chain type. ALFRED BURGER

The reaction of methane and lower homologs with carbon monoxide and dioxide at various catalysts. FRANZ FISCHER AND HERBERT BAHR. *Ges Abhandl. Kenntnis Kohle* 8, 279–81. *Chem. Zentr* 1930, I, 31 —A repetition of Berthelot's expt., in which $C_2H_4$ was formed on conducting 1 vol. CO and 2 vols $CH_4$ through a glowing glass tube filled with pumice, yielded the same phenomenon. It was impossible to identify the hydrocarbon on account of the small quantity obtained. In another expt. F. and B conducted the same mixt. of $CH_4$ and CO over various catalysts at different temps CO was decompd with formation of $CO_2$, and $CH_4$ dissocd partly into C and H, but a reaction between $CH_4$ and CO was scarcely detectable When the waste gas from a catalyst for the synthesis of mineral oil was conducted over metallic sponge Fe at 900°, the greatest part of the $CO_2$ was reduced to CO; gasol, heavy hydrocarbons and a fraction of H disappeared, and a large quantity of water was formed. G SCHWOCH

The decomposition of methane at various temperatures at various catalysts. FRANZ FISCHER AND HERBERT BAHR. *Ges. Abhandl. Kenntnis Kohle* 8, 27–94; *Chem Zentr.* 1930, I, 31.—When a gas mixt. rich in $CH_4$ (natural gas from Altengamme with 92.5% $CH_4$) was conducted through a heated quartz tube or through a heated porcelain

b 60 0–0 4°, $d_4^0$ 0 9139, $d_4^{15}$ 0 8964, 81 6%; III, b 53 6–4 0°, $d_4^0$ 0 9119, $d_4^{15}$ 0 8945, 88 5%; IV, b 57 8–8 2°, $d_4^0$ 0 9121, $d_4^{15}$ 0 8946, 85 2%. V, b 61 2—1 0°, $d_4^0$ 0 9081, $d_4^{15}$ 0 8912, 79 8%

A I Hynne

Aliphatic diazo compounds. II. Alexander Schönberg and Th Stolpp (in part with J Tscholakoff and E Willner) *Ber* 63B, 3102–16(1930); cf *C A* 25, 031.—$CH_2N_2$ itself reacts with arylsulfur chlorides like diaryldiazomethanes to give hemimercaptole halides $CH_2N_2 + RSX = CH_2(SR)X$ (I) or $[CH_2(SR)]X + N_2$ (II). The aromatic hemimercaptole halides form mercaptoles with mercaptans and give "free" radicals with Hg and other heavy metals. In $C_6H_6$ they react instantaneously with BzOAg to give $R_2C(SR')OBz$, the rapidity of the reaction makes it probable that the structure II must be considered along with I. With $H_2O$ they give the corresponding ketone and mercaptole, probably through the hemimercaptole, $R_2C(SR')OH$. With $NH_3$ in $C_6H_6$ they do not give the expected $R_2C(SR')NH_2$ (which is probably an intermediate product) but the mercaptole and ketone imide. It had been found that diaryl thioketones react with 1 mol. of certain inorg. metal compds. and it had been concluded that the products are mol. compds. (*e. g.*, $R_2C{:}S{:}HgCl_2$). This investigation has been concluded and the results are reported here because these products are now thought to be complexes and very closely related to the aromatic hemimercaptole halides. A systematic study of the action of aromatic thioketones on $HgCl_2$, $HgBr_2$, $AgNO_3$ and $AgClO_4$ has shown that reaction takes place in every case, although the products cannot always be obtained in cryst. form, and sometimes, although cryst., they decomp. so rapidly that they cannot be isolated in analytically pure form. The following *complex compds.*, however, were obtained in cryst., analytically pure form: $[R_2C(SHgCl)]Cl$ R = *o*-$MeOC_6H_4$, red, *p*-$MeOC_6H_4$, orange; $[R_2C(SHgBr)]Br$ R = *p*-$MeOC_6H_4$, orange, *p*-$EtOC_6H_4$, orange, 3,4-$MeO(EtO)C_6H_3$, orange; $[O(C_6H_4)_2C(SAg)]ClO_4$ blood red; $[O(C_6H_4)_2C(SHgCl)]Cl$, orange. The color of these compds. is in every case lighter than that of the thioketones from which they are derived, probably because of the disappearance of the C:S group. Some of the compds. are quantitatively converted into the thioketones by covering them with $Et_2O$ and shaking out with aq. KI, this is explained by assuming in the $Et_2O$ phase the equil. thioketone + $HgCl_2$ ⇌ complex compd., which is disturbed by the aq. KI. A continuation of the study of the action of diaryldiazomethanes on aromatic disulfides has shown that the formation of mercaptoles in this way is also a general reaction, although it is of significance as a method of prepn. only for asym. mercaptoles which, for some reason or other, cannot be prepd. by other methods, and in connection with the study of the reaction mechanism. *Diazothioxanthene*, $S(C_6H_4)_2CN_2$ (I), was obtained from thioxanthione, $S(C_6H_4)_2CS$ (II), by conversion with $N_2H_4$ into the hydrazone and oxidation of the latter with HgO or treatment with $S(C_6H_4)_2CCl_2$. Attempts to prep. diazoxanthene (III) in the same way were unsuccessful, the $O(C_6H_4)C{:}NNH_2$ was unchanged by yellow HgO in the cold, and on heating there was obtained the ketazine, $[O(C_6H_4)_2C{:}N-]_2$ (IV), the decompn. product of the intermediate III. IV is also obtained from the hydrazone and $O(C_6H_4)_2CCl_2$. Chromone hydrazone could likewise not be converted into the diazo compd. *(o-Nitrophenylmercapto)chloromethane*, from $O_2NC_6H_4SCl$ and $CH_2N_2$ in $Et_2O$, yellow, m. around 95°, shows green halochromism with red fluorescence in concd. $H_2SO_4$, the soln. soon becoming brown. *Diphenyl(o-nitrophenylmercapto)bromomethane*, from $O_2NC_6H_4SBr$ and $Ph_2CN_2$, red-brown, m. about 108°, fumes in the air (HBr) and gradually becomes smeary. *Diphenyl(p-chloro-o-nitrophenylmercapto)chloromethane*, yellow, m. 121°, evolves *HCl* on long standing in moist air. *Diphenyl(phenylmercapto)methyl benzoate*, from $Ph_2(PhS)CCl$ and AgOBz in $Et_2O$, m. 148–9°, shows red-yellow halochromism in concd. $H_2SO_4$. *Diphenyl(o-nitrophenylmercapto)methyl benzoate* (4 5 g. from 4 g. of the chloride), faintly yellow, m. 132°, shows red orange halochromism in concd. $H_2SO_4$. *Diphenylene(phenylmercapto)methyl benzoate* (2 g. from 4 g. $(C_6H_4)_2C(SPh)Cl$), faintly yellow, m. around 132°, shows yellow-brown halochromism with concd. $H_2SO_4$. *Diphenyl(phenylmercapto)(o-nitrophenylmercapto)methane* (0 1 g. from 5 g. $O_2NC_6H_4SSPh$ and $Ph_2CN_2$ refluxed in $C_6H_6$), yellow, m. 134°. *Di-β-naphthyldiphenylmercaptomethane*, from $(C_{10}H_7)_2CN_2$ and $Ph_2S_2$, m. 160°, shows deep red halochromism and splits off PhSH in concd. $H_2SO_4$. The mercaptole could not be isolated from the products of the reaction of $(p\text{-}MeC_6H_4)_2CN_2$ with $Ph_2S_2$ and of $Ph_2N_2$ with $(p\text{-}MeC_6H_4)_2S_2$ but that it was formed was indicated by the fact that after removal of the ketazine the residual products turned blue at about 210°, and in concd. $H_2SO_4$ showed halochromism and split off PhSH and $MeC_6H_4SH$, resp. *Xanthone hydrazone*, from xanthione and $N_2H_4.H_2O$ in abs. alc., light yellow, m. 128–30°, sol. in concd. $H_2SO_4$ with light yellow color. *Ketazine* (IV), red-yellow,

m 283°, sol in concd $H_2SO_4$ with orange yellow color *Thioxanthone hydrazone*, yellowish m 115°, sol in concd $H_2SO_4$ with orange-red color. I, green, m. 105°, sol in ether, petroleum ether and $C_6H_6$ with violet color and green fluorescence, in $H_2SO_4$ with orange red color *Thioxanthone ketazine*, from the hydrazone with $S(C_6H_4)_2CCl_2$ in $C_6H_6$ yellow red m 284°, sol in $H_2SO_4$ with bright red color. *Chromone hydrazone*, m 96° was obtained in 4 5 g yield from 5 g chromone with $N_2H_4$ $H_2O$ in alc. and in 80% yield from 4 thiochromone C. A. R

*n*-Butyl ester of phosphonic acid. A Arbuzov and I Arbuzova *J. Russ Phys Chem Soc* 62, 1533–6(1930).—By acting with $PCl_3$ on BuONa was obtained tri Bu phosphite $P(OBu)_3$ (I) identical with the product prepd by Milobedzki and Sachnowski (*C A* 13, 2865) by the interaction of BuOH, $PCl_3$ and $C_5H_5N$. The action of BuI on I gives the isomeric di Bu butanephosphonate, $BuPO(OBu)_2$, (II), which when saponif with HCl produces butanephosphonic acid, (III) *Expll part*.—First was prepd BuONa by heating on the water bath 950 g of freshly distd. *n*-BuOH, b 117° with 70 g of metallic Na then, while cooling, were added $Et_2O$ and $PCl_3$, the $Et_2O$ was expelled, and the reaction product on distn gave at 9 mm and 180° (temp of glycerol bath) 174 g (68 6%) of crude I. Close fractionation being impossible, the fraction $b_7$ 116–39° (97 g.) was added to 4 5 g of Na wire suspended in dry $Et_2O$, then heated 1 hr on the water bath, poured off from unchanged Na, and redistd., producing 27 6% of I $b_4$ 119 5–20°, $d_0^0$ 0 9309, $d_0^{17}$ 0 9201. In the distg flask there remained $P(OBu)ONa$ When 1 28 g of Br is added to 2 g of I and then distd there is obtained 1 83 g (91 5%) of $C_4H_9Br$, b 98° The isomerization of I to II is effected on heating 8 hrs at 150–60° in a sealed tube a mixt of 20 g of I and 12 g of freshly distd BuI (b 129–31°), the reaction product on redistg gives 11 80° g of II, $b_{14}$ 150–51°, $d_0^0$ 0 9634, $d_0^{17}$ 0 9520, colorless and odorless liquid II is saponif to III on heating 5 hrs at 170° in a sealed tube a mixt of 6.3 g of II and 2 vols of HCl (1 1), the upper layer of BuCl, in theoretical yield, was sepd., and the aq soln was repeatedly evapd with $H_2O$ on a water bath, the heavy mass was treated with $H_2O$, the sepd crystals filtered off, boiled in $H_2O$ with animal charcoal, filtered and evapd to dryness; yield of crude III 3 55 g., m 89–99°, recrystd from ligroin and dried over $H_2SO_4$ it m 101–3°, the acid is dibasic. Chas Blanc

**2-Methyl-2-buten-4-al.** F G Fischer, L. Ertel and K. Löwenberg *Ber* 64B, 30–4(1931), cf *C A*. 24, 595.—In connection with the building up of terpene-like substances with open and closed chains it was of interest to prep and characterize *2 methyl 2 buten-4-al* (I) In a note on the rearrangement of tertiary acetylenecarbinols with $HCO_2H$, Rupe and Kambli (*C A*. 20, 3443) state that dimethylethinylcarbinol gives in poor yield "isopropylidenacetaldehyde" (I), the m p of whose semicarbazone is given as 244° in Engl pat. 267,954 In agreement with them, the authors find that this method is ill adapted to the prepn of I; after short heating of the carbinol with $HCO_2H$ there is obtained a small amount of a C·O compd whose semicarbazone, however, m 221–2° and *p*-nitrophenylhydrazone m 161–2°. After other methods of prepg I from $Me_2CO$ had failed, the following method was devised iso-AmOH ⟶ $Me_2CHCH_2CHO$ ⟶ $Me_2CHCHBrCH(OEt)_2$ (II) ⟶ $Me_2C$ $CH$-$CH(OEt)_2$ ⟶ $Me_2C$ $CHCHO$ (I) The use of fermentation amyl alc as the starting material has the disadvantage that the $Me_2CHCH_2CHO$ is accompanied by the isomeric $EtCHMeCHO$, which, however, is removed in the last step of the above reaction it is probably present as $EtC(CH_3)CHO$ in the first runnings of the fractionated crude I. The $C_4H_5CHO$, b 90–2°, $[\alpha]_D^{29}$ 5 5° (and therefore contg about 75% $Me_2CHCH_2$-$CHO$) in $CHCl_3$ at −25° slowly treated with Br in the light of an Osram lamp and then with abs EtOH gave 75% of the II, $b_{13}$ 88–9°, $d_4^{20}$ 1 1772, $n_D^{20}$ 1 4489, which, heated 4 hrs in N with fused KOH yielded 65–70% of the *methylbutenal di Et acetal*, bm 163–5°, $d_4^{20}$ 0 8555, $n_D^{20}$ 1 4201, decolorizes only about 0 1 of the calcd amt. of Br in $CHCl_3$, a slight excess quickly giving a dark green color changing to blood red on addn of NaOH; Br water is also decolorized but without the play of colors; anhyd $(CO_2H)_2$ gives a grass-green color and changes the acetal into a viscous liquid converted by heating into a brittle amber like resin insol in the ordinary org solvents but swelling markedly under $C_6H_6$. Hydrolysis of 53 g of the acetal with cold satd aq tartaric acid gives 5 g $b_{18}$ 26–8°, b 77–80°, of an unsatd. aldehyde, probably $EtC$-$(CH_3)CHO$ (*semicarbazone*, m 183–4°, *p-nitrophenylhydrazone*, golden yellow, m. 141–2°), and 18 g of I, $b_{44}$ 62–3°, $b_{760}$ 132–3°, $d_4^{20}$ 0.8722, $n_D^{20}$ 1 4526, is easily auto-oxidizable but stable for a long time in sealed vessels; *semicarbazone*, m. 221–2°, *p nitrophenylhydrazone*, violet red, m 161–2°. Hydrogenation of I with Pd-$CaCO_3$

gives $Me_2CHCH_2CHO$ (semicarbazone, m. 126–7°; *p*-nitrophenylhydrazone, m. 116°)
C. A. R.

**Absorption and reactivity of the ketone group.** Mme. Ramart-Lucas and Mme Bruzau. *Compt. rend.* 192, 427–9(1931).—Variations in the chem activity of the hexaalkyl-substituted ketones can be explained by the rate of absorption of ultra violet light. This is due to a mutual influence between the alkyl radicals present and the ketone group
Julius White

**Catalytic hydrogenation of azines. V. Hydrogenation of ketazines. Determination of affinity capacities of methyl and ethyl groups.** K A Taipale and P V Usachev. *J. Russ Phys.-Chem Soc* 62, 1241–58(1930), cf. *C A* 20, 3282.—The speed of the reaction of catalytic hydrogenation of aldazines makes possible an estimation of the relative consumption of affinity by various radicals at the C atom in the azi methylene grouping of aldazines (*C A* 19, 3478). If the affinity capacity of the Me group is 100, the relative values of the affinity capacity of hydrocarbon radicals and the H atom for this C atom can be deduced, as follows H 12, Me 100, Et 135, Pr 200, iso-Pr 555, iso-Bu 700, Ph 600 Other investigators, detg the affinity capacity of radicals in relation to C, found that the Me group absorbs a greater amt of affinity than the Et group Therefore it is desirable to compare the affinity capacities of Me and Et groups in another example than that previously obtained by hydrogenation of the aldazines of AcH and PrH The following ketazines are considered bis(dimethyl)azimethylene, $Me_2C{:}NN{:}CMe_2$ (I), bis(methylethyl)azimethylene, (II), bis (diethyl)azimethylene, (III) From the speed of hydrogenation of I and II, and of II and III, we are able to study the different influences of Me and Et groups on the speed of addn of H to the azimethylene group >C NN C<, and from that of I and III the difference in the influence of 2 Me and 2 Et groups, the resulting relations of speeds of hydrogenation enabling us to make an estimate of the relative values of affinity capacities of these 2 radicals The expts show that the speeds of hydrogenation of II and I in the presence of Pt black are to each other as 1 to 1.3, those of III and II as 1 to 1.7, and those of III and I as 1 to 2.6, *i e*, an azimethylene group joined with Et groups combines with H less readily than the one joined with Me groups Considering that the speed of hydrogenation of a double bond depends on the magnitude of the residual affinity of the atoms constituting this bond, and that the magnitude of the residual affinity in turn depends on the degree of consumption of the affinity by the radicals combined with these atoms, the conclusion is made that the Et group possesses a higher affinity capacity than the Me group Having previously assumed the affinity capacity of Me as 100, that of Et then is 140, which corresponds with the value of 135 derived from the speeds of hydrogenation of the aldazines (cf. Kindler, *C. A.* 21, 1453) The catalytic hydrogenation of ketazines led also to investigation of the properties of the fatty hydrazo compds. formed in the reaction The properties of hydrazo compds depend on the size and structure of the radicals attached to the hydrazo group, which influence its reactivity, and are noticeable in their basicity, the reactivity of the H of the imino group, and, probably, in the stability of the hydrazo grouping against decompn into amines by further addn of H. T. (*C A.* 18, 3049) has shown that $(NHCHMe_2)_2$, obtained by hydrogenation of I, possesses a considerably lower basicity than $(NHMe)_2$, $(NHEt)_2$, $(NHPr)_2$ and $(NHCH_2CHMe_2)_2$. The $(NHCHMe_2)_2$ forms a di-HCl salt, which, however, easily loses 1 HCl, moreover, only the H of 1 imino group is capable of reacting, giving mononitro-, mono-Bz derivs and the corresponding derivs. of $(NH_2)_2CO$ and $(NH_2)_2CS$, while the other above named hydrazo compds give disubstituted derivs *Hydrazo-α methylpropane (IV)* and *hydrazo-α-ethylpropane (V)* obtained, resp., from II and III, behave also like $(NHCHMe_2)_2$. Their di-HCl salts are even less stable: the stability decreasing with the increasing wt. of the radicals. The more affinity is consumed by the radicals from the hydrazo group, the less of the residual affinity remains with the latter, the lower it seems, is its basicity, and also the lower is the stability possessed by the HCl salts. The hydrazines also form only mono-substitution products with BzCl and PhNCS. IV and V and their homologs are very readily oxidized in the air, forming azo compds., which are isomerized with acids and alkalies to hydrazones, and the latter are decompd. with acids into ketones and primary hydrazines. The hydrogenation of ketazines in $Ac_2O$ proceeds differently than in other solvents. After addn of 1 mol. of H as in the case of AcOH, the addn of the next mol of H is very slow. This is explained from a study of the hydrogenation of II, by assuming that the azo compd. formed in the first phase of the reaction is isomerized to the hydrazone, which is readily acetylated, and the Ac deriv. of the hydrazone under the influence of the Ac group is more difficultly hydrogenated than the free hydrazone or the azo compd. (Skita and Rolfes, *C. A.* 14, 3667). *Expll. part*.—The ketazines were prepd. by the known

methods (K and C, *C A* 15, 2879) I $b_{760}$ 131–3°, $b_{15}$ 38°, $d_4^{20}$ 0 8389, $n_D^{22}$ 1 45318, calcd $MR_D$ 36 11, found $MR_D$ 36 16 II $b_{760}$ 171–2°, $b_{15}$ 72°, $d_4^{22}$ 0 8404, $n_D^{22}$ 1 4511, calcd $MR_D$ 45 35 found $MR_D$ 45 27 III $b_{760}$ 196–7°, $b_{37}$ 110 5–11°, $b_{11}$ 82°, $d_4^{20}$ 0 8419, $n_D^{20}$ 1 4574 calcd $MR_D$ 54 58, found $MR_D$ 54 44 For the method of hydrogenation see *C A* 20, 3282 Results of hydrogenation I adds H 1.3 times more readily than II, II 1 5 times more readily than III. The products of hydrogenation of the ketazines were isolated from alc either by drying the filtrate with $K_2CO_3$ and then redistg in H, or by satg the filtrate with HCl, whereby 60–70% of the mono HCl salt of the hydrazine is pptd The mother liquor evapd *in vacuo* deposits the di HCl salt contaminated with amino-HCl The hydrogenation in AcOH produces a 100% yield with no formation of amines (*C A* 17, 3015) IV $b_{760}$ 108 5–9°, $b_{11}$ 100–1°, $d_0^0$ 0 8214, $d_4^0$ 0 8050 $n_D^{20}$ 1 4283 calcd $MR_D$ 46 23, found $MR_D$ 46 07 The di HCl salt, loses 1 HCl in the air or $H_2O$ giving the mono-HCl salt, m 147°. Diisobutylsemicarbazide $NH_2CON(C_4H_9)NH(C_4H_9)$, obtained by the action of 1 5 mols of concd. KCN on 1 mol of the HCl salt, m 48–9° Diisobutyl-4 phenylthiosemicarbazide, $PhNHCSN(C_4H_9)NHC_4H_9$, prepd by mixing 1 mol of the base with 1 (or 2) mols of PhNCS, evapg and filtering, m 78–8 5° Azo-α methylpropane (VI) was prepd by adding the calcd amt of HgO to 7 5 g of IV in $Et_2O$, while cooling; after 24 hrs' standing the mass was heated on the water bath, filtered, dried with BaO, the $Et_2O$ expelled and redistd, yielding 5 2 g (70%), $b_{751}$ 140–1° It is also prepd by adding 3 5 g of $NaNO_2$ in $H_2O$ to 6 g of the HCl salt of IV in $H_2O$, then a few drops of AcOH is added, allowed to stand 24 hrs, neutralized with $Na_2CO_3$, extd. with $Et_2O$, dried with $K_2CO_3$, $b_8$ 31°, $d_0^0$ 0 7904 $d_4^{20}$ 0 7748, $d_{20}^{22}$ 0 7757, $n_D^{22}$ 1 4127, $MR_D$ (calcd.) 45 81, $MR_D$ (found) 45 72 The isomerization of VI to the hydrazone was carried out by refluxing 3 hrs with NaOH, fractionating, taking up the part b 155–64° in $Et_2O$ and satg with HCl, giving about 50% of isobutylhydrazine 2 HCl, which heated *in vacuo* at 50° goes over to the mono-HCl salt. Dibenzoylisobutylhydrazine, $C_4H_9N_2HBz_2$, prepd by refluxing several hrs on the water bath a mixt of 3 g. of VI in $C_6H_6$ 4 g of BzCl and some calcined $Na_2CO_3$, m 169–70°. Isobutylsemicarbazide, $NH_2CO$ N-$(C_4H_9)NH_2$ was obtained by heating in a water bath a mixt of the hydrazine-HCl with KCN in soln, extg with $C_6H_6$, m 97 5–8°. V, obtained by hydrogenation of III, $b_{760}$ 193–3 5°, $d_4^{20}$ 0 8210, $n_D^{20}$ 1 4388, $MR_D$ (calcd.) 55 51, $MR_D$ (found) 55 16 The di HCl salt crystallizes with 1 $H_2O$, the mono-HCl salt is prepd from the di HCl salt on warming Benzoyldiamylhydrazine, $AmNBzNHAm$, was obtained by heating the mono-HCl salt of the base with BzCl and dry $Na_2CO_3$ in $C_6H_6$, $b_{15}$ 184–5°. Diamylsemicarbazide, $NH_2CONAmNHAm$, prepd. by the action of KCN on the HCl salt of the base, m 57–57 5° Azo-α-ethylpropane, obtained by oxidation of the hydrazo compd with HgO in $Et_2O$, $b_{760}$ 182°, $b_{15}$ 70° Amylhydrazine 2 HCl, $Et_2CH$-$NHNH_2$ 2HCl, was obtained by the action of HCl on the azo compd or hydrazone in $Et_2O$, the mono HCl salt is formed on heating the di HCl salt at 60–70°. Dibenzoyl amylhydrazine, $Et_2CHNH_2Bz_2$, prepd by heating the azo compd in $Et_2O$ with an excess of BzCl, m 199 5–200° Amylsemicarbazide, $NH_2CONAmNH_2$, prepd from a concd soln of HCl-salt of the primary hydrazine on heating with an excess of KCN, m 107–8°.

CHAS. BLANC

A few derivatives of propylene glycol. A DEWAEL. *Bull soc chim Belg* 39, 395–401(1930).—The following *new* compds have been prepd $CH_2ClCH(OMe)Me$, obtained by methylation of $CH_2ClCH(OH)Me$ (I) with $Me_2SO_4$, b 103–4°, $d_4^{20}$ 1 009 $n_D^{20}$ 1 41372 $CH_2ClCH(OEt)Me$, prepd by ethylation of I with $Et_2SO_4$, b 117°, $d_4^{20}$ 0 9965, $n_D^{20}$ 1 41902 The dehydration of I by $H_2SO_4$ gives $(CH_2ClCHMe)_2O$ $b_{760}$ 187–8°, $d_4^{20}$ 1 103, $n_D^{20}$ 1 45046, which reacts with KOAc and HOAc to give $(CHMeCH_2OAc)_2O$, $b_{760}$ 248°, $d_4^{20}$ 1 050, $n_D^{20}$ 1 42654 $EtOCH_2CH(OH)Me$, obtained from alc and propylene oxide with 2 drops of $H_2SO_4$, b 136°, $d_4^{20}$ 0 9028, $n_D^{20}$ 1 4 $EtOCH_2$-$CHMeOAc$ b 158–60°, $d_4^{20}$ 0 9461, $n_D^{20}$ 1 40968 $CH_2(OH)CH(OEt)Me$, obtained from I through the acetin, $b_{760}$ 140–1°, $d_4^{20}$ 0 9044, $n_D^{20}$ $CH_2(OMe)CH(OH)Me$ b 126–7°, $d_4^{20}$ 0 9260, $n_D^{20}$ 1 40696, is obtained from MeOH and propylene oxide, with $H_2SO_4$ $MeOCH_2CH(OAc)Me$ $b_{760}$ 147°, $d_4^{20}$ 0 9709, $n_D^{20}$ 1 40449 $Me_2CHOCH_2$-$CH(OH)Me$, $b_{764}$ 142–3°, $d_4^{20}$ 0 9059 The condensation of $HOCH_2CHClMe$ and propylene oxide with $H_2SO_4$ gives $MeCHClCH_2OCH_2CH(OH)Me$, $b_{760}$ 204–5°, $d_4^{20}$ 1 059 $CH_2(OCOPr)CHClMe$ $b_{760}$ 184°, $d_4^{20}$ 1 031, $n_D^{20}$ 1 42875. $AcOCH_2CH(OAc)Me$

$b_{751}$ 190–1°, $d_D^{20}$ 1 059, $n_D^{20}$ 1 4173, treated with HCl gives a mixt. of $ClCH_2CH(OH)Me$ (preponderant) and $CH_2(OH)CHClMe$ while HBr gives a mixt. of the 2 corresponding Br derivs A L. HENNE

Ether-like compounds. III. Polyether acids of the type $R.O.(CH_2.CH_2.O)_n.CH_2CO_2H$. M H PALOMAA AND T A SITTONEN *Ber* 63B, 3117–20(1930); cf. *C A* 13, 2863.—The mono- and di-ether acids of the above type ($n$ = 1 and 2) are readily obtained by converting the com "alkylglycols" and "alkylpolyglycols" into the corresponding Na alcoholates, adding $ClCH_2CO_2H$ and liberating the acids from the resulting Na salts The Na alcoholates are very sol. in ether or the corresponding ether alc and on evapn of the solvent yield crystals which have not yet been investigated The poly-ether acids are also relatively easily sol in $H_2O$ and their extn. (especially of the MeO derivs) from $H_2O$ with ether is a time-consuming operation. The MeO compds exchange the Me for H with HI *(β-Methoxyethoxy)acetic acid* (yield, 80%, based on the $ClCH_2CO_2H$), thick oil miscible with water in all proportions, $b_4$ 121–2°, $d_D^{20}$ 1 1634, $n$ 1 43375, 1 43592, 1 44129, 1 44556 at 20° for α, D, β and γ; *Et ester*, from the acid in abs alc with $CuSO_4$ and a few drops concd $H_2SO_4$, miscible with water in all proportions, $b_{10}$ 90°, $d_4^{20}$ 1 0369, $n$ 1 41697, 1 41908, 1.42412, 1 42836 *(β Ethoxyethoxy)acetic acid*, $b_4$ 125–6°, $d_4^{20}$ 1 1103, $n$ 1 43349, 1 43572, 1 44100, 1 44534 *(β-Propoxyethoxy)acetic acid* (from *ethylenglycol mono-Pr ether*, b 150–0 5°, $d_4^{23}$ 0 9106), $b_4$ 131°, $d_4^{20}$ 1 07415, $n$ 1 43432, 1 43652, 1 44186, 1 44604 *(β-Butoxyethoxy)acetic acid* (from redistd com "butylglycol," $b_{751}$ 168–9°, $b_4$ 50°, $d_4^{20}$ 0 9015, $n$ 1 41711, 1 41980, 1.42493, 1 42901), miscible with water, $b_4$ 141°, $d_4^{20}$ 1 04635, $n$ 1 43605, 1.43823, 1 44360, 1 44797 Repeatedly refractionated $MeOCH_2CH_2OCH_2CH_2OH$ (com "methyl polyglycol"), $b_4$ 65°, $d_4^{20}$ 1 02695, 1 42475, 1 42686, 1 43197, 1 43620, gave *[β-(β'-methoxyethoxy)ethoxy]acetic acid*, miscible with water, $b_4$ 155–6°, $d_4^{20}$ 1 1492, $n$ 1 44351, 1 44575, 1.45112, 1 45553 C. A. R.

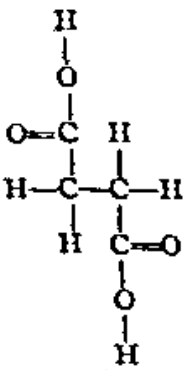
Itaconic anhydride and itaconic acid R L SHRINER, S G FORD AND L J ROLL. *Org. Syntheses* 11, 70–2(1931).—Heating citric acid until it melts and then rapidly distg gives 37–47% of itaconic anhydride, the free acid is obtained by refluxing with $H_2O$ for 1 hr. C. J. WEST

Resolution of synthetically prepared isoleucine into its four optically active components, namely *l-* and *d*-isoleucine and *d-* and *l*-alloisoleucine. EMIL ABDERHALDEN AND WALTHER ZEISSET *Z. physiol Chem* 195, 121–31(1931).—Isoleucine, $EtCHMe\text{-}CH(NH_2)CO_2H$, contains 2 asym. carbons, and its synthetic prepn. should therefore consist of 2 pairs of optical isomers The 2nd pair has hitherto been overlooked Isoleucine was prepd by the previously described method (*C A*. 4, 172) in which $EtCHMeCHBrCO_2H$ is aminated with $NH_4OH$ The sepn. of the isomeric pairs was effected by repeated pptn of the aq soln. by EtOH in which *dl*-isoleucine is insol, and recovery of *dl*-alloleucine from the mother liquor by distn. of the Et ester and sapon. of the distillate by boiling with $H_2O$ Sepn. of the optical isomers was effected by converting the *dl*-mixt. into the formyl deriv. and crystg the brucine salt of the latter. The properties of the 4 individual isomers and their HCO, $PhSO_2$, PhNCO and α-$C_{10}H_7NCO$ derivs are described. *l-Isoleucine* m 285–6 (decompn.), $[\alpha]_D^{20}$ in $H_2O$ 10 7°, in 20% HCl 40.8°; *l-alloisoleucine* m 278° (decompn.), $[\alpha]_D^{22}$ in $H_2O$ 14 0°, in 20% HCl 38 1°; *d-isoleucine*, m. 283–4° (decompn.), $[\alpha]_D^{20}$ in $H_2O$ —10 7°, in 20% HCl —41 6°; *d-alloisoleucine*, m. 274–5° (decompn.), $[\alpha]_D^{20}$ in $H_2O$ —14 2°, in 20% HCl —38 0°; *formyl-l-isoleucine*, m 155°, $[\alpha]_D^{20}$ in EtOH 26 6°; *formyl-l-alloisoleucine* m. 126°, $[\alpha]_D^{22}$ in EtOH 24.2°, *formyl-d-isoleucine*, m. 156°, $[\alpha]_D^{22}$ in EtOH —26 8°; *formyl-d-alloisoleucine*, m 126°, $[\alpha]_D^{20}$ in EtOH —25 2°; *benzenesulfonyl-l-isoleucine* m 153°, $[\alpha]_D^{20}$ in *N* NaOH —14 4°, in EtOH 25 3°; *benzenesulfonyl-l-alloisoleucine*, m 147–8°, $[\alpha]_D^{20}$ in EtOH 30 7°; *benzenesulfonyl-d-isoleucine*, m. 153–4°, $[\alpha]_D^{20}$ in *N* NaOH 14.3°, in EtOH —25 5°, *benzenesulfonyl-d-alloisoleucine*, m. 147–8°, $[\alpha]_D^{22}$ in EtOH —30 7°; *l-isoleucine phenyl isocyanate deriv*, m. 121°, $[\alpha]_D^{20}$ in *N* NaOH 14 9°, in EtOH 37 5°; *l-alloisoleucine phenyl isocyanate deriv*, m. 151°, $[\alpha]_D^{20}$ in NaOH 16 9°, in EtOH 30 8°; *d-isoleucine phenyl isocyanate deriv*, m. 119–21°, $[\alpha]_D^{22}$ in NaOH —15 0°, in EtOH —36.3°; *d-alloisoleucine phenyl isocyanate deriv.*, m. 151°, $[\alpha]_D^{20}$ in NaOH —16 8°, in EtOH —30 6°; *l-isoleucine α-naphthyl isocyanate deriv*, m. 178–9°, $[\alpha]_D^{20}$ in EtOH 30 1°; *l-alloisoleucine α-naphthyl isocyanate deriv*, m 165–6°, $[\alpha]_D^{20}$

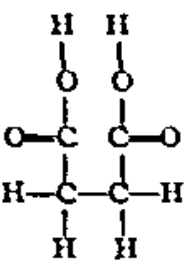
in EtOH 25.1°, *d-isoleucine α-naphthyl isocyanate deriv.*, m. 177–8°, $[\alpha]_D^{22}$ in EtOH 28.5° *d-alloisoleucine α-naphthyl isocyanate deriv.*, m. 168°, $[\alpha]_D^{22}$ in EtOH —25.5° *formyl-dl-isoleucine* m. 120–1°, *formyl-dl-alloisoleucine*, m. 117–8°; and *dl-alloisoleucine Et ester* b$_{14}$ 85–8° (7–8° lower than the recorded b. p. of *dl* isoleucine Et ester)
A. W. Dox

Action of thionyl chloride on some anilic acids. W. H. Warren and R. A. Briggs. *Ber.* 64B, 20–30(1931).—By the action of $PCl_5$ on $HO_2CCONHPh$ Aschan obtained $ClCOCONHPh$ which on heating readily lost HCl and CO and yielded about 85% PhNCO. He suggested that oxanil (I) was possibly an intermediate product, but the properties of I are so characteristic that it could not have escaped detection if it had been formed; moreover, it is not affected by $PCl_5$. In attempting to prep. PhNCO by this method but with $SOCl_2$ instead of $PCl_5$, W. and B. obtained I instead of PhNCO, and they found that a no. of other anilic acids react in the same way with $SOCl_2$. The anils were obtained by refluxing the anilic acid with 8 parts $SOCl_2$ in an all glass app. until the evolution of HCl and $SO_2$ ceased, distg. off the excess of $SOCl_2$, washing with petroleum ether (dried over Na) or $C_6H_6$, extg. the last traces of anilic acid with boiling $H_2O$ and crystg. from an appropriate solvent. I, crystd. from $PhNO_2$, does not m. 320°, mol. wt. in boiling $PhNO_2$ 154.4, unchanged by most dil. or concd., hot or cold mineral acids but sol. in hot concd. $H_2SO_4$ with decompn. into $PhNH_2$, CO and $CO_2$, decompd. by hot NaOH with evolution of a PhNC odor, converted by boiling $Ba(OH)_2$ into $PhNH_2$ and $(CO_2)_2Ba$, by alc. $NH_3$ in sealed tubes into $(CONHPh)_2$ and $(CONH_2)_2$ and by excess of boiling $PhNH_2$ into $(CONHPh)_2$. *Malonanil*, light yellow, m. 249°, similarly obtained from $HO_2CCH_2CONHPh$, is apparently not affected by concd. $HNO_3$ or HCl, decompd. by hot concd. $H_2SO_4$ into $PhNH_2$, $CO_2$ and AcOH, converted by alc. $NH_3$ in sealed tubes into $CH_2(CONHPh)_2$ and $CH_2(CONH_2)_2$ and by boiling NaOH into $PhNH_2$ and $CH_2(CO_2Na)_2$. In the same way were prepd. succinanil, m. 150°, *glutaranil*, does not m. 320° (possibly a polymer of Bödtker's compd., m. 144–5°, obtained directly from glutaric acid and $PhNH_2$ (*Diss. Leipzig*, 1891)), phthalanil, m. 203°, camphoranil, m. 116°, and *diphenanil*, m. 199° (*diphenanilic acid*, from diphenic anhydride and $PhNH_2$, m. 176°).
C. A. R.

The polymorphism of the saturated diacids of the aliphatic series as a function of temperature. F. Dupré la Tour. *Compt. rend.* 191, 1348–50(1930).—Two forms of succinic acid have been studied under the microscope and by x rays. β-Succinic acid, stable at low temps., is triclinic pinacoidal with *a* 5.04 A. U., *b* 7.58 A. U., *c* 9.75 A. U. At about 137° a transformation to the α-form occurs. The α-acid is monoclinic prismatic with *a* 5.03 A. U., *b* 8.75 A. U., *c* 7.48 A. U. The mol. structure appears to be modified thus in the cryst. change



Mol. β (less stable)

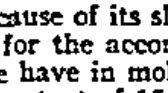


Mol. α

H. W. Walker

Additive heteropolymerization. Theodor Wagner-Jauregg. *Ber.* 63B, 3213–24 (1930).—In the investigation of highly polymerized org. natural products Staudinger and his pupils have made use of model compds. prepd. by polymerization, or addn. to each other, of several identical mols. of low mol. wt. It is now shown that 2 unlike units of low mol. wt., each contg. a C C union, can likewise be combined into a large mol. by polymerizing addn. The name *additive heteropolymerization* is suggested for such a process. The present paper deals with the prepn. of addn. heteropolymerizates without the use of catalysts from 2 ethylene components, 1 of which was maleic anhydride (I). I alone shows no tendency to polymerize but has a pronounced additive capacity. When it is boiled with stilbene (II) in xylene, there seps. 45–70% of a white, amorphous, infusible *substance* (III) insol. in most org. solvents, sol. colloidally, with preliminary

swelling, in others (including camphor). Because of its slight soly., its mol. wt. could not be detd, but it is doubtless very high, for the accompanying polymer homologs extd in very small amount by boiling xylene have in molten camphor an av particle size of about 4200, corresponding to an av content of 15 mols. each of I and II. On dry distn with or without $Ba(OH)_2$ it decomps with regeneration of II. From its compn. it consists very nearly of equal nos. of I and II mols, irrespective of the relative proportions of the 2 components in the original reaction mixt (the ratio II:I in the product obtained from a 2 1 mixt is 1 1, and in that obtained from a 1·2 mixt. it is 0 95 1) The constancy of the stoichiometric compn would seem to point to a product built up according to a definite plan, such as —[CHPh CHPh CH——CH]—. A



soln of the product in $(CHCl_2)_2$ absorbed Br only after long boiling and in very small amount Along with the III there is formed a very small amount (about 10% of the wt of the III) of very slightly more sol. polymerization products, the rest of the original materials remains unchanged. The polymerization does not take place in the lower-boiling $C_6H_6$ and PhMe, but there also seems to be a sp solvent factor, for the yield is much smaller in $(CHCl_2)_2$ which boils about 6° higher than xylene and even less in the molten mixt. at the temp of boiling xylene Conversely, benzalfluorene (IV) and I give in good yield in the fused mixt at 130°, but not in xylene, a white amorphous *heteropolymer* very similar to III, insol in the fused mixt of the components; no intermediate products of lower mol wt. were observed; the ratio IV:I is 1 1 and 0 9.1, resp, in the products obtained from 2 1 and 1 2 mixts. of IV and I. The fused mixt. of anisalfluorene and I at about 130° also deposits an amorphous *polymer*. The *heteropolymers* of $PhCH_2CH_2CH$ CHPh (V) and I are likewise sol in the fused mixt. of the monomers The ratio V:I is not 1 1 but shifted in favor of I (1 1 5 and 1.1.3–1.25), the V are relatively easily sol Attempts to prep heteropolymerizates of bromostilbene, $Ph_2C$ $CPh_2$, $(PhCH_2CH)_2$ and other unsatd compds with I were unsuccessful, indicating that the nature of the substituents on the C C union has an influence on the tendency to heteropolymerization. Steric influences also play a role, for isostilbene with I gave a polymer in only very poor yield. While the hydrocarbons which are well adapted to heteropolymerization show no marked tendency to homopolymerization, the easily polymerized $Ph_2C$ $CH_2$ forms with 2 mols. I a well crystd. *compd* (VI) having the calcd mol wt. 376 Succinic anhydride cannot be substituted for I in these reactions but $(PhCH_2)_2$ gives, although in very poor yield, a 1:1 heteropolymerizate with I. Amylene and styrene heated with I give viscous, gummy masses Styrene and di-Me maleate gave a white amorphous powder which, from its compn, contained 4–5 styrene mols to each ester mol and gave di-Me fumarate on dry distn Some substances with a C N union also seem to form heteropolymerizates with I; I boiled with fluorenone imine in $C_6H_6$ or with benzal- or cinnamalazine, in PhMe or xylene gives yellow to brown, amorphous products; benzalazine, in addn, gives a cryst. addn *product* (VII) contg. 2 mols I, and, with di-Me maleate in xylene, an analogous product (VIII). VI, $C_{28}H_{16}O_4$, m 279–81° (cor, decompn.), mol. wt. in camphor 373–8, sol. in hot 2 *N* NaOH and boiling 2 *N* $Na_2CO_3$, gives a green color with cold alk. $KMnO_4$, decolorizes $KMnO_4$ in $Me_2CO$ only very slowly, does not decolorize Br in boiling AcOH VII, $C_{28}H_{16}O_4N_2$, m. 243–4° (cor) VIII, $C_{34}H_{32}O_4N_2$, m. 232–4° (cor.). C. A. R.

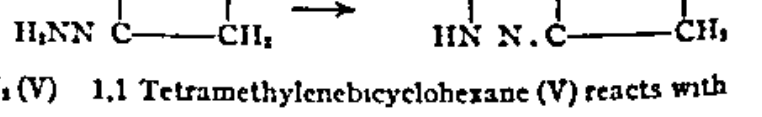
Glucomannan from "konjak." I. Kitsuji Nishida and Hideo Hatori. *J. Agr Chem Soc Japan* 6, 991–5, *Bull Agr Chem Soc. Japan* 6, 78–80(1930).—The mannan was liquefied by boiling with $H_2O$ or by enzymes and pptd. with alc. The mannan still contains the other impurities such as inulin, pectin, galactan, fructan, xylan, araban, etc. The powd crude mannan was heated with $H_2O$ under 1–1 5 atm in an autoclave. It was pptd by Fehling soln. and decompd. by alc. HCl Pure mannan was pptd by alc and $Et_2O$. It is a white powder which has no I reaction and does not reduce Fehling soln. Its ash content is 0.10–0 45% II. *J. Agr. Chem. Soc. Japan* 6, 1065-77; *Bull. Agr. Chem Soc. Japan* 6, 80–2(1930).—The mannan was hydrolyzed by mineral acids of various concns. The hydrolysis was complete with 2% HCl after 25 hrs. The ratio of mannose to glucose was 1:1 from the detn. of mannose as the phenylhydrazones and 2 1 by calcn from the rotation. The difference is due to the incomplete pptn of mannose phenylhydrazone. When a large amt. of $PhNHNH_2$ was added, the ratio was 2.1. Glucomannan of "konjak" consists of 2 mols. of mannose and 1 mol. of glucose. Y. Kihara

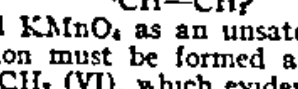
A mannan from the bulb of Lilium. I. Teizo Takahashi *J. Agr. Chem. Soc Japan* 6, 791–9(1930) —The water ext of the lily bulb powder was filtered and

pptd with alc The ppt was hydrolyzed by dil HCl Only mannose and glucose were identified, resp, as phenylhydrazone and osazone in the hydrolyzate. The mannan obtained was named "yurl mannan" Tri Ac deriv is a white powder, sol. in AcOH, $CH_2Cl_2$, acetone, AcOEt and pyridine, m p about 245°, $[\alpha]_D^{15}$ —17.61°. II. *Ibid* 861 9 —The mannose and glucose ratio is 2 1 The aldose detn method of Willstätter and Schudel was exmd for mannose galactose, glucose, fructose, arabinose and xylose When 3 5-5 times the 0 1 *N* I theoretically required was used, mannose was detd quant In "yurl mannan" no ketose is present Y. KIHARA

The dispersion of the refraction of cyclic hydrocarbons. MARCEL GODCHOT AND (MLLE) G CAUQUIL *Compt rend* 191, 1326-8(1930) —From $n_D^{13.6}$ and $n_\alpha^{13.6}$ and $d_{13.6}$ the sp dispersion $\Delta n/d$ has been calcd for a no of satd and unsatd cyclic hydrocarbons of $C_5$, $C_6$ $C_7$ and $C_8$ $\Delta n$ increases with increasing mol wt and the value for the unsatd compds is more than 20 units greater than that for the corresponding satd compd $\Delta n/d$ has the nearly const value of $121 \times 10^{-4}$ for the satd compds. and $151 \times 10^{-4}$ for the unsatd compds It is independent of the nature of the ring, being the same for methylcyclopentane, cyclohexane and methylcycloöctane and likewise the same for cycloöctene and methylcycloheptene Aromatic hydrocarbons with $\Delta n/d$ about $250 \times 10^{-4}$ may be detd in oils in the presence of cyclic hydrocarbons. H. W. WALKER

Cyclopentylidenecyclopentane and its relation to catalytic hydrogenation. N. D ZELINSKI AND N I SHUIKIN *J Russ Phys Chem Soc* 62, 1343-54(1930), cf *C. A.* 25, 1513 —After the failure to obtain 1,1 dihydroxydicyclopentyl (pinacol of cyclopentanone) for the prepn of spirocyclodecane (*C A* 24, 76), the attempts to obtain the pinacol from cyclopentylidenecyclopentane (I) by oxidation with $BzO_2H$, or to convert I into the glycol with $KMnO_4$, have also met with negative results The hydrogenation of I in presence of Pt C produced a satd hydrocarbon different from the expected dicyclopentyl (II) These 2 negative results have led to an investigation of the starting product, cyclopentylidenecyclopentanone (III) III was prepd by Wallach's method (*Ber* 29, 2955(1896)), and by dehydrating cyclopentanone (IV) vapors with $Al_2O_3$ at 200° Of interest is a large increment in the mol refraction of III, while I derived from III shows considerable optical decrement. The high coeff. of refraction of III may indicate that a considerable part of III is present in tautomeric (enol) form. The relation of the structures of III and I may be elucidated by decompn of the hydrazone of III in the presence of Pt, whereby instead of substitution of $H_2$ for N at the C bearing O, the reaction probably proceeds by way of an intermediate pyrazoline to a tricyclic spiro-hydrocarbon





1,1 Tetramethylenebicyclohexane (V) reacts with Br and $KMnO_4$ as an unsatd compd, and with $BzO_2H$ not at all By catalytic reduction must be formed a satd hydrocarbon $C_{10}H_{18}$, spirocyclodecane, $(CH_2)_4C(CH_2)_4CH_2$ (VI), which evidently undergoes isomerization to methylspirocyclononane, $(CH_2)_4C\langle CHMe\ CH_2\ CH_2\ CH_2 \rangle$ (VII) The phys properties of V are almost identical with those of IV, and greatly different from those of II. *Exptl part*—The prepn. of III from IV with such agents as alc EtONa (Wallach), solid KOH, alc KOH, or KCN gives up to 40% of higher condensation by products, while passing vapors of IV over $Al_2O_3$ at 200° results in a 41% yield of III with practically no formation of by-products A mixt. of IV and concd alc KOH is allowed to cool, then heated 1 5 hrs on the water bath, treated with $H_2O$, the oily layer extd with $Et_2O$, dried with solid KOH, the $Et_2O$ expelled, and distd *in racuo*, $b_{16}$ 116–8°, $n_D^{20}$ 1 5211, $d_4^{20}$ 1 0172, oxime m 122–3°, semicarbazone, m 167–70° (decompn), hydrazone, m 88–94° (decompn) III obtained by heating IV 4 hrs with 10% solid KCN, $n_D^{20}$ 1 5186, $d_4^{20}$ 1 0172, $b_{15}$ 119–21°, b 252–4° The fraction $b_{16}$ 185–200° on recrystn from EtOH m 83–4° and analyzes for a compd to which Wallach ascribes the m p 76–7°, and the formula $(CH_2)_4C\langle CH_2—CH_2 \rangle CO\ C(CH_2)_4$ V, obtained by distg the hydrazone of III in presence of KOH and Pt, treating with dil AcOH, washing with $H_2O$ to a neutral reaction, drying with $K_2CO_3$, and twice distg over metallic Na, colorless liquid, reacting with $KMnO_4$ and Br, $b_{744.5}$ 189–90°, $n_D^{17}$ 1 4864, $d_D^{17}$ 0 9131 V produces with $KMnO_4$

no pinacol, and does not react with $BzO_3H$. By passing V 3 times over Pt-C at 190° and subsequently distg over Na is obtained VII, $b_{751}$ 184–5°, $n_D^{19}$ 1 4708, $n_D^{20}$ 1 4701, $d_D^{20}$ 0 8728, which reacts with $KMnO_4$ very slowly, and on dehydrogenation over Pt-C at 300° shows no change 1-Cyclopentenylcyclopentane, (VIII), was obtained by dehydrating cyclopentyl 2 cyclopentanol (IX), prepd by reduction of III with Na in aq $Et_2O$ VIII, $b_{747}$ 189–91°, $n_D^{20}$ 1 4853, $d_4^{20}$ 0 8898, reacts with $KMnO_4$ and Br, and when reduced over Pt C at 190° gives II. Cyclopentyl 2 cyclopentanone (X), obtained when 38 g of IX is mixed with 80 cc of 80% AcOH, to which is added 17 g of $CrO_3$ in 80 cc of $H_2O$, the whole is heated 30 min on the water bath, dild with $H_2O$, the oily layer sepd, washed with $H_2O$, dried with calcined $K_2CO_3$, and redistd, $b_{10}$ 111–3°, semicarbazone, m 210°, $d_4^{22}$ 0 9748, $n_D^{22}$ 1 4793 *Prepn of* II. The hydrazone was prepd. by heating on the water bath 23 g of X with 11 5 g of $N_2H_4 \cdot H_2O$ in alc., the crude product was decompd with KOH in presence of Pt powder, dried with $CaCl_2$ and redistd over Na, $b_{744}$ 188–89 5°, $d_4^{21}$ 0 8652, $n_D^{21}$ 1 4638 CHAS BLANC

**A hydrocarbon from pine oil essence and the stereoisomeric 1,2-dimethylcyclopentanes.** G CHAVANNE *Bull soc chim Belg* 39, 402–11(1930).—A fractional distn of $C_7H_{12}$, prepd by dehydration of 1 2 dimethyl 1 cyclopentanol, gives about 10% of $MeC\overset{\alpha}{C}Me\overset{\beta}{C}H_2\overset{\gamma}{C}H_2\overset{\delta}{C}H_2$ b 96–7°, $d_4^{20}$ 0 783, $n_\alpha^{20}$ 1 4321, $n_\beta^{20}$ 1 4415, $n_\gamma$ 1 4472, $n_{Ro}$ 1 4349, m —124 8°, and 90% of $HC\overset{\alpha}{C}Me\overset{\beta}{C}HMe\overset{\gamma}{C}H_2\overset{\delta}{C}H_2$ b 105 0–5.2°, $d_4^{20}$ 0 7952, $d_4^{15}$ 0 7998, $n_\alpha^{20}$ 1 4412, $n_\beta^{20}$ 1 4511, $n_\gamma^{20}$ 1 4571, $n_{Ho}$ 1 4442, viscosity $\eta_{18}$ 0 00537, m —90 4° These synthetic hydrocarbons are compared with $C_7H_{12}$ from pine oil, and it is concluded that the natural product is probably the isomer b 105°, with a small amount of impurity which affects its d and $n$, but not its b p The hydrogenation of $C_7H_{12}$ with Pt black gives the 2 stereoisomeric forms of 1,2-dimethylcyclopentane, one of which b 91 8° ± 0 1°, $b_{741}$ 90 95°, $d_4^{20}$ 0 7495, $d_4^{15}$ 0 7541, m —120°, $n_\alpha^{20}$ 1 4093, $n_\beta^{20}$ 1 41659, $n_\gamma^{20}$ 1 42077, $n_{Ho}^{20}$ 1 41155, while the other b 99.25 ± 0 1°, $b_{741}$ 98 40°, m —62°, $d_4^{20}$ 0 7718, $d_4^{15}$ 0 7764, $n_\alpha^{20}$ 1 42014, $n_\beta^{20}$ 1 42748, $n_\gamma^{20}$ 1 43180, $n_{Ho}^{20}$ 1 42202 The spatial configuration is discussed A. L. HENNE

**β-Enines and β-diines** V GRIGNARD AND L LAPAYRE *Compt rend* 192, 250–3(1931).—The influence of 2 triple bonds, or 1 triple and 1 double bond, in the β position, on the acidity of the central $CH_2$ group was investigated For this purpose the reactions of *1,5-diphenyl 1,4-pentadiine* PhC CCH$_2$C CPh (I), *1-phenylpent 4-en 1-ine*, PhC CCH$_2$C CH$_2$ (II), and *dec-1-en-4-ine* Me(CH$_2$)$_4$C CCH$_2$CH:CH$_2$ (III) with Na, $NaNH_2$, EtMgBr were studied By heating I with EtMgBr, 1 mol of $C_2H_6$ is evolved at 35°, 2 mols at 70° II and III show monoacidity at 70°, III does not evolve 2 complete mol equivs of $C_2H_6$ at 175°. $NaNH_2$ evolves more than one $NH_3$ from I and III, in consequence of a partial rearrangement to derivs of $C_2H_2$ with free active H. The triple bond exerts a more negativating effect on the $CH_2$ group in these systems than the double bond, the aromatic substituents reënforce this action I, prepd from $CH_2I_2$ and Mg phenylacetylide (IV), m 88–90°, yield 8% Allyl bromide (V) and IV yield 70% of II, a liquid, $b_{10}$ 103–5°, $d_{15}^{15}$ 0 940, $n_D^{18}$ 1 558, exaltation of the mol refraction 1 9 Mg pentylacetylide and V yield III, a liquid $b_{11-10}$ 82–5°, $d_{11}^{11}$ 0 806, $n_D^{15}$ 1 459, exaltation 0 4 It becomes resinous on standing ALFRED BURGER

**Sulfides and polysulfides of organic bases** T G LEVI *Gazz chim ital.* 60, 975–87(1930).—A review of the literature shows a great scarcity of expts on the prepn. of polysulfides of org bases In view of this, several polysulfides were prepd. and their properties studied Phenylbiguanide-$H_2S$ (I) was prepd by the method of Romani (cf *C. A* 18, 1066), and its analysis, not undertaken by R., confirmed its compn. Phenylbiguanide sulfide could not be obtained as indicated by R (who did not analyze it), *i. e.*, by slow conversion of I in air, or rapid conversion on heating, with loss of $H_2S$; and even by the action of concd aq $(NH_4)_2S$ on phenylbiguanide only I is formed, and on the other hand when aq I is heated gently, $H_2S$ is eliminated, but no neutral sulfide is formed All attempts at the prepn of diphenylguanidine sulfide were without success Alc. *o*-tolylbiguanide treated with $H_2S$, and Et$_2$O added, ppts in good yield *o tolylbiguanidine hydrosulfide* $C_9H_{13}N_5 \cdot H_2S$, m 123–6°, stable at room temp when kept dry, decomps slowly in cold water. Benzylamine polysulfide, $(PhCH_2NH_2)_2 \cdot H_2S_6$ (II), was prepd in a different way from that described by Bruni and Borgo (cf. *C A.* 2, 2658) Addn of S to $PhCH_2NH_2$ (III) gives the orange color characteristic of poly-

sulfides, if at the same time $H_2S$ is passed in, there is an abundant ppt. of II, but it is so unstable that it cannot be washed and dried to const. wt. without loss of $H_2S$. When dil. aq. III HCl is poured into excess $NH_4$ polysulfide (approx. compn. $(NH_4)_2S_{7.8}$ prepd. from $NH_4OH$ of d. 0.92), II is pptd. and under these conditions it is more stable, and it can be washed with water without losing $H_2S$, but when it is dried in a desiccator or in air, it decomps. slowly. Since it was impracticable to obtain II dry enough to analyze, it was analyzed in the wet state. This analysis indicated $(PhCH_2NH_2)_2 H_2S_6$. Further attempts to isolate polysulfides of other aliphatic and heterocyclic bases, particularly secondary bases, were unsuccessful, though the formation of the polysulfides was proved. When S is added to $C_5H_{10}NH$ (IV) the liquid turns more intensely orange than with III, and heat is evolved (cf. Bedford, U. S. Pat. 1,710,920 (*C. A.* **23**, 4376). To isolate the *IV polysulfide (V), the reaction product was washed with* $Et_2O$ and with $CS_2$, but during this it decompd. with evolution of $H_2S$. The reaction mixt. was therefore extd. with cold water, but the yellow water ext. *let stand rapidly became* turbid and S sepd. With acids it forms II persulfide, which proves the formation of V. V is readily decompd. by excess PbO, in which case the liquid becomes colorless, and IV probably forms a polythioamine. By filtering off the PbS, spontaneous evapn., soln. in EtOH and partial pptn. with water of the residue from the evapn., the polythiopiperidine seps., and can be purified by recrystn. from EtOH. The reactions are (1) $2\,IV + xS \longrightarrow (C_5H_{11}N)_2S_{x-1} + H_2S$, and (2) $2\,IV + H_2S + xS \longrightarrow (C_5H_{10}NH)_2\,H_2S\,S_x$. Data on *N* polythioamines higher than the dithio derivs. are to be published in a forthcoming paper. $Et_2NH$ and S behave similarly at ordinary temp. With all these bases, *attempts to sep. the polysulfides from* solns. of salts of the corresponding bases and $(NH_4)_2S_x$ were not successful. The method of Romani (*loc. cit.*) for the prepn. of phenylbiguanide polysulfide, $(C_8H_{11}N_5)_2\,H_2S_x$, viz. by boiling aq. I with S, was not considered satisfactory, because, as was verified by expt., there is too great a loss of $H_2S$ and sepn. of phenylbiguanide (VI). Accordingly concd. alc. VI contg. S was treated with $H_2S$, under which conditions a mixt. of I and a polysulfide (*VII*) pptd., and the latter alone could not be obtained because I is insol. and seps. immediately, and then is transformed slowly and incompletely into VII. In contrast to this, $(PhHN)_2C{:}NH$ does not form directly a sulfide or $H_2S$ deriv., and in general this method of prepn. of polysulfides is of greater advantage where the base forms only the polysulfide. A mixt. of I and VII was also obtained when the starting material was alc. $(NH_4)_2S$. In contrast to this, cold satd. aq. pure (approx. 5%) VI (m. 143°) (100 cc. + 10 cc. addnl. water) and aq. $(NH_4)_2S_x$ (100 cc. prepd. by satg. $NH_4OH$ (100 cc. of d. 0.920) with $H_2S$, adding 100 cc. more of $NH_4OH$ and heating in the absence of air with 70 g. of S) let stand several days in a sealed vessel, the ppt. (low yield) removed, pulverized in a mortar, washed successively with water, EtOH, $CS_2$, EtOH, and $Et_2O$, and dried *in vacuo*, yields *phenylbiguanide hexasulfide*, $(C_8H_{11}N_5)_2\,H_2S_6$ (VIII), orange-yellow, m. 130–5°, *stable when dry (did not lose* $H_2S$ *when kept all summer* at 26–30°), decomps. very slowly in cold water and rapidly in hot water (liberation of S), and decomps. slowly in EtOH (liberation of $H_2S$). Under no conditions was the disulfide of Romani isolated. Thus with $(NH_4)_2S_x$ contg. less S (prepd. as above but with 30 instead of 70 g. of S per 200 cc. of $NH_4OH$) only I was obtained. On increasing the quantity of S to 45 g., a mixt. of I and VII was obtained. To obtain VIII, it is *necessary to adhere strictly to the proportions noted above, otherwise mixts. are obtained.* These mixts. with HCl evolve $H_2S$ and II persulfide seps., whereas pure VIII and HCl give only II persulfide. This difference is strictly analogous to the behavior of strychnine hexasulfide (IX) with acids. Besides the orange-red IX obtained by Hofmann (cf. *Ber.* **1**, 1868, 10, 1087) from cold satd. alc. strychnine (X) and alc. $(NH_4)_2S_x$, the IX prepd. by Schmidt (cf. *Ann.* **180**, 287) from alc. X and $H_2S$ was also obtained, and in this latter case the compn. of the IX is, contrary to Schmidt, identical with that obtained by the method of Hofmann. Cold satd. (8%) alc. $(PhHN)_2C{:}NH$ (4 g.) and S (3 g.) *in suspension* treated with $H_2S$, let stand in a sealed vessel, filtered, the residue washed successively with EtOH, $CS_2$, EtOH and $Et_2O$, and dried *in vacuo*, yields *diphenylguanidine hexasulfide* $(C_{13}H_{13}N_3)_2\,H_2S\,S_6$ (XI), m. 100–10° (to a red liquid), stable when kept dry, decomps. slightly in cold water and more so in EtOH. When the S in the prepn. is diminished even as low as 0.5 g. of S (*loc. cit.*), XI is still obtained but the yields are smaller. XI is also obtained from aq. $(PhHN)_2C{:}NH\,H_2SO_4$ or other salts and aq. $(NH_4)_2S_x$ (from $NH_4OH$ of d. 0.92). Unlike VIII, XI liberates $H_2S$ and S when treated with acids. Therefore either it first forms a persulfide, and this is unstable, or its structure is like that of strychnine polyiodide (the more probable hypothesis). Prepd. like XI, though the passage of $H_2S$ must be much longer, *di-o-tolylguanidine heptasulfide* $(C_{15}H_{17}N_3)_2H_2S\,S_7$ (XII), is stable when kept dry, decomps.

(VII) (cf. Meyer, *C. A.* 10, 504). An intimate mixt. of V and excess solid KOH heated over a flame, the vapors collected as an oil, allowed to solidify, and recryst'd. from $C_6H_6$ yields *p*-$C_6H_4(NH_2)_2$. By the same procedure as with I, 3,α-$C_6H_3(NO)OH$ (VIII) and III yield 4,4′-formamidinoazobenzene (cf. P., *C. A.* 17, 1632), m. 196–7°. When evapd., the $C_6H_6$ mother liquor yields formyl *p*-aminoazobenzene. In dissolving the solid product from the reaction of VIII and III, a small quantity of an unidentified brown black *compd.*, insol. in all solvents, remained undissolved. Further expts. have been started on the reaction of isonitriles with true NO derivs., *e. g.*, PhNO. I and PhNO boiled in $C_6H_6$ form, besides resinous products, $(PhNH)_2CO$ and a red *compd.*, m. 212–3° which analysis indicated as an integral condensation product of 3 mols. of I, with no PhNO in combination. It is therefore not a trimer, but a true condensation compd. With PhNO III reacts like I. This investigation is to be published in more detail in a forthcoming paper. C. C. Davis

Derivatives of *m*-xylenols. II. Intermediate products from *m*-2-xylenol (2-hydroxy-1,3-dimethylbenzene). F. M. Rowe, S. H. Bannister and R. C. Storey. *J. Soc. Chem. Ind.* 50, 79–80T(1931). cf. *C. A.* 25, 930.—2,6,4-$Me_2(NH_2)C_6H_2OH$ (I) was prepd. in 92% yield from 2,6-Me-$C_6H_3OH$ (II) by coupling with $PhN_2Cl$ and reducing with $Na_2S_2O_4$, and in 79% yield by reducing the corresponding NO compd. with $Na_2S_2O_4$. I, leaflets from $H_2O$ or $C_6H_6$, m. 137–8° (decompn.), gives a di-Ac deriv., m. 160°. With 2,4-$(NO_2)_2C_6H_3Cl$ in the presence of Cu, I gave 2,4-*dinitro*-4′-*hydroxy*-3′,5′-*dimethyldiphenylamine*, m. 193°. 2,6-$Me_2C_6H_3OMe$ (III), b. 182–3°, was prepd. from II and $Me_2SO_4$. III was best nitrated by gradually adding 103 cc. of 70% $HNO_3$ to 50 g. III in 75 cc. of AcOH and warming at 60–70°. This gave 2,6,4-$Me_2(NO_2)C_6H_2OMe$ (IV) in 50% yield, m. 92°, which was hydrolyzed with 60% $H_2SO_4$ to give 2,6,4-$Me_2(NO_2)C_6H_2OH$, m. 169–70°. Reduction of IV to 2,6,4-$Me_2(NH_2)C_6H_2OMe$ (V), m. 66°, was best done with Fe, $SnCl_2$ gave hydrolysis. V gave an Ac deriv. (VI) m. 136–7°. IV and $Na_2S_2O_4$ gave 89% of 2,6,4-$Me_2(NH_2)C_6H(OMe)SO_2Na$(3), from which the $SO_2H$ group can be easily hydrolyzed to give V. V reacts with β-hydroxynaphthoic acid in the presence of $PCl_3$ to give 99% of the 3,5-dimethyl-4-methoxyanilide needles from EtOH. This gives red colors on coupling with diazo compds. VI is easily nitrated in AcOH, giving 90.5% of 2-nitro-3,5-dimethyl-4-methoxyacetanilide, pale yellow, m. 128°. The Ac group can be hydrolyzed off with NaOH or HCl, producing 1-methoxy-2,6-dimethyl-3-nitro-4-aminobenzene, m. 47°, which is converted to the corresponding 3,4-isoxadiazole oxide, m. 96°, by boiling with NaOCl. G. R. Yohe

Preparation of salicylyl chloride. A. Kirpal. *Ber.* 63B, 3190(1930).—By adding a little $AlCl_3$ *o*-$HOC_6H_4CO_2H$ can be made to react with $SOCl_2$ at a temp. at which secondary reactions do not occur. When 10 g. of the acid, 7 cc. $SOCl_2$ and 0.02 g. $AlCl_3$ are kept at 45–50° the reaction is complete in 1.5 hrs. if the acid was sufficiently finely divided. Removal of the excess of $SOCl_2$ *in vacuo* leaves a mobile liquid solidifying in ice and showing, without further purification, the m. p. 18° given by Kopetschni and Karczag for *o*-$HOC_6H_4COCl$. C. A. R.

Constituents of the volatile oil from the leaf of Chamaecyparis obtusa, Sieb. et Zucc., *f. Formosana*, Hayata or Arisan-Hinoki. I. Kinzo Kafuku, Tetsuo Nozoe and Chuta Hata. *Bull. Chem. Soc. Japan* 6, 40–53(1931).—Steam distn. of leaves of *Chamaecyparis obtusa* gave 0.3% of oil, slightly yellow changing to red on standing, $d_{28}$ 0.8988, $n_D^{25}$ 1.4878, $[\alpha]_D^{25}$ −5.83°, acid value 0.96, ester value 12.63, ester value after acetylation 54.81. From 5 kg. of oil, 12 g. of acids and 1.5 g. of phenols were obtained by extn. with 5% KOH and subsequent regeneration of the ext. in the usual manner with $CO_2$ and $H_2SO_4$. On vacuum fractionation of the acids the main portion was an unsatd. acid apparently of the aliphatic terpene group, $C_{10}H_{16}O_2$, b. 133–5°, $d_4^{20}$ 0.9544, $n_D^{20}$ 1.4732, $[\alpha]_D$ 0°, mol. refraction 49.40. The remainder of the acid fraction consisted *apparently of hinokic acid*, m. 165–6°, lower fatty acids and traces of phenols. The oil remaining after extn. of the acids on vacuum fractionation yielded 34.1% of terpenes and 11.4% of terpene alcs. Of the terpenes 50% was *d sabinene*, $[\alpha]_D^{17.5}$ 86.4°, and 20–30% *chamene* (I), a new terpene, $b_{14}$ 86–8°, $b_{760}$ 168–70°, $d_4^{25}$ 0.8228, $n_D^{25}$ 1.4686, $[\alpha]_D$ 35°, mol. refraction 46.00. Satn. of the cold ether soln. of I with dry HCl gas gave the hydrochloride, $b_{11}$ 80–90°, $d_{28}$ 1.0196, $n_D^{25}$ 1.4783, mol. refraction 58.09. Shaking 20 g. of I with 20 cc. $H_2SO_4$ (1:3) at room temp. gave *isochamene* (II), $b_{14}$ 88–90°, $d_4^{25}$ 0.8222, $n_D^{25}$ 1.4726, $[\alpha]_D^{25}$ −0.27°, mol. refraction 46.42, and, contrary to chamene, fairly stable to atm. oxidation. II with alc. $H_2SO_4$ (1:1) polymerized *to diisochamene*, $b_4$ 155–6°, $d_4^{20}$ 0.9150, $n_D^{20}$ 1.5134, $[\alpha]_D^{20}$ −0.7°, mol. re-

fraction 89-40. II with $HNO_3$ in benzene gave *α terpinene nitrosite*, apparently by rearrangement of isochamene nitrosite I gave a deep red color in $Ac_2O$ on addn. of 1 drop of $H_2SO_4$ Other terpenes found were *α-pinene*, *α-thujene*, *p-cymene*, *α terpinene*, *γ-terpinene* and dipentene The terpene ales. consisted of *d* Δ *terpineol-4*, *borneol*, *l-linaloöl*, and its esters, and an octenol, $C_8H_{16}O$, $d_4^{30}$ 0.8454, $n_D^{30}$ 1.4441, $[\alpha]_D^{30}$ —10.62°. and its esters R. C. ELDERFIELD

Bitolyl series. I. A. ANGELETTI with A. BRAMBILLA *Gazz. chim. ital.* 60, 967–74(1930).—The growing interest and importance of the $Ph_2$ group induced A. to start a systematic series of expts. on bitolyl compds. Of these, the 2,2'- and 6,6'-dimethylbiphenyl derivs. are of special importance because of the cases of optical stereoisomerism without asym. atoms (cf. Mascarelli, *C. A.* 22, 68, 21, 2962, 3694, *Atti III congresso naz. chim. pura applicata* Firenze 249–62(1930), Meisenheimer and Höring, *C. A.* 21, 2892). 4,5-$Cl(O_2N)C_6H_2Me$ was converted to *o,o'*-dinitrobitolyl by the reaction of Ullmann and Bieleckı (cf. Mascarelli and Purani, *Gazz. chim. ital.* 41, I, 70(1911)) and this was partially reduced with ale. $(NH_4)_2S$ by the method of Mascarelli and Gatti (*C. A.* 24, 2121) to 2-amino-2'-nitro-4,4'-dimethylbiphenyl (I). I (5 g.) in 7% $H_2SO_4$ (200 cc.) diazotized at 4° with aq. $NaNO_2$ (1.6 g. in 25 cc.), poured slowly into a large excess of KI in 10% $H_2SO_4$ at 100° (cf. Gelmo, *Ber.* 39, 4175(1906)), decolorized with $SO_2$, the semi-oily product dried *in vacuo*, extd. with $Et_2O$ (a small quantity of insol. black residue is probably bitolyleneiodonium iodide (II), for treated with moist $Ag_2O$ at 60°, filtered, KI added to the filtrate, and the yellow powder recrystd. from boiling water, it yields a yellowish compd. which turns brown at 198° and m. 204–5° (decompn.), while Mascarelli and Purani (*loc. cit.*) give a m. p. of 206° for II), the ext. extd. with aq. NaOH, the residue evapd., steam-distd., the 1st. portion of the distillate (a small yield of 4,4'-dimethylbiphenylene oxide (III) (cf. *Ber.* 34, 3336(1901)) the later portion (oil which solidifies to a yellow mass) dissolved in petr. ether (b. p. 70–80°), concd., and the cryst. ppt. recrystd. from 80% EtOH yields 0.70 g. of *2-iodo-2'-nitro-4,4'-dimethylbiphenyl* (*o*-iodo-*o'*-nitrobitolyl), pale yellow, m. 83–4°. The same procedure was used in an attempt to prep. the corresponding Br deriv., but only resinous products which could not be purified were formed. A very small yield was obtained by diazotizing I-HBr in presence of CuBr, following, in general, the method of Dobbie, Fox and Hoffmeister (cf. *C. A.* 5, 3048, 6, 593) for the prepn. of 2,2'-dibromobiphenyl. I (12 g.) and hot water (100 cc.) added to aq. HBr (45 cc. of d. 1.49) and freshly prepd. CuBr (16 g.), all air removed from the flask by $CO_2$, heated on a water bath, diazotized with aq. $NaNO_2$ (4 g. in 50 cc.), (maintained at approx. 100°), heated 1 more hr. at 100°, cooled, dild. with water, the product (a black pitch contg. a yellow solid), washed with water, dried *in vacuo*, extd. with $Et_2O$ (the black residue contg. Cu will be studied later), the ext. washed with aq. NaOH, dried, evapd., the semi-oily residue (5 g.) steam distd., yields 2 portions (1) a white substance (2 g.) of agreeable odor and (2) brown pitch. Portion (1) recrystd. from 95% EtOH (very sol.) and then from 80% EtOH, yields 0.40 g. of III, which in this case is difficult to purify because of contamination with the chief product. The 95% ale. mother liquor from the 1st. crystn. of III contains a trace of 4,4'-dimethylcarbazole. Portion (2) steam-distd. again yields an oil which partially solidifies, and which crystd. from 70% EtOH yields after long standing 0.25 g. of *2-bromo-2'-nitro-4,4'-dimethylbiphenyl* (*o*-bromo-*o'*-nitrobitolyl) (IV), pale yellow, m. 73–4°. The most convenient method for prepg. the Cl deriv., though the yield is very low, is the following. I (12 g.) in a mixt. of concd. HCl (50 cc.) and water (200 cc.), diazotized hot with aq. $NaNO_2$ (4 g. in 50 cc.) and fresh CuCl (16 g.), the black resin extd. with $Et_2O$, the ext. washed with aq. NaOH, dried, evapd., the oily residue (approx. 4 g.) steam distd. (III first distils in small quantity as before), and the later oily distillate crystd. repeatedly from 70% EtOH, yields 0.22 g. of *2-chloro-2'-nitro-4,4'-dimethylbiphenyl* (*o*-chloro-*o'*-nitrobitolyl), light yellowish, m. 85–6°. Attempts were made to prep. 2-hydroxy-2'-nitro-4,4'-dimethylbiphenyl (V), but the product could not be purified. In one case the soln. of diazonitro deriv., decompd. by bubbling in steam in the presence of urea, yielded a small quantity of III, while the chief product (also a very small yield of acidic nature) repeatedly dissolved in aq. NaOH and reppt'd. with HCl, yielded a brown-red, amorphous product which could not be steam-distd., sublimed or otherwise purified. Likewise no success was had in decompg. the diazo deriv. by pouring the soln. in hot dil. $H_2SO_4$. Finally attempts were made to acetylate the reaction product, but starting from 3 g. of product (from 20 g. of I) there was obtained, after acetylation, by crystn. from 80% EtOH, a red yellow cryst. *compd.*, m. 99–100°, mixed with a yellowish powder. The yield was so low that it could not be identified. If II is formed from small quantities of diamino deriv. as an impurity, the same explanation does not apply to the formation of

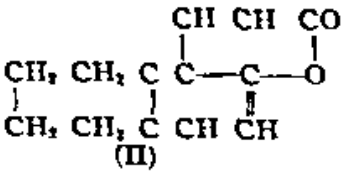
III, for the yield of III in the prepn of IV is too great to be accounted for thus In the decompn of the diazonitro deriv, the hydroxynitro deriv. 4,6-Me(HO)$C_6H_2$-$C_6H_3$(NO$_2$)Me 2 4 (VI) is formed initially, and this by elimination of 1 mol of $HNO_2$ passes to III. This hypothesis is supported by the fact that it was impossible to obtain V in the attempts in which III was formed. Furthermore it is possible that, by the action of water the $NO_2$ group in VI is replaced by OH, a reaction which occurs in polynitro derivs (cf Claessen, *Ger pat* 289446) The di HO deriv thus formed passes readily by elimination of water, to III (cf *Ber* 25, 2745(1892)) The tendency of the Ph$_2$ derivs to form heterocyclic, pentatomic nuclei is observed in numerous other cases (cf Mascarelli, *C A* 3, 781, 23, 3604, Treche, *Thesis Bologna* 1911; Dobbie, Fox and Hoffmeister, *loc cit*, Mascarelli and Gatti, *loc cit*) C. C. DAVIS

Remark on the work on "aromatic thio ketones." F BERGMANN *Ber.* 63B, 3225(1930) —In connection with the statement in the paper abstracted in *C. A.* 25, 1239 that aromatic thio ketones react with Na apparently differently from the O analogs Schonberg has drawn B 's attention to the fact that he (S ) first observed the reactivity of thio ketones toward Na (*C A* 20, 364) C. A R

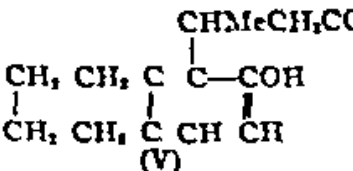
Stereochemical structure II. Optically active α- and β-methylhydrobenzoin. ROBERT ROGER *Biochem Z* 230, 320–9(1931), cf *C A* 24, 3000 —*d*(+)-PhAc-CHOH (I) was prepd by Neuberg s carboligase method (*C A* 17, 1484) and also from *d*(−) mandelamide and MeMgI I and PhMgBr give *d*(+)-*methylhydrobenzoin* (*α-form*) (II), m 92–3° $[\alpha]_{5461}$ 31° in acetone, 40° in EtOH *d*(+)-Methylhydrobenz oin(β form) (III) m 80–1° $[\alpha]_{5461}$ 31° in acetone, 21° in EtOH, prepd from *d*(−)-benzoin and MeMgI, is not identical with II as shown by mixed m. ps The compd. Neuberg prepd from I and PhMgBr, which he called III is not identical with II or III, but may be a phys modification of II. *d*(+)-*2-Methyl-2 hydroxy-1,1-diphenylethanol* (IV) m 92–3° $[\alpha]_{5461}$ 133° in acetone, was prepd from PhMgBr and Et *d*(+)-lactate IV is not identical with II or III as shown by the color with concd $H_2SO_4$ and mixed m ps Hence I reacts as such and does not rearrange to BzMeCHOH D S SEARLE

Synthesis of munjisthin. P C. MITTER AND HARGOPAL BISWAS. *Nature* 126, 761(1930) —Munjisthin is a dihydroxyanthraquinonecarboxylic acid occurring in *Rubia munjistha* It has been synthesized from 2,6-Cl(MeO)$C_6H_3$Me and $C_6H_4(CO)_2O$ A L. HENNE

Partially hydrogenated lactones of naphthalenes. GEORG HUPPMANN *Süddeut Apoth Ztg* 71, 137–9(1931) —In the present study it is shown that relatively good yields of partially hydrogenated lactones are obtained by condensation of *ar-β* tetralol (I) with HO acids or β ketone acid esters in the presence of concd. $H_2SO_4$. Thus, malic acid and I give CO + 3 $H_2O$ + *tetrahydronaphtho-α-pyrone* (II), m 131°. Similarly, $AcCH_2CO_2Et$ and I give *γ-methyltetrahydronaphtho-α-pyrone* (III), m. 154° On heating with alkalies the lactone ring is opened with formation of the corresponding *HO acid* stable only in the form of its salts which are obtained by evapn. of an alk. soln of the acid Na Hg converts the acid into the hydrogenated *product* (V), m. 107°, which with concd $H_2SO_4$ gives the lactone From citric acid and I there resulted *γ-carboxymethyltetrahydronaphtho-α-pyrone* m 189°; heating causes loss of $CO_2$ with formation of III.



(II)

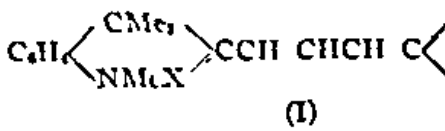


(V)

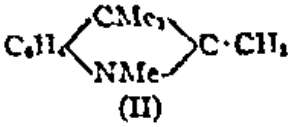
W O EMERY

Conjugated double bonds XV. Constitution of indolenine yellow. RICHARD KUHN, ALFRED WINTERSTEIN AND GEORG BALSER *Ber* 63B, 3176–84(1931); cf *C A* 25, 1513 —As a rule, replacement of methine groups, =CH—, in a polyene chain by =N— has practically no influence on the color Deviations from this rule occur in the initial members of homologous series and seem always to lie in the direction of *stronger absorption by the N-contg* compds. An apparent exception was afforded by the violet indolenine red (I) (pure red in soln.), obtained from the methylene base (II) and salts or esters of $HCO_2H$, and the greenish yellow compd (III) (called *indolenine yellow* in the present paper), obtained according to Ger pat. 459,616 from II and $HNO_2$ and which, by analogy, was assigned the structure IV. It has been found, however, that in the condensation of bases of type II with $HNO_2$ in the presence of $Ac_2O$ not only $H_2O$ but also 1 mol HCN is split off The yellow dye is therefore given

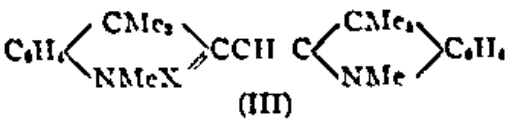
the structure III, which makes it a lower vinylene homolog of I and most satisfactorily explains its color. Attempts to obtain III by condensing 1,2,3,3-tetramethylindolenininum salts with 1,2,3-trimethylindolinone (V) were unsuccessful. *It*, however, II in cold AcOH is slowly treated with 1 mol $NaNO_2$ in a little water and then pptd with $HClO_4$ there seps an *oxime perchlorate* (VI) which with II in $Ac_2O$ yields III but also decomps, when heated in $Ac_2O$, into V, $HClO_4$ and HCN. In the absence of II this decompn is very smooth and affords a better method of prepg V than does oxidation of II with $KMnO_4$. If the formula III is correct, the condensation of II with the *1,3,3,5,-7-penta-Me homolog* (VII) of VI on the one hand, and of the 1,3,3,5,7-penta-Me homolog of II with VI on the other hand should give 2 different di-Me derivs., but as a matter of fact the same dye (VIII) was obtained in both cases. This can be explained on the basis of König's theory that in dyes of this type the anion is not arrayed with the one or the other N atom but with both simultaneously, giving rise to a system of "fluid heteropolar unions" as represented by formula IX. The derivation of an electronic formula, in which this equivalence of the two N atoms is brought out, is briefly discussed. *1,3,3-Trimethyl-2-formoxime-indolinium-1-perchlorate* (VI) (90% yield), m. 215° (Berl block, cor.) with decompn. *Perchlorate* of III, m. 207° (Berl block, cor.) with decompn. Free III, m. 147°. VII, m. 210° (decompn.). *5,7-Di-Me deriv.* (VIII) of III, isolated as the *perchlorate*, yellow, m. 250.5° (decompn.).



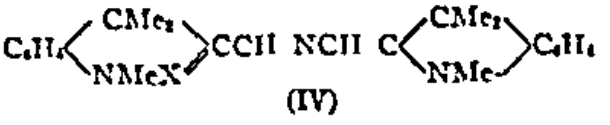
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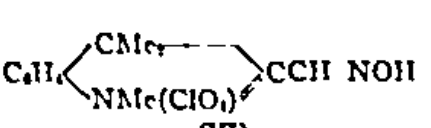
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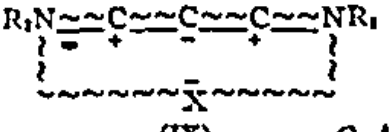
(III)



(IV)



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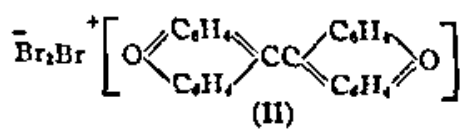


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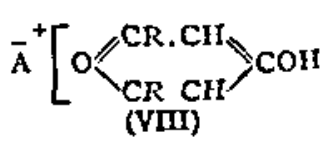
C. A. R.

**Relationships between dipyrylenes and *meri*- as well as *holo*-dipyrylium salts. Action of halogens on fulvenes.** F. Arndt and L. Lorenz. *Ber.* 63B, 3121–32 (1930).—The results of these expts., which were completed 4 yr. ago (L., *Diss. Breslau* 1927) were to be published later in connection with others and are now given separately only on account of the appearance of the paper by Bergmann and v. Christiani (*C. A.* 25, 1236–7). They assign to the hexabromide of dixanthylene (I), which A., Scholz and Nachtwey had represented as a dixanthonium or dixanthylium perbromide (II), the structure $O(C_6H_4)_2C(Br\ Br_2)C(Br\ Br_2)C(C_6H_4)_2O$ (III), but A. and L. believe that II is in better agreement with the known facts, such as the existence of those other dixanthylium salts with the same cation but different anions described by Werner, the formation of an analogous hexabromide by dithioxanthylene (IV) but not by the *disulfone*, the behavior toward Br of tetraphenyldipyrylene (V) and dipyrylenetetracarboxylic ester (VI). From all these it follows that the behavior of the xanthenes *and dipyrylenes toward halogens is not comparable with that* of open and carbocyclic fulvenes, the Br addn. product (II) of I contains all its Br in the form of 2 anions, $\overline{Br}Br_3$, and the manner and ease of such Br addn. depends materially on the possibility of a change from a quinoid pyrone to a benzenoid pyrylium form. This does not mean that formula II completely represents the actual state of the compd. If it be assumed that the Bergmann formula III is changed only in that the $BrBr_3$ groups are represented as anions, there results a dicarbenium salt in the cation of which all the at. nuclei occupy the same relative positions as in the dioxonium cation of II, the 2 salts differing from each other only in the distribution of the "bonds" and "charges." Between these 2 extreme forms there conceivably exists that "intermediate stage" recently discussed (*C. A.* 25, 2145), and it may be assumed that in the hexabromide of I the "intermediate stage" lies far on the side of the pyrylium or oxonium form (II) but that there is still present a residue of carbenium unsaturatedness which plays a role in the color of the hexabromide. The expts. described in this paper were based on the following line of reasoning. γ-Pyrones $O(CR{:}CH)_2O$ (VII), like ordinary ketones, add the H nucleus of an acid at the C:O group but instead of an unsatd., positively charged

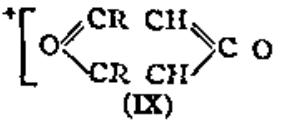
carbenium group they form a satd positive oxonium group *and an aromatic ring*, the resulting salts (VIII) therefore being colorless and much more stable than ordinary ketone salts A and L assume that such inner satn in the direction of the betaine form (IX) has already begun in the free γ pyrones which therefore do not behave like unsatd ketones *in VIII and IX the electron seeking γ-O atom* has attracted an electron from the C, as manifested by the replacement of the "double bond" in VII by the single bond in VIII and IX. The excess negative charge which the O atom thereby acquires is compensated for in VIII by the newly introduced H nucleus but is still present *in IX A diperylene system* $O(CR{:}CH)_2C{:}C(CH{:}CR)_2O$ (X), however, can of itself not undergo such an inner satn since there is no electron-seeking atom on the central or γ O atoms, and such a system (insofar as it is not condensed with $C_6H_4$ rings as in I) is a true fulvene system and intensely colored Its latent tendency to pyrylium formation can be brought out only by (1) introduction of an electron-seeking atom or group on the one γ C atom or (2) complete removal of 1 of the 2 pairs of electrons (*i. e.*, of 2 electrons) of the double bond The simplest example of (1) is where the newly introduced atom is the H nucleus of a strong acid, with formation of the *meri*-dipyrylium salt (XI) (2) on the other hand is equiv to an oxidation and from X or from XI, in the absence of the necessary anions, there results the *holo*-dipyrylium salt (XII) The XI are more deeply colored than the X themselves and the XII are in general considerably less deeply colored The XII are most simply prepd from the X with Cl or Br, the halogen acting as an oxidizing agent and also furnishing the anion (the Br anion adds another mol of $Br_2$ to give II) The resulting dichlorides exist in 2 forms (red and black) which rearrange into each other with extreme ease in a non-controllable manner It is assumed that the red forms are the *holo* salts while the black forms have the structure XIII, the $Cl_2$ splitting into $Cl^-$ and $Cl^+$ and the latter adding at 1 *of the central C atoms I, faintly greenish yellow, m 325°, dissolves in hot o* $C_6H_4Cl_2$ with blue green color (light yellow in the cold), forms a blue green melt, shows intense light blue fluorescence under the quartz lamp Thioxanthone, very faintly yellow, m 213°, shows yellow fluorescence in ultra violet light Thioxanthione, dark needles with green surface luster, m 176°, sol *in* $C_6H_6$ *with red color* (by transmitted light, green by incident light or in thin layers), in $CHCl_3$ with pure green, in concd $H_2SO_4$ with dark orange color IV, m 365°, shows blue fluorescence in ultra-violet light Thioxanthone gives on reduction according to F Mayer a compd m 346° but behaving toward Br like IV *Dithioxanthylene disulfone*, from IV and $H_2O_2$ in AcOH, gradually darkens between 380° and 500°, melts at red heat on Pt, does not react with Br soln or vapor even on heating *Dixanthionium perbromide* crimson, darkens 220°, decomps 245°, regenerates IV with Zn dust and AcOH *meri-Perchlorate* from V, obtained by boiling finely divided V (pptd from $C_5H_5N$ with water) in AcOH under $CO_2$, filtering and adding *70% $HClO_4$*, brown black decomps 287–8° with considerable violence *holo Perchlorate*, from V and $HClO_4$ at about 200°, red, deflagrates vigorously when heated *meri Perchlorate* from VI, red needles, changes in hot concd $H_2SO_4$ or 70% $HClO_4$ or on treatment in cold AcOH with $HClO_4$ and Br from deep red to green. Tetraphenyldithiopyrylene (XIV) *in* $CHCl_3$ *adds only* 2 atoms *Cl in* $CCl_4$, *forming* 2 mutually intereonvertible *dichlorides* (red and black), the red form darkens around 80°, both sinter 100° and decomp 300–10° *Dichlorides* of V; the red rapidly changes into the black form which sinters around 100°, m 305° With Br in $CHCl_3$ XIV gives a *hexabromide*, golden yellow, loses Br at 80–100° on slow heating, becomes smeary at 120°



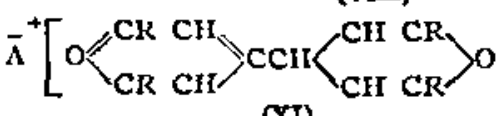
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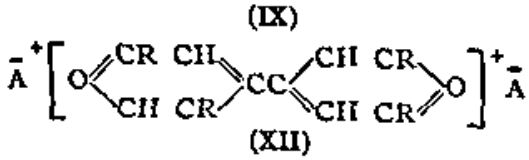
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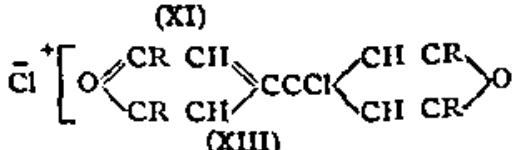
(IX)



(XI)



(XII)



(XIII)

Some 2,4-substituted derivatives of pyridine RODERICH GRAF (WITH ERNST C A R

LEDERER-PONZER AND LEOPOLD FREIBERG) *Ber* 64B, 21–6(1931); cf. *C. A.* 23, 837.—4-Chloro- (I) and 4 iodopicolinic acid (II) were degraded by the Curtius method through the hydrazide and azide to *4-chloro-* (III) and *4-iodo-2-aminopyridine* (IV). Attempts to convert the I by the Naegeli method through the chloride directly into III failed because of the slight reactivity of the chloride with $NaN_3$. In $C_6H_6$ the chloride with $N_2H_4$ $H_2O$ gave *di-4-chloropicolinic hydrazide* (V). The simple *hydrazide* (VI) was best prepd. by converting the I with $SOCl_2$ into the chloride, then with excess of MeOH into the Me ester which gave the VI almost quant. Attempts to degrade the VI directly to the urethan, without isolating the azide, by boiling in abs. alc. with AmONO gave a difficultly sol., unreactive *substance* which carbonized at 272° without melting. On the other hand, the azide boiled with dil. AcOH gave III directly. By the Schotten Baumann method, III gives the di-Bz deriv., converted by long boiling with alc. into the mono-Bz deriv. I, faintly yellowish, m. 180–1°, was obtained in 50–5% yield by refluxing anhyd. picolinic acid HCl in $SOCl_2$ for 10 days and decompg. the resulting chloropicolinyl chloride HCl with $H_2O$. V, faintly yellowish, m. 269–71° (decompn.). VI, from the *chloride* (m. 46°), m. 167–8° (18 g. from 18.5 g. of I). *benzal deriv.*, m. 178°. *Azide*, from VI in cold *N* HCl with aq. $KNO_2$, m. 92°, deflagrates on rapid heating, gives with 1:1 AcOH on the water bath N, $CO_2$ and III (3.2 g. from 7.4 g. VI), m. 130–1°, easily volatile with steam. *picrate*, yellow, m. 243–4°. *N-Carbethoxy deriv.* of III, from the azide and boiling abs. alc., m. 161°, best hydrolyzed by const. boiling HI, which gives III. *HI*, m. 206–7°, soon turns yellow in the air. *N,N-Di-Bz deriv.* m. 165–6°. *N Bz deriv.*, m. 120–1°. *N Ac deriv.*, from III and boiling $Ac_2O$, m. 115–6°. *2 HIO compd.*, from III in dil. $H_2SO_4$ with the calcd. amount of $KNO_2$, m. 184°, only slightly sol. in dil. acids. *2,4 Dichloropyridine*, from III by the Sandmeyer method (about 1 g. from 5 g. III), b. about 184°, m. 0°, almost insol. in dil. acids, exceedingly volatile with steam, forms a cryst. double salt with $HgCl_2$ but no picrate. II from I refluxed in HI (d. 1.7) with some red P, m. 169° (decompn.), cannot be converted into the chloride with $SOCl_2$ because of exchange of the I for Cl. The Me ester, from II and MeOH-$H_2SO_4$, yielded with concd. alc. $NH_3$ the *amide*, m. 158°, and with alc. $N_2H_4$ $H_2O$ the *hydrazide*, m. 160–1° (*benzal deriv.*, m. 207–8°). IV (through the *azide*, m. 89° (foaming)), m. 163–4°, *picrate*, yellow, m. 253–4°; *N-carbethoxy deriv.*, m. 167°, *N,N-di Bz deriv.*, m. 176–7°, *N-Bz deriv.*, m. 167–8°; *N-Ac deriv.*, m. 150°, *2-HIO compd.*, m. 195°. C. A. R.

Imide and amide chlorides of non-aromatic acids. VI. A new way in the quinoline series. JULIUS V. BRAUN AND ALBRECHT HEYMONS (WITH L. SCHNITZSPAHN) *Ber* 63B, 3191–203(1930), cf. *C. A.* 24, 2999.—Wallach assigned the structure $MeC(NR)CH_2CCl{:}NR$ to the compds. obtained by condensation, with loss of 1 HCl, of 2 mols. of the imide chlorides, $MeCCl{:}NR$, derived from AcOH, but it was later shown that they are amidines, $MeC(NR)NRCCl{:}CH_2$, *i. e.*, that the condensation takes place between a C and N atom. It was thought that imide chlorides of the type $R'CH_2CCl{:}NR$ undergo a similar condensation, since Wallach, and later Bischoff and Walden, had found that $ClCH_2CONHPh$ gives a compd. $C_{14}H_{12}N_2Cl_2$ (I), whose formation through an intermediate imide chloride, $ClCH_2CCl{:}NPh$, could readily be explained by the equation $2\ C_8H_7NCl_2 = I + HCl$. I, however, is characterized by an unexpectedly strong, bright yellow color and by the surprising ease (treatment with cold $Na_2CO_3$) with which it loses another mol. of HCl, and in addn. to the Wallach formula, $ClCH_2C(NPh)CHClCCl{:}NPh$, Bischoff and Walden suggested the structure of a HCl salt $ClCH{:}C(NPh)CHCl{-}CH{:}NPh\ HCl$. Recently, in connection with the prepn. of imide chlorides from chloroacetanilides with substituents in the *o*-position to the N (*C. A.* 24, 2999), similarly bright yellow compds. were obtained, and although analysis showed they were formed by loss of 1 mol. HCl from 2 mols. imide chloride the difference in color between the AcOH and $ClCH_2CO_2H$ derivs. was too great to be explainable on the basis of the amidine structure for both. A more thorough study has now shown that I is indeed a HCl salt of a colorless base $C_{14}H_{12}N_2Cl_2$ (II) which when heated with mineral acids under pressure splits off only 1 mol. $PhNH_2$; on less-energetic treatment with concd. HCl it yields a weakly basic substance $C_{14}H_8NCl_3$ (III) and on more vigorous treatment a phenolic compd. $C_{14}H_8(OH)NCl_2$ (IV) which regenerates III with $PCl_5$. III with HI and P loses all its Cl and gives pure quinaldine. The imide chlorides derived from the chloroacetarylides therefore condense with 2-fold elimination of HCl to give, not amidines like the acetarylides, but quinolines. It has thus far been impossible to force the $PCl_5$ reaction with $ClCH_2CONHPh$ in the amidine direction and that with AcNHPh in the quinoline direction. Derivs. of $EtCO_2H$ and $PhCH_2CO_2H$ also yield quinolines. The new reaction should prove to be one of the

most fruitful for the prepn of quinolines, for the ring formation takes place very readily and in part quantitatively and the products can undergo numberless further transformations. *2 Chloromethyl-3-chloro 4-anilinoquinoline-HCl* (I), decomps 222° (B and W give 212°), is obtained in 90-5% yield from ClCH$_2$CONHPh, cooled in running H$_2$O treated with 1 mol $PCl_5$, allowed to stand 12 hrs. and washed with Et$_2$O, the free *base* (II), m. 134°, is obtained by taking I up in a little cold $C_5H_5N$ and quickly pptg the II with dil. $NH_4OH$ or $Na_2CO_3$. The course of the reaction of II with aq. HCl under pressure depends on the length of heating, the temp. and the amt. of HCl, for not alone is the NHPh group replaced by Cl and the latter by HO but the Cl in the $CH_2Cl$ side chain can independently be replaced by HO. The *2-chloromethyl 3-chloro-4-hydroxyquinoline* (IV), m. 303°, is obtained in about 80% yield from II and 4 parts concd. HCl heated 12 hrs. at 160–5° and 1 hr. at 175–80°; it dissolves only in excess of concd. acid and is repptd. by dilu. with H$_2$O. Along with the IV is formed the alkali-insol. III, the amt. of which is the greater the shorter the length of heating (46% each of III and IV after 14 min. at 170–80°). With only 1.5 parts by wt. of concd. HCl at 165°, II gives 77% IV and the H$_2$O sol. *2 hydroxymethyl-3-chloro-4-hydroxyquinoline*, m. 283°, readily obtained by boiling IV several hrs. with aq. alkali. The *2-chloromethyl-3,4-dichloroquinoline* (III), m. 119–20°, is readily obtained by heating IV a few min. at 130–40° with somewhat more than 1 mol. $PCl_5$ and a little $POCl_3$. The 4 Cl and still more the Cl atom in the side chain are reactive and therefore heating III in aq. alc. a few hrs. with 1 mol. alkali gives the alkali insol. *2 hydroxymethyl-3,4-dichloroquinoline*, m. 44°, $b_{0.1}$ 150–4°. The compd. obtained by Bischoff and Walden from I with Zn dust and AcOH, which they believed to have the compn. $C_{16}H_{12}N_2Cl_2$, is in reality *3-chloro-4-anilinoquinaldine*, it is best obtained from II with excess of Sn and concd. HCl on the H$_2$O bath and m. 172°. *picrate*, yellow, m. 229°. *3-Chloro-4-hydroxyquinaldine*, from IV in much boiling AcOH with 10 parts Zn dust, m. 340°, converted by $PCl_5$ $POCl_3$ into *3,4-dichloroquinaldine*, m. 322°. With 30 atoms Na and alc. II yields *py* tetrahydroquinaldine, $b_{15}$ 125°. Short warming of II with aq. alc. KOH gives *2 hydroxymethyl-3 chloro-4-anilinoquinoline*, m. 93–4°, with KCN in aq. alc. is obtained the *2-cyanomethyl compd.*, m. 156°, which readily condenses with BzH in alc. and a few drops of alkali to form a *compd.* $C_{18}H_{11}N_2Cl$, yellow, m. 192°. With $PhNH_2$, II gives *2-anilinomethyl-3 chloro-4-anilinoquinoline*, m. 192°, isolated as the yellow *HCl salt*, and acetylated on the new N atom by hot $Ac_2O$, giving an *Ac deriv.* m. 209°. With 3 mols. $NHMe_2$ in alc. II gives *2-dimethylaminomethyl-3-chloro-4-anilinoquinoline*, $b_{0.1}$ 215–20°, m. 93°, *picrate*, m. 190–3°, with 2.1 atoms Na and alc. the base gives $PhNH_2$ and *2-dimethylaminomethyl py-tetrahydroquinoline*, yellowish, $b_{15}$ 148–52°. *2 Dimethylaminomethyl-3,4-dichloroquinoline*, similarly obtained from III, m. 62°; *picrate*, red yellow, m. 177°. *2 Piperidinomethyl-3-chloro-4-hydroxyquinoline*, from IV, m. 233–5°, sol. in both acids and alkalies. II and III also react with tertiary bases through the reactive $CH_2Cl$ group. II with $C_5H_5N$ gives the quaternary *compd* $C_{21}H_{17}N_2Cl_3$, deep yellow, m. 245°. *isoquinoline compd.*, $C_{21}H_{17}N_2Cl_3$, m. 258°. Both give with aq. alkali slimy ppts. of the corresponding pseudo bases which, when fresh, redissolve in HCl to form the original salts but undergo change on standing. The yellow *compd* $C_{21}H_{17}N_2Cl_3$, m. 272°, obtained by Bischoff and Walden from *p*-MeC$_6$H$_4$NHCOCH$_2$OH and $PCl_5$, is readily obtained from *p*-MeC$_6$H$_4$NHCOCH$_2$Cl *N-(Chloroacetyl)-p-toloanisine*, m. 193°, likewise gives with $PCl_5$ a yellow magma which, pptd. from cold $C_5H_5N$ with dil. $Na_2CO_3$, yields the *di I analog*, $C_{21}H_{15}N_2Cl_3I_2$, of II, m. 184° (*HCl salt*, yellow, m. 232°; *picrate*, m. 202°). *2-diethylaminomethyl compd.*, $C_{20}H_{19}N_2ClI_2$, faintly yellow, m. 152° (*picrate*, yellow, m. 178°). *m* ClC$_6$H$_4$NHCOCH$_2$Cl gives practically only 1 *product*, $C_{15}H_{11}N_2Cl_3$, m. 179°, reacting smoothly with *p*-EtOC$_6$H$_4$NH$_2$ *to form 2 p-phenetidinomethyl-3-chloro-4-m-chloroanilino 7-chloroquinoline*, m. 131°. Likewise, 3,4 ClMeC$_6$H$_3$NHCOCH$_2$Cl gives a practically homogeneous *quinoline* $C_{16}H_{11}N_2Cl_4$, m. 174°. These results with $PhNH_2$ and its *m*- and *p*-substituted derivs. showed that the compds. recently isolated in very small amounts along with the imide chlorides from *o* substituted chloroacetanilides are quinolines and not amidines. These compds. have the following m. ps.: from *o* toluidine, 160°; *o* anisidine, 196°; *o*-ClC$_6$H$_4$NH$_2$, 116°; *o* BrC$_6$H$_4$NH$_2$ does not crystallize well (*HCl salt*, m. 135°). *2 Ethyl-3 methyl-4-anilinoquinoline HCl*, from EtCONHPh and $PCl_5$ (yield, more than 50%), yellow, m. 217–20°, *free base*, m. 178°; *HCl salt*, yellow, m. 219–20°; *picrate*, m. 221°. The base heated 2.5 hrs. at 155° with 10 parts concd. HCl gives 1 $PhNH_2$ and *2-ethyl-3-methyl-4-chloroquinoline*, m. 40–3°. If the temp. during the heating is raised to 180–90° there is obtained the *4-HO compd.*, only slightly sol. in alkalies but easily sol. in dil. mineral acids, m. 284°, converted back into the 4-Cl compd. by $PCl_5$-$POCl_3$ at 140° and reduced by Na-EtOH to the *py* tetrahydro-2-ethyl-3-methyl-

quinoline, $b_{12}$ 136–40° (HCl salt, m 193°) *2-Benzyl-3-phenyl-4-anilinoquinoline HCl* (80% yield), yellow, m 209°; free *base*, m 172°, *picrate*, m 188°. Heated 6 hrs at 170–200° with concd. HCl the 4-Cl compd gives the *4-HO deriv*, m 308° *2-Benzyl-3 phenyltetrahydroquinoline*, light yellow, $b_{0.3}$ 190–2°, non-volatile with steam

C. A. R.

Azo compounds from trimethylmethyleneketopyrazine. VII. E. Principalle. *Gazz chim ital* 60, 963-6(1930), cf. *C A*. 24, 3792.—2,5-Dimethyl-6-keto-1,6-dihydropyrazine couples easily with diazonium salts (cf *C A* 23, 3472), but if the formation of a lactimic group is prevented by substitution of the imine H by a radical, no coupling takes place (cf *C A* 24, 3792) Azo compds are also formed by the reaction of 1,2,4 trimethyl 5-methylene-6 keto-1,6,4,5-tetrahydropyrazine (I) (cf *C A*. 24, 1383) and diazonium salts, since diazonium salts react easily with compds. which contain multiple aliphatic bonds (cf Meyer, *C A* 14, 1330, Quilico, *C A* 23, 597, 3075). The reaction takes place by addn to the C $CH_2$ group, with subsequent elimination of $H_2O$ thus OC(—NMe.CMe.CH.NMe.C$CH_2$) (I) + PhN NOH ⟶ —NMe.C(OH)$CH_2$N NPh ⟶ —NMe.C(=)CHN NPh I reacts also with $PhHNNH_2$ (II), with formation of the same azo compd as that by the action of PhN.NCl, and the reaction takes place in a similar way The basic products are stable compds., in general of an intense red color, and with H halides form salts; the structure is not certain (see later) I and II (equimol quantities) heated in 20% AcOH for 48 hrs at 50°, cooled, neutralized with NaOH, and the product recrystd from EtOH, yields *1,2,4 trimethyl-5-phenylazomethylene 6 keto-1,6,4,5 tetrahydropyrazine* (III), red, m 201° (decompn.) A better yield of III is obtained with $PhN_2Cl$ though the procedure is more tedious, *i. e.*, sufficient NaOH is added to 1,2,5-trimethyl-6-keto-1,6 dihydropyrazine-MeI soln to liberate the base, the mixt is cooled, $PhN_2Cl$ (calcd quantity) is added dropwise, the product is let stand until sepn. is complete, the ppt (a mixt of III-HCl and IV) recrystd from dil HCl, decompd with NaOH, and the III recrystd from EtOH, dil HCl or dil HI III and dil HI allowed to crystallize yield the *III salt* $C_{14}H_{17}ON_4I$ (IV), red, m 228° (decompn.). By the same procedure as in the previous prepn., there is obtained from *p*-$MeC_6H_4N_2Cl$, after recrystn from EtOH, *1,2,4-trimethyl-5-p-tolylazomethylene 6-keto-1,6,4,5 tetrahydropyrazine* (V), red, m 214° (decompn.) V and dil. HI yield the *III salt* $C_{15}H_{19}ON_4I$ (VI), brilliant green, m 226° (decompn.). Likewise from V and dil HCl is obtained the *HCl salt*, $C_{15}H_{19}ON_4Cl$ (VII), green, m. 205° (decompn.). The salts IV, VI and VII may have either or both of two structures, viz., OC(—NMe.CMe.CH.NHMeI.C:CHN:NPh) (VIII) or OC(—NMe.CMe:CH.NMeI:CCH NNHPh) (IX). VIII would be formed by the normal addn of the halogen acid, with conversion of N from tervalent to quinquevalent. IX would be formed from VIII by subsequent isomerization It is very probable that IX represents the form of IV, VI and VII, which means that they have a structure analogous to those formed from 2,3,3-trimethylindolenine-MeI (cf Rosenhauer and Feilner, *C. A*. 21, 407). Further expts are in progress to settle this problem

C C. Davis

Strychnos alkaloids. LVII. Oxidation of tetrahydrostrychnine and some derivatives. Hermann Leuchs (in part with Fritz Kröhnke). *Ber*. 63B, 3184–9(1930), cf. *C. A* 25, 705.—Whereas in the oxidation of brucine, the aminostrychnines, strychnine and strychnidine (I) by $CrO_3$ only products which had been attacked in the $C_6H_4$ nucleus could be isolated, the oxidation of tetrahydrostrychnine (II) proceeded differently While here, too, there was obtained a *compd*. $C_{17}H_{19}O_4N_2$ (III), analogous to diketonucidine, isolated in 7.4% yield as the perchlorate, there was also obtained 14% of an amino acid $C_{11}H_{12}O_4N_2$ $4H_2O$ (IV), whose compn shows that the $C_6H_4$ nucleus is still intact IV had already been observed in the oxidation of I, but in such small and widely varying yields that its formation was probably due to the presence of II in the crude I. The oxidation of the II consists in the taking up of two O and loss of four H atoms, since a $CO_2H$ group is formed, there may have occurred the change —$CH_2$(OH) into $CO_2H$, with which would have to be related that of —$CH_2$ NH— into —CO NH— or —C(OH) N—. For in strychninic acid, with the same groups —$CH_2$ NH— and $HO_2C$—, these are anhydrized by mineral acids The negative semicarbazone test would indicate that the compd is not a ketone. Oxidation of a (b) N.$CH_2$— residue would still leave a salt-forming group in (a) NH CH= but would not explain the lactam ring remaining open To test these views, the Ac derivs

of II were studied The *O,N*-di Ac deriv (V) is quite stable toward $CrO_3$, it consumed less than 19 equivs giving chiefly, with loss of the *O* Ac group, an *amino acid* $C_{21}H_{22}O_4N_2$ (VI) isolated as the perchlorate in 55% yield From the compn of VI, the reaction must have been limited to sapon and conversion of $—CH_2(OH)$ into $—CO_2H$, *i. e.*, VI must be *N* acetylstrychnine acid, attempts to prep it from $Ac_2O$ and an alk soln of the acid gave only strychnine The sapon precedes the oxidation, and the *N* Ac deriv likewise gives VI (in 77% yield with only 14 equivs $CrO_3$). 10 equivs KMnO in $Me_2CO$ at 0° gave no cryst products Attempts to oxidize II with Br gave first an aromatic *di Br deriv* (*o, p* to the (a)N) (VII) which then changed into resinous substances *Perchlorate* of I, needles and prisms with 1 $H_2O$, $[\alpha]_D^{17}$ —10 1°/d ($H_2O$); HCl salt, $[\alpha]_D^{17}$ 13 5°/d *Perchlorate* of II, $[\alpha]_D^{15}$ —74 9°/d ; HCl salt, $[\alpha]_D^{15}$ —80 6°/d ; free base needles with 2 $H_2O$, m 202° (vacuum), *N*-Ac deriv, prisms with 1 $H_2O$, m 157–9° and anhyd, 197 9° (vacuum), *perchlorate*, $[\alpha]_D^{15}$ 101–6°/d ; HCl salt, $[\alpha]_D^{15}$ 122 3°/d V, tables and prisms with 1 $H_2O$, m around 100° and, anhyd, 135–42° $[\alpha]_D^{15}$ in 1 mol 0 1 *N* HCl 112 2°/d *perchlorate* prisms with 1 5 $H_2O$, $[\alpha]_D^{15}$ 96°/d VII, sinters 238° m 248 50° (250–2° *in vacuo*), shows no basic reactions and does not react with $FeCl_3$, dissolves in $CrO_3$ $H_2SO_4$ with red violet color, is unchanged by boiling $Ba(OH)_2$ *HBr salt* needles losing 10 1% in wt at 100° and 15 mm ; *HCl salt*, $[\alpha]_D^{15}$ 23 2°/d IV, needles or leaflets with 4 $H_2O$ (erroneously given as 3 $H_2O$ in an earlier paper (*C. A.* 25, 705)) sol in *N* $KHCO_3$ but not in *N* NaOAc, does not m 320°; HCl salt, $[\alpha]_D^{15}$ —21 0°/d *Perchlorate* of III, tables and octahedrons with 2 $H_2O$, $[\alpha]_D^{15}$ 73 8°/d, free *base*, faintly yellow prisms, losing (under 15 mm) 1 5% in wt at 75° and 2.3% at 115°, sinters 230° m 243 5° (245–7° *in vacuo*) Oxidation with 24 equivs $CrO_3$ gave more than 10% IV and less than 5% salt of III; pretreatment of the II with $FeNH_4(SO_4)_2$ decreased the yields *Perchlorate* of IV, $[\alpha]_D^{17}$ 118 5°/d. ($H_2O$), free *acid*, prisms with neutral reaction, sinters 180 200°, becomes foamy 220°, decomps 305° C. A. R.

**Sinomenine and disinomenine XXIII The identity of β-tetra-hydrodesoxy-codeine and dihydrothebacodine** KAKUJI GOTO AND SHINGO MITSUI *Bull. Chem. Soc. Japan* 6, 33–9(1931) —Kondo and Ochiai (*C. A.* 24, 3213) obtained desoxytetra-hydrosinomenine, the *d* form of dihydrothebacodine (I), by Clemmensen reduction of sinomenine (II) whereby the phenolic OH group is apparently removed and the CO group reduced to a secondary alc Goto (*C. A.* 24, 1385) attempting to repeat this obtained desoxydemethoxydihydrosinomenine (III), the *d* form of β tetrahydrodesoxy-codeine (IV) The retention of the phenolic OH and reduction of the CO group to $CH_2$ is now confirmed by reduction of demethoxydihydrosinomenine to III by means of $PCl_5$ and subsequent catalytic reduction of the ketone dichloride. By subjecting various derivs of II to the Tafel electrolytic reduction G and M were able in no case to remove the phenolic OH and obtain an alc. base corresponding to the dihydrothebacodine of Speyer and Siebert The identity of I and IV is further supported by the identity of the des *N*-Me bases, m 147–8°, and the N free bases, m 107–8°, from both sources It is proposed to substitute the name *dihydro-eu thebainan* for K and O s *dihydrothebainan*, designating I, III and IV. The easy reduction by the Clemmen sen method of the MeO and corresponding OH groups in all derivs of I contg the CO group makes it seem probable that these groups are vicinal R. C. ELDERFIELD

**The sapogenin of guaiac bark. I** E. WEDEKIND AND W. SCHICKE *Z. physiol. Chem.* 195, 132–8(1931) —The crude saponin was hydrolyzed with 5% $H_2SO_4$ and the insol amorphous end sapogenin, for which the name *guagenin* is proposed, was used in the prepn of derivs $Ac_2O$ converted it into a cryst *acetylguagenin*, m 268°, $[\alpha]_D^{17}$ in $CHCl_3$ 74 5°, from which the *Me ester*, m 220°, $[\alpha]_D^{17}$ in $CHCl_3$ 69 2°, was obtained by treatment with $CH_2N_2$ By sapong the Ac deriv with KOH in MeOH the *guagenin*, $C_{30}H_{50}O_4$, m 310°, was obtained cryst This cryst product yielded a *Me ester*, m 196°, $[\alpha]_D^{17}$ 73 9°, and an Ac deriv identical with that prepd from the amorphous sapogenin A. W. Dox

**Synthetic experiments on the constitution of the bile pigment III Synthesis of hydroxypyrromethenes, and some derivatives of coproporphyrin I.** HANS FISCHER AND WALTER RÖHRIS. *Z. physiol. Chem.* 195, 49–80(1931), cf. *C. A.* 18, 2515 —A study was first made of the reactivity of the α Br in 4 3',5' trimethyl-3,4'-dipropionic acid 5-bromopyrromethene and its Me ester (I), since a replacement of the Br by OH should yield a product very closely related to xanthobilirubic acid I reacts with $PhNH_2$ to form *4,3',5' trimethyl 3 4'-di(propionic Me ester)-5 phenylaminopyrromethene-*

*HBr*, m 180°. The *free base*, m 145°, forms a *complex Cu salt*, m 120°. Treatment of I with $MeNH_2$ does not replace the Br but converts the ester groups into the corresponding amide, yielding *4,3',5'-trimethyl-3,4'-di(propionic methylamide)5-bromopyrromethene* (II), m 212° (decompn) A similar reaction occurs with $NH_3$ in MeOH, which yields *4,3',5'-trimethyl-3,4'-di(propionamide)-5-bromopyrromethene*, decomps 260–70°. Treatment of II with 10% KOH in MeOH replaces the Br by MeO, forming *4,3',5'-trimethyl-3,4'-di(propionic methylamide)-5-methoxypyrromethene*, m. 225° I yields a similar MeO deriv., *viz* *4,3',5' trimethyl 3,4'-di(propionic Me ester)-5-methoxypyrromethene* (III), m 88° The OH deriv representing hydrolysis of the Br in I, *viz*, *4,3',5'-trimethyl-3,4'-di(propionic Me ester) 5 hydroxypyrromethene*, m 180°, may be prepd directly from I by heating the AcOH soln with AgOAc, or from III by hydrolysis of the MeO This is accomplished by heating III with MeONa at 170–80° and reësterifying the carboxyls with $Me_2SO_4$, or better by resorcinol fusion of III at 170–80° This hydroxymethene in $CHCl_3$ gives a green color reaction with diazobenzenesulfonic acid and HCl Heated to 170–80° with HBr-AcOH, 2 mols condense to coproporphyrin in small yield The di-Et deriv corresponding to the free acid of I, when heated with KOH in MeOH, yields *4,3',5'-trimethyl-3,4'-diethyl 5-methoxypyrromethene*, m 70°, from which *4,3',5' trimethyl-3,4'-diethyl-5-hydroxypyrromethene*, m 243°, is obtained in small yield by resorcinol fusion. The mother liquors remaining from the prepn of the HBr salt of I (free acid), when evapd spontaneously over a period of several months, gradually formed coproporphyrin I, which was isolated and identified as the tetra-Et ester, m 226° In the prepn of coproporphyrin tetra-Me ester by citric acid fusion a mother liquor remained from which the Me ester of coproporphyrin IV, m 177°, was isolated Porphyrin formation occurs also in small yield when the HBr salt of the free acid of I is treated with $H_2SO_4$ Coproporphyrin tetra-Me ester I and isouroporphyrin octa-Me ester II yield *complex Co salts*, m 270° and 316°, resp. The copro ester gives a *Ag salt*, m 286°, which may be sapond to the free acid by boiling with KCN in 90% EtOH and reësterified by shaking with $Me_2SO_4$ and $Na_2CO_3$. Treatment of the Ag salt ester with $Fe(OAc)_2$ and AcOH contg a little NaCl replaces the Ag by Fe, yielding the tetra-Me ester of coprohemin, m 245° $Na_2CO_3$ converts the latter into coprohematin tetra-Me ester, m. 215°. Reduction of this ester with Na and AmOH converts it into the corresponding *chlorintetracarboxylic acid* which dissolves in $Et_2O$ to a stable green soln., but its alk soln soon reverts to the red porphyrin Exposure of an aq colloidal suspension of coproporphyrin to summer sunlight for several days converts it into a chlorin which differs from the synthetic chlorin in that its alk soln is stable to atm O Nitration of the copro ester with concd $HNO_3$ yields a *dinitrocoproporphyrin*, and hematinic anhydride as a by product. This dinitro deriv forms a *tetra-Me ester*, m 191° (*complex Cu salt*, m 200°, *complex Ag salt*, m. 240°) If the esterification is performed by refluxing with 5% HCl in MeOH the product is a *mononitrodihydroxyporphyrin ester*, m 206° (*complex Cu salt*, m 245°). Attempts to prep an aminoporphyrin by reduction of the $NO_2$ were unsuccessful. After treatment of the dinitro deriv with Na-Hg the products isolated were coproporphyrin, dinitroporphyrin, and *mononitroporphyrin*, from which a *tetra-Me ester*, m. 204°, was prepd The mono- is more stable than the dinitro deriv. and can be esterified at refluxing temp Finally a *tetrahydrazide*, was prepd from the tetra-Me ester of coproporphyrin and $N_2H_4$ $H_2O$ in MeOH. Its *Fe salt* was obtained in the same manner from coprohemin ester The *tetraazide of coproporphyrin* was prepd. by treatment of the hydrazide with $NaNO_2$ and HCl with ice cooling It explodes at about 90°. MeOH converts the azide into a *tetraurethan*, m 190° This is a remarkably stable substance, not attacked by concd. $H_2SO_4$ or by resorcinol fusion at 200°. It is apparently sapond by HCl at 200°, but the expected tetraaminoporphyrin could not be isolated in a pure state A. W Dox

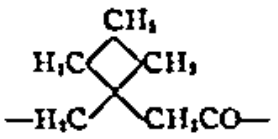
Blossom xanthophylls. The pigment of the sunflower. L. Zechmeister and P. Tuzson *Ber.* 63B, 3203–7(1930) —The polarimetric method is at present probably the most reliable means of distinguishing closely related pigments of the xanthophyll type from each other The non homogeneity of leaf xanthophyll was proved by the isolation of analytically pure prepns of widely varying rotations (137–92°) from stinging nettles; the maize pigment, zeaxanthin, can readily be distinguished from the xanthophyll of leaves by its *l* rotation, and the lutein of egg yolk by its characteristically low *d* rotation (72°). In the search for other natural xanthophylls differing in rotation from that of leaves, it has been found that the well-crystd pigment (I) of the sunflower (*C. A.* 25, 314) has a low *d* rotation (75°) identical, within the exptl errors, with that of the egg lutein, and as its other consts also agree with those of lutein, there can hardly be any doubt that the two substances are identical The sunflower

seems to contain the lutein mostly in the form of a cryst ester. The I (0.234 g from 300 g dried petals) was isolated by letting the fresh petals stand 1 day under 90–6% EtOH drying at 35°, powdering, percolating with $C_6H_6$, concg *in vacuo* at 40°, adding 98% alc (which ppts a colorless substance), filtering, adding $H_2O$, extg with $Et_2O$, letting the washed $Et_2O$ ext stand 20 hrs with concd KOH in MeOH, concg the $Et_2O$ layer (dried with $Na_2SO_4$) *in vacuo* in a current of $CO_2$, pptg with petroleum ether, extg with boiling 70% EtOH and crystg the insol residue from MeOH. It m 193° (cor.) $[\alpha]_D^{18}$ 75° ($CHCl_3$). Spectrum in 96% EtOH (5 mg in 1 l., 10-mm layer), 486–72, 455.5–442.5, about 420. C. A. R.

**The iron salt of pheophorbide *b*.** Otto Warburg. *Ber* 64B, 682–3(1931).—A mixt. of 1 g. Fe powder, 1 g. NaCl and 60 cc. glacial AcOH is boiled in an atm. of $CO_2$, cooled and filtered. The Fe salt of pheophorbide *b* is obtained in 530 mg. yield by adding 1 g. pheophorbide *b* to the above soln., passing a current of $CO_2$ through it and heating for 10 min. on a water bath. The crude product deposited on cooling is centrifuged and washed with 50% AcOH and $H_2O$. It may be crystd. by dissolving 100 mg. in 15 cc. hot propionic acid, filtering and adding 7.5 cc. hot 0.5% HCl. The crystals which sep. on cooling are probably $(CH_3CH_2CO)C_{33}H_{31}N_4O_4FeCl$. The Fe salt of pheophorbide *a* may be similarly prepd. Ruth Berggren

**Isolation of phytosterolin from wheat embryo.** Nobuzo Nakamura and Akiyoshi Ichiba. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 15, Nos. 289–91, 137–41(1931).—From the ether ext. of wheat embryo 0.2% of phytosterolin was isolated. It is identical with the glucoside ipuranol of phytosterol from other materials (*C. A.* 7, 2218). It forms needles (from AmOH), m. 285–90°. *Ac deriv.* m. 168°, $[\alpha]_D$ −22.4° (in $CHCl_3$). *Bz deriv.* m. 198°, $[\alpha]_D$ 17.24° (in $CHCl_3$). Alfred Burger

**Some relations between constitution and odor.** A. Angeli. *Gazz. chim. ital.* 60, 939–46(1930).—In view of the odorous characteristics of aromatic musks and of violet ketones, it is surprising that the ketones first synthesized by Ruzicka possess such remarkable odors, for they contain no Me groups around the CO residue. Consequently, because of the size of the ring resulting from a great no. of methylene groups, deformation of the ring itself probably occurs in such a way that lateral nodes are formed. These nodes are made up of residues which function in the same way as do the Me groups in the musks and ketones mentioned. In this case there would be a twisting as represented by the structure



and this seems likely from the fact that, though x-ray examn. of the ketones of Ruzicka furnish no evidence, Lee (cf. *C. A.* 21, 3189) has noticed anomalies in certain long-chain compds. which are greatest with 15 C atoms. Furthermore Lee and van Rysselberge (cf. *C. A.* 24, 59) suggest a spiral form in long-chain compds. To throw light on this problem, the chem. behavior of some cyclic ketones was studied, particularly the influence of certain substituents (alc. radicals) on the reactions which are characteristic of these ketones. If the hypothesis already suggested, *i. e.*, that in proximity to the CO group the methylene chain is deformed, were true, then it is probable that the condensations mentioned take place only partially or not at all. The cycloketone contg. 15 atoms (with the com. name of hexalthone) was mixed with BzH (equimol. quantities) and condensation was attempted with cold, dil. KOH, hot aq. KOH (as with cyclohexanone) and with alc. KOH. There was no condensation in any case. Moreover as in expts. of Wieland (no reference) hexalthone (1 mol.) and then (cooling with ice) $EtNO_2$ (1 mol.) were added to EtOK (1 mol.) in abs. EtOH, and the next day $Et_2O$ was added but no salt sepd., and upon the addn. of water all the hexalthone was recovered. This behavior makes it probable that there is a steric hindrance at work, which would in turn support the hypothesis suggested. Very probably the same arguments apply to polymethylenic lactones, *e. g.*, ambrettolides, which have been studied by Kerschbaum. The exptl. details of the present paper will be published later. Cf. *C. A.* 24, 4525. C. C. Davis

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Aqueous liquors from low temperature carbonization of coal (Morgan, Pettet) 21. The protective action of some antioxidants. II. The metal halide compounds of some protective agents against aging (Kirchhof) 30. AcOH recovery in the cellulose acetate industry (Clotworthy) 23. The ultra violet absorption spectra of the amides

of α methylbutenoic acids (CASTILLE) 3. Color and constitution from the standpoint of recent electronic theory (HODGSON) 3. Studies in Raman effect X The Raman spectra of organic substances (DADIEU, KOHLRAUSCH) 3. Raman effect and constitutional problems II Cyanogen compounds (DADIEU) 3. Thermal disaggregation of gelatin (GERNGROSS *et al*) 2. Kinetics of heterogeneous formate formation (BIRSTEIN, LOBANOW) 2. Influence of the strength of aromatic amines on their reactions (HERTEL, SCHNEIDER) 2. An x ray study of mannitol, dulcitol and mannose (MARWICK) 2. The crystallographic character of the amides of methylbutenoic acids (THOREAU) 2. Zero volumes of crystalline organic substances (BILTZ) 2. Isoprene and rubber (STAUDINGER, JOSEPH) 30.

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Organic compounds. I G FARBENIND A G (Otto Nicodemus and Walter Berndt, inventors) Ger 514,174, Sept 16, 1925 Addn to 481,819 (*C A* 24, 2139). Org compounds are obtained by leading the vapors of mixed aromatic heterocyclic ketones, optionally in the presence of oxidizing agents and catalyzers, over highly porous materials Thus, 2 xylyl 5-xyloylpyridine is evapd under reduced pressure in an air current and passed over active C at 400–420°. The substance 1-xylyl-7-methylbenzoquinoline (m 170°) is found among the unchanged starting material and other products Other examples are given.

Hydrocarbons. I G FARBENIND A-G Fr 695,125, May 6, 1930 Products of higher b p are prepd by treating satd. compds. of the aliphatic or hydroaromatic series, particularly the halogen derivs, with hydrocarbons of the $C_nH_4$ or $C_nH_2$ series under pressure and in the presence of condensing agents Thus, hydrocarbons distg between 120° and 200° are prepd from $C_2H_4$ and MeCl in the presence of $AlCl_3$, and a product distg between 150° and 180° contg about 2% of O from the double compd. of $Et_2O$ and $BF_3$ under pressure of $C_2H_4$. Cf. *C. A* 25, 1536 and following abstrs.

Hydrocarbons. I. G FARBENIND. A-G Fr. 37,296, Aug. 1, 1929. Addn. to 663,539 In the process of the prior patent the conditions of working in the second or following phases are made more vigorous otherwise than by a rise of temp, *e. g.*, by an increase of pressure, an increase of the partial pressure of H, the use of a more active catalyst, etc., or these measures are used along with a rise of temp. (cf. *C. A.* 24, 2875)

Hydrocarbons. I G FARBENIND A-G Fr. 37,440, Sept 17, 1929. Addn. to 659,583 (*C A* 23, 5312) The S and O compds are eliminated from the starting materials by heating these in the presence of catalysts and, if necessary, gases other than H or treating the starting materials with appropriate solvents or in any other manner.

Diolefins. PAUL FEILER (to I G Farbenind A-G). U. S 1,795,549, March 10 In the recovery of diolefins such as butadiene from various mixed gases contg the diolefins, the gas is treated with a salt of a heavy metal from groups 1 and 2 of the periodic system such as $Cu_2Cl_2$ or $AgNO_3$ and the diolefins are subsequently liberated (suitably by heating) from the resulting additive compds

Organic oxygen compounds. I G FARBENIND. A-G Fr. 37,351, Aug 16, 1929. Addn. to 646,087 (*C A* 23, 2186) Benzene hydrocarbons having a lateral chain bound cyclically to the $C_6H_4$ ring, particularly benzopolymethylenic compds. are oxidized by O or gases contg O in the presence of catalysts, preferably heavy metals. Thus, tetrahydronaphthalene is oxidized to α-ketotetrahydronaphthalene and α-hydroxytetrahydronaphthalene Several examples are given.

Oxygenated organic compounds from carbon oxides and hydrogen. H. DREYFUS. Brit. 338,854, July 24 1929 Products such as EtOH, PrOH, acetaldehyde, HOAc, MeOAc and their higher homologs, and ketones, are formed from mixts contg. C oxides and H such as water gas, coke-oven gas or producer gas in the presence of catalysts consisting of alkali or alk. earth or Cu silicates, borates or phosphates or salts of other oxyacids of P. Temps. of 200–600° and pressures of 50–500 atm may be used,

$CH_4$ or inert gases such as N may be present and reaction chambers of Cu or steel lined with Cu or of steel contg Mo, W, Mn, Co or Ni may be used Cf. *C. A.*, 25, 1839.

Mixtures of hydrogen and carbon monoxide MARIA CASALE SACCHI Austrian 121,228, Sept 15, 1930 Hydrocarbons are treated with O and an excess of steam at a temp above 1000° under reduced pressure

Oxidizing organic substances CONSORTIUM FÜR ELEKTROCHEM IND G M B H (Erich Baum and Willy O Herrmann inventors) Ger 518,391, May 7, 1924 A mixt of the org substance to be oxidized and an oxygen-contg gas or other oxidizing agent is caused to flow rapidly through a narrow orifice and impinge on a heated surface, which may consist of, or contain a catalyst The oxidation of AcH, $C_6H_6$ and MeOH to $CH_2O$, of $C_6H_6$ to maleic acid and of $C_{10}H_8$ to phthalic acid or phthalic anhydride is referred to Examples are given

Recovering organic substances from adsorbent materials. I G FARBENIND A G Fr 695 123, May 6, 1930 Org substances are recovered from adsorbent materials contg them by heating them with water, or aq solns or other org or inorg liquids in which the org substances are scarcely or not at all sol in the presence of substances which are more easily wetted by the org substances than the adsorbent materials which contain them Thus fuller's earth contg oil is mixed with active C and soft soap and the mass is boiled with water An oily layer contg the C seps., and the C is removed by filtration

Hydrocyclic compounds. I G FARBENIND A-G Fr 37,498, Oct. 9, 1929 Addn to 663,564 (*C. A.* 24, 625) Hydrocyclic compds are prepd by condensing unsatd $\alpha\beta$ nitriles contg the atomic group $-C=C-C=N$ in the form of a chain, with compds contg doubly conjugated C=C compds Thus, the nitrile of crotonic acid ($CH_3CH:CHC:N$) is heated under pressure with cyclopentadiene The product has probably the formula $CH\,CH\,CH\,CHMe\,CH(CN)\,CH\,CH_2$ With 2,4-dimethylbutadiene, a product of the formula $CH_2\,CHMe\,CH(CN)\,CHMe\,CH\,CMe$ is obtained Products from the nitrile of sorbic acid are also described

Basic products I G FARBENIND A G Fr 37,289, July 30, 1929 Addn to 671,362 (*C. A.* 24, 2244) Imido ethers, the acids from which they are derived, their chlorides, esters or amides are condensed with primary or secondary aromatic amines contg a basic lateral side chain with a tertiary N, or the side chain with a tertiary N may be introduced afterward Thus, if *p*-$\beta$ diethylaminoethoxyaniline is condensed with oleic acid chloride a product of the formula $C_{17}H_{33}CONHC_6H_4OC_2H_4NEt_2$ is obtained Other examples and the formulas of the products obtained are given Cf *C. A.* 25, 837, 1261

Diaryl compounds FEDERAL PHOSPHORUS CO Fr 37,449, Sept 20, 1929 Addn. to 667,840 (*C. A.* 24, 1394) Complex diaryl compds of b. p. higher than biphenyl are produced by vaporizing the corresponding hydrocarbon, *e. g.*, pure com benzene or com 90% benzene contg aromatic hydrocarbons other than $C_6H_6$ such as toluene and xylene The preliminary heating is to a temp just below that at which diaryl compds are formed and the temp is then rapidly raised to that at which these compds are formed

Complex diaryl compounds. J N CAROTHERS, T. J SCOTT and FEDERAL PHOSPHORUS CO Brit 338 631, Sept. 5, 1929 See preceding abstr

Drying organic liquids WILHELM KOPESKA Austrian 120,875 Aug 15, 1930 Benzine and other org liquids contg water in suspension are dried by treatment with a higher fatty acid ester of a carbohydrate of the formula $(C_6H_{10}O_5)_n$ The ester must be insol in the org liquid, and may be used in such a form that the org liquid can filter through it. Cellulose stearate, palmitate and laurate are suitable esters

Trichloroalcohols. CHEMISCHE FABRIKEN JOACHIM WIERNIK & CO A.-G (Gustav Heidner, inventor) Ger 515,539, Jan 14, 1925 The corresponding ketone is caused to react with $CHCl_3$ in the presence of alkali amide, and the resulting alcoholate treated with acid The alkali amide may be suspended in a water free indifferent solvent. Thus, acetone and $CHCl_3$ are added to a suspension of $NaNH_2$ in $Et_2O$ The temp is kept at 0° Dil $H_2SO_4$ (33%) is added and a steam distn gives a 60% yield of $C_4H_7Cl_3OH$ Further examples are given

Hydrogenating paraldol I G FARBENIND A.-G Brit. 338 807, Jan 30, 1929 1,3-Butylene glycol is made by catalytic hydrogenation of paraldol at 30–50° in the presence of a solvent or diluent such as water, EtOH, isopropanol or butanol, under

pressure, with catalysts such as Ni or Cu or both on pumice or Kieselguhr Use of Co, Pt and Pd also is mentioned

Ketones such as acetone. H Dreyfus Brit 338,518, Aug 19, 1929. The vapors of aliphatic alcs contg at least 2 C atoms, in admixt with air or O, are subjected to temps of 250–700° in the presence of catalysts such as oxides, hydroxides, carbonates, metaborates, ortho-, meta and pyro-phosphates and silicates of Ca, Ba or Mg which may be deposited on pumice or Kieselguhr Natural compds such as wollastonite, augite, osteolite, danburite or datolite may be used, and the gases may be passed through a tube of Cu, Fe, staybrite" or earthenware contg the catalyst and the vapor of an aliphatic acid such as HOAc may be added and a large excess of O used Brit 338,519 relates to a similar process in which steam is added to the reaction mixt

Carbocyclic ketones Brit 339,348, Oct 9, 1928, Soc anon M Naef & Cie. Fr 37,380, Aug 30, 1929 Addn to 599,765 Unsatd cyclic ketones having more than 9 ring members are prepd by submitting to the action of heat a metallic salt of an unsatd dicarboxylic acid contg at least 11 atoms of C in the normal chain and the 2COOH groups at the ends of the chain Salts of $UO_2$, or metals having the at numbers 59–72 are referred to

Methylene ethers. Imperial Chemical Industries, Ltd, T Birchall and S Coffey Brit 338,624, Aug 30, 1929 In the production of products such as methylene diethyl ether methylene di *n* butyl ether and 1,3 dioxane, $(CH_2)_3N_4$ is caused to react with mono- or di hydric alcs in the presence of acids such as HCl or $H_2SO_4$ Among the alcs which may be used for such reactions are MeOH, EtOH, *n* Bu alc, allyl alc, benzyl and substituted benzyl alcs, and ethylene and trimethylene glycols

Diazo compounds from 4-aminoresorcinol. N N Vorozhtzov Russ appl 49 050, June 12, 1929 4,1,3 $H_2NC_6H_3(OH)_2$ is diazotized by known methods in the presence of Cu or Fe salts or Co, Ni, Zn or other similar metal

Diazoamino compounds. I G Farbenind A-G Fr 37,240, July 25, 1929 Addn to 677,579 (*C A* 24, 3248) Diazoamino compds are made by the reaction of diazo compds on polycyclic primary amines sol in water, which on account of the position of the substituents, with respect to the amino group, are not capable of forming azo dyes Thus, 3 nitro-4-amino-1-methylbenzene is diazotized and combined with 1-naphthylamine-2,4-disulfonic acid Other examples are given

Aromatic amines. I G Farbenind A-G (Julius Laux, inventor) Ger 515,758, Aug 21, 1925 Aromatic amines are prepd by reducing the corresponding nitro compds with Fe in the presence of aq Al salt solns Thus $PhNO_2$ is reduced to $PhNH_2$ by Fe in the presence of aq $AlCl_3$ After distg off the $PhNH_2$, a yellowish brown ppt is left, which, on sepn from the unused Fe, produces a deep violet red Fe dye on heating to glowing Further examples are given

*N*-Aminoalkylamines. I G Farbenind A-G (Werner Schulemann, Fritz Schönhofer and August Wingler, inventors) Ger 518,207, Jan 26, 1927. Amines are caused to react with aminoalkyl halides or the corresponding sulfonates, the aminoalkylating agents being used in the form of their salts, in the presence or absence of an acid binding agent and a solvent Thus, ω-diethylaminoethylaniline may be prepd by heating $PhNH_2$ with $Et_2NCH_2CH_2Cl$ HCl Other examples are given also Cf *C A* 24, 2469

Esters. E I du Pont de Nemours & Co Ger 515,678, Mar 25, 1928 Esters and other org compds result when primary alcs with more than 1 C atom or a mixt of alcs are subjected to the action of dehydrogenating catalyzers at raised temp and pressure. The alcs. are circulated over an equal amt of catalyzer, volume-for-volume, at a pressure of 10 atm The catalyzers may be Ni, Cu, Co, Fe alone or mixed with $MnO_2$, $Cr_2O_3$, MgO, CaO, etc. EtOH treated in this way gives 55% unchanged EtOH, 25% AcOEt, 12 5% BuOH and small quantities of AcOH, AcH, $CO_2$ and $CH_4$.

Lactic acid esters. Schering-Kahlbaum A-G (Frank Hartwich, inventor) Ger. 518 388, Jan 23, 1926 A mixt of Mg lactate, an alc. and an acid, with or without a catalyst, *e g*, an excess of acid or $CaCl_2$, is heated Examples are given

Halogenated phosphorous and phosphoric esters. I G Farbenind A-G Brit 338,981, Aug 31, 1929 Reaction is effected between a compd contg an alkylene oxide group and a P trihalide or oxyhalide, suitably with use of a catalyst such as I, $FeCl_3$, S or iron filings *E g*, with $PCl_3$ and ethylene oxide, the O bridge is opened and a Cl atom combines with a $CH_2$ group while the P atom combines with the O. Thus ethylene oxide can be attached up to three times, so that the neutral ω-chloroethyl ester of phosphorous acid may be formed Examples are also given of reactions between epichlorohydrin and P oxychloride with iron filings as catalyst and of epichlorohydrin with $PBr_3$

Alkyl halides. N.-V. de Bataafsche Petroleum Maatschappij Brit. 338,742, Jan. 8, 1929. Products such as pentyl, butyl and propyl chlorides and butyl bromide are made by chlorination or bromination of paraffin hydrocarbons such as propane, butane and pentane, as by mixing the reacting materials in the dark at a low temp. and then heating without exposure to light (suitably in app. of enameled metal or Pyrex glass).

Addition products from acetylene and hydrogen halides. Consortium für Elektrochemische Industrie Ges. Brit. 339,093, Nov. 19, 1928. Addn. products are formed by passing a mixt. of $C_2H_2$ and a halide such as HCl or HBr at a raised temp. over a catalyst comprising a compd. of an alk. earth metal, Mg, Bi, Sb, V, Zn, Al, Fe or Hg or a mixt. of such compds., carried on a material of large surface such as active C or $SiO_2$ gel.

1-Aroylamino-4-haloanthraquinones. I. G. Farbenind. A.-G. (Willi Hartmann, inventor). Ger. 518,406, Dec. 23, 1926. 1-Aroylaminoanthraquinones are halogenated in inert solvents. Examples are given.

Anthraquinoneazines. W. Smith, S. G. Willimott, J. Thomas and Scottish Dyes, Ltd. Brit. 338,486, May 13, 1929. Anthraquinonetetrahydrodiphenazines are made by condensing $\alpha,\alpha$-dichloroanthraquinones with *o* nitroaniline or $\alpha,\alpha$-diaminoanthraquinones with *o* nitrochlorobenzene, and treating the products with alc. Na sulfide. The condensation may be effected by heating in an inert solvent such as $PhNO_2$ in the presence of an acid-absorbing agent such as $Na_2CO_3$ and a Cu catalyst, and the hydrodiphenazines may be converted into phenazines by treatment with oxidizing agents. Several examples are given.

Mercaptobenzothiazoles. I. G. Farbenind. A. G. (Eduard Tschunkur and Ernst Herdieckerhoff, inventors). Ger. 518,200, Feb. 22, 1928. See Fr. 669,921 (*C. A.* 24, 1867).

Monoxanthogens. George S. Whitby (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,972, March 17. Monoxanthogens of the general formula RO—CS—S—CS—OR, wherein the group RO— is the radical of any aliphatic alc. or deriv. thereof capable of yielding a xanthate and wherein R is of a non-cyclic nature can be prepd. in excellent yield by the reaction of alkali metal cyanides with the corresponding disulfide compds. as follows: RO CS $S_2$ CS OR + MCN = RO CS S CS OR + MSCN (where M is an alkali metal). The disulfides used may be prepd. by a variety of methods, such as electrolysis of concd. xanthate solns., action of I with KI on a xanthate soln., etc., but preferably are prepd. through the action of an alkali metal hypochlorite on a xanthate. The propyl, butyl, isobutyl, isoamyl and hexyl derivs. are yellow oils, while the methyl deriv. forms yellow needles m. 55°. The monoxanthogens prepd. from a mixt. of higher alcs. (corresponding in mean mol. wt. to decyl alc.) as well as from the monoethyl ether of ethylene glycol, by way of the corresponding xanthates and dixanthogens, are also yellow oils. Those monoxanthogens in which R—O—, of the formula R—O—CS S CS—O—R is a secondary aliphatic alc. radical, are good accelerators of the vulcanization of rubber and are called secondary alkyl monoxanthogens. As an example of this group the isopropyl deriv. or isopropyl monoxanthogen, is a golden yellow cryst. solid m. 54–55°. Details are given of the production of isopropyl monoxanthogen.

Calcium humate. R. Kekéts. Hung. 100,679, Oct. 24, 1928. Materials in the state of primary carbonization (*e. g.*, peat, lignite or brown coal) are finely powdered and boiled under pressure with alkalies. The alkali humates are filtered and lime water is added to ppt. Ca humate.

Anthraquinone derivatives. I. G. Farbenind. A. G. Fr. 37,109, June 17, 1929. Addn. to 630,511. Esters of *o* aminocarboxylic acids of the anthraquinone series are prepd. by treating an anthraquinone 1,2 isoxazole with a compd. of the formula ROH in which R is an alkyl or aryl group such as alcs. or phenols in the presence of an agent of alk. action. Examples are given of the prepn. of the Et, Me and Ph esters of 1-aminoanthraquinone-2-carboxylic acid.

Azine derivatives. I. G. Farbenind. A.-G. Brit. 339,283, Aug. 30, 1929. 1,2,5,6 Dibenzophenazine and its derivs. are made from 2 naphthylamine or its corresponding derivs. which contain a free 1 position by oxidation in an inert solvent of high b. p. with a metal oxide such as CuO or $MnO_2$. Several examples are given. Cf. *C. A.* 24, 2242.

Benzanthrone derivatives. I. G. Farbenind. A.-G. (Otto Braunsdorf, Eduard Holzapfel and Hans Lange, inventors). Ger. 518,410, Aug. 3, 1926. Addn. to 479,356 (*C. A.* 23, 4830). The aminobenzanthronyl sulfides, etc., described in Ger. 479,356 are now prepd. by the action of $NH_2OH$ in $H_2SO_4$ soln. on benzanthronyl sulfides, bisulfides, mercaptans or their derivs. The reaction is effected at about 125°, and a

catalyst may be present, *e. g.*, $FeSO_4$ or $CuSO_4$. Examples are given. Cf. *C. A.* 25, 2301.

**Cyclohexanol derivatives.** Schering-Kahlbaum (Walter Schoeller and Hans Jordan, inventors). Ger. 514,417, July 24, 1927. Addn. to 512,719 (*C. A.* 25, 1260). Alkylisoalkylcyclohexanol and corresponding ketones are prepd. by subjecting a mixt. of the corresponding phenol and alkylated coumaran to the action of H, in the presence of catalyzers, until 6 or 8 H atoms are taken up, and sepg. the alkylated coumarin from the hydrogenated product. Thus a mixt. of 4-methyl-6-isopropylenephenol and 2,4-dimethylcoumaran is treated with H at 150° in the presence of a Ni catalyzer. Pressure may be applied. The reaction is stopped when 8 atoms are taken up. A 60% yield of the hydrogenated product *p*-menthol and a 3–5% yield of *p*-menthone, can be obtained by careful fractional distn. Further examples are given.

**Guanidine derivatives.** Reinhard Freiherr von Godin. Ger. 518,407, July 24, 1928. Salts of diguanidine derivs. of higher paraffin hydrocarbons are prepd. by the reaction of $\alpha,\omega$-dihalogenated higher paraffin hydrocarbons with guanidine in warm alc. soln. About 3 mols. of guanidine should be used for 1 mol. of halogenated hydrocarbon. Examples are given.

**Substituted guanidines.** Herbert Schotte (to Schering-Kahlbaum A.-G.). U. S. 1,795,738, March 10. In forming a compd. such as $\alpha$-dimethyl-$\beta$-ethylguanidine, a dialkylcyanamide such as dimethylcyanamide is treated with a salt of an amine having at least one H atom attached to the N atom, such as ethylamine-HCl in the presence of the corresponding free amine.

**Diacyl derivatives of *m*-xylene.** I. G. Farbenind. A.-G. (Otto Wulff, inventor). Ger. 515,540, Dec. 21, 1926. Aromatic or aliphatic acid chlorides are caused to react on monoacyl *m*-xylene derivs. or their $AlCl_3$ compds. at temps. above 50°. Excess of $AlCl_3$ and diluents may be present. In an example, acetyl-*m*-xylene is mixed slowly with $AlCl_3$ at 40°. $AcCl_3$ is dropped in at about 45°. The temp. is then raised to 85–90° for two hours, *i. e.*, until the HCl evolution ceases. The temp. is then raised to 95°. The reaction mass gives an 80% yield of diacetyl-*m*-xylene. Further examples are given.

**Reduction products of *N*-acetylindoxyl.** I. G. Farbenind. A.-G. (Curt Schumann, Eduard Münch and Bruno Christ, inventors). Ger. 515,544, May 27, 1928. *N*-Acetylindoxyl, its homologs, anologs or derivs. are treated with H in the presence of hydrogenating catalyzers. Numerous examples are given. In one, *N*-acetyl-2,3-naphthindoxyl is treated with H at 100 atm. at 25° for 16 hrs., in an autoclave, in the presence of alc. and a Ni kieselguhr catalyzer, to give *N*-acetyl-2,3-naphthodihydroindoxyl. Cf. *C. A.* 24, 2142.

**Solid compounds from hydrogen peroxide combinations.** I. G. Farbenind. A.-G. Brit. 339,332, Aug. 6, 1929. Gaseous mixts. contg. vapors of $H_2O_2$ are passed (suitably countercurrentwise) over substances which unite with it such as urea, methylolureas, acetamide, urethan, succinic amide, mannitol, erythritol, pinacol, $(CH_3)_4N_2$, or alkali metal sulfates, carbonates, borates, nitrates, phosphates or pyrophosphates (either with cooling, heating (to not above 80°) or at ordinary temp.). Stabilizers such as starch, dextrin, amines, EtOH, borates or acid or neutral pyrophosphates may be incorporated in small proportions with the solid substances, and the gaseous mixt. used may be obtained by the action of a silent elec. discharge or of ultra violet rays on H contg. air or O.

**Concentrating acids.** Soc. anon. des distilleries des Deux-Sèvres. Fr. 37,269, Mar. 19, 1929. Addn. to 651,528 (*C. A.* 23, 3234). The processes of the prior patent and its addns. 34,574 (*C. A.* 24, 1392) and 34,691 (*C. A.* 24, 1392) are applied to the dehydration of org. acids in general and of the fatty series in particular. A solvent insol. or slightly sol. in water is used the b. p. of which is higher than that of the acid to be dehydrated, and which does not form an azeotropic mixt. with the anhyd. acid. A carrying substance giving with water an azeotropic mixt. boiling below the mixt. of water and solvent is also used. The method described in the addn. 35,750 (*C. A.* 24, 4052) is varied by using an accessory liquid which forms with the acid to be dehydrated a binary mixt. of min. b. p. Cf. *C. A.* 25, 970.

**Acylated hydroxy fatty acids.** Oranienburger Chemische Fabrik A.-G. Ger. 515,679, Aug. 24, 1928. Hydroxy fatty acids or derivs. are treated with org. acids or their anhydrides or chlorides. A small quantity of $ClSO_3H$ is added during the acylation, and the product is neutralized after the reaction is over. Thus, ricinoleic acid is mixed with BzCl and a small quantity of $ClSO_3H$ added. After the reaction is over, the product is neutralized with NaOH. Further examples are given.

**Mixtures of hydroxy fatty acids.** Carl Stiepel. Ger. 518,300, June 5, 1926.

Acid mixts resembling the acids of castor oil are prepd from unsatd. animal or vegetable fats or oils, or their free acids or their soaps, by partially satg these by chlorination, and then replacing the Cl atoms by OH groups in known manner, by heating with NaOH soln. under pressure, etc. Examples are given.

Acid- and lime-resisting derivatives of unsaturated fatty acids. Ferdinand Münz (to General Aniline Works) U. S. 1,796,801, March 17. Acids such as com. oleic acid or ricinoleic acid (heated to 150–60° until its acidity is reduced by about one-half, with formation of dicinine acid) are treated with fuming sulfuric acid contg. 66% of $SO_3$ (suitably in $CCl_4$) to obtain products which are not pptd. from soln. by hard water and are resistant to acids.

Pyrazol-anthrone-2-carboxylic acid. I. G. Farbenind. A.-G. (Heinz Scheyer, inventor). Ger. 515,640, Apr. 6, 1928. $N_2H_4$ is caused to react on 1-haloanthraquinone-2-carboxylic acid. Examples are given. Cf. *C. A.* 25, 909.

Phenylglycidic acid. Adolf Kaufmann. Ger. 515,034, Oct. 30, 1928. Addn. to 509,938 (*C. A.* 25, 715). The method of 509,938 for forming the above acid by oxidation of cinnamic aldehyde is modified by using hypohalogenite soln. as the oxidizing agent. Examples are given.

1-Hydroxy-4-haloanthraquinone-2-sulfonic acids. I. G. Farbenind. A.-G. (Ernst Honold, inventor). Ger. 518,214, Aug. 20, 1929. The diazo compds. from 1-amino-4-haloanthraquinone-2-sulfonic acids in an aq. medium are treated with Cu or a Cu compd. in the presence or absence of free acid. The amt. of Cu may be such that the product seps. as the insol. Cu salt. Examples are given.

Formic acid. N. V. de Bataafsche Petroleum Maatschappij. Brit. 339,045, Oct. 31, 1928. See Fr. 653,068 (*C. A.* 24, 4522).

Acetic acid. Hermann Suida. Austrian 120,870, Aug. 15, 1930. Concd. AcOH is recovered from dil. AcOH by extn. in the liquid phase with esters b. above 150° and derived from mono- or poly basic cyclic carboxylic acids and mono- or poly hydric ales. Examples describing the use of dibutyl and diethyl phthalates are given. Cf. *C. A.* 24, 3250.

Concentrating acetic acid. Hermann Suida. U. S. 1,795,977, March 10. Dil. HOAc is subjected to cold extn. with a solvent such as anthracene oil and quinoline and the acid and extg. medium are sepd. by distn.

Concentrating acetic acid. Hermann Suida. U. S. 1,795,979, March 10. A superheated aq.-HOAc vapor mixt. is brought into direct contact with a counter flow of a liquid ester such as dibenzyl phthalate to effect extn. of the HOAc from the mixt. and concd. HOAc is recovered from the soln. thus formed. App. is described.

Recovering acetic acid. Hermann Suida. Austrian 121,251, Sept. 15, 1930. Dil. AcOH is extd. in the cold with a mixt. of a non-acetylatable base b. above 150° and pentachloroethane or a hydrocarbon b. above 150°. A suitable extg. mixt. is quinoline 1 and anthracene oil 1 part. Concd. AcOH is recovered by distg. the ext.

Acetic acid and other acids from nitriles. I. G. Farbenind. A.-G. Brit. 339,235, Dec. 18, 1929. Nitrile vapors, either directly as produced by the method described in Brit. 322,258 (*C. A.* 25, 115) or after previous condensation and revaporization, are saponified by continuously passing the nitrile vapor in contact with a current of inorg. acid such as a 50–90% $H_2SO_4$ or $H_3PO_4$. Various details and examples are given.

Anhydrides of aliphatic acids. N. V. de Bataafsche Petroleum Maatschappij. Brit. 338,507, Aug. 9, 1929. Anhydrides such as $Ac_2O$ or butyric acetic anhydride are obtained by heating "monobasic" aliphatic acids in admixt. with monoketones such as acetone or ketone forming substances such as iso-Pr alc., secondary Bu alc., propylene oxide or MeOAc (suitably at about 600–700° and under ordinary, increased or reduced pressures). The materials may be passed through a heated tube of porcelain, quartz, yellow brass or other suitable material and catalysts may be used such as Cu, yellow brass or Al sulfate together with fillers such as porcelain, kieselguhr or pumice. Solid ketone forming substances such as NaOAc or $Ca(OAc)_2$ may be used and caused to pass through the reaction tube by a device such as a screw conveyor.

Dehydrogenating isopropyl alcohol. N.-V. de Bataafsche Petroleum Maatschappij. Brit. 339,491, Dec. 6, 1929. Isopropyl alc. vapor, with or without admixt. with other gases, is passed through a liquid medium such as molten Pb or salts or other non-reactive materials, heated to 200–700°, to produce acetone and H. Various details of app. and procedure are described.

Polymers of vinyl alcohol. I. G. Farbenind. A.-G. (Fritz Klatte and Hermann Müller, inventors). Ger. 515,780, Nov. 29, 1929. Addn. to 514,593 (*C. A.* 25, 2153). Polyvinyl mixed esters, which contain a halogenated org. acid and a non-halogenated

org acid, are sapond. by $NH_4OH$. Thus, polyvinyl acetate chloroacetate is saponified with $NH_4OH$ to give a solid polyvinyl alc.

Acetaldehyde. Consortium für elektrochem Ind G m b H (Erch Baum and Martin Mugdan, inventors) Ger 518,290, July 22, 1913 An excess of $C_2H_2$ is led through aq $H_2SO_4$ of 6–35% concn contg a compd of Hg, the acid being maintained at 60–80° AcH is removed from the gases leaving the reaction vessel, and the excess of $C_2H_2$ is returned to the vessel

Acetylene Russell W Millar to The Shell Development Co Can. 309,744, Mar 17, 1931 $C_2H_2$ is formed by the controlled combustion of a stream of O-contg gas in an atm of hydrocarbon gas

Normal butyl oleate Wm J Bannister (to Commercial Solvents Corp U S 1,796,231, March 10 Normal Bu oleate is made by reaction of butanol and oleic acid in the presence of $H_3PO_4$. It is a mobile yellow oily liquid, insol in water, $b_{10-11}$ 235–45°

Acetals. Willy O Herrmann and Hans Deutsch (to Consortium fur Elektrochemische Industrie) U S 1,796,690, March 17 See Ger 502,431 (*C. A.* 24, 4793)

2,5,6-Trichloro-1,3-dimethylbenzene, etc. Georg Kalischer and Fritz Förster (to General Aniline Works) U S 1,796,108, March 10 2,5,6-Trichloro-1,3-dimethylbenzene, crystg from glacial HOAc as white needles m about 95–6°, b 255–60°, is formed by the action of an inorg acid on the corresponding 4-sulfonic acid (which in turn is obtained by reaction of NaOCl on 1,3-dimethylbenzene-4-sulfonic acid in aq HCl soln and in general chlorinated products are formed by treating 1,3-dimethylbenzene-4 sulfonic acid in a mineral acid soln. with a chlorinating agent. Depending on the amt. of Cl employed the mono-, di- or tri-chloro-1,3-dimethylbenzene-4 sulfonic acid is obtained By hydrolysis effected in the usual manner for instance, by heating with $H_2SO_4$ or $H_3PO_4$ or the like, the sulfonic acid group is split off from the mol of the aforesaid compds and the corresponding chlorinated benzene derivs are obtained For splitting off the sulfonic acid group from the trichloro-1,3-dimethylbenzenesulfonic acid an excess of Cl may be employed, whereby the sulfonic acid group is replaced by Cl and tetrachloro-1,3-dimethylbenzene is obtained Details of procedure are also given for the production of 2-chloro-1,3-dimethylbenzene-4-sulfonic acid (the amide of which m about 222°), 2-chloro-1,3-dimethylbenzene (b about 185–7°), dichloro-1,3-dimethylbenzene-4-sulfonic acid (the amide of which m about 330°), tetrachloro-1,3-dimethylbenzene (m 218–20°) and derivs

*m*-Nitroaniline. G A Kirchov and I T Eskin Russ appl. 66,606, Mar 18 1930 *m*-$O_2NC_6H_4NH_2$ is prepd by reducing an aq suspension of *m*-$C_6H_4(NO_2)_2$ with $Na_2S$ in the presence of $NH_4Cl$

2,4-Dihydroxypyridine-3-carboxylic nitrile. Georg Schroeter. Ger. 515,991, Jan. 18, 1927 The above nitrile and its derivs are prepd. from dihydroxyhalopyridine carboxylic nitrile by (a) replacing the halogen by H or a substituted $NH_2$ group, or (b) treating with 1 mol of an alkylating agent to form the *N*-alkylated pyridone compd., and substituting the halogen by H, OH, SH, $NH_2$ or substituted $NH_2$. Thus, 2,4-dihydroxy-6-chloropyridine-3-carboxylic nitrile is treated with 2 *N* $H_2SO_4$ and Zn dust to give the required nitrile. Or, the chloro deriv is treated with NaOH and $Me_2SO_4$ to give 1-methyl-4-hydroxy-6-chloro-2 pyridone-3-carboxylic nitrile. The Cl is then substituted by H and treated with $H_2SO_4$ and Zn as before. Further examples are given.

Pure phenylazo-2,6-diaminopyridine hydrochloride. C. F. Boehringer & Soehne G m b H Ger 515,781, Nov 5, 1927 2,6-Diaminopyridine is coupled with diazotized $PhNH_2$ in the presence of a sufficient amt. of dil. HCl to form the dihydrochloride at 12°. The dihydrochloride is then decomposed to the monohydrochloride by addn. of water. An example is given.

Hydroxythionaphthenes. Karl Schirmacher and Ernst Fischer (to General Aniline Works) U. S 1,797,104, March 17. Hydroxythionaphthenes can be obtained with an excellent yield from compds. of the formula $\overline{CX.CX\ CX\ C\ alkyl.\ CY.CS\text{-}CH_2CO_2Z}$ wherein X may be H, alkyl or halogen, Y may stand for CN, COOH, COO-metal and Z for H or a metal, by heating them with water to a temp. of 100–200°, preferably 180°, that is to say, by using such *o*-carboxythioglycolic acids, or salts thereof, or *o*-cyanothioglycolic acids as contain in *o*-position to the carboxyl or nitrile group a further substituent, particularly an alkyl residue. If there is no further substituent in *o*-position to the cyanogen group, no hydroxythionaphthene is formed. Examples with details of procedure are given for the production of 4-methyl-6-chlorohydroxythionaphthene and 4,7-dimethyl-6-chlorohydroxythionaphthene. Cf. *C. A.* 25, 973.

**Alkoxy-3-hydroxythionaphthenes.** I G FARBENIND A.-G. (Ernst Runne, Karl Moldaenke and Ernst Fischer, inventors) Ger. 515,541, Oct. 9, 1927. Alkoxyaryl thioglycolic acid halides of the $C_6H_4$ or $C_{10}H_6$ series are treated with Al halides in the presence of solvents. Thus, 6-ethoxynaphthalene 2 thioglycolic acid (m. 122°) in $C_6H_5Cl$ is converted to the chloride by addn. of $PCl_5$. $AlCl_3$ is added at 30–40° and the $C_6H_5Cl$ steam-distd. off. An 80% yield of the corresponding ethoxybenzohydroxythionaphthene is obtained. Further examples are given. Cf. *C. A.* 24, 379.

**4-Alkylquinolines.** SCHERING KAHLBAUM A. G. (Clemens Zöllner, inventor) Ger. 518,291, Jan. 15, 1927. $PhNH_2$ or its substitution products is caused to react with alkyl β haloethyl ketones in aq. acid or alk. soln. in the presence of an oxidizing agent. Thus 4 methylquinoline is prepd. by heating on the water bath a mixt. of $PhNH_2$ with methyl β chloroethyl ketone, concd. HCl, and $PhNO_2$. Other examples are given also.

**Anthraquinone and its derivatives.** I G FARBENIND A.-G. Fr. 37,337, June 26, 1929. Addn. to 673,825 (*C. A.* 24, 2757). The transposition products, obtained by treating with alk. or acid agents or by heating the products resulting from the condensation of one mol. of benzoquinone with 2 mols., identical or different, of 1,3-butadiene hydrocarbons are submitted to a regulated dehydrogenation which may be followed by a more vigorous dehydrogenation. The transposition and the regulated dehydrogenation may be carried out in one operation. 1,4,5,8-Tetrahydroanthrahydroquinone, 1,4,5,8-tetrahydroanthraquinone, their homologs and derivs. prepd. by this process are stated to be new. Cf. *C. A.* 25, 965.

**2-Aroylpyrazoleanthrones.** I G FARBENIND A.-G. (Heinz Scheyer, inventor) Ger. 518,120, Apr. 6, 1928. Pyrazoleanthrone 2 carboxylic acid or its *N*-alkyl or *N*-aralkyl derivs. or substitution products of any of these, are converted into the chlorides, and these are condensed with aromatic hydrocarbons or their substitution products in the presence of an acid condensing agent. Examples are given.

***N*-Substituted 3,6-diaminoxanthones.** IMPERIAL CHEMICAL INDUSTRIES. Ger. 515,524, Mar. 3, 1929. See Brit. 314,826 (*C. A.* 24, 1521).

**Phenols.** F. PERILHOU. Brit. 328,628, Sept. 11, 1929. Phenols are sepd. from phenolic tar oils by treating the oils with aq. solns. of alkali carbonates under pressure and at temps. above 100°, with continuous escape of $CO_2$, isolation of the phenates thus formed and then decompn. of them with $CO_2$ liberated in the process, to regenerate the phenols. Various details of procedure and app. are described.

**α-Naphthol.** I G FARBENIND A.-G. (Emil Laage, inventor). Ger. 518,409, Apr. 11, 1929. See Fr. 603,596 (*C. A.* 25, 1529).

**Coumarone.** GES. FÜR TEERVERWERTUNG M. B. H. and OTTO KELBER. Ger. 515,546, July 14, 1929. Heavy benzine contg. coumarone, is sulfonated and cooled in the presence of at least sufficient water absorbing agent (*e. g.*, $Ac_2O$) to absorb the water formed during sulfonation. The resulting sulfonic acids are then split up by H, causing pure coumarone to sep. Examples are given.

**Isatins.** DEUTSCHE GOLD- UND SILBER SCHEIDEANSTALT VORMALS ROESSLER. Ger. 515,542, May 13, 1927. Isatins are prepd. by converting *N*-substituted cyanoformarylides into the corresponding imide compds. at high temps. in the presence of condensing agents, and sapong. the product. Thus, diphenylcyanoformamide is shaken with concd. $H_2SO_4$. The product is cooled and treated with hot dil. NaOH, to give *N*-phenylisatin, m. 140°. Other examples describe the prepn. of *N*-methylisatin, and *N*-ethylnaphthisatin.

**Diphenolisatin.** G. RICHTER, LTD. Hung. 101,105, Jan. 28, 1920. Isatin is condensed with phenol in dil. mineral acids.

**1,2,4-Triazoles.** GEORG SCHEUING and BRUNO WALACH (to C. H. Boehringer Sohn A. G.) U. S. 1,796,403, March 17. Triazoles are in general obtained, *e. g.*, by treating oxime ester, *e. g.*, the benzenesulfonic acid esters of the oximes, with acylhydrazines under conditions under which the esters undergo Beckmann transformation to the imido ester of the corresponding secondary acid amide. Further, triazoles may also be obtained by subjecting oximes to the Beckmann transformation with the aid of acid halides, such as $PCl_5$, $COCl_2$ and the like and by causing acylhydrazines to react with the reaction product. The same imido compds. and therefore also the triazoles may be obtained from mono-substituted acid amides by acylating the same in their enolic form, *e. g.*, by treating the mono-substituted acid amides with acid halides, such as acid chlorides, and then causing an acylhydrazine to react with the reaction product. The 1,2,4-triazole is formed by the elimination of water from the resulting primary hydrazidine. Numerous examples with details of procedure are given and particular claim is made to *3-methyl-4-xylyl-5-isopropyl-1,2,4 triazole* as a new product, manuf. of which and of various similar compds. is described.

Thymol, etc. SCHERING KAHLBAUM A.-G. (Hans Jordan, inventor). Ger. 518,209, Aug. 17, 1926. Thymol and its isomers and homologs are prepd. by hydrogenating the phenol ketone condensation products obtainable as described in Brit. 273,684 (*C. A.* 22, 1982), the process being continued until 4 atoms of H have been taken up. A phenolate or a compd. giving rise thereto may be present in the reaction mixt., as well as a catalyst promoting hydrogenation. Examples are given. Cf. *C. A.* 25, 717.

Porphyrin. HANS FISCHER and JOSEF KLARER. Ger. 515,992, Oct. 9, 1926. Addn. to 509,939 (*C. A.* 25, 716). The method of 509,939, for producing porphyrin by acting on halogenated dipyrrylmethenes with concd. $H_2SO_4$, is extended to include other acids. Examples mention HCOOH, succinic acid, AcOH and $H_3PO_4$. Cf. *C. A.* 25, 716.

Skatole. GES. FÜR TEERVERWERTUNG M. B. H. and OTTO KRUBER. Ger. 515,543, Nov. 10, 1928. Skatole is obtained by treating the tar-oil fraction contg. indole homologs with Na or $NaNH_2$ at temps. above 165°, and sepg. the unchanged oil from the Na indole compds. The skatole is then sepd. from the oil by direct cooling. The mixt. of Na indole compds. may also be treated with $CO_2$ with exclusion of water, to cause the skatole to sep. Thus, crude indole oil is treated with Na at 190–5°. A stream of dry $CO_2$ is led in. An oil seps. above the lye. This is cooled to a low temp. to cause solid skatole to sep. Another example is given.

# 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

## A—GENERAL

FRANK P. UNDERHILL

**A model for the segregation of enzyme from substrate (diastase-starch) in the cell.** M. MICHLBAUER. *Fermentforschung* **12**, 273–94(1931).—The sepn. existing between enzyme and substrate in the living cell and the more or less marked abolition of this sepn. under definite conditions is illustrated with pancreatic diastase and starch as a model. This spatial sepn. in the model is effected by superficially active substances which occur in the cell, such as Na oleate, lecithin, salts of bile acids and cholesterol. With Na oleate the sepn. of enzyme from substrate is brought about by its property of surrounding enzyme and substrate particles and thereby imparting to them a definite and uniform elec. charge. The enveloping film is thus a superficially active substance and the enclosed particles are mutually repelled by similar charges. The sepn. is reversible under biol. conditions. The reversal is best effected by changing the H ion concn. In a mixt. of diastase and starch without soap, a change in $p_H$ between 6.8 and 8.0 hardly exerts a measurable influence on the rate of digestion. If, however, the system contains soap, a slight change in $p_H$ within these limits is of enormous influence. The time required for disappearance of the starch, as shown by neg. I reaction, may thus be several hrs. at the higher and only a few sec. at the lower $p_H$. The change in $p_H$ toward the acid side merely removes the protecting soap film from the particles. The addn. of Ca salts has much the same effect, by pptg. the fatty acid as an insol. soap. Other superficially active substances can bring about a reversible sepn. of enzyme and substrate, *e. g.* ales in isocapillary proportions. The hormones, adrenaline, thyroxine and insulin, and the ergot poison, ergotamine, were practically without influence. A. W. Dox

**The problem of the specific action of tyrosinase.** EMIL ABDERHALDEN AND WALTER SCHAIRER. *Fermentforschung* **12**, 329–32(1931).—Previous expts. with exts. of dried champignon [*Agaricus?*] showed that the tyrosinase present was very reactive toward *p* tyrosine, adrenaline and 3,4-dihydroxyphenylalanine, but inert toward *o*- and *m*-tyrosine. The expts. have now been repeated with practically the same results, except that a slight reddish coloration was noted at the surface of the *o* tyrosine and 2-amino-tyrosine solns. The same effects were produced by a tyrosinase prepn. from dried potato peelings. On the other hand, exts. of *Russula delica* gave a pos. reaction with *m*-tyrosine, also with *o* and *m*-cresol. The reaction was neg. with ephetonine, *d*- and *l*-ephedrine and thyroxine. The tyrosine dipeptides, glycyl-*l* tyrosine, *d*- and *l* alanyl-*l*-tyrosine, aminoisobutyryl-, *d* valyl-, *d*- and *l* norleucyl-, *d*- and *l* leucyl-*l* tyrosine and the corresponding haloacyl derivs. all reacted at $p_H$ 6.5 with formation of the characteristic red color. 2,5-Iodo- and 2,5-dibromotyrosine reacted, also *l* tryptophan, while *d*-alanyl-*l*-tryptophan remained colorless. Possibly the pos. result now obtained with *m* tyrosine is due to the presence of an addnl. enzyme. A. W. Dox

The active group of catalase II. KARL ZEILE *Z physiol Chem* 195, 39–48 (1931) cf *C A* 25, 119.—The close relationship between porphyrin Fe content and catalase activity of horse liver ext. is further shown by the constancy of this ratio in preps purified by $Ca_3(PO_4)_2$ adsorption, dialysis, $Al(OH)_3$ adsorption, and $Ca_3(PO_4)_2$ adsorption after 70% inactivation. The same relationship is now shown to hold for catalase preps from plant sources. Expts. with the fungus, *Boletus scaber*, were unsatisfactory because of low enzyme activity and the presence of hemin in some other form which gave the hemochromogen reaction. A suitable source of plant catalase was found in the cotyledons of germinated pumpkin seeds. The max. activity develops between the 3rd and 5th days of germination. These cotyledons yield an ext. with 1/18 the catalase activity of liver ext. The ratio of enzyme to porphyrin Fe as detd. by the hemochromogen spectrum is approx. 8000, about 3 times as high as that of liver ext. The dissocn. const. of the HCN compd. of pumpkin catalase is about 1/3 that of liver catalase. In both enzymes the active group is probably of similar constitution.

A. W. Dox

Activators Z. H. v. EULER AND TORE PHILIPSON *Z physiol Chem* 195, 81–100 (1931). Caffeine, theobromine, xanthine, tryptophan, adenosine, thymidine and hemin in concns. of 1.5 mg. per cc., have no influence on the rate of fermentation, even in the presence of an activator Z prep. Plant material from various sources was examd. for the presence of activator Z but the evidence was very slight except in malt germs where the ext. showed practically the same activity as boiled yeast ext. Z consists of 2 factors which are differentiated by their temp. stability and, like vitamin B, are more sensitive to alkali than to acid. Various pptn. and adsorption reactions were applied with a view to purifying the Z factors. A concd. yeast dialyzate was freed from certain impurities by treatment with $Pb(OAc)_2$ and $Hg(OAc)_2$. The filtrate was then used for adsorption expts. Treatment with $AgNO_3$ + $Ba(OH)_2$ removes some of the activity. Picric acid does not ppt. the activator, since the loss of activity is not restored by recombining the ppt. and filtrate. Addn. of MeAc to 95% gives a ppt. which contains the full activity and about 40% of the inert material is left in the filtrate. $Fe(OH)_3$ gives a ppt. from which the Z activator can be recovered by elution with 1% $KH_2PO_4$, but without the preliminary Pb-Hg treatment the adsorption of activator does not occur. The Fe filtrate does not give up its active substance to charcoal regardless of the $p_H$ of the medium. A good adsorbent is $Ba_3(PO_4)_2$ when this is prepd. in the presence of the activator; otherwise no adsorption is effected. Recovery of the activator from this ppt. cannot be accomplished by elution but requires a decompn. of the phosphate by $H_2SO_4$. $AlPO_4$ has the advantage of insoly. in AcOH and the activator which it adsorbs can be released by AcOH extn. and thus freed from phosphate. $Al(OH)_3$ gives the same adsorption as $Fe(OH)_3$. The activation of yeast by activator preps. reaches a max. beyond which further addn. is ineffectual. Bottom yeast is activated to the same extent by the original dialyzate as by the Fe filtrate; hence it is influenced only by that part of the Z activator which is not adsorbed by $Fe(OH)_3$.

A. W. Dox

The nature of the proteases. VIII. Refractometric studies on the activity of various pepsin preparations. I. A. SMORODINTZEV, A. N. ADOVA AND S. S. DROSDOV *Z physiol Chem* 195, 113–20 (1931), cf *C A* 25, 1268.—The sol. products resulting from digestion of an insol. protein, such as fibrin, increase the $n$ of the medium. By detg. the $n$ of the soln. after enzyme and substrate have reacted under standard conditions it is possible to compare the activity of various pepsin preps. Control expts. with enzyme alone show that the more active preps. have higher $n$ values.

A. W. Dox

Studies on the intermediary metabolism of tryptophan. I. Kynurenine, an intermediary metabolic product of tryptophan. Y. KOTAKE AND J. IWAO *Z physiol Chem* 195, 139–47 (1931).—When tryptophan is injected subcutaneously into rabbits whose metabolism has been lowered by a regime of polished rice, a product intermediate between tryptophan and kynurenic acid is excreted in the urine. The name *kynurenine* is proposed for this substance. If the kynurenine is present in considerable amt. it can be crystd. out directly as sulfate by addn. of $H_2SO_4$ and a little $Et_2O$, but ordinarily its isolation requires a pptn. by phosphotungstic acid or $HgSO_4$ and decompn. of the ppt. by $Ba(OH)_2$ or $H_2S$. Kynurenine is $o$-$H_2NC_6H_4C(CO_2H)$ $CHCH(NH_2)CO_2H$. It m. 190° (decompn.) with previous sintering and darkening, and has $[\alpha]_D^{17}$ −28.5°. It forms a *sulfate* which begins to darken at 165° and becomes black at 180°, and has $[\alpha]_D^{15}$ 10.7°. Esterification by satg. the EtOH soln. with HCl gives a *diethyl ester di HCl salt*. The $\alpha$ $NH_2$ is shown by the ninhydrin reaction, and the double bond in

the side chain by the addn of 2 Br to form a *dibromide*, m 206–7° (decompn), which is the lactone of the aromatic $NH_2$ and the γ-$CO_2H$, and is thus an indole deriv Excretion of kynurenine is accompanied by a decrease in kynurenic acid excretion. On the other hand, when kynurenine is fed to rabbits 20–40% may be recovered as kynurenic acid. II. **The cleavage of kynurenine by means of barium hydroxide.** Y Kotake and M Kiyokawa *Ibid* 147–52.—Kynurenine is very stable to acids and withstands 10 hrs' boiling with 25% $H_2SO_4$. It is very unstable to alkalies, splitting off $NH_3$ and $CO_2$. After boiling with 1% $Ba(OH)_2$ the products isolated were *o-aminoacetophenone* in 70–81% yield (identified as the HCl salt, m 264 5°, the Ac deriv m 75–6°, the mono-Br deriv of the latter, m 157–8°), and kynurenic acid. The reaction is best explained by the intermediate formation of *o-aminobenzoylpyruvic acid* which on the one hand would yield *o*-$H_2NC_6H_4Ac$ and $C_2H_2O_4$ by hydrolysis, and on the other hand kynurenic acid by enolization and ring closure to the quinoline structure. These products of hydrolysis furnish further proof of the structure of kynurenine (see above). III. **The cleavage of kynurenine by means of sodium bicarbonate solution.** Y Kotake and G Shichiri *Ibid* 152–8.—When refluxed with 2% $NaHCO_3$ kynurenine splits of $NH_3$ and the soln becomes canary yellow, then orange yellow and soon shows fluorescence. Some *o*-$H_2NC_6H_4Ac$ is formed, but much less than in the cleavage by $Ba(OH)_2$. After removal of this by $Et_2O$ extn., the orange yellow product may be obtained from the mother liquor by acidifying and again extg with $Et_2O$. The substance crystallizes on evapn of the $Et_2O$ but is unstable to air light and heat. Its m. p. varies considerably with different prepns., hence the substance is probably not pure. Further treatment with $NaHCO_3$ or $Ba(OH)_2$ yields $H_2NC_6H_4Ac$ but no $NH_3$. When treated with warm water part of the substance dissolves and part forms an oil. A soln. of the latter in $Et_2O$ shows an intense blue fluorescence and yields yellow crystals of *kynurenine yellow*, m 182°, an unstable substance closely related to kynurenic acid. The orange yellow product obtained from kynurenine by $NaHCO_3$ cleavage probably consists mainly of *o-aminobenzoylpyruvic acid*, a part of which appears to be present in a condensation form. Kynurenine gives a blue color reaction when its aq. soln. is treated with $PhNHNH_2$.HCl and $NaHCO_3$, the mixt. heated to boiling, then cooled and treated with concd $H_2SO_4$. IV. **The mechanism of kynurenic acid formation in the organism.** Y Kotake *Ibid* 158–66.—The discovery of kynurenine as an intermediate in the metabolism of tryptophan to kynurenic acid, and the elaboration of its structural formula, furnishes an important link in the chain of reactions involved in the breakdown of tryptophan. The successive reactions are now believed to occur as follows: (1) tryptophan is oxidized to its Py α hydroxy deriv., (2) the pyrrole ring is opened by hydrolysis to γ *o* aminophenylglutaric acid, (3) removal of 2H from the glutamic acid grouping yields kynurenine, (4) $CO_2$ and $NH_3$ are removed by oxidation, yielding *o*-aminobenzoylpyruvic acid, (5) the tautomeric form of the latter closes to a quinoline ring with formation of kynurenic acid. V. **The formation of kynurenic acid from kynurenine by microörganisms.** G Shichiri and M Kiyokawa *Ibid* 166–71.—Synthetic culture media to which kynurenine had been added as the source of N were inoculated with *Oidium lactis* and *Willia anomala* and incubated for 17 and 33–89 days, resp. Both organisms converted part of the kynurenine into kynurenic acid, which was isolated and identified by m. p. and by analysis of the Ba salt. From the mold culture a small quantity of a substance m 122° was obtained by $Et_2O$ extn.; it was probably anthranilic acid. The yeast culture contained a colored substance possessing the general properties of urochromogen. A medium contg. α,γ quinolinedicarboxylic acid gave a good growth of mold but no kynurenic acid. From kynurenine the max. yield of kynurenic acid was 60%. The cleavage of kynurenine by yeast is essentially the same as that by the animal organism, and supports the view that the formation of kynurenic acid and urochrome from tryptophan in the animal organism occurs via kynurenine. VI. **The excretion of kynurenic acid in the bile and its stability in the organism.** Y Kotake and K. Ichihara *Ibid* 171–9.—The path of excretion of the kynurenic acid formed in the organism from tryptophan varies with different animals. With dogs the excretion is often greater in the bile than in the urine, while with rabbits the excretion is entirely in the urine. This explains the variable results reported on dogs where only the urine was examd. Kynurenic acid, after subcutaneous injection as the Na salt, is excreted in both bile and urine by rabbits as well as dogs. It is not utilized by the organism, but is eliminated quantitatively, although only slowly after large doses. Kynurenic acid is not an intermediary product but an end product of tryptophan metabolism. VII. **The site of formation of kynurenic acid in the organism.** K Ichihara, S Otani and J Tsujimoto (with collaboration of Y Okagawa and T. Kiyomatsu). *Ibid*

179 84 Tryptophan was administered subcutaneously to dogs that had been hepatectomized after connecting the portal vein to the vena cava by means of a cannula. The animals lived 9 5 and 12 5 hrs , resp , at the end of which time the blood and urine were examd for kynurenic acid The results were neg A perfusion expt. in which defibrinated blood contg kynurenine was passed 18 times through the isolated liver gave an 18% yield of kynurenic acid In a control expt without kynurenine no kynurenic acid was obtained It is evident that conversion of kynurenine into kynurenic acid occurs in the liver The excretion of kynurenic acid is increased by extirpation of the spleen VIII The question of the origin of urochrome. Y. Kotake and H Sakata (with collaboration of Y Shirabe and S Otani) *Ibid* 184-91 — After ingestion of 3 g of tryptophan the urochrome content of the alloxyproteic acid fraction of the urine as detd colorimetrically, nearly doubled The Ba and Ca salts prepd from this fraction were easily sol in $H_2O$ and gave the Pauly diazo and the PbS reactions but neither the biuret nor the Ehrlich diazo reaction The N content of the urochrome fraction varied with the intensity of the color When kynurenine instead of tryptophan was administered the Ehrlich reaction became pos The urine then had a greenish color which became yellow on standing in the air The urochromogen or urochrome is formed from tryptophan by way of kynurenine Oral administration of tryptophan to a patient with pulmonary phthisis gave a marked increase in diazo and urochrome values of the urine IX. The effect of tryptophan on experimental anemia and its relation to the spleen. Y Okagawa and M. Tatsui *Ibid* 192 202 —The recovery from exptl anemia produced in dogs by injection of Ph $NHNH_2$ HCl is somewhat more rapid as detd by erythrocyte count and hemoglobin content of the blood if the animals are given injections of tryptophan every 2 days If the anemia is produced 25-45 days after removal of the spleen recovery is less rapid and is not accelerated by the tryptophan treatment. One year after splenectomy the tryptophan treatment is somewhat more effective in curing exptl anemia The spleen appears to play some role in the utilization of tryptophan for purposes of blood building The liver contains somewhat more tryptophan than the kidney The amts. present undergo practically no change within 40 days after extirpation of the spleen, but after a longer period the tryptophan content of the liver increases This compensation of spleen function also supports the view that tryptophan can serve as building material for hemoglobin formation X. *dl*-Indolelactic acid and its use in nutrition. K Ichihara and N Iwakura *Ibid* 202-7 —The indolelactic acid used by Jackson (*C A* 21, 3079) with neg results as a substitute for tryptophan in feeding expts was not the *dl* form as J supposed but the *l* form as indicated by m p The *dl*-acid prepd by autoclaving the *l* acid with $Ba(OH)_2$ until optically inactive, and tested by mixed m p with synthetic *dl* acid obtained by reduction of indolepyruvic acid, gives positive results with rabbits The acid recovered from the urine was mainly the *l* form, showing that the *d* acid was actually utilized Feeding expts with rats showed that a loss in wt. occurred when the animals received a tryptophan free ration consisting of hydrolyzed casein, cystine tyrosine starch, sugar, salt and agar When this ration was supplemented by *dl* indolelactic acid the animals more than made up the loss. Indolepyruvic acid and *l* indolelactic acid were ineffectual as substitutes for tryptophan. XI. The effect of methyltryptophan on artificial anemia and nutrition. Z Matsuoka and T Nakao *Ibid* 208-14 —As measured by increase in erythrocyte count and hemoglobin content and decrease in reticulocytes the recovery of guinea pigs from exptl. anemia is more rapid with $\alpha$ methyltryptophan than with tryptophan administered subcutaneously On the other hand the feeding of $\alpha$ methyltryptophan to rats does not compensate a dietary deficiency in tryptophan The action of methyltryptophan, and probably that of tryptophan in curing exptl anemia is independent of their nutritional value

A. W Dox

The chemical nature of urease. Ernst Waldschmidt Leitz and Felix Steiger walt *Z physiol Chem* 195, 260-6(1931) —The protein character of cryst. urease brings up the question whether the enzyme is actually a protein or whether the protein is merely a carrier which stabilizes the enzyme The effect of activators such as amino acids and HCN is to overcome the inhibitory effect of accessory substances, since the activation is observed only with crude enzyme and not with purified or cryst. prepns The protein is not an essential component of urease, as shown by the fact that proteolysis by pancreatic ext , trypsin or papain HCN to the point where sulfosalicylic acid no longer gives a ppt does not diminish the activity of the enzyme Hydrolytic products resulting from the breakdown of this protein function equally well as carriers of the urease activity The protein may even be only an accessory concomitant of the pure enzyme

A. W Dox

The intermediary metabolism of histidine. III. S Edlbacher and J. Kraus *Z physiol Chem* 195, 267–72(1931), cf *C A* 25, 118.—In the enzymic cleavage of histidine, previously reported, the products isolated were glutamic acid, $HCO_2H$ and $2NH_3$. The method of isolation, however, involved the use of NaOH and HCl, and the possibility remains that the end products were thus formed from an unknown intermediate. Kauffmann and Mirlowitzer (*C A* 25, 307) have since shown that the use of $Na_2CO_3$ instead of NaOH yields only $1NH_3$. This observation is now confirmed by E. and K. The possible intermediates glutamine and $HCONH_2$ show the same difference in behavior toward $Na_2CO_3$ and NaOH. Both differ, however, from the histidine intermediate in that the former is hydrolyzed by dil. HCl while the latter is not. In the progress of the enzymic cleavage of histidine the ratio of $NH_3$ liberated by $Na_2CO_3$ to that liberated by NaOH decreases from 0.83 after 2 hrs. to 0.58 after 24 hrs., where it then remains const. The first attack of the enzyme breaks open the imidazole ring and liberates $1NH_3$. The product is probably an amide which is hydrolyzed by NaOH but is resistant to HCl. Whether a further breakdown is due to enzymic action or to a spontaneous decomposition has not as yet been detd. A. W. Dox

An easily cleavable phosphoric acid compound in yeast. Hans v. Euler and Ragnar Nilsson *Z physiol Chem* 195, 273–6(1931).—Ext. of dried yeast after removal of protein by $CCl_3CO_2H$, contains a substance from which $H_3PO_4$ is not ppted by magnesia mixt. and $NH_4OH$ but which gradually forms a ppt. with Embden's reagent. The $H_3PO_4$ is thus easily split off. The amt. of this complex rapidly diminishes during the first few hrs., but less rapidly in the presence of added Na hexosediphosphate. In the presence of $H_3PO_4$ it increases while the $H_3PO_4$ disappears within 2 hrs. then the amt. rapidly decreases. Addn. of creatin retards this synthesis. A. W. Dox

Pepsin. Preliminary paper. Heinz Herter *Z. physiol. Chem.* 196, 1–9 (1931).—The early stages of peptic digestion were studied by measuring the changes in viscosity of a 3% casein soln. at *p*H 2.3 and 30°. Dil. pepsin solns. were used in order to prolong the initial stage and make possible a greater no. of observations. The viscosity, as measured by timing the flow through a viscometer, decreases in the very first phase of the digestion and soon reaches a min., after which it rapidly increases and attains a sharp max., which is a multiple of the original value. This stage marks the coagulation of the entire casein soln. As the digestion proceeds there occurs a sepn. of phosphopeptone, and with increasing d. of the floccules the viscosity again decreases. The peptic cleavage was followed by means of the Linderström Lang acid titration in acetone. The initial digestion stage in which viscosity decreases was studied in particular. Viscosity change is not a simple function of cleavage but varies with the nature of the peptide linkages broken. The ratio between cleavage and viscosity is different for different pepsin preps. but const. for one and the same prepn. The curve can serve for characterization of a pepsin digestion just as the location of *p*H optimum toward definite substrates distinguishes different proteolytic enzymes. Studies were made of different pepsin preps., including Northrop's crystd. pepsin and fractions obtained by adsorption on $Al(OH)_3$. The sep. fractions give different curves, but when they are recombined the original curve is again obtained. Even the crystd. pepsin is amenable to fractionation. Peptic action is therefore not a simple phenomenon, and the variations noted must be due to differences in the enzyme itself. A. W. Dox

The physiological actions of cozymase. Sven Gard *Z. physiol. Chem.* 196, 65–70(1931).—Injection of cozymase into the jugular vein of rabbits under urethan narcosis causes a lowering of blood pressure. This effect is independent of the specific action of cozymase, since inactivation by heating does not diminish it. Pure adenylic acid of yeast is somewhat more active in this respect, possibly because of the fact that cozymase is not an entirely pure adenylic acid. Adenylthiomethylpentose has about the same effect. Introduction of the thiomethyl group into the adenosine mol. apparently does not diminish this special action. In the surviving rabbit heart, on the other hand, cozymase injection is followed by a considerable increase in activity, perhaps on account of dilation of the coronary vessels. Here also there is no difference in effect between active and inactive cozymase. The action of cozymase in lowering the blood pressure is a non-specific effect of adenylic acid or homologous adenosine derivs., which corresponds to that observed by Zipf with muscle adenylic acid. A. W. Dox

Cytochrome. R. Bierich and A. Rosenbohm *Z physiol Chem* 196, 87–8 (1931).—The discrepancy pointed out by Shibata and Tamiya (*C. A.* 24, 3523) between his results and those of B. and R. (*C A* 24, 133) with regard to the influence of KCN in preventing the disappearance of the cytochrome band by oxidation is due to the fact that the cytochrome in the first instance was of vegetable origin (yeast) while in

the 2nd it was of animal origin (rat testes) In animal tissues the B component is oxidized in the presence of KCN while the C and A components remain reduced
A. W. Dox

**The absorption of ultra-violet light by amino acids (fragments of proteins).** H. Guthmann, K. Schwerin and F. Stähler. *Strahlentherapie* 39, 401–41(1931).—In synthetic mixts. of the amino acids corresponding in compn. to albumin, globulin and fibrin 2 absorption maxima are present, at 300$\mu\mu$ and 250$\mu\mu$, which are the specific bands for the action of the ultra violet rays on the skin Tyrosine, phenylalanine and glutamic acid are the substances which absorb the ultra violet rays very powerfully In substances of the propionic acid series (propionic acid, alanine, phenylalanine, tyrosine, histidine and tryptophan) the influence of various groups on the absorption power is entirely independent of the mol. wt., but depends on the stereochem. structure of the mol. The most powerful in this respect is the aldehyde group, the activity decreases in the order $NH_2$ $CO_2H$ OH
F. R. Greenbaum

**The biologic action of Röntgen rays. Action of Röntgen rays on the potassium and calcium in the blood serum of man.** G. Schaal, M. A. Gruschetzkaya and E. J. Zwilichowskaya. *Strahlentherapie* 40, 111–23(1931).—Röntgen rays caused a change in the quotient K/Ca in the human blood serum The direction of this change seems to depend upon the time interval between irradiation and blood examn. After the first day of the radiation the K seems to be increased but later on the Ca seems to be increased This may account for the following phenomena fluctuation of a no. of leucocytes analgesic action early reactions and poisoning due to Röntgen treatment.
F. R. Greenbaum

**Biologic investigations on the transparency of gypsum and mica to ultra-violet.** Tomoshige Takagi. *Strahlentherapie* 40, 189–92(1931).—Light from a Hg arc lamp which has passed through natural plates of gypsum is very active on blood agar plates as well as on the human skin light filtered through mica was without action
F. R. Greenbaum

**Effect of hydrogen-ion concentration upon the precipitation of certain basic substances by phosphotungstic acid.** Rudolf A. Peters. *Biochem. J.* 24, 1852–5 (1930).—With most bases the pptn. appears upon passing from a more alk. to a less alk. soln. with guanidine compds., this is reversed
Benjamin Harrow

**Inhibition of esterases by excess substrate.** David R. P. Murray. *Biochem. J.* 24, 1890–6(1930).—Haldane's suggestion ("Enzymes," p. 84(1930); cf. *C. A.* 25, 720), that the inhibition of certain enzymes by excess of substrate is due to the formation of a non-hydrolyzable complex of the enzyme with 2 mols. of the substrate, has been tested for the esterase of sheep liver and found to explain the facts
Benjamin Harrow

**Crystalline urease: a review.** Henry Tauber. *J. Am. Inst. Homeopathy* 24, 66–8(1931).—The literature on urease is reviewed A bibliography is given.
Joseph S. Hepburn

**Prothrombase: its preparation and properties.** John Mellanby. *Proc. Roy. Soc.* (London) B107, 271–85(1930).—Prothrombase is prepd. from oxalated mammalian serum by (1) pptn. of its globulin complex at $p_H$ 5.3 after dilu. with 10 vols. of $H_2O$, (2) extn. from this complex with a dil. soln. of $Ca(HCO_3)_2$ and (3) pptn. from the resulting soln. by addn. of acid to $p_H$ 5.3 Approx. 40 mg. prothrombase results from 100 cc. plasma, as a rule, 1 mg. of the prepn., after its conversion into thrombase, coagulates 100 cc. plasma in 20 sec. Prothrombase is a white amorphous powder giving the characteristic reactions of acid metaprotein, it is insol. in $H_2O$, readily sol. in dil. alkali and not dialyzable through a collodion membrane Heating at a temp. of 100° for 5 min. does not destroy prothrombase, but diminishes the rate at which it may be activated. Activation is produced by addn. of thrombokinase, is initially slow and proceeds with a rapidly increasing velocity, is influenced by the reaction of the medium and the temp., is accelerated greatly by the presence of small quantities of Ca or Sr and slightly by Ba or Mg
Joseph S. Hepburn

**Porphyrin of component *c* of cytochrome and its relationship to other porphyrins.** R. Hill and D. Keilin. *Proc. Roy. Soc.* (London) B107, 286–92(1930).—Unmodified cytochrome *c* of bakers' yeast yields 2 different porphyrins The *one* porphyrin, obtained by the action of HBr and AcOH, is indistinguishable from hematoporphyrin having the following properties of the latter (1) soly. in $Et_2O$ and AcOH, (2) absorption spectra in $Et_2O$ and in HCl, (3) combination with Fe, various compds. of N, and globin to form hemochromogens or hemoglobins, (4) conversion into protoporphyrin by (*a*) heating *in vacuo*, or (*b*) heating the corresponding hematohematin *in vacuo*, or (*c*) heating the hematohematin in AcOH in a sealed tube The *other* porphyrin results from the action of HCl in the presence of a reducing agent such as $SO_2$, it is insol. in

dextrin in which the I reaction was yellow, and kept for 10 days at 20° and $p_H$ 6.2. The soln. gives a violet blue color reaction for I-IK. From the soln. the synthesized dextrin was pptd. It was proved by the reactions, the soly., the viscosity and mol. wt. to be a polymerized dextrin. The existence of amylocoagulase in the malt ext. could not be verified. But coagulation of starch by the yeast ext. was found at any concn. Amylocoagulase and amylosynthease exist in the yeast ext. Sol. starch was hydrolyzed as much as possible by malt amylase and then the yeast ext. was added. The I reaction became violet after 18 days. The synthesized dextrin was pptd. by alc. The hydrolysis of the synthesized dextrin by amylase was like that of starch.

Y. Kihara

Proteins of wool. II. Michio Saito. *J. Agr. Chem. Soc. Japan* 6, 1109–24 (1930).—The wool was treated with 1% HCl under 5 atm. pressure for 5 hrs. Ninety % of the solid matter was dissolved. By fractional pptn. 6 albumoses and a peptone were obtained. These are compared.

Y. Kihara

Glucuronic acid fermentation. Teizo Takahashi and Toshinobu Asai. *J. Agr. Chem. Soc. Japan* 7, 1–5(1931).—By the fermentative action of *Bact. industrium* var. Hoshigaki on a medium consisting of 1 l. yeast ext., 100 g. glucose and 25 g. $CaCO_3$ for 30 days, 35 g. Ca hydroxygluconate was obtained. From the filtrate 20 g. Ca gluconate was obtained. By the addn. of MeOH to the filtrate of Ca gluconate, 20 g. Ca glucuronate was pptd. Ca glucuronate was proved by the color reactions, sp. rotation of the free acid ($[\alpha]_D^{23} = -18.5°$) and Ca salt ($[\alpha]_D^{23} = -24.0°$), phenyl-osazone, m. 131–2°, *p*-nitrophenylhydrazone, m. 209–10°, Ba salt of *p*-bromophenyl-osazone, m. 204–7°, and brucine salt, m. 178–9°. From the fermentation products of *Bact. industrium* var. Hoshigaki on a medium of yeast ext. and Ca gluconate, 5 g. Ca glucuronate was obtained. The bacteria produce glucuronic acid and hydroxygluconic acid not only from glucose, but also from gluconic acid.

Y. Kihara

Amylase from wheat. Dattatreya V. Karmarkar and Vinayak N. Patwardhan. *J. Indian Inst. Sci.* 13A, 159–64(1930).—The amylase from wheat is more active than that from barley. Its optimum temp. is 49–58°, $p_H$ 4.6. Heating the dry enzyme at 160° for 1 hr. destroys its activity, which is not regenerated by adding salts or amino acids. Inactivation results on prolonged dialysis through collodion bags or in the presence of pepsin. Neutral salts and amino acids are without influence.

Mary E. Lear

Isolation of protein crystals possessing tryptic activity. John H. Northrop and M. Kunitz. *Science* 73, 202–3(1931).—A cryst. protein has been isolated from a corn prepn. of "trypsin" which digests casein and gelatin in neutral solns. The digestive power of the crystals is about 10 times that of the most active corn preps. The activity remains const. through 3 successive crystns. The substance is unstable and may become less active during its prepn. unless proper care is exercised. The process of prepn. of the substance is briefly outlined.

B. S. Levine

The action of blood on acetylcholine. K. Matthes. *J. Physiol.* 70, 338–48 (1930).—The destruction of acetylcholine by blood is due to the action of an esterase, which is specifically inhibited by eserine and also by fluorides.

J. F. Lyman

The inactivation of histamine. C. H. Best and E. W. McHenry. *J. Physiol.* 70, 349–72(1930).—The destructive agent, which is in highest concn. among the tissues of the dog in kidney and intestine, appears to have the properties of an enzyme; the name *histaminase* is suggested. Histamine seems to be destroyed by it through a change involving rupture of the imidazole ring.

J. F. Lyman

A physicochemical theory of the action of substances on living matter. P. Lazarev. *J. chim. phys.* 28, 42–8(1931).—It is assumed that the functions of a cell depend on the concn. of the material introduced $C_0$, and that the sensibility $E$ can be expressed in such measurable quantities as rate of oxygen consumption, speed of nervous reaction, etc. The equation $E = E_0 + E_1 \beta C_0(1 - e^{-\alpha t})$ is derived to show the sensibility of the cell at time $t$, where $\beta$ is the ratio of the diffusion rate into the cell to the rate out of the cell, the latter being $\alpha$. The equation is applied to the action of $Et_2O$ on assimilation by chlorophyll and to the action on the nervous centers of substances introduced into the blood.

J. G. McNally

The action of monochromatic light. Guido Guerrini. *Boll. soc. ital. biol. sper.* 5, 1098–1100(1930); cf. *C. A.* 25, 534.—The action of light filtered through colored plates on *S. cerevisiae* in the presence of glucose was studied. The amt. of $CO_2$ liberated as a function of time was max. for light filtered through red plates; slightly less for light filtered through yellow plates, still less for light filtered through green plates, and nothing or almost nothing for light filtered through blue plates. Light rays of long

wave length therefore stimulate the action of *S cerevisiae* in the presence of glucose PETER MASUCCI

Alcoholic fermentation in liver. VIRGILIO MARTINI *Boll soc. ital. biol sper.* 5, 1172–5(1930).—Liver pulp, strongly acidified with HCl (0.6–0.7%) and incubated at 37°, undergoes alc. fermentation with the formation of $CO_2$ and EtOH. The fermentation is caused by some thermolabile factor PETER MASUCCI

Precipitation of animal proteins. GEORG GRASSER *J. Faculty Agr. Hokkaido Imp. Univ.* 27, Pt. II, 227–42(1930).—The behavior of solns. of gelatin and egg albumin with a large no. of phenols, naphthols, aldehydes and inorg. salts is tabulated. H. B. MERRILL

Electrokinetic phenomena. III. The "isoelectric point" of normal and sensitized mammalian erythrocytes. HAROLD A. ABRAMSON *J. Gen. Physiol.* 14, 163–77 (1930); cf. *C. A.* 24, 5568.—Published isoelec. points of certain mammalian erythrocytes derived from studies of electrophoretic mobilities are the result of equil. incidental to erythrocyte destruction. This is a study of the mobilities of washed sheep and human erythrocytes in 0.85% NaCl soln. at $p_H$ 3.6 to 7.4 made in 2 min. after prepn. of the suspensions. Under these conditions reversal of the sign of elec. charge did not occur, it occurred only after time had elapsed for the adsorption of the products of red cell destruction. Mobility changes little with decrease of $p_H$. The reversal of the sign of the charge occurs in the presence of normal and immune (anti-sheep) rabbit sera. The isoelec. point detd. under these conditions is apparently not specifically connected with the immune body but may be incidental to red cell destruction and the presence of serum. The characteristic lowering of mobility by amboceptor, however, occurs from $p_H$ 4.0 to 7.4. The identity of the isoelec. points for normal and sensitized sheep cells is apparently not concerned with the immune reaction. Red cells are probably not covered with a film of albumin or globulin. Serum protein reacts with red cells in acid soln. whereas gelatin does not. Lowering of mobility, usually ascribed to anti sheep rabbit serum, may also occur, but to lesser degree, in normal rabbit serum. This diminution of mobility is not assocd. with sensitization to hemolysis induced by complement. Only a very small part of the surface of the red cell need be changed to obtain complete hemolysis in the presence of complement. C. H. RICHARDSON

The kinetics of penetration. III. Equations for the exchange of ions. W. J. V. OSTERHOUT *J. Gen. Physiol.* 14, 277–84(1930); cf. *C. A.* 24, 5318.—This is a preliminary attempt to outline the math. treatment of an exchange of ions between the interior of a living cell and the external soln. C. H. RICHARDSON

The reversion of protein hydrolysis. A. SARLUY. *Arch. néerland. physiol.* 16, 136–44(1931).—*The idea of Wasteneys and Borsook that such simple aromatic compds.* as benzene, toluene, xylene, benzoic acid or benzaldehyde when added to peptic protein hydrolyzates synthesize proteins is not held by S. It is his belief that the addn. of BzH to these hydrolyzates forms Schiff's base and that the addn. of benzene, toluene and xylene is merely an adsorption phenomenon. M. H. SOULE

The action of muscle phosphatase, cozymase and insulin. J. BODNÁR AND B. TANKÓ *Magyar Orvosi Arch.* 31, 105–31(1930); cf. *C. A.* 25, 1889.—The amt. of esterified phosphoric acid increases remarkably if the phosphate concn. is increased. 0.25 g. muscle powder (prepd. by Euler's method, from pigeon breast) esterified in max. 11.42 mg. $P_2O_5$ (4.57%). The original muscle powder is not affected by boiled muscle juice. Muscle powder washed with $H_2O$ at room temp. inhibits considerable of its activity, which is due to the want of cozymase, since the boiled juice increases the phosphoration of the washed powder in the presence of higher phosphate concn. Washed muscle powder esterified 0.63%, washed muscle-powder plus boiled muscle juice 2.03% $P_2O_5$. The boiled muscle juice not only increases the esterification of the washed muscle powder but it has the power of counteracting the lowering of the optimum caused by the injury of the phosphatase. Boiled yeast juice also has the power of reactivating the esterification of the washed muscle powder. Fresh muscle paste loses its activity in a few hours, but the dry powder keeps rather long. In 5 weeks only 20% of its activity is lost. Insulin has no effect on the power of phosphoration either in fresh muscle paste or in muscle powder. H. TAUBER

Thermal disaggregation of gelatin (GERNGROSS, *et al.*) 2. Chemical decomposition by radiation (HARKER) 3. A new physicochemical explanation of the formation of humus, peat and coal. The significance of biological factors in these processes (ZOLCINSKI) 8. Some relations between constitution and odor (ANGELI) 10.

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NEEDHAM JOSEPH A Chart to Illustrate the History of Biochemistry and Physiology Cambridge, Eng the author 2 charts Paper, 10s. 6d Reviewed in *J Am Med Assoc* 96, 1100(1931)

Vegetable albumins HENRI A BEAUFOUR Fr 695,233, Aug 30, 1929 Colloidal solns of the albumins are treated in a salt medium by dialysis and ultrafiltration in 2 successive phases The 1st phase consists in the use of the phenomenon of dialysis and osmosis or electrodialysis and electro osmosis an ultrafilter membrane of medium porosity is used as dialyzing membrane Between the 2 phases a large part of the albumin is sepd by hypercentrifugation this process depends on the change of mol state provoked by the dialysis Cf *C A* 24, 5951

Enzymes. ALBERT R BOIDIN and IVAN A EFFRONT Fr 37,420, May 23, 1929 Addn to 670,099 (*C A* 24, 2007) The $p_H$ of worts fermented to obtain proteolytic enzymes of high power is corrected during this fermentation as often as necessary by the addn of compds of alk., acid or amphoteric reaction

Enzymes I G FARBENIND A G Ger 515,931, Feb 18, 1928 Enzymes are prepd by treating the starting material such as milk, latex, etc., with proteases of $p_H$ about 7, sepg the coagulation product and isolating the enzymes therein in the usual manner Cf *C A* 24, 4186

## B—METHODS AND APPARATUS

STANLEY R BENEDICT

A simplified method for quantitative tissue culture in vitro. MACHTELD SANO AND LAWRENCE W SMITH *Proc Soc Exptl Biol Med* 28, 282–4(1930).—The tissue is grown in media contained in a special chamber consisting of a Pyrex glass ring 3 in in diam., 5–6 mm high with parallel flat ground surfaces, 2–3 mm in thickness. Thin sheets of mica 3½ in. in diam form the top and bottom of the chamber, they are held in place by rims of petrolatum The chamber is kept in a 4 in Petri dish The method permits the examn of the growing tissue with high power microscopic objectives quant growth is possible and the tissues may be fixed and stained without distortion

C V. BAILEY

Micro method for the determination of cystine in proteins. A D MARENZI *Compt rend soc biol* 104, 405–7(1930).—See *C A* 24, 5049 E J C.

The methylene-blue staining of yeast cells and studies on the permeability of the yeast-cell membrane I HERMANN FINK. *Z physiol Chem* 195, 215–40(1931), cf *C A* 24, 4384.—A crit. study was made of the methylene-blue staining method commonly employed for distinguishing between living and dead yeast cells, and also a study of the permeability of the cell membrane Both the quantity of dye taken up by the yeast and the no of cells stained depend on the $p_H$ For one and the same yeast quite different values may be obtained for the no of "dead" cells according to whether the yeast is taken directly from the fermented substrate or given a subsequent treatment with tap water The influence of salts on the methylene-blue staining is still more important In distd water the no of stainable cells rapidly increases while in tap water it remains practically const during the same period of time This difference becomes enormous when sugar is also present. In a few min as many as 98% of the cells in the salt free sugar soln are stained deep blue, while in tap water the presence of sugar has little influence This result is not to be interpreted in the sense of the methylene blue method as the death of the cells, but must be considered from the standpoint of a change in permeability of the cell membrane By the brief sojourn in an electrolyte free sugar soln the cells or their membranes are so altered that the methylene blue can penetrate These cells thus prepd for the reception of dye and easily stained deep blue are sound and capable of proliferation They are not killed until the dye has actually penetrated The predisposition to reception of dye can be completely removed again by a small addn of salt. The same phenomena are evoked equally by glucose, fructose, sucrose and galactose maltose is somewhat less effective They are more pronounced with brewer's yeast than with baker's yeast. The results were confirmed and extended in eudiometer expts In electrolyte-free mixts the fermentation velocity was less than in the presence of salts If methylene blue was also present in the system the fermentation was strongly inhibited. This inhibition is almost completely overcome by salts, the activity of their ions following essentially the order of the Hofmeister series

A W. DOX

The microdetection of alkaloids G D LANDER. *Am J. Pharm* 103, 100–3 (1931).—See *C A* 24, 5048

W. G GAESSLER

Studies on the specificity of Asher's method for testing thyroid gland function by oxygen want. LEON ASHER AND HANS WAGNER. *Z ges exptl Med* 68, 32–81(1929) F. L. DUNN

The chemical detection of adrenaline in the blood. G VIALE *Boll. soc. ital. biol sper* 5, 1163–7(1930).—To 1 cc of blood add 1 cc of satd $HgCl_2$ acidified with traces of HCl ($p_H \approx 6$) Filter, add to the filtrate a few drops of satd. sulfanilic acid and satd $KIO_3$ soln., boil The soln develops a rose color The reaction is always pos with blood, occasionally with lymph neg with cerebrospinal fluid The reaction is not given by urea, uric acid, tyrosine, tryptophan, indole, cholesterol, ephetonine, nor by the products of acid hydrolysis of egg white Animal expts indicate that the reaction is given by adrenaline Since the blood of dogs deprived of the suprarenal capsules also gave a pos reaction, the hypothesis is advanced that the reaction is also given by precursors of adrenaline, substances contg the pyrocatechin group. The reaction may be used as an index of the amt. of adrenaline in the blood, by estg the quantity colorimetrically It is sensitive in a dilu of 1 to 30 million PETER MASUCCI

Preferred methods for the clinical determination of glucemia. LUIGI PINELLI AND ATTILIO CORBIA *Biochim terap sper* 18, 19–33(1931).—The methods of Folin-Thivolle, Hagedorn, Hartmann-Schaeffer, Ionesco-Matiu and Bertrand-Silvestri are described and the results compared Generally the methods based on the reduction of Fe salts give higher results than the Cu methods. The av figures for normal persons by the method of Folin are 0.085, by Hagedorn 0.135, Ionesco 0.162, Schaeffer 0.076 and Bertrand 0.085%. The av in diseases was 0.088, 0.105, 0.157, 0.085 and 0.094, resp The Ionesco method gave in some cases results 4 times as high as those by the Folin method A. E. MEYER

Estimation of Fe in biological material (HILL) 7.

OSGOOD, EDWIN E., AND HASKINS, HOWARD D Laboratory Diagnosis. Philadelphia P. Blakiston's Son & Co. $5

Determination of albumin according to Esbach. J. VÁSÁRHELYI Hun. 101,531, Dec. 21, 1929 Esbach tubes that can be used in centrifuges are specified They reduce the time required for the detn to a few min. instead of 24 hrs.

## C—BACTERIOLOGY

CHARLES B. MORREY

Microbic dissociation with reference to the attenuated tubercle bacillus of Calmette and Guerin (B. C. G.). R. S. BEGBIE *Edinburgh Med. J.* 38, 174–82(1931).—Evidence is presented for the dissocn of B. C. G. into intermediate, rough and smooth types. By guinea pig inoculation the virulence is found to increase in the order named A fresh culture of B. C. G. on glycerol bile potato medium is less virulent than a subculture on Dorset's egg medium RACHEL BROWN

Experimental and applied studies in electrosterilization. I. LOUIS I. GROSSMAN AND J. L. T. APPLETON, JR. *Dental Cosmos* 73, 147–60(1931).—With oral bacteria and a clinically tolerated dosage of current (30 ma.-min.), greater antibacterial effect was uniformly obtained from an electrolyzed soln than from the same soln. without electrolysis. The antibacterial effect always was greater at the anode $ZnI_2$ was more efficient than KI Of approx. 50 solns. tested, the greatest antibacterial effect compatible with tissue tolerance was given by 1 *M* $ZnI_2$ in 0.1 *M* I; this soln had no greater irritant action than 0.85% NaCl soln. The action exerted was bactericidal and due directly to the action of the electrolyzed compd., and not to a change in the reaction of the medium II. Relative antibacterial effects of different electrodes used in electrosterilization. *Ibid* 230–3.—The antibacterial effect depended upon both the electrode and the electrolyte With NaCl as the electrolyte, a Zn electrode gave a greater antibacterial effect than an Ir-Pt electrode. With either $ZnCl_2$ or $ZnI_2 + I_2$, both types of electrode gave similar results As electrode material Wipla steel was more efficient than Pt, less efficient than Zn Both Zn and Zn-coated electrodes were slightly corroded by 1 *M* $ZnI_2$ in 0.1 *M* I, while an Ir-Pt electrode was unaffected III. Single- and multiple-electrode studies. *Ibid* 370–3.—The antibacterial effect from a single electrode is greater than that from each of the 2 or 3 electrodes constituting a multiple electrode Each constituent of a multiple electrode has practically the same effect. JOSEPH S. HEPBURN

Theories of the bacteriophage. JULES BORDET. *Proc. Roy. Soc.* (London) B107, 398–417(1931).—The bacteriophage is not a virus, but its intense action represents

merely the pathol exaggeration of a normal function connected with mutation, the lysis being a transmissible autolysis JOSEPH S HEPBURN

Modification of the Morse-Kopeloff culture of anaerobes. ARAO ITANO AND SACHIO ARAKAWA *J Agr Chem Soc Japan* 6, 998; 8(1930) —A mixt of 0.5–1.0 g pyrogallol and 10–15 cc 10% KOH was put in a Petri dish, and covered by another dish with agar culture medium The dishes were sealed with Toma tape This is a convenient method for the culture of *Clostridium pasterianum* and of thermobacteria at 60–5° Y. KIHARA

The influence of soaps on the germicidal properties of certain mercurial compounds BETTYLEE HAMPIL *Am J Hyg* 13, 623-37(1931) —The presence of Na oleate or a mixt of soaps such as Lux in concn of 1% or over greatly increases the toxicity of $HgCl_2$ to virulent staphylococci at 37°. Smaller quantities of soap gave varying results large amts were no better than 1% Destruction of the bacteria occurred in 5 min The fact that there is no toxicity is not due to increased absorption due to the soap influencing the membrane, for it makes no difference whether the soap and the mercurial are used together or in any order Some other organisms were not affected by the soap and for some its presence was protective Soap increases the action of $HgBr_2$ and $Hg(NO)_2$ in some instances, particularly for *Staph aureus* The toxicity of $Hg(CN)_2$ and *o*-chloromercuriphenol is increased 3 to 4 times by soap G H W LUCAS

Germicidal efficiency of soaps and of mixtures of soaps with sodium hydroxide or with phenols J M SCHAFFER AND P W. TILLEY *J Agr. Research* 41, 737–47 (1930) —Coconut-oil soap is the only common soap with significant germicidal activity at room temp Its activity against most of the organisms tested is comparatively low but in the absence of org matter it manifests a very high germicidal activity against *Pasteurella avicida* and *P. suisseptica* and some strains of hemolytic streptococci In the presence of org matter, however, its activity toward these organisms is relatively low The addn of NaOH to solns. of neutral coconut-oil soap increases the effectiveness of the solns against the various bacteria tested Coconut-oil soap, castor-oil soap or linseed-oil soap when mixed with various phenolic compds. in the proportion of 1 part of soap to 2 parts of phenol considerably increased the germicidal efficiency of the phenols in the absence of org matter In the presence of milk or blood serum such increases were comparatively small Germicidal soaps made by adding cresol, commercial cresylic acid or orthophenylphenol to coconut-oil soap are efficient against *Staphylococcus aureus* even in the presence of milk or blood serum There is no satisfactory explanation of the germicidal activity of soaps, or of their action in enhancing the germicidal activity of phenols W H ROSS

A System of Bacteriology in Relation to Medicine. Vol. VII. Virus Diseases and Bacteriophage. Issued by Medical Research Council at London. New York (551 Fifth Ave) The British Library of Information 509 pp $6 Reviewed in *Am J Pub Health* 21, 462, *Nature* 127, 265(1931)

D'HERELLE, F The Bacteriophage and Its Clinical Applications. Translated by George H Smith London Baillière, Tindall & Cox 254 pp 18s. Reviewed in *J. State Med* 39, 248(1931)

## D—BOTANY

THOMAS G PHILLIPS

Changes in the phosphorus content of growing mung beans. JAMES E WEBSTER AND CLAUDE DALBOM *J Agr Research* 41, 819–24(1930) —A study of the P content of the various aerial organs of the mung bean as the plant grew to maturity shows that the stems and branches have a greater proportion of total inorg P than is found in the leaves. The decrease in total P is much larger than the decrease in ash content There is a relatively small change in the amt. of inorg P in any 1 organ as the plant matures There are indications that the P taken into the plant is metabolized to org forms for storage. Lipoid P constitutes only a small fraction of the green plant and changes little during growth There is only a slight change in the total P content at harvest times, so that differences of 2 or 3 weeks would make only negligible changes in the P feeding value. There is no evidence that P is transferred from the leaves and branches to the stems, and it is assumed that the localization of P follows the normal ash intake and is not the result of metabolic activities. J R. ADAMS

The chemical composition of Ambrosia trifida at successive growth stages. R. B DUSTMAN AND L C. SHRIVER *J. Am Soc Agron* 23, 190–4(1931) —The crude protein, N free ext. and ash content of *Ambrosia trifida* are high well up to the time of

bloom while the fiber is correspondingly low. This plant might be made to yield considerable amts. of forage of high nutritive value because of its leafy nature and the high N content of the leaves. J. R. Adams

Guttation and its relationship to nitrates and other salts in the nutrient medium. A Draghetti *Ann staz sper agr Modena* [N S ], 1, 123–32(1930).—Wheat plants were cultivated on nutrient media contg several salts, and the quantity of liquid obtained by guttation was measured This quantity always reaches a max. in the 4th or 5th day of culture When the nutrient soln contains Ca, Na, $NH_4$ or K nitrates, the guttated liquid gives the nitrate reaction, but when Ba or Sr nitrates are present, the $NO_3$ reaction is not obtained. G A. Bravo

Morphological, biometrical and chemical notes on the cherries cultivated in the Modena Province. G D'Ippolito and E Alberti *Ann staz sper agr Modena* [N S ], 1, 189–202(1930) —The chem analyses of the cherries made by Berard, Fresenius and Richardson are given (without bibliography) and the morphological characters of 11 varieties of cherries (derived from *Cerasus avium* L ) are described. G A. B

Effect of turbulence (of the atmosphere) on the carbon-dioxide exchange in plants. P Lehmann *Fortschritte Landw* 4, 745(1929) —Variations in the $CO_2$ content of the air at short intervals and under varying conditions are recorded The effect of wind velocity, temp and environmental conditions on local changes in the moisture and $CO_2$ contents of air and the resulting influence on the $CO_2$ assimilation of plants, are discussed B C. A

Cyanogenetic glucosides in Australian plants. II. (a) Eremophila maculata. Horace Finnemore and Charles Bertram Cox *J Proc Roy Soc N S Wales* 63, 172–8(1930) —Prunasin (cyanogenetic glucoside) has been isolated from the bark of *Prunus serotina*, and its identity with the glucoside now isolated from *Eremophila maculata* has been confirmed by the mixed m.-p method. (b) Presence of enzymes in fodder plants as a factor in the poisoning of stock. Suzanne K. Reichard. *Ibid* 179–82(1930) —The isolation of sambunigrin and prunasin has afforded the opportunity of testing, by means of these cyanogenetic glucosides, for the presence of enzymes in plants capable of decompg them, and liberating the HCN which they contain. Investigation of *E. maculata* showed that the sample of dried plant employed contained practically no enzyme, and that, therefore, only a trace of HCN was liberated, and, in spite of the presence of an exceptionally large amt. of glucoside, there still remained some doubt whether this plant was poisonous or not. Another plant, *Hetrodendron oleifolium*, recently submitted for examn., similarly contained a large amt. of cyanogenetic glucoside, but insufficient enzyme to give a positive reaction until enzyme from another source had been added. In this particular case it has been recorded by Petrie that only 1/3 the amt. of acid was liberated before the addn of enzyme (emulsin) Some of Petrie's work has been repeated, notably that involving amygdalin and its splitting enzyme β-amygdalase The ease with which prunasin and sambunigrin are decomposed, as compared with amygdalin by the enzymes of plants, is shown, and the significance of the presence of enzymes in fodder plants is illustrated. W. O E.

Membranes of spores and pollen. II. Lycopodium clavatum L. 2. Fritz Zetzsche and Hans Vicari *Helv Chim Acta* 14, 58–62(1931), cf *C. A.* 22, 2949 — The sporenin from lycopodium spores previously described was not free from cellulose and ash The cellulose could not be entirely removed by Schweitzer's cuprammonium reagent Treatment with 85% $H_3PO_4$ gave a cellulose-free product, so did 75% $H_2SO_4$ but some sulfonation took place Ash was reduced to < 0.2% by concd HF Hydroxyl groups were detd. by acetylation. The formula is fixed as $C_{34}H_{52}O_{23}(OH)_{18}$. The yield was 23.8% of the spores. III. 2. Picea orientalis, Pinus silvestris L., Corylus avellana L. *Ibid* 62–7 —Qual. tests on many pollens showed that their hulls or membranes are similar chemically to lycopodium sporenin, and the name *pollenin* is proposed for such compds. Three were isolated by treating the pollen successively with volatile solvents, KOH, $H_3PO_4$ and HF, and their formulas detd. as: *Picea* pollenin, $C_{34}H_{56}O_{23}$. *Pinus* pollenin, $C_{34}H_{54}O_{24}$ or $C_{34}H_{52}O_{23}(OH)_2$. *Corylus* pollenin, $C_{34}H_{52}O_{22}$. The yields were, resp., 21.9, 20.0 and 7.3% of the pollens. IV. 3. Fossil sporopollenins from Tasmanite and Russian lignite. Fritz Zetzsche, Hans Vicari and Gustav Schärer. *Ibid* 67–78 —Fossil spores and pollens have been found in many coals and oil shales. Selected specimens of a Tasmanian oil shale, tasmanite, were ground and the organic material was sepd. from the sand by floating on $CCl_4$. Clay was removed by shaking with soap soln. The crude sporopollenin, i. e., mixt. of spore and pollen membranes, obtained was purified as previously described. The yield was 17% of a substance with the probable formula, $C_{34}H_{54}O_{24}(OH)_2$, for which the name *fossilin* is proposed From a lignite from the Tschulchowsky deposits near Skopin

S C, of a fossil spore r $C_6H_7O(OH)_4$ was isolated This is believed to be derived from macrospores of the genus *Lycopodium* hence the name *bothrodendrin* is proposed for the compd A S-sorting spore r was also present. Recent lycopodium spores in and fossil bothrodendrin dissolve in concd $HNO_3$ in 12-24 hrs at room temp., tasmanin requires weeks This is attributed to the decreased no of OH groups making it more paraffin like in character L. E. Gilson

Biochemistry of tomato pigment. H von Euler, P Karrer, E von Kraitss and O Walker *Helv. Chim. Acta* 14, 1362-72 1931).—Green tomatoes kept at 20-1° ripened normally in a few days developing the usual red lycopin coloring At 30° they developed only a yellow color Tests showed carotene xanthophyll and an unidentified yellow flavone dye but no lycopin At 37° they turned yellow and spoiled rapidly Light or its absence has no effect on the rate of coloring It is believed that lycopin is formed by an enzyme action which is inhibited by the higher temp The pigment of the naturally yellow variety of tomato "Golden Queen" was studied Dried skins from vine ripened fruit contained 0.021 g carotene and 0.0053 g xanthophyll per kg but no lycopin A considerable amt. of a yellow flavone dye, insol in $CS_2$ sol in alk was also present This has not yet been identified. L. E. Gilson

The significance of iodine in plant and human metabolism. J Stoklasa *Z. Ernähr.* 1, 3-1 (1931).—I is absorbed by many plants in comparatively large quantities and changed to org I The I said plants have an important pharmacol sign nificance and can well be used in place of org I The I aids the oxidation processes in plants and animals and hinders a rise in H ion concn in the individual organs. *The I absorbed by plants* accumulates chiefly in the chlorophyll rich portion of the plant. For expts. on the absorption of I by plants and its distribution in org and inorg form, the following data are given The *p*H of the soil was 6.6-7.30 High org and inorg soil I were closely correlated with high org and inorg plant I in the cases of *Cucumis sativus* *Solanum lycopersicum* *Raphanus sativus* *Rheum undulatum* and *Spinacea oleracea* For example the fruit of *Cucumis sativus* gave 1330 parts per billion of total I with a soil content of 2.1 and 2440 parts per billion with a soil content of 859 The *p*H values of the juices from the roots of various plants are given By I fertilization the *p*H is raised The author after 14 days on a diet of plants high in I, noticed a lowering of the H ion concn of the urine from *p*H 4.8-5.2 to 5.6-6.2 By the feeding of silk worms with leaves high in I a 6%-85% increase in the no of eggs laid was obtained Thirty three references are given Francis P Griffiths

Organic matter given off by algae August Krogh, Ebbe Lange and Willy Smith *Biochem. J.* 24, 1666-71(1930).—Culture expts. show that the org material synthesized by the assimilation of freshwater algae is almost quantitatively stored in the cells of the algae Benjamin Harrow

Determination of maltose in plant extracts by maltase Nadigar Narasimha Murti and Motnahalli Sreenivasaya *Biochem. J.* 24, 1734-6(1930).—The enzyme ext was prepd from finely ground brewer's yeast desiccated over $P_2O_5$ by treating the material with 10 parts of a 5.8% soln of Na phosphate at 20° for 14 hrs. The ext was centrifuged for 10 min the filtrate neutralized to litmus with 4% $KH_2PO_4$ and preserved at 0° This maltase ext can be used for estg maltose in mixts. of sugars occurring in plant exts and tissue fluids Benjamin Harrow

Accumulation of electrolytes in plant cells. A suggested mechanism. G F Briggs. *Proc. Roy. Soc.* (London) B107, 248-69 1930 —"A possible scheme, based on alternating phases, one of greater permeability to anions and the other of greater permeability to cations is suggested to explain the accumulation of ions." J. S. H

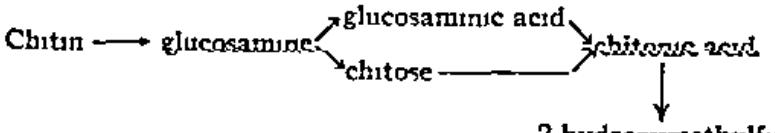
Alteration of the iron in chloroplasts due to chemical treatment. Hans Griesmeyer *Planta Abt. E. Z. wiss. Biol.* 11, 331-58(1930).—When leaves of certain cereal plants were exposed in darkness to such vapors as $SO_2$ and fuming $HNO_3$ and to solns of KCN and $NH_4CNS$ the sol Fe in the plastids increased at the expense of the insol Fe Plasmolytic tests with $KNO_3$ immediately after treatment showed that the leaf cells had not been killed In contrast, treatment with ether and phenylurethan failed to increase the sol Fe Placing leaves in an Fe soln increased the Fe content of the plastids Leaves lacking a normal green color due to etiolation, variegation or to lack of Fe all contained a normal amt of Fe in the plastids. But after treatment with the chemicals previously mentioned, these abnormally colored leaves behaved the same as normal green leaves in regard to an increase in sol Fe These results are offered as direct evidence for the participation of Fe in photosynthesis. A. E. H

Experiments on the influence of iron salts on the pigments of chlorophyll. T. N

Godnev, S K. Korzhenevskii and M. H. Gonchiarik. *Ann Weissruth Staatl Akad. Landw Gory Gorki* 9, 126–35(1929).—In expts with *Pisum sativum* in culture solns it was found that there was no proportional relation between the Fe taken up from the soln and the coloring matter in the plants as was the case in maize Fe is not of immediate importance for the building of chlorophyll, it is rather important primarily in the metabolic activity of the plasma Fe enters as a constituent part of the chlorophyll mol J S Joffe

Limiting factors in photosynthesis. V A Chesnokov and E N Bazuirina *Comp rend acad sci U R S S* No 8, 193–8(1930A).—Ch and B analyze the theory of Blackman (*Ann Botany* 19, 28(1905) and *Proc Roy Soc* (London) B76, 402(1905)) on the influence of direct and indirect factors on photosynthesis as it is based on the Liebig law of minima They question the character of the optimum curve as expounded by Blackman An increase in the temp of the medium which surrounds the leaf, according to Blackman causes a series of changes in photosynthesis Two groups of changes are noted, one corresponds to an increase in photochem activity following the van't Hoff reaction The other one has to do with some processes in the plasma Both influences take place simultaneously and the curve is a result of that. They point out that the temp of the leaf itself and not the external temp of the medium is responsible for the thermal increase in reactivity In general they consider that all the factors in photosynthesis are nothing more than indirect factors From the expts of Warburg and Negelein (cf *C A* 16, 3929–30) it is apparent that the coeff of utilization of light is very high even with a small light intensity, which shows that light influences other processes which in turn change the velocity of photochem reactions As an increase in the temp of the leaf takes place, there is an increase in transpiration, dehydration of the plasma, a change in the penetration of $CO_2$ in the plasma, etc The only rational way of investigating external factors is to det. the direct limiting factors Such factors may be found in the internal system of the plant They criticize the work of Lundegårdh on the effect of $CO_2$ concn and intensity of light on photosynthesis They do not consider the $CO_2$ or light as the limiting factors It is the velocity of the penetration of $CO_2$ in the plasma that is responsible for the changes observed They explain Lundegårdh's expts as follows: Under the influence of light an increase in the penetration of $CO_2$ in the protoplasm takes place. This causes the chloroplastids to take up more moles of $CO_2$ and photosynthesis is speeded up. The same takes place with an increase in the concn of $CO_2$ Thus the min is the $CO_2$ entrance in the plastids They prove their point with the results described by Warburg They conclude that Lundegårdh's new theory does not overthrow the fundamentals of Blackman, if the latter's theories are analyzed in the light of the authors' contention that it is the internal influences which are responsible for the behaviors noted J S Joffe

The fermentation products of molds. VIII. Aspergillus glaucus. Yusuke Sumiki *J. Agr Chem Soc Japan* 6, 1153–65, *Bull. Agr Chem Soc Japan* 6, 105–6 (1930), cf *C A* 24, 3812.—In the culture of *A glaucus* 2 hydroxymethylfuran 5 carboxylic acid (m 163°) was produced and identified as the mono Ac deriv. (m 115°) It was not obtained in the culture solns of gluconic acid and hydroxymethylfurfurol, but glucosamine, glucosaminic acid and chitose or chitonic acid were The source of 2 hydroxymethylfuran 5 carboxylic acid may be chitin in the mold




Y. Kihara

Phytin and the methods of its preparation. N. E Zeligson *Trans Sci Chem-Pharm Inst* (Moscow) No 23, 4–81 (in German 82–3)(1930).—A monograph contg a review of the literature, a restatement of the most reliable methods for the estn of the constituent element of phytin and a description of a new method for the double combustion of C. A new method is offered for the estn of the mineral phosphoric acid in phytin by pptn with molybdic soln in the cold The following detns were made: total phosphoric acid, mineral phosphoric acid, phosphoric acid added to phytin previously freed from mineral phosphates, phosphoric acid in org combination, C and H, bases (Ca and Mg, Na and K, $NH_4$), Fe and Mn, Na and moisture. Analysis of several samples of phytin and a study of the Ba, Ca, Na, strychnine and borax salts of inositol phosphoric acid were made Inositolhexaphosphomolybdic acid was given

some consideration analytically Summaries in Russian and in German are appended
B. S Levine

*Physico-chemical studies of rice produced in Gifu province.* Hanshmon Ito, Tatsuo Watanabe and Masuo Kitahara Gifu Imp Coll of Agr (Japan), *Research Bull* 13, 48 pp (1930) —Rice with high protein content is generally harder The protein content of rice of poor quality is generally high, but grain of superior quality is high in fat The fat of rice varieties adapted to growth in colder regions is higher in acid value than the varieties requiring warmer climate Elementary analyses of the glutelin and globulin of rice showed the following values

| | C % | H % | N % | S % | Ash % | Isoelectric point, $p_H$ |
|---|---|---|---|---|---|---|
| Glutelin | 50 6–53 3 | 7 0–7 7 | 16 5–17 3 | 0 53–0 64 | 0 31–0 70 | 6 2–5 0 |
| Globulin | 50 8–52 5 | 7 0–7 6 | 16 5–17 3 | 0 44–1 15 | | 5 5–4 6 |

K. Kitsuta

The role of iron and copper in the growth and metabolism of yeast. C. A Elvehjem *J Biol Chem* 90, 111–32(1931) —The yeast was grown in a modified Wildier's medium the constituents of which were purified so that they were practically Fe- and Cu free Addn of a small amt. of Fe accelerates the rate of yeast growth, increases the cytochrome content to the amt. normally present in com. yeast, and increases the respiratory quotient to $Q_{O_2}$ values of 35–40 Addn of both Cu and Fe causes a further increase in the growth rate and the production of cytochrome with a distinctly higher *a* component Cu has the property of stimulating the formation of certain hematin compds 0 02 mg of Cu per 200 cc of medium is the optimum amt for stimulating the formation of cytochrome *a* and additional amts inhibit cell growth during the 1st 48 hrs The toxic effect disappears as the no of cells per unit of medium increases The ratio of available Fe to the amt of yeast present determines the Fe content of the yeast Yeast low in inorg Fe is unable to assimilate Fe from a phosphate buffer at $p_H$ 7 0 but readily takes up Fe at $p_H$ 4 0 Thus, the availability of Fe may be the limiting factor in many of the synthetic media which have been used for studying the growth requirements of yeast, $Q_{O_2}$ values of 35–40 in 48-hr cultures decrease to 15–20 when the culture is 6–7 days old because of the high acidity of the medium At least 80% of the respiration is inhibited by KCN at 48 hrs. of age but the KCN labile portion gradually decreases and after 7 days the $O_2$ uptake is completely unaffected by KCN The KCN stable system metabolizes glucose, is destroyed by heating to 60° and is inhibited by urethan to the extent of 70% The respiration of yeast grown on beer wort, which prevents the development of high acidity, is largely inhibited by KCN The total respiration of yeast grown on wort may be low on account of an insufficient supply of Fe in the beer wort. Bios stimulated the growth rate to a small extent but had no effect on the respiratory activity The activity of bios is not so noticeable when the medium is maintained at the proper $p_H$ Further work will be required to det whether the effect of bios can be eliminated entirely by regulation of acidity or whether it actually stimulates yeast growth but in either case the effect will be closely associated with the availability of the Fe Bibliography of 23 references
A P Lothrop

The non-volatile organic acids of green tobacco leaves. Hubert B Vickery and George W Pucher *J Biol Chem* 90, 637–53(1931), *Connecticut Agr Expt Sta Bull* 323, 155–202 —The existing methods for the *detn of the org acids in plant tissues* have been so modified as to make possible approx quant isolation and positive identification of the predominating acids The acids are initially pptd as Ba salts in the presence of dil alc rather than as the Pb salts by basic Pb acetate In tobacco leaf exts only about ½ of the total titratable acidity consists of acids of the familiar types such as malic, citric succinic and fumaric The remainder is due to acidic *substances, the nature of which has not been detd although* part appears as *phenolic* acids On account of the presence of these substances, indirect methods for the detn of oxalic, citric and malic acids, such as those of Kissling and of Fleisher, do not yield trustworthy results Bibliography of 29 references
A P Lothrop

Causes of unequal resistance of a vine to mildew. L. Rives and G Kalé *Prog agr vit* 95, 138–9(1931) —An examn of the f ps of extd juices of grape vine leaves, sampled in October, indicated no relation between their resistance to mildew and the concn of their cellular juice
F. W Marsh

Variations in the osmotic pressure of certain Basidiomycetes. Sylvia Colla and Zipora Danin *Boll soc ital biol sper* 5, 885–7(1930) —The juice of *B edulis*,

*A. cesarea* L., *C. cibarius* Fries and *Russula virescens* Schäff was obtained by pressing and the Δ detd. The Δ varied from species to species; it varied during the development of the reproductive cells and decreased during maturation and when aged, it was not equal in all parts of the same fungus. PETER MASUCCI

Respiration of seeds from oil plants. A. I. ERMAKOV AND NICOLAI N. IVANOV. *Biochem. Z.* 231, 79–91(1931).—The respiration of oil seeds during the early stages of germination does not differ from that of seeds contg. carbohydrate stores. The $CO_2$ production bears a ratio of 1:1 to the $O_2$ absorption of these oil seeds. Neither the quantity nor the quality of the oil changes in the first hrs. of germination, while the amt. of sugar increases at the expense of polysaccharides undergoing enzymic hydrolysis. The fact that the I no. of the oil does not change leads to the conclusion that the oil is not directly oxidized by the $O_2$ from the air; carbohydrates being the material primarily used in the respiration. S. MORGULIS

The presence of a dihydroxyphenyl derivative and of a specific enzyme in the apple and other fruits. KARL SPITZER. *Biochem. Z.* 231, 309–13(1931).—The presence of an *o*-dihydroxyphenyl deriv. has been established in apples, pears and other fruits, and its identity with dopa seems very probable. Also an enzyme has been found in these fruits which reacts in a sp. way on dopa but has no effect on tyrosine. The enzyme is attached to the tissues. The browning of the fruit is due to its action on the chromogen. S. MORGULIS

Relations existing between the different organic acids elaborated by Sterigmatocystis nigra. MOLLIARD. *Compt. rend.* 192, 313–5(1931).—When *Sterigmatocystis nigra* is cultivated in media sufficiently low in minerals to insure the utilization of a given quantity of org. substance, org. acids are formed of which the most important are gluconic, citric and oxalic acids. From cultures grown for 90 days in a medium contg. sucrose and only $^1/_{25}$ of the normal amts. of mineral the following information was obtained. An appreciable amt. of reducing sugar remained at the end, at no time did oxalic acid appear, gluconic acid increased rapidly for 10 days, remained stationary from the 10th to the 60th day and then rapidly diminished, citric acid was not very abundant at the end of 10 days, but increased in concn. constantly throughout the entire 90 days. To det. whether citric acid is formed from gluconic acid a culture of *S. nigra* was grown under conditions similar to those of the above expt., gluconic acid being used instead of sucrose as the base. The following results were obtained: No trace of citric or oxalic acids was formed; the polarimetric deviation remained proportional to the free acidity. Gluconic acid, then, acts as a nutrient in the same manner as glucose, but never gives rise to citric acid. Gluconic acid, like the sugars, gives rise to oxalic acid when the culture medium tends toward alky. Analogous conclusions are reached concerning citric acid. M. concludes that gluconic and citric acids must be considered as oxidation products of sugars because of inanition in mineral substances, they both may be utilized subsequently by the fungus, but citric acid cannot be formed from gluconic acid. Oxalic acid is incapable of being utilized by *Sterigmatocystis nigra* and must be considered a final excretion product. ALBERT L. RAWLINS

The influence of nickel compounds and of cyanides on the germination of grains. ANNELIESE NIETHAMMER. *Wiss. Arch. Landw., Abt. A, Pflanze* 4, 607–34(1930).—Grains of wheat were placed in vessels contg. $H_2O$, $NiSO_4$, $Ni(NO_3)_2$, $NiCl_2$, $NiCO_3$, $Ni(CN)_2$, 2KCN, KCNS, NaCNS solns. of 0.1, 0.5 and 1.0% and the germination was observed. Arranged in the order of injurious effects, the compounds rank $Ni(CN)_2$ - 2KCN > $Ni(NO_3)_2$ > $NiCO_3$ > $NiCl_2$ > $NiSO_4$. 0.1% solns. of $Ni(NO_3)_2$ and $NiSO_4$ accelerate germination. It was not detd. whether the effect was due to physical or chemical changes, although histological examn. showed that the Ni solns. penetrated to the embryo as well as the endosperm. Wheat grains of the years 1921, 1923 and 1924 were similarly treated, and similar results were observed. The individual grains were then examd. quantitatively for acetaldehyde, starch, reducing sugar and protein. The same investigation was conducted on *Allium cepa*. W. GORDON ROSE

The algae flora of the Ruhr River. HERMANN BUDDE. *Arch. Hydrobiol.* 21, 559–648(1930).—Numerous data on the compn. of the Ruhr water are included. The analyses comprised temp., transparency, color, sediment, reaction to phenolphthalein, H ion concn., hardness, no. of germs and content of org. substance, Cl, $HNO_3$, $HNO_2$, $NH_3$, Fe, $CO_2$ and $O_2$. Large bibliography. G. SCHWOCH

The metabolism of mosaic-diseased and healthy tobacco plants. M. LÜDTKE. *Phytopath. Z.* 2, 341–59(1930); *Rev. Applied Mycol.* 10, 132–3.—Chem. analysis of healthy and mosaic tobacco plants showed that the accumulation of starch in the latter is not due to a disturbance or reduction of diastatic activity. A sucrose- and a pep-

respiratory quotient for the 38th to 44th hr., inclusive, is 0.733, uncorrected, or 0.722 if corrected for protein metabolism. The gas-exchange studies were definitely controlled and can be reproduced. C. R. FELLERS

Specific dynamic action. GRAHAM LUSK. *J. Nutrition* 3, 519-30(1931).—A review. L. believes that sp. dynamic action of carbohydrate is due to heat production of the intermediary metabolism rather than to carbohydrate plethora. His views are now in agreement with those of Rubner. C. R. FELLERS

Investigations in the feeding of cottonseed meal to cattle. J. O. HALVERSON AND T. W. SHERWOOD. North Carolina Agr. Expt. Sta., *Tech. Bull.* 39, 5-158(1930).—Eight years' results are reported in full. The feeding of large amts. of cottonseed meal and hulls to cattle over considerable periods of time results in what is commonly called "cottonseed meal poisoning," a condition formerly ascribed to a toxic substance, *gossypol*. Numerous expts. showed definitely that the disease was not due to a poisonous principle but rather to nutritive deficiencies of the rations. A crit. study of the various combinations of nutritive adjuvants used indicates that cottonseed meal and cottonseed hulls do not contain sufficient Ca or vitamins A, D or B to meet fully the needs of the animals. Great care must be used to select rations furnishing adequate amts. of minerals and vitamins for dairy cows. White corn is likely to be deficient in Ca, P and vitamin A and corn silage or grain should not be used to supplement cottonseed feeds. The typical symptoms of cottonseed poisoning, *i. e.*, staggers, impaired vision and spasms, were readily reproduced on heifers receiving meals other than cottonseed such as linseed, peanut and soy bean in the presence of minerals. On autopsy, the livers of the animals were shown to be almost totally lacking in vitamin A. Cod liver oil added to the ration proved moderately efficacious in preventing or curing the condition. Reproduction of cows fed on a cottonseed or similar deficient ration was decidedly subnormal. Numerous expts. where cottonseed meal was supplemented by poor roughage, wheat straw and a small quantity of green feed showed inadequate maintenance, poor reproduction and other conditions attributable to Ca and vitamin A deficiency. Similarly, rations of cottonseed meal contg. minerals, timothy hay and corn silage did not quite maintain health and vigor in the animals. Even when 1/4 of the entire ration was alfalfa hay and beet pulp was fed in addn., the ration was inadequate for dairy cows over an extended period of time. Cottonseed or other meals from high oil bearing seeds must be freely supplemented with good hay and possibly non maize grains to avoid various nutritive deficiencies. Bibliography. C. R. FELLERS

Corn silage versus a mixture of wet beet pulp and molasses for milk production. C. F. MONROE, C. C. HAYDEN AND A. T. PERKINS. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 148, 3-8(Jan.-Feb. 1931).—Slightly higher milk and butterfat production were obtained on the beet pulp-molasses ration, though insufficient to justify the increased cost of the ration. C. R. FELLERS

Does the feeding of corn silage to dairy cows lead to acidosis? A. E. PERKINS, C. C. HAYDEN AND C. F. MONROE. Ohio Agr. Expt., *Bimonthly Bull.* 148, 8-11(Jan.-Feb., 1931).—The total acidity of corn silage averaged 2-3%, consisting of lactic and acetic acids. The blood and urine of cattle normally have a slightly alk. reaction. The urine of several cows fed daily rations contg. 30-50 lb. of corn silage as compared with beet pulp showed no significant increase in either total acidity or H ion concn. $NH_3$ and bicarbonate $CO_2$, were also unaffected by the feeding of silage. Conclusion: The org. acids in silage are fully metabolized and do not appear as org. acids or related compds. in the urine. C. R. FELLERS

Relation of food to the growth of pre-school children. MARY A. BROWN. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 149, 73-6(Mar.-Apr., 1931).—Two groups were formed based on different economic levels, of 114 kindergarten children. The children were regularly weighed and examd. for phys. defects, etc., for approx. 1 year. Conclusion: It is desirable to include a quart of milk, vegetables, cooked and uncooked fruits, and cereals in the daily diet of the growing child, and eggs should be used several times a week, since a greater rate of growth was observed for those children whose diets contained these foods than for those children whose diets were lacking in quantity in certain food elements. C. R. FELLERS

Adsorption of vitamin A on silica gel. L. L. LACHAT, R. ADAMS DUTCHER AND H. E. HONEYWELL. Penna. Agr. Expt. Sta., *Bull.* 258, 8(1930). Abstract; *43d Ann. Report of Director*.—Vitamin A in cod liver oil may be adsorbed on highly activated silica gel so tenaciously that it cannot be rendered available when the silica gel is fed to rats. Toluene removes the adsorbed vitamin A from the silica gel, while acetone exts. are inactive. Further studies on availability before and after adsorption are being continued. C. R. FELLERS

Digestibility by sheep of the constituents of the nitrogen-free extract of feeds. G S Fraps. Texas Agr. Expt. Sta., *Bull* 418, 5–15(1930).—The contents of starch, pentosans, residual N free ext and sugars were detd on 56 feeds The digestibility by sheep of the sugars, starches, pentosans and residual N free ext was detd by animal feeding tests Feeds known to be of high feeding value are characterized by a high content of starch, or starch and sugar combined, or if the starch content is not high by a high content of protein. The N-free ext. of feeds of low feeding value contains a high percentage of pentosans and of residual N free ext The N free ext of some feeds contains an appreciable percentage of compds which are not carbohydrates, whose digestibility is uniformly high For several feeds the digestibility of pentosans was 50–60%, but was somewhat variable The pentosans in crude fiber are usually digested to a less extent than the total pentosans, or the pentosans in the N free ext The residual N free ext in hays and fodders is generally digested to a greater extent than are the pentosans. C R Fellers

The nature of dietary deficiencies of milk. J Ernestine Becker and E V McCollum *Am J Hyg* 12, 503–10(1930).—Of 38 diets in which milk powder was used at 60–85% levels in combination with other substances, only 24 sufficed for the production of young rats The best supplements from the standpoint of reproduction records were cooked dried beef liver, yeast and a mixt of ferric citrate and copper sulfate The liver is believed to owe its value to the Cu and Fe which it contains. S B Foster

Effect of cod-liver oil on calcium metabolism of young chicks. Arthur D Holmes and Madeleine G Pigott *Ind Eng Chem* 23, 190–6(1931).—Four hundred vigorous, day-old Rhode Island Red chicks were divided into 12 comparable pens, and the effect of cod liver oil on their Ca utilization was detd (1) when the Ca was obtained from different sources, (2) when it was fed at different levels, and (3) when it was fed at varying ratios to P Judged by the rate of growth and bone development, the chicks which received cod-liver oil showed better Ca utilization than the controls The oil was most effective when the Ca-P ratio was low. When this ratio was 5–1 the growth and Ca utilization of both exptl. and control groups were unsatisfactory. S B Foster

Radiographic study of the effect of irradiated ergosterol on the healing of experimental fractures. J. Morelle. *Rev Belge Sci.* 2, 226–8(1930); *Bull. Hyg.* 6, 88 (1931).—M. studied the action of vitamin D on the lesions of the fibula of rats. The rats were divided into 3 groups which were given 0.001 mg., 0.01 mg. and 2–4 mg of ergosterol per day Up to the 20th day no results were visible, but after that time in those receiving the medium dose the fracture lines were invisible, while in the controls they were still apparent. After the 30th day there was a dense callus in treated animals while in the controls the disappearance had just begun Heavy doses caused abnormally dense and exuberant callus formation George R Greenbank

The mode of action of the vitamin B complex. I. Emil Abderhalden. *Arch. ges Physiol.* (Pflügers) 226, 723–37(1931).—The paralytic symptoms of pigeons fed on a diet of polished rice could be abolished by feeding small quantities of various organ exts. (particularly liver) The bearing of these expts on the problem of the nature of the vitamin B complex is discussed II. Emil Abderhalden and V. Vlassopoulos. *Ibid* 808–15.—The *dehydrase* content of liver, muscle, and brain tissue of pigeons maintained on a diet of polished rice is abnormally low The addn of yeast or of dried organ exts to the diet of such pigeons restores the above mentioned organs to their normal dehydrase content. Arthur Grollman

The utilization of soy-bean flour and a new soy protein preparation by man and the lower animals. J. Kaffhammer and H. Habs. *Deut med Wochschr.* 56, 1168–70 (1930).—Metabolism expts on men and dogs showed the value of soy-bean flour as a source of protein in the diet. *Noro-Tropon*, a com prepn. contg. soy bean flour, also proved efficacious as a source of protein. Arthur Grollman

Carotene and vitamin A. L. K. Wolff, J. Overhoff and M. van Eckelen. *Deut med. Wochschr.* 56, 1428–9(1930).—Carotene and vitamin A were sepd from a no. of plant and animal substances. Their detn in such substances is described Arthur Grollman

The effect of hypophyseal extracts and various protein bodies on the specific dynamic action of protein. Ernst Herzfeld. *Deut med Wochschr.* 56, 1558–60 (1930).—Muscle, milk, and liver protein showed a specific dynamic action in normal individuals. Arthur Grollman

"Diet 4" for breeding rats for work on vitamin A. Skuli V Gudjónsson. *Biochem J* 24, 1591–4(1930).—The diet contains (in per cent) skimmed-milk powder

Simple methods for metabolic balance studies and their interpretation. Eva Donelson, Betty Nims, Helen A Hunscher, Carroll F Shukers and Icie G Macy. *J Home Econ* 23, 267–72(1931).—The mean difference between the chem compn. of a diet as computed from standard tables and as detd in the lab was 2–5% N varied 0 7–38%, Ca varied 0 22%, and P varied 0–38%. The magnitude of retention or loss that can be considered significant in any expt is detd. by calcg the av deviation. A calcn of metabolic balance for short observation periods shows daily fluctuations, while balances for longer periods show the general tendency better. A list of 23 references is given Amy LeVesconte

The effect of feeding sorghum and sugar-cane sirups on nutritional anemia. Olive Sheets and Ernestine Frazier *J Home Econ.* 23, 273–80(1931).—Sorghum and sugar-cane sirup are effective in producing hemoglobin in the rat A few expts with Crooked Top sirup proved it to be almost as potent as calf liver A. LeV.

A differentiation of the so-called antipellagric factor, vitamin G. Barnett Sure, Margaret Elizabeth Smith and M C Kik. *Science* 73, 242–3(1931).—Many expts indicate that vitamin G contains 2 factors, one producing dermatitis without affecting the growth of rats, the other stunting the growth without sign of skin lesions It is suggested that the growth promoting factor be designated by the letter F Amy LeVesconte

Comparison between irradiation of diet and supplemental irradiation of animals in vitamin A and D deficiency. F E Chidester, A G Eaton and N K Speicher *Science* 73, 190–1(1931).—Rats depleted of vitamins A and D were fed on a diet (Sherman No 380) low in D and deficient in A and given 0 01 mg of ergosterol daily Some of these rats were irradiated also for 30 sec. daily The addnl irradiation stimulated growth for a short time but did not produce the striking effects observed when Fe, was also added. I. M. Levine

Sterol content and antirachitic activatibility of mold mycelia. L M Preuss, W. H Peterson, H Steenbock and E B Fred *J Biol Chem.* 90, 369–84(1931).—The autoclaved, dried and finely grown pads, resulting from the growth of certain molds in a synthetic, inorg medium contg 4% glucose as the source of C, were irradiated with ultra-violet light and fed to rachitic rats Five kinds of mushroom were also tested for antirachitic activatibility Eight of 12 molds and 3 of the mushrooms brought about distinct healing of rickets even when fed at a level of 10 mg of irradiated material per rat for 7 days The total alc. sol sterol, detd by the digitonide method, in 11 molds and 4 mushrooms varied from about 0.1 to 1 0% of the dry wt. of the fungus material In most cases 90% or more of the alc.-sol. sterol was present in the free state The sterol content of the molds varied not only with the species but also with different strains of the same species and was decreased by increasing the glucose content of the medium. Supplementing the medium with such org nutrients as an aq ext. of malt sprouts or fresh yeast did not appreciably change the sterol content but the mycelial growth of 1 of the strains studied, *Aspergillus oryzae*, was increased from 20 to 50% A decrease of 56% in the wt of the pad resulted from increasing the incubation period of this strain from 10 to 50 days. In most cases increasing the glucose content of the medium to 10 or 20% more than doubled the wt. of the dry pad. Bibliography of 22 references. A. P. Lothrop

The induction of tetany in rachitic rats by means of a normal diet. Alfred F Hess, Mildred Weinstock, H R. Benjamin and J. Gross. *J. Biol. Chem.* 90, 737–46(1931).—"Tetany can be induced in rachitic rats simply by an abrupt change from a rickets-producing ration, high in Ca and low in P, to a normal ration of dried milk or of dried milk and whole wheat The fall in Ca in the serum which is brought about by this means develops within 48 hrs. but is maintained for only a few days This striking reaction is due not to an absolute or to a relative increase of P in the dietary but to a sudden shift in the Ca P ratio in the subsequent diet as compared to the preliminary diet. When this ratio of Ca P is decreased from about 4.1 to 1 or 1 5 1 tetany ensues, whereas if it is decreased only to about 2 1 the fall in Ca and nervous symptoms do not come about. Attention should be directed to the effect of marked alterations in the constitution of dietaries, as such shifts may help to explain nutritional disturbances which are inexplicable merely from the standpoint of adequacy." A. P. Lothrop

The effect of heat upon the biological value of cereal proteins and casein. Agnes F. Morgan with the coöperation of Florence B. King, Ruth E. Boyden and V. Ann Petro. *J. Biol. Chem* 90, 771–92(1931).—The digestibility of proteins toasted at 150–200° for 30–45 min is but little different from that of the raw protein but there are differences in the biol values (ranging from 10 to 19%) which are in all cases more

than 6 times as great as their probable errors The unexplainable loss of N occurs chiefly in the urine, indicating that the change produced by the heat treatment lies probably in the assortment or availability of the amino acids absorbed The addn. of 5% casein to the toasted diets very nearly made up the discrepancy between the latter and correspondingly supplemented raw diets, thus indicating that the deficiency observed lay in the protein fraction of the toasted diet. With wheat gluten the max growth rate (1 4 g per g of protein eaten in 56 days) occurred when the diet contained 18% of the protein. At an approx 12% level the biol values of raw and toasted gluten were 60 and 54, resp The values for raw and toasted casein at an 8% level were 66 and 53 Cooking with $H_2O$, in general, slightly increased the biol value of the protein The values of raw, water-cooked and toasted whole-wheat protein alone and supplemented with 5% casein were found to be 64, 67 and 52 for wheat alone and 67, 75 and 69 with wheat plus casein Bibliography of 33 references A. P. L.

Digestive erythropenia and factors which cause it. Giuseppe Solarino and Vittorio Cattaino *Boll soc ital biol sper* 5, 985–9(1930).—The administration of a diet rich in protein substances (meat) or in HCl in concn corresponding with that of gastric juice causes in normal dogs and in man a marked, const. erythropenia Erythropenia more marked and of longer duration follows the administration of liver Digestive erythropenia is related to 2 series of factors to the accumulation of blood in the splanchnic area and to the erythrocytic activity of certain hemopoietic tissues. Peter Masucci

Studies on the metabolism of fats. VII. The glycogen content of adipose tissue of rats under varying conditions of alimentation G Scoz *Boll soc ital biol. sper* 5, 1037(1930), cf *C A* 24, 5804.—Glycogen detns expressed as mg per 100 g adipose tissue were fasting animal 181, animal at const wt 527, animal after refeeding 1600 Peter Masucci

The diet in diabetes of children. Pedro B Landaburu and Félix Pucciulu *Semana méd* (Buenos Aires) 1931, I, 360–3.—The calorie intake should be in the first decade of life 69 cal per kg wt., in the second 48 cal The requirement for carbohydrates is 2 09 g per kg in the first decade and 1 44 g in the second decade, for proteins it is 2 47 and 1 58 g., resp and for fats 5 57 and 3 87 g Only in a few cases is it possible to dispense with insulin A E Meyer

Calcium metabolism. Albert Ranson *Semana méd* (Buenos Aires) 1931, I, 465–7.—After a short review on the subject, opocalcium is recommended, a product composed of minerals, parathyroid suprarenal and thymus gland, which has been exposed to ultra violet light A. E. Meyer

Results of exclusively dietary treatment in forty-six cases of obesity. Eggert Möller. *Acta med scand* 74, 341–52(1931).—Forty-six patients were treated with a diet contg 950 calories with about 6 g protein N per day This treatment continued for 54 days, the av loss in wt. sustained being 8 8 kg The basal metabolic rate of one patient who lost 29 kg in 5 months showed no significant changes during that period. S Morgulis

Influence of some fats and oils, meat and bread on growing rats. V A Leibovich-Livshina *Biochem Z* 231, 260–73(1931).—Large amts of cod liver oil cause toxic effects which manifest themselves in extensive losses of body wt., trophic disturbances and premature death With corresponding quantities of olive oil the body losses are smaller and the animals do not die prematurely even in long-continued expts Small or moderate amts. of olive, linolic and other oils do not stimulate the growth of the rat The greatest stimulating effect upon increase in body wt., especially following a preliminary fast, has been obtained with 5 g meat added to a bread diet or with meat alone The stimulating effect of the meat lasts longer in growing rats which have had a previous fasting experience than in rats without this. S Morgulis

The presence of vitasterol A in the cacao and its products of extraction. H. Labbé, Heim de Balsac and R. Lerat. *Bull soc therap.* No 10, 12 pp (1930), cf *C A* 25, 729.—The following exts of the cacao bean were made: (1) cacao butter, (2) alc. ext. of bean, (3) alc. ext. of shell, (4) the tailings of crystn after extn of α- and β-sterols These products, in comparison with cod-liver oil, were tested by the color reaction with $AsCl_3$ and $SbCl_3$ according to the procedure of Carr and Price The alc. ext of the bean gives a feeble color reaction with both reagents, $AsCl_3$ and $SbCl_3$, the alc. ext. of the shell and the tailings of crystn. give color reactions comparable to that obtained with cod liver oil These exts. were further tested for their growth promoting and antirachitic properties in expts with white rats which had been sensitized by a vitamin A-deficient diet according to a procedure of Lecoq It was shown that important amts. of a vitasterol, similar to vitamin A of growth and develop-

the acid fed animals increased in wt.; in the other groups the base fed animals gained The av gain of 27 base-fed animals was 8% greater than the av. of 27 acid fed animals Diuresis caused in both acid- and base fed animals the same loss of body wt which shows that the difference in growth was not caused by the retention of fixed fluid H TAUBER

The significance of the calcium and phosphorus content of the food. K. WALTNER *Magyar Orvosi Archivum* 31, 276–82(1930) —For white rats the min quantity of P necessary for optimum growth is the same as that of Ca A food contg P and Ca in the same ratio as that in human milk is deficient in P for rats Twice the min amt of one of the elements can be ingested without injury in the presence of the min amt of the other Ca deficiency of the food can be partly compensated by vitamin D, but the deficiency in P only to a very limited degree H TAUBER

The influence of liver diet on the action of hemolytic poisons V FEHÉR *Magyar Orvosi Archivum* 31, 446–50(1930) —The development of anemia in rats caused by phenylhydrazine poisoning is retarded by liver diet, but the regeneration of blood is not stimulated Typical anemia cannot be produced by Cu acetate Liver diet has no effect upon Cu acetate poisoning H TAUBER

The destructive action of finely divided solids on vitamin A JOSEPH K MARCUS *J Biol Chem* 90, 507–13(1931) —The activity of vitamin A concentrates from cod-liver oil (Marcus, *C A* 23, 1162, 4093) is largely destroyed on standing 8–26 days in presence of various finely divided powders, whether in air or $CO_2$ K V T.

The fundamental food requirements for the growth of the rat. VI. The influence of the food consumption and the efficiency quotient of the animal. LEROY S PALMER AND CORNELIA KENNEDY *J Biol Chem* 90, 545–64(1931), cf *C A* 23, 4499 — The digestibility of various stock diets by rats varies from 80 to 95%, and diets should therefore be compared on the basis of an equal intake of digestible dry matter This is done very reproducibly by collecting, drying and weighing the feces When diets are thus compared, differences in the growth curves on synthetic vitamin contg and natural complete diets almost disappear, though the natural diet appears still slightly superior Furthermore, the efficiency of food utilization, expressed as the efficiency quotient (E Q), or gain in wt per 100 g body wt per g of food digested, is higher in males than in females The greater gain in wt of males is due to this (cf. Osborne and Mendel *C A* 20, 3487, Mendel and Cannon, *C A* 22, 798) Differences in E Q also account for the variations in growth between groups of rats on the same diet. The stimulating effects of fresh lettuce, liver and carrots, given with yeast, on the growth of rats are shown to be due solely to effects on the food consumption, when allowance is made for differences in the E Q With the same method yeast and wheat embryo are found equally effective as sources of water sol vitamin in a diet otherwise complete By means of the E Q, growth expts can be more accurately controlled, and individual variation in gain in wt of animals can be partially eliminated. K. V. T.

A critique of the line test for vitamin D. CHARLES E BILLS, EDNA M HONEYWELL, ALICE M WIRICK AND MILDRED NUSSMEIER *J Biol Chem* 90, 619–36(1931) — The 4 grades or degrees of healing of rickets devised by Bills and McDonald (*C. A.* 20, 2522) are not proportional to the dosage of vitamin D A graphic method is described whereby the amt of diln required for any vitamin-D-contg prepn to give 2+ healing can be detd Av cod liver oil is taken as that which induces 2+ healing when given to rickety rats at 1/4% in diet 3143 for 5 days The sex, color and wt of rats are not of importance in the line test. The relation of dosage required to the duration of the test period (between 3 and 14 days) is plotted, and the probable error of the method estd K. V. THIMANN

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## F—PHYSIOLOGY

R K. MARSHALL, JR.

Basal metabolic rate of medical students and nurses in training at Charleston, S. C. ROB E REMINGTON AND F BARTOW CULP *Arch Internal Med* 47, 366–75(1931).— The basal metabolic rate of student nurses and male medical students at Charleston, S C., showed results 10% lower than the Aub-Dubois standards The I intake, dietary

habits and the state of nutrition are not believed to be responsible for the results obtained J. B. BROWN

Effect of acidosis upon capacity for work. H DENNIG, J H TALBOTT, H. T. EDWARDS AND D B DILL. *J Clin Investigation* 9, 601–13(1931); cf *C. A.* 24, 2504 — Acidosis produced by the oral ingestion of $NH_4Cl$ lowers the capacity for work as evidenced by decrease in capacity for O debt The buffer value of blood proteins is reduced 1/3 or more with a decrease of 1/3 in $CO_2$ capacity The ability to neutralize lactic acid is lowered These factors are raised in alkalosis J. B. BROWN

Normal standards of gastric function. W SCOTT POLLAND AND ARTHUR L. BLOOMFIELD *J Clin Investigation* 9, 651–8(1931) —The results of gastric analysis, detd under fasting basal conditions and resulting from the injection of histamine, are plotted in a number of charts showing the normal ranges. The charts are useful in clinical diagnosis J B. BROWN

Studies on the physiology of the parathyroid glands. II. The relation of the serum calcium to the serum phosphorus at different levels of parathyroid activity. FULLER ALBRIGHT, WALTER BAUER, JESSIE REED COCKRILL AND READ ELLSWORTH. *J Clin Investigation* 9, 659–77(1931) cf *C A* 23, 5231 —Study of a large no of simultaneous detns. of serum Ca and inorg P in patients with hypo- and hyper parathyroidism shows a slight reduction of P at high Ca level and a marked increase of P at low Ca level, so that the product of Ca and P is roughly const Parathyroid dysfunction is a disorder in which body fluids show normal Ca phosphate but an abnormal ratio of Ca to phosphate At high Ca levels, however, P is no longer excreted and the fluids contain high Ca phosphate, with calcification elsewhere than in the bones as the result The data do not explain the casual relationship between Ca rise and P fall J B BROWN

The effect of injections of female sex hormone (estrin on conception and pregnancy in the guinea pig. G LOMBARD KELLY *Surgery, Gynecol Obstet* 52, 713–22 (1931); cf *C A* 24, 3816 —Small doses of estrin injected into female guinea pigs prevent conception Pregnancy may be interrupted by this hormone An excess of female sex hormone in the blood over the corpus luteum hormone is incompatible with conception J. B BROWN

Hormonal sterilization. K. JUNKMANN *Z angew Chem* 44, 162–3(1931) — A review and bibliography are given of the different chemotherapeutical ways of producing facultative sexual sterility in the animal and human body During pregnancy the corpus luteum prevents the ripening of new ova by internal secretion The same effect is obtained by the injection of prepns. from ovaries or placentas of pregnant animals, such as placentaoptone (Merck), progynon, folliculin, menformone or the inner secretions of the corpus luteum The hormones of the anterior lobe of the pituitary body can have the same effect, though the mechanism of their action is different. In the male body sterility can be produced by administering female sexual hormones. ALFRED BURGER

Combined peptic-tryptic digestion in vitro and the digestibility of foodstuffs. A. RONCATO *Arch fisiol.* 28, 69–98(1930) —See *C A* 25, 329 E. J. C.

The existence of a pancreas hormone which lowers blood pressure. P. GLEY AND N. KISTHINIOS. *Wiener Klin. Wochschr* 43, 1530–6(1930) —The amt. of the hormone is quite variable in different com insulin prepns. Its effect is not the same as that of histamine or choline. It neutralizes the effect of adrenaline on blood pressure. D. B. DILL

Action of the heart hormone, "Eutonon," from the liver. H SALOMON AND G. ZUELZER. *Z. ges. exptl Med* 66, 291–324(1929).—The response to eutonon was detd in the frog heart, various heart lung prepns and in selected clinical cases. F. L. D.

The antimasculine action of the female sex hormone, menformone. E BORCHARDT, F DINGEMANSE, S. E DEJONGH AND E LAQUEUR *Z. ges exptl Med.* 68, 86–105(1929) F. L. DUNN

Corpus luteum and the sexual hormone. L. FRAENKEL AND E FELS. *Z. ges exptl Med* 68, 172–81(1929). F. L. DUNN

A hormone affecting heart activity. XIII. Effect on the frog heart. L. HABERLANDT. *Z ges exptl Med* 68, 185–95(1929); cf *C. A* 24, 5817–8, *Med Klin.* 1929, No. 14 —The action of Hormocardiol (Hoechst) on the frog heart is discussed F. L. DUNN

Effect of muscle activity, adrenaline and stimulation with the galvanic and faradic currents upon the blood sugar. M. DORLE. *Z. ges exptl Med.* 69, 242–54(1930).— Below the point of fatigue muscle activity produced a variable response in the blood sugar and in various diseases and constitutional types. Adrenaline produced the same reaction in the two constitutional types. Elec. stimulation of the gastro-intestinal canal

in animals produced the greatest rise in blood sugar The rise in blood sugar did not parallel the rise in blood pressure following the injection of adrenaline F L Dunn

*The mercapto group in blood cells.* P Gabbe *Z. ges exptl Med* 69, 392–421 (1930) —A method is described based on the oxidation of the SH group by $K_4Fe(CN)_6$ in strongly acid soln by which *the relation of SH and SS groups in glutathione and* thionine can be detd in blood In venous blood the SH form is found, while in arterial or oxygenated blood the proportion of SH group is reduced 10–50% *The SH combination* remains attached to protein when the soln is treated with $CCl_3CO_2H$, neutralized with U acetate in the cold, but it is sepd following hemolysis The SH content of the blood cells *increases following bleeding, anoxemia and* $PhNHNH_2$ poisoning There is an extensive bibliography F. L. Dunn

Metabolism at reduced pressure. I. H Elias and M Taubenhaus *Z ges exptl Med* 69, 529–60(1930) F L. Dunn

Behavior of δ-keto-*n*-hexoic acid in the perfused liver. Walter L Dulière and Henry S Raper *Biochem J* 24, 1672-7(1930) —The Na salt of δ ketohexoic acid on perfusion through the liver yields acetone bodies, this indicates a δ-oxidation Benjamin Harrow

Male hormone. IV. Casimir Funk and Benjamin Harrow. *Biochem J.* 24, 1678–80(1930) cf *C A* 24, 5821 —A simplified method of prepg *the hormone is de* scribed This involves the extn of strongly acidified male urine with $CHCl_3$, heating the evapd $CHCl_3$ residue with alkali, repeatedly extg the alk solution with ether, *evapg the ether ext and taking up the residue with oil* About twice as much of the hormone can be obtained from a strongly acidified urine as from an alk urine An important *difference in the chem behavior of the male and female hormones has been* noted Benjamin Harrow

The presence of a volatile organic chlorine compound in blood. Noah Morris and Samuel Morris *Biochem J* 24, 1716–22(1930) —For each blood there is a certain max and min amt of volatile Cl present beyond which the content does not pass The Cl in normal blood probably exists in 3 forms (*a*) inorg., (*b*) org non volatile and (*c*) org volatile Benjamin Harrow

*Studies on the biochemistry of sulfur. VIII. Rate of absorption of cystine from* the gastro-intestinal tract of the white rat. M X. Sullivan and W. C. Hess. *U. S Pub Health Repts*, Suppl., No 89, 16 pp (1931), cf *C A.* 25, 2449 —Studies are made on the rate of absorption of cystine, fed as the Na salt, from the gastrointestinal tract of the rat by means of 3 cystine methods, the Folin Marenzi method, the Okuda iodometric method and the Sullivan method The last two methods are in close agreement when corrections are made for the cystine value of the Na cystinate fed *and the % recovery of cystine in the method of extn The value found by these methods* is, in round nos., 50 mg of cystine per 100 g of body wt per hr —a value which puts cystine in the same class as other amino acids as far as absorption is concerned The F.-M method gives a lower value, in round nos., 30 mg of cystine per 100 g of body wt per hr., in agreement with the work of Wilson (cf *C A* 24, 3821), with the same method If the value obtained by the F M. method is the true one, this method must be reacting to a desulfurized changed cystine left in the gastro-intestinal tract, a complex *to which the other methods do not react If this assumption is made that the excess of* material reacting to the F.-M method is only changed cystine, then the findings by the F.-M method are the true rate of absorption of cystine by the white rat Data are given to show that hydrolyzates of amino acids with no cystine present react pos as cystine in the F.-M method, but neg in the other 2 methods, and that feeding glycine, and especially alanine, gives an increase in cystine value by the F.-M method Indications were obtained of an increase in glutathione content of the liver by feeding cystine There are 27 references J A. Kennedy

Modern conceptions on the antagonism of the sexual glands Angelo Miglia vacca *Boll soc ital biol sper* 5, 1082–4(1930) Peter Masucci

Relation between the calcium in the blood and the inhibitory action of the splanchnic nerve E Gley and H Jankowska *J physiol path gén* 28, 789–99(1930) —The inhibitory action of the splanchnic nerve on the movement of the intestines depends, as does its vasomotor action, upon the Ca content of the blood When this content falls $^1/_3$ or $^1/_2$ there results a large diminution and *sometimes* even a temporary suppression of the inhibitory action This action is reëstablished rapidly under the influence of Ca *injection The inhibitory system is less sensitive to Ca deprivation* than is the vasomotor system L. A. Maynard

Suprarenal *capsules* and glutathione. A Blanchetière, Leon Binet and A Arnaudet *J physiol. path gén* 28, 816–21(1930) —The suprarenal gland is the organ

which is richest in glutathione The amt of glutathione diminishes after ovariotomy and increases considerably during lactation The venous blood of the suprarenals is particularly rich in glutathione Perfusing the glands with blood to which glutamic acid and cystine have been added causes an increase of glutathione in the perfusate and in the tissues of the gland, indicating that glutathione can be synthesized from these constituents L. A. MAYNARD

*Psychic influences upon the calcium content of the blood serum.* M. CH. PERSTRÖM *Acta med. scand.* 74, 378-95(1931). The effect of induced sleep is the same as that of normal sleep upon the Ca level of the serum Psychic functions which are characterized by a state of quiet produce an effect upon the chemistry of the blood which manifests itself in a lowering of the serum Ca, while psychic states characterized by restlessness have the opposite effect upon the serum Ca S. MORGULIS

**The ammonia content and ammonia formation in muscle and its relation to function and change in condition. VIII. The assumed participation of the amide nitrogen of blood and muscle protein in the chemical processes of active muscles.** J. MANN *Biochem. Z.* 231, 37-8(1931). This is chiefly a critical examn. of the expts. of Hill (*C. A.* 23, 1916), who claims for the tissues the ability to synthesize from $NH_4$ ions and blood protein amide compds. and to utilize these amide groups for the neutralization of acids *produced during work. It was found that neither in the human blood nor in the isolated* frog muscle does amide N take part in the chemistry of the metabolic processes. **IX. The position of ammonia formation in the series of chemical processes in active muscle.** WL. MOZOLOWSKI, J. MANN AND C. LUTWAK *Ibid.* 280-95. The curve of $NH_4$ formation during activity of muscle poisoned with $CH_2ICO_2H$ shows that the largest production of $NH_4$ takes place not during activity but during fatigue exhaustion of the creatine phosphate and the development of rigidity S. MORGULIS

**Experimental studies on the influence of air rarefaction on the resistance of red blood corpuscles to hypotonic salt solutions.** CIARA NARGELI *Biochem. Z.* 231, 95-102(1931).—Keeping animals in rarefied air greatly affects the resistance of their red blood cells to hypotonic NaCl solns. and after 6-8 days the min. resistance diminishes by 0.02-0.08% NaCl and the max. increases at least 0.08%. S. MORGULIS

**Changes in the physical state of inorganic components of serum under reciprocal influences.** HANS G. SCHULTZ *Biochem. Z.* 231, 135-43(1931).—Studies by means of ultrafiltration show that a colloidal Ca P complex is formed in serum when either the Ca or P level is raised A similar complex is also formed with Mg The addn. of $CaCl_2$ to serum increases the ultrafiltrability of the K and the addn. of $MgCl_2$ increases that of Ca The hypothesis of a colloidal K compound in serum is given support by these expts. S. MORGULIS

**Studies on blood glucolysis. III. Inhibition of glucolysis.** H. K. BARRENSCHEEN AND KARL BRAUN *Biochem. Z.* 231, 111-72(1931). cf. *C. A.* 25, 1890.—Under all conditions or agents which inhibit glucolysis of the erythrocytes (hemolysis, narcotics such as ether and $CHCl_3$, fluorides, oxalates and the monohalogen derivs. of AcOH, $CH_3XCO_2H$) there is a splitting of inorg. P from org. combination, the chief source being the pyrophosphate fraction of the org. phosphate With fluorides and $CH_3XCO_2H$ the inhibition of glucolysis is assocd. with a synthesis of difficultly hydrolyzable esters related to the hexosediphosphate fraction From these considerations it is concluded that the pyrophosphate fraction is essential for the glucolytic process and is either the coenzyme or the activator of the coenzyme This is sustained by such facts as the following: the fermentation of yeast preps. free from, or poor in, coenzyme is somewhat activated by the addn. of the pyrophosphate fraction from erythrocytes, and the inhibition of glucolysis by hemolysis, fluorides or $CH_3XCO_2H$ is accompanied by an accumulation of methylglyoxal from added hexosediphosphate. S. M.

**Cholesterols in structural combination in the protoplasm. VI. Studies on the cow spleen.** G. PFEIFFER *Biochem. Z.* 231, 249-71(1931). cf. *C. A.* 25, 1890.—The spleen of the 1-yr. old cow contains 0.0116% total cholesterol per 100 g. fresh substance Of this 61.1% are cholesterol + oxycholesterol (oxycholesterol = 0%) and 38.6% cholesterol esters. Of the latter the oleic acid of cholesterol was 7.5% and of oxycholesterol 28.0% The spleen shows thus a higher cholesterol content than other organs which is assocd. with its physiol. function of destroying red blood cells The cholesterol set free in the process of erythrocyte destruction accumulates in the spleen S. MORGULIS

**Presence of ergosterol in the human brain.** IRVINE H. PAGE AND WILH. MUNSCHICK. *Biochem. Z.* 231, 416-50(1931).—The absorption spectra were studied of the purified sterol fraction from the brains of fetuses, newborn babies, lactating babies and adults In the first three the absorption maxima of the brain sterols were at 291, 283 and

250 mμ resp The absorption at 294 and 283 mμ belongs to ergosterol and its concn in the cholesterol diminishes from 0.05% (fetus) to 0.01% in the 1½-yr.-old baby. The substance corresponding to the absorption band at 250 mμ has not yet been identified. The ergosterol has been identified by means of digitonin pptn. and change in absorption spectrum under the influence of ultra violet radiation The absolute amt. of ergosterol reaches a max of 1 mg. in the brain of the 1-yr.-old baby, and then diminishes considerably S. Morgulis

The non-inhibition of cell respiration by hydrocyanic acid. Otto Warburg *Biochem. Z.* 231, 493-7(1931).—Dixon's discovery (*C. A.* 24, 426) that KCN affects only 60% of the cell respiration is shown to be based on error Liver, kidney and spleen cells are injured by the phosphate buffer as used by Dixon When these cells are experimented with in a Ringer $NaHCO_3 + CO_2$ medium their respiration is completely inhibited by KCN just as is that of yeast cells Attention is called to several other exptl. errors in Dixon's work A no. of instances are cited demonstrating that injury of the cell frequently affects the inhibition of its respiratory activity under certain conditions. W. points out that the cardinal problem in cellular respiration is not whether $O_2$ or $H_2$ is activated but whether or not activation is catalyzed by Fe. From the fact that baker's yeast heated 90 min. at 52° practically loses the ability to oxidize physiol. substances, though it can still oxidize a mixt. of *p*-$C_6H_4(NH_2)_2$ and α-naphthol to indophenol, which is also inhibited by CO Keilin (*C. A.* 23, 3719) concluded that the respiratory enzyme is the indophenoloxidase The reaction with the heated yeast, however, is irregular and the expts. are interpreted as showing merely that the respiratory enzyme has been injured S. Morgulis

Skin and climacterium. Clara Naegeli and Marian Fellner. *Endokrinologie* 8, 81-121(1931).—General S. Morgulis

The endocrine function of the placenta. Arthur v. Probstner *Endokrinologie* 8, 161-9(1931).—From the fact that a patient who underwent an operation for double ovariectomy during pregnancy completed the term, gave birth to a normal child and still continued to secrete in the urine the sex hormone, just as the normal female does, it is concluded that the hormone must be produced by the placenta. S. Morgulis

The mechanism of the action of the sex (follicular) hormone. Peter Hauptstein *Endokrinologie* 8, 169-80(1931).—Studies on mice show that the effectiveness of the follicular hormone depends only up to a certain degree upon the amt. of the hormone administered. Repeating the dose at short intervals may increase its effectiveness even a hundred fold The loss of activity is rapid and independent of the dose and is apparently due to quick excretion Following prolonged administration of nonphysiol. amts. of the hormone there is definite evidence of injury of the follicular app. of the mouse manifesting itself in inhibition of the follicular development and the failure of development of corpora lutea The last fact is especially important in human therapeutics. S. Morgulis

The chemical composition of animal fetuses. Hamdi Ömer *Arch. Wiss. Prakt. Tierheilkunde* 62, 248-66(1930).—Water, fat and ash were detd. in hog and sheep fetuses, and in hogs and sheep at various times shortly after birth The water content of the fetus decreases, and the ash content and material free from fat and ash increase, as the fetus increases in size. The ash content of the fetus is less than that of the mature animal. W. Gordon Rose

Partial diuresis. Giulio Lega *Arch. farmacol. sper.* 51, 49-54(1930).—When 1000 cc. physiol. NaCl soln. was given to normal fasting humans, the NaCl was promptly excreted, while an increased water elimination became noticeable after 4-5 hrs. Urea administered in physiol. NaCl soln. to healthy persons was immediately excreted, while the elimination of water and NaCl was retarded Daily administration of NaCl to nephrotics did not at first exert an influence on the NaCl excretion, which, however, began to rise after a few days. Administration of 500 cc. water to nephritics with polyuria and with glomerular and vascular lesions caused a retarded diuresis, if any. Protracted administration of urea to chronic nephritics with normal NaCl elimination and scanty urea exretion was followed in some cases by a prompt and prolonged urea excretion in the urine In other cases with more severe lesions no urea was eliminated after administration of a single dose, in many of these cases, however, protracted urea administration was followed by increased elimination No exptl. data are given G. Schwoch

Action of some organic and inorganic substances on the capacity for work of the gastrocnemius of the frog. Vincenzo Famiani *Arch. farmacol. sper.* 51, 65-79 (1930).—One of the gastrocnemic muscles together with its nerve was isolated and immersed in a soln. of NaCl 0.60, KCl 0.03 and $CaCl_2$ 0.02% for 15 min. Then it was

put to work under isotonic conditions until it was completely exhausted Meanwhile the substance to be tested was injected into the dorsal lymphatic sac of the frog. After 1 hr (1 5 hrs with glucose) the other gastrocnemius was isolated, immersed in the salt soln *for 15 min and stimulated to complete exhaustion* From the muscular contractions as registered by the kymograph the work done was calcd in g m and from the difference in work accomplished by the 2 muscles conclusions were drawn with regard to the favorable or unfavorable effect of the substance tested Creatine, and to a slightly lesser degree $NaH_2PO_4$, caused an increase in the capacity for work $K_2HPO_4$ in very small doses acted similarly, while in large doses it had an injurious effect The influence of creatine in combination with $K_2HPO_4$ or $NaH_2PO_4$ was not greater than that of one of the compds alone Glucose alone or in combination with creatine or phosphates, or together with creatine and phosphates, always caused a distinct diminution in the work done Other expts showed that within certain limits the isolated gastrocnemius of the frog had a greater capacity for work the longer it had been immersed in the salt soln All conditions being equal, the right muscle had a greater capacity for work than the left muscle A large bibliography is included G Schwoch

The participation of the nucleolus of hepatic cells in iron metabolism. Giovanni Corradini *Arch farmacol sper* 51, 125–8(1930) —By means of the Berlin blue reaction C demonstrated that in the white mouse the nucleoli of hepatic cells participate in Fe metabolism Normally the reaction is distinct only in the vicinity of the centrolobular vein, but after injection of colloidal Fe it was observed throughout the liver Similar expts on rabbits and guinea pigs showed that in these animals the Berlin blue reaction could not be produced in the nucleoli of the hepatic cells G Schwoch

Effect of experimental hyperthyroidism on reproductive processes of female albino rats Charles K Weichert *Physiol Zoöl* 3, 461–6(1930) —When normal female rats, which had shown regular estrous cycles, were fed with 0 25 g of desiccated thyroid daily, the diestrous condition persisted as long as the thyroid feeding was continued (6–22 days) The animals came into estrus 2–10 days after feeding was discontinued The general health of these rats was not markedly altered, though the body wt had decreased approx 19% after 3 weeks of thyroid feeding Sections of the ovaries revealed a no of corpora lutea along with follicles of all sizes When pregnant mature rats were fed with desiccated thyroid (0 25 or 0 5 g daily) very severe reactions followed Some of the animals resorbed their young, others died before or after delivery The gestation period was prolonged in those rats which lived long enough to deliver their young. The young were born dead or died within 1 or 2 days The animals appeared to be in good health until the last 2 or 3 days of pregnancy The reactions were more severe in the groups receiving the larger dose The possibility is discussed that the anterior lobe of the pituitary body may be involved G Schwoch

Separation of anterior-lobe substances and study of their individual effects. Pearl E Claus *Physiol Zoöl* 4, 36–57(1931); cf *Proc Soc Exptl Biol Med.* 27, 29–30 — Armour's desiccated anterior lobe was extd with acid alc In the attempt to sep the hormones the method of Fevold, Hisaw and Meyer (*Proc Soc Exptl Biol Med* 27, 604) was used with some modifications Two substances were isolated One of them (I) was a constituent of a cryst fraction; when injected subcutaneously it stimulated follicular development in adult female rats and induced early maturity in immature female mice and rats and in immature male mice Identical crystals with the same physiol. properties were also obtained from urine of pregnant women, the epididymis of the bull, fish sperm, the thyroid gland and adrenal cortex The other active fraction (II) was sol. in abs alc. and contained a luteinizing hormone which was not obtained from a similarly prepd ext of adrenal cortex or epididymis The luteinizing fraction caused, in the ovary of an adult rat, the formation of atretic corpora lutea with the ovum inclosed, but it did not induce early maturity It also stimulated placentomata formation which does not occur with I. No increase in wt was noticed after adult rats had been treated with I or II for 6 weeks Numerous references and 6 plates are given.
G. Schwoch

The formation of bile pigments in tissue cultures. I. Sümegi and M Csaba *Magyar Orvosi Arch.* 31, 473–7(1930) —The spleens of chicken embryos and those of amphibians are able to produce bilirubin in tissue cultures from laked blood. The bile pigments were identified by the *indirect diazo reaction Undissolved hemoglobin* (erythrocytes from the explanates) produces bilirubin in the same way but only in traces The formation of bile pigments is a vital function of the spleen H T.

The conditions of metabolism which can permit the change of sex. Ph. Joyet-Lavergne *Compt rend* 192, 180–2(1931) —The changes of sex in animals, which have been described in recent years, are attributed to simple physiol causes. the change

from male to female to the deposition of fat in the testicles, the change from female to male to an increase in metabolism, a decrease in reducing power of the tissues and changes in the compn of the blood The last changes can be produced by tuberculous tumors (Crew, *Proc Roy Soc* B95, 256, 1923) and are accompanied by the expected sex change K. V THIMANN

The relation between the effect of the estrus-producing hormone and a corpus luteum extract on the growth of the mammary gland C. W TURNER AND A H FRANK *Science* 73, 2[illegible]–6(1931) —Development of the mammary glands character istic of pregnancy could not be obtained in rabbits by injection of the estrus producing hormone alone Injection of the hormone together with corpeus luteum ext prepared by Allen's method (*C A* 24, 4819) however, gave after 30 days a development of the mammary glands of castrated males similar to that of advanced pregnancy The active principle of the corpus luteum ext responsible for this effect was present in a water- and EtOH sol ext. of the urine of pregnant cows, and this ext. could be substituted for the Allen's ext in the above expts K. V THIMANN

*Protoplasma-Monographien.* Edited by FR WEBER AND L. V. HEILBRUNN Band V. PH JOYET LAVERGNE La physicochimie de la sexualité. Berlin: Gebrüder Borntraeger 457 pp M. 32

## G—PATHOLOGY

H GIDEON WELLS

A modified method for the production of antipneumococcus serum in horses EDWIN J BANZHAF AND THEODORE J CURPHEY *Proc Soc Expll Biol Med* 28, 279–80(1930) —Horses were immunized by intramuscular injections of phenolized pneumococcus pleural exudate and intravenous injections of formalinized sediment of 18-hr broth cultures The sera of such horses had a greater therapeutic value than was indicated by their mouse protection unit content detd by comparison with antiserum produced by administering vaccine intravenously C. V. BAILEY

Is ferratin precipitinogenic? LUDVIG HEKTOEN AND WM H. WELKER *Proc Soc Expll Biol Med* 28, 293–4(1930) —Ferratin, a deriv. of nucleoprotein high in Fe, is obtained by boiling the liver, filtering and pptg with tartaric acid It can be rendered practically free from blood and lymph protein Hog, beef and sheep ferratins were used in expts on rabbits The precipitinogenic power was slight and ferratin was not demonstrated to be a species specific antigen C. V. BAILEY

Antigenic power of ultra-violet-irradiated tetanus toxin. EMERSON MEGRAIL AND HENRY WELCH *Proc Soc Expl Biol Med* 28, 494–5(1931) —A mixt. of 2 tetanus toxins did to contain 1 m l d per cc was irradiated with the C arc at 25 cm distance for 2 min; the toxin was partly destroyed, half the inoculated guinea pigs developed late tetanus A further irradiation of 2 min rendered the material atoxic By use of a quan tity originally contg 1 m l d, 9 guinea pigs were given 5 subcutaneous injections of this irradiated toxin at 6–7 day intervals and were inoculated 3 weeks later with freshly titrated tetanus toxin in doses of 1–10 m l d Tetanus did not develop in the 45 days of observation Ultra violet irradiation destroys the toxic but not the antigenic power of tetanus toxin C. V. BAILEY

Absorption of hydrokollag from the obstructed bowel. H A CARLSON, H J DVORAK, F W LYNCH AND O H WANGENSTEEN *Proc Soc Expll Biol Med* 28, 542–4(1931) —Hydrokollag a colloidal suspension of graphite, was not absorbed from the obstructed intestine of the dog or of the rabbit It was absorbed from the peritoneal cavity and possibly from the ulcerated intestine C V. BAILEY

Gastric acidity in diabetes mellitus. Its clinical significance based on a study of one hundred cases. I M RABINOWITCH, A F FOWLER AND B A WATSON *Arch Internal Med* 47, 384–90(1931) —A study of normal cases shows a possible incidence of 20% who have achlorhydria This incidence is, however, only one-half that found in diabetes mellitus, suggesting that this disease is accompanied by low gastric acidity The etiology of this condition is discussed J B BROWN

The metabolism of galactose. I. Conditions underlying the use of galactose in tests on the function of the liver. HARRY SHAY, EUGENE M SCHLOSS AND MILTON A BELL. *Arch Internal Med* 47, 391–402(1931) —Galactose is very suitable for testing liver function for the following reasons readily obtainable pure, readily absorbed from the intestine, convertible with difficulty by the liver into glycogen; not utilized by other tissues than the liver, in the general circulation it is readily excreted in the urine, regardless of the condition of the kidney or endocrine activity J B. BROWN

The blood calcium in diabetic retinitis. R. D LAWRENCE, KATE MADDERS AND

H. R. Millar. *Brit Med J.* 1930, II, 559.—The observation that diabetic retinitis is accompanied by low blood Ca is not confirmed J B. Brown

The relationship of blood uric acid content to the state of renal function in nephritis Christopher Johnston *J Clin Investigation* 9, 555–9(1931).—Simultaneous detn. of blood uric acid and urea clearance showed the former to be of little value in the estn. of kidney function Despite 80% loss of urea-excreting power by the kidney, uric acid may be normal J B Brown

The excretion of intravenously injected bilirubin as a test of liver function. George A Harrop and E S Guzman Barron *J Clin Investigation* 9, 577–87(1931).—The bilirubin excretory power is the most delicate method for testing liver function. J B. Brown

Studies of serum electrolytes. VII The total base and protein components of the serum during lobar pneumonia with a note on the gastric secretion. F Wm Sunderman *J Clin Investigation* 9, 615–33(1931).—Study of the base and protein constituents of the serum in patients with lobar pneumonia showed a decreased concn of Na in proportion to the decrease in concn of total base *In over half of the detns* an increase of K appeared before and after the crisis During the febrile period Ca was decreased, while the Mg values were variable A decrease in albumin was balanced by increase in globulin, making the total protein concn nearly normal Protein-bound base usually fell during the febrile period Gastric acidity was low until after the crisis There was no apparent correlation between serum total base or chloride with gastric acidity J B Brown

The cause of death in liver autolysis. Edmund Andrews *Surgery, Gynecol Obstet* 52, 61–6(1931).—Implantation of sterile liver (*in vivo* autolysis) produces a toxic reaction, described as autolytic peritonitis The toxic agent probably falls within the albumose group J B Brown

Action of parathyroid graft on calcemia in normal or parathyroidectomized dogs J T Lewis and Rebeca Gerschman *Compt rend soc biol* 103, 1281–3(1930).—See *C A* 25, 337. E J C.

Leucine and tyrosine in urine in lung tumors. Hans Asperger. *Wiener klin Wochschr.* 43, 1281–4(1930).—Leucine and tyrosine are excreted in the urine in increasing quantities with the progress of carcinoma of the lungs Their presence in the urine is of diagnostic value in doubtful cases D. B Dill

The influence of ergotamine and liver diet on liver function. Richard Bauer and Oskar Wozasek. *Wiener klin Wochschr* 43, 1337–41(1930).—The administration of 40 g of *galactose* results in *galactosuria* in some cases of liver disease when on a liver diet but does not occur with normal subjects on a liver diet D. B. Dill

Distribution of electrolytes in serum and cerebrospinal fluid. I. Calcium and magnesium. Zdenko Stary, Adalbert Kral and Rudolf Winternitz. *Z. ges exptl. Med* 66, 671–91(1929), cf *C A* 24, 3543.—The Ca content of cerebrospinal fluid approaches that of the dialyzable fraction of the serum Dialysis of serum against spinal fluid produces only a slight change in the Ca distribution. The Ca content of cerebrospinal fluid is more constant than the serum Ca in the same individual, while Mg is the reverse The spinal fluid Mg is higher than the serum Mg A series of compensation dialysis experiments suggests that the serum Mg is in a complex anion. The ratio of Mg in spinal fluid and serum varied between 110 and 200% for non meningitic cases. Tuberculous meningitis had a ratio less than 100% II. Potassium and sodium. *Ibid* 691–701.—The K content of cerebrospinal fluid in a group of miscellaneous cases averaged 11.7 mg % with an av of 21 7 mg % for the serum, giving a distribution coeff of 53 92%; similarly for Na 295 mg % for spinal fluid and 321 mg % for serum, and a quotient of 91% Dialysis of serum and cerebrospinal fluid results in both fluids having the same K concn There were no characteristic changes in the distribution ratio of K or Na in the various diseases studied F L Dunn

Behavior of free cholesterol and its ester in the blood and organs of the rabbit following artificial obstruction of the bile. E von Rosztoczy. *Z. ges. exptl. Med* 68, 690–700(1929).—The rise in free cholesterol occurs in spite of the defective absorption of cholesterol resulting from the failure of the bile acids to be secreted because of the obstruction. The ester cholesterol showed a decrease in the organs while it was increased in the blood The liver damage resulting from biliary obstruction is a factor in determining the relative amounts of free cholesterol and its ester. Part of the increase in cholesterol is due to the erythrocyte destruction accompanying biliary obstruction. The bibliography contains 75 references F. L. Dunn

The *specific dynamic action of protein in disturbed endocrine function.* M Serbiskii and Sophie Jislin. *Z. ges. exptl. Med* 69, 321–36(1930).—Disease of the

thyroid resulted in a reduction or absence of the sp dynamic action for protein This change in hyperthyroidism was due to the satn. of the body with thyroid substance and to the over stimulation of the vegetative nervous system. In hypothyroidism the lowered sp dynamic action is a reflection of the general torpidity of bodily processes The metabolism in thyroid disease is essentially endothermic in type F L DUNN

Serum proteins in secondary syphilis. A. SEZARY AND P. MARTINET. *Bull Mem Soc Med Hopit Paris* 1930, 945–7. *Bull Hyg* 6, 55.—The authors investigated the relation of albumin and globulin in the sera of 6 syphilitics in the secondary stage showing no nephrosis The normal ratio is 1 6/1. The authors' figures range from 0 67 to 0 97/1 They assume the change due to changes in the metabolism brought about by spirochetal septicemia, not to nephrosis GEORGE R. GREENBANK

Present status of the investigation of the cause, and of the geographical distribution, of mottled enamel, including a complete bibliography of mottled enamel. FREDERICK S MCKAY. *J Dental Research* 10, 561–8(1930).—"The evidence has been so overwhelmingly conclusive, to the effect that the productive influence resides in the drinking water, that the investigation now rests upon this hypothesis" The bibliography contains 47 references JOSEPH S HEPBURN

Cellular individuality in the higher animals with special reference to the individuality of the red blood corpuscle. II. CHARLES TODD *Proc. Roy Soc* (London) B107, 197–205(1930).—Examn of a family of Plymouth Rock chickens by means of exhausted immune iso-agglutinating sera revealed that the corpuscles of no 2 chickens were exactly alike, the cells of different individuals differed in immunological behavior from a close resemblance to a very marked contrast. Individual chickens, immunized with the blood of their own brothers and sisters, yielded active, highly sp agglutinating sera The ease of formation of the agglutinins varied with the degree of difference in character between the erythrocytes of the injected chicken and those used for immunization "The red blood corpuscle must be regarded as a 'multiple antigen' in the sense that it contains a large number of different antigenic units or 'receptors,' which apparently behave as independent units when hereditarily transmitted" JOSEPH S HEPBURN

Heat of rigor of mammalian muscle. E. C SMITH *Proc Roy Soc* (London) B107, 214–22(1930).—Neither the disappearance of glycogen nor the formation of lactic acid suffices to explain the stiffening in rigor A third chem change, as yet not clearly understood, must also be involved JOSEPH S HEPBURN

Lactic acid content of the blood in several diseases, especially malignancy. E M GELSTEIN AND M I FRANKSTEIN *Z klin Med* 111, 563–81(1929).—The av lactic acid content of the blood in healthy well nourished persons is 9 08 mg per 100 cc. It was increased in anemia, leucemia and cardiac disease with cyanosis and decreased oxidation in the tissues, and also in 56% of the cancer patients studied A dose of 100 g of dextrose or sucrose produced a temporary increase in the lactic acid content of the peripheral blood, the av concn being 66 9 mg per 100 cc. at the end of 1 hr This phenomenon was still more marked in some cancer patients JOSEPH S HEPBURN

Precipitation of sediments and the formation of calculi in the urinary tract. JOHANNES MEYER. *Z klin Med* 111, 613–87(1929).—Pure uric acid calculi form in a normal, strongly acid urine with $p_H$ approx 5 0 Mixed calculi, composed of pure, quite dense uric acid, urate, oxalate and Ca phosphate layers, arise in normal urine of $p_H$ 6 0 Pure Ca phosphate calculi form in normal neutral urine of $p_H$ approx. 7 0 Hard, stratified calculi, composed chiefly of $MgNH_4PO_4$, Ca phosphate and $NH_4$ urate, form slowly in an ammoniacal urine with a faintly alk reaction ($8 > p_H > 7$) If layers contg considerable amts of $CaCO_3$ be present in these calculi, then the reaction at their formation has been decidedly more alk. Soft free calculi, consisting chiefly of $MgNH_4PO_4$, $CaCO_3$ and $NH_4$ urate, form rapidly in a strongly alk. urine with $p_H > 8$ Org compds are simultaneously pptd., but the degree of satn of the urine with crystalline compds decides when the calculus grows, and the compn of the deposited layers An elaborate bibliography is appended JOSEPH S HEPBURN

Kidney function tests and blood-urea determination. H KRUKENBERG *Arch Gynakol* 143, 56–71(1930).—The various methods for detg the functional activity of the kidney are reviewed Most of them are too complicated for the average practitioner and require elaborate lab equipment and often special prepn of the patient The detn. of the urea content of the blood by means of the azotometer is suggested as a reliable method for the average practitioner as the test is easily made and requires no special prepn of the patient. HARRIET P. HOLMES

The xanthoproteic reaction in blood from which protein has been removed in pregnancy. H EUFINGER. *Arch Gynäkol* 143, 366–75(1930).—The xanthoproteic reaction according to the method of Becher was carried out on blood from which the

protein had been removed from 80 pregnant women, 10 cases *ante partum* and 175 cases *post partum*. The xanthoprotein reaction was neg. during pregnancy and *ante partum*. *Post partum* a positive reaction was obtained in 15%, and the reaction was obtained most often between the 6th and 10th days *post partum*. Fractionation of the total xanthoprotein content makes it seem probable that an increase of the intermediary aromatic amino acids is an indication of autolytic processes in the uterus in the puerperium. A pos. xanthoprotein reaction was obtained in 40% of the toxicoses of pregnancy, nephropathy and eclampsia. The xanthoprotein reaction is often markedly increased in cases of carcinoma of the uterus after x-ray or radium irradiation. Possibly the reaction will furnish a means for following the effect of irradiation in carcinoma cases. HARRIET L. HOLMES.

**Carbohydrate metabolism in cancer of the uterus after Röntgen and radium irradiation.** I. LUCAS. *Arch. Gynäkol.* 141, 389–411(1930). In 10 cases of carcinoma of the uterus after treatment with x-ray or radium irradiation the sugar content and lactic acid content of the blood remain normal with the exception of a transitory increase in lactic acid content shortly after irradiation. The values for the alkali reserve indicate a hypocapnia of the blood. There was a decrease of alkali reserve 2–4 hrs. after the irradiation which was of short duration and 24 hrs. later there was an increase of alkali reserve which was slightly increased by each further irradiation. However there is never a return to normal $CO_2$ binding power. The transitory increase in lactic acid shortly after irradiation coincides in time with the decrease in alkali reserve. The products of carbohydrate metabolism furnish no explanation for the persisting hypocapnia in patients with carcinoma of the uterus. HARRIET L. HOLMES.

**The Manoiloff reaction for pregnancy.** F. FREUDENBERG AND K. OTTO. *Arch. Gynäkol.* 141, 450–61(1930). The Manoiloff reaction (C. A. 24, 1115) for pregnancy was tried on sera from pregnant women, from healthy nonpregnant women and healthy men, and from patients with conditions that frequently give pos. results with other serological tests for pregnancy. The reaction was 61% pos. in the later months of pregnancy, but almost uniformly neg. in the earlier months of pregnancy. The reaction, therefore, is of no practical importance for the diagnosis of pregnancy. The reaction is not sp. HARRIET L. HOLMES.

**The two types of bilirubin diazo reactions in serum, with a hypothesis on the nature of the bilirubin in the serum from hemolytic jaundice.** G. HUNTER. *Brit. J. Exptl. Path.* 11, 115–9(1930). An attempt has been made to det. the probable nature of the 2 kinds of diazo reactions for bilirubin obtainable in icteric sera. The so-called direct reaction, as it occurs in bile or in the serum of patients with obstructive jaundice, is most probably due to the presence of Na H bilirubinate. The so-called delayed reaction as it occurs in hemorrhagic exudates and in the serum of patients with hemolytic jaundice is probably due to the presence of free bilirubin in an undetd. solvent which is sol. in alc. The bilirubin solvent (it may be a lipoid or sterol) need be present in only relatively small amts. to retain the bilirubin in solution on the addn. of alc. The bilirubin may be in combination with its solvent or some other serum constituent so that it resists salt formation and oxidation. It would not be dialyzable or extractable with $CHCl_3$. H. thinks such a hypothesis to account for the delayed type of bilirubin would fit the findings better than the assumption of the presence of colloidal bilirubin. H. L. H.

**Phosphorus, total calcium and diffusible calcium content of the blood sera of lepers and their relation to bone changes.** JURATH G. WOOLEY AND HILARY ROSS. *U. S. Pub. Health Repts.* 46, 611–55(1931). —Sera from 47 lepers were analyzed for Ca and inorg. P, the results were found to be within the range usually considered normal. Sera from 15 normal, healthy young men were examd. for inorg. P, total Ca, diffusible Ca; the % of Ca that was diffusible, the Ca P and the diffusible Ca P balance ratios were detd. Sera from 61 lepers, representing the various types and stages of progression of the disease, were similarly examd. The diffusible Ca and the % of total Ca that was diffusible averaged considerably lower in the lepers than in the normal young men, and in only a few instances did the diffusible Ca in the lepers approx. the level found in the controls. Radiographic studies of the bones of the hands and feet of 18 of these lepers showed bone atrophy in 11 (61.0%), the condition manifesting itself either as decalcification or absorption. The writers appreciate that the records here submitted do not include a sufficient no. of cases, observed over a sufficiently long period, to warrant the drawing of conclusions, it is thought, however, that deviation from the presumed normal has been marked enough to justify continuation of the investigation. J. A. KINNEY.

**Antigenic value of scarlet-fever streptococcus toxin modified by the action of formalin.** M. V. VELDEE. *U. S. Pub. Health Repts.* 46, 693–8(1931).—V. briefly

reviews the data presented by various independent workers The exptl work here presented confirms the findings of others that scarlet fever streptococcus toxin can be rendered much less toxic by subjecting it to heat and formalin *The antigenic value of* the toxin apparently is not destroyed either by the action of the formalin or by the prolonged exposure to 37° to 38°. The amt of antigen tolerated by susceptible individuals *in each injection is greatly increased* by this method of detoxification, so that the number of doses required for active immunization may be reduced At the same time the reactions following the injections occur much less frequently and their severity is markedly diminished Further experimentation may, it is hoped, develop a technic for removing the remaining toxic factor, thereby eliminating *all disagreeable reactions* and permitting the use of greater quantities of antigen J A KENNEDY

**The reactions of immunity among invertebrates** J CANTACUZÈNE *Arch roum path exptl microbiol* 1, 1-75(1928) —The introduction into the celom of *Sipunculus nudus* of sheep red corpuscles causes a certain no of reactions on the part of the organism which have as their final effect the elimination of foreign particles in suspension in the cavity liquid, their reabsorption and the ultimate incorporation of the residue of this process into the brown bodies of the general cavity The reabsorption is brought about solely by the phagocytes, the phagocytic action is facilitated by the agglutinant action of the viscous secretions The process is characterized by an overproduction of all the cellular elements, and an intensification of their secretions, as well as a marked tendency toward agglutination and pptn MARIE MAXIM

**Investigations in the resistance of diphtheria and dysenteric toxin to different concentrations of hydrogen ions** C IONESCO MIHAIESTI AND A DÂMBOVICEANU *Arch roum path exptl microbiol* 1, 115-21(1928) —The destruction of the diphtheric toxin by the different concns in H or OH ions is not immediate For zone $p_H$ 4 7-4 9 and 9 6-10 1 *the toxicity is almost unchanged for 30 min For 24 hrs the limits are* $p_H$ 5 7-5 9 and 9-9 4 Likewise for dysenteric toxin the toxicity does not diminish until after a certain time, 30 min in a medium of $p_H$ 2 07-2 15 or $p_H$ 11 does not suffice for any change, 24 hrs of $p_H$ 2 5-3 completes the action of the toxin MARIE MAXIM

**Appearance of a desensitizing and hypotensive substance in the organism after blocking of the reticulo-endothelial system.** I MODOVAN *Arch roum path exptl microbiol* 1, 167-77(1928) —The intravascular or intraperitoneal injection of substances provoking the blocking of the reticulo-endothelial tissue brings about in the serum of inoculated animals the appearance of a desensitizing hypotensive, thermoresistant substance, sol in acids, alc, water, easily dialyzable through membranes of collodion and which has not been identified MARIE MAXIM

**Investigations on blood lipase in different forms of tuberculosis** I NICOLAU AND O ANTINESCU *Arch roum path exptl microbiol* 1, 437-51(1928) —Fat. detd according to the stalagmometric method is generally diminished in the blood of tuberculous patients, its variations are in relation to the general state of the sufferer and not to the degree of tuberculous lesion MARIE MAXIM

**The glycogenesis of the sarcoma of Peyton Rous.** E C CRACIUN. *Arch roum. path exptl microbiol* 2, 105-11(1929) —The sarcoma of Rous presents a quite abundant and irregular glycogenesis at the level of coagulation necrosis as well as with liquefying necrosis There is no relation between the glycogenesis and the virulence of this tumor MARIE MAXIM

**Investigations on specific substances (residual antigens) of the anthrax bacilli.** D COMBIESCO, E SORU AND S STAMATESCO *Arch roum path exptl microbiol* 2, 291-312(1929) —A water sol substance having the properties of polysaccharides has been sepd from *B anthracis* This substance is not toxic for white mice and guinea pigs, does not form antibodies and gives a pptn. with *specific serums The rotary* power after hydrolysis is —20, it contains hexoses and pentoses MARIE MAXIM

**Glycogenesis and regeneration of voluntary muscles.** E C CRACIUN *Arch roum path exptl microbiol* 2, 313 23(1929) —The sarcoblasts and granulation tissue contain no glycogen, this substance is often present in abscesses M M

**The heliotropic property of cholesterol in relation to cancer of the skin** A H ROFFO AND FR PILAR *J physiol path gén* 28, 854-6(1930) —Exposure of the skin to sunlight or ultra violet light increases its cholesterol *content In the authors' experience* 92% of the skin tumors of the face occur on parts directly exposed to the sun They conclude that there is a relationship between the heliotropic properties of cholesterol, its fixation in the skin and tumor formation L A MAYNARD

**The chemical investigation of lung tissue in pneumoconiosis.** LUIS ROSSI AND SANTIAGO A CELSI *Semana méd* (Buenos Aires) 1931, I, 629-34 —In the lungs of

miners in Bolivia, $SiO_2$, Fe, Al and Sn were found, the last at a ratio of 1 0961% calcd on dry or 0 272% calcd on fresh substance A R Meyer

**Studies on the subfractions of the serum globulins and albumins. II The distribution of lipoids, precipitinogens and bacterial agglutinins among the separate fractions of serum.** H Lustig and R Katz *Biochem Z* **231**, 39 44(1931) —The largest lipoid content is found together with the albumin and the smallest with the euglobulin fractions of serum Among the subfractions of euglobulins and pseudoglobulins the highest total lipoid and lecithin content is found in the proteins sol in NaCl and the smallest in the water sol ones The largest amt of the sp precipitinogen is also in the NaCl sol euglobulins and pseudoglobulins and the least in the albumin fractions I and II Normal agglutinins are chiefly associated with the euglobulin and are practically absent in the albumins Among the globulins the $Na_2CO_3$ sol fraction has the largest amt of agglutinin while the NaCl sol fraction has the smallest amt III. **Elementary composition, distribution of amide nitrogen, humin nitrogen, diamino nitrogen, mono- or non-amino nitrogen, of tryptophan, and of carbohydrate in the separate subfractions of cow serum.** H Lustig and P Haas *Ibid* 472 92(1931) The water absorption (% increase in wt of dry powder suspended in $H_2O$) of the different serum protein fractions is as follows water sol. euglobulin 88 12.4%, NaCl sol euglobulin 90 13%, $Na_2CO_3$ sol euglobulin 83 10%, and NaOH sol euglobulin 87 12.8%, water sol pseudoglobulin 88 11%, NaCl sol pseudoglobulin 81 12.5% $Na_2CO_3$ sol pseudoglobulin 68 9.5% albumin I 10.5 11%, albumin II 9.5 12.5% and albumin III 8.0 12.8% The elementary compn of the different fractions in the same order, are % C 51.80, 52 11, 55 76, 49 51 53 02 51 79, 57 11 51 70 51 27, 55 82 % H 6 38, 6 70, 7 27, 6 32, 6 75, 6 01, 7 53 7 25 6 71 7 71 % N 15 25 15 90, 17 81 9 83 14 05, 15 45, 13 25, 15 13, 14 69, 15 02 % S 1 64 1 55, 1 71 1 57 1 61, 1 41 1 18 2 37 2 18, 2 27 % P 0 00, trace, 0 15, 0 21, 0 12, 0 20 0 00 0 07 0 00 0 15 % $CH_3$ on O 0 16 0 00, 0 49, 0 47, 0 05, 0 42, 0 61, 0 57 0 00, 1 01 % $CH_3$ on N 0 70 1 50, 0 57, 0 38 0 11, 0 83, 0 68, 0 03, 0 58, 0 66 The percentages of amide N in the different fractions were 4 5, 1 5, 3 2, —, 4 3, 1 0 —, 4 8, 1 3 of humin N, 4 8 2 1 2 2, — 1 2, 1 0, —, 1 5, 1 7, — of diamino N, 27 6, 26 5, 27 0, 21 8, 26 0 , 32 5 33 7, —, of mono and non amino N, 68 2 71 8, 61 8, 72 2, 68 1, 63 8, 62 5 — The av percentages of carbohydrate were 0 81, 0 09, 2 38, 8 50, 0 08, 0 61, 0 40 0 17, 0 55, 0 65 S Morgulis

**Studies on antitricin.** Fritz Reuter *Biochem Z* **231**, 175 272(1931) —The antitricin is adsorbed with kaolin from an anti serum The relation of the antitricin to the serum proteins is thereby not affected since the latter are likewise adsorbed, the adsorption of both being proportional to the quantity of kaolin The adsorption is complete in 10 min , neither the order of mixing nor the degree of dilu of the serum being of any consequence Small amts of kaolin adsorb the antitricin and proteins without reacting $NH_2$ groups, whereas with larger amts proteins with reacting $NH_2$ groups also appear. A *M/3* phosphate buffer of *p*H 7 17 leaches out the antitricin only to a small extent, but this is improved by the addn of normal serum to the buffer NaCl does not leach out the antitricin even in the presence of a great excess of serum Infusorial earth Cy is an excellent adsorbent, and the antitricin can be very well leached out with phosphate buffer (not with NaCl), the ease depending upon the concn of the buffer Evidently the $PO_4$ ions are essential for the leaching out With increasing acidity of the buffer soln it becomes less suited for leaching out purposes Furthermore, the $PO_4$ ions also tend to displace the protein and antitricin from the adsorbent, since the latter treated with phosphate loses some of its adsorbing power The leaching out was repeated 3 times, most of the antitricin together with most of the protein being removed after the first leaching, each successive leaching, however, removing a const portion of the antitricin present in the adsorbent The second leaching yields antitricin poorest in protein Through fractional pptn with $(NH_4)_2SO_4$ much protein can be removed without affecting the antitricin content Further purification can be effected through electrodialysis, etc Antitricin is not attacked by proteinase, carboxypolypeptidase or trypsin S Morgulis

**Rose bengal in the examination of the liver function.** Attilio Ricci *Arch farmacol. sper* **51**, 25-31(1930) —R concludes from the analysis of liver-function tests on 12 patients that with the Rose bengal test the eliminating power of the liver, but not the entire functional ability of the hepatic cells, is detd When bile pigment or urobilin is found in the urine and when the Rose bengal test is positive, the functional ability of the liver is altered The reverse is not true, however, since the elimination may be normal, though the more complex functions of the liver may be impaired O Benwoch

**The gastric secretion in fasting patients** Flaminio Ricci, *Arch. farmacol.*

*sper.* 51, 55-63(1930) —In 70 patients with gastric disturbances the gastric secretion was studied with respect to quantity of fluid, free HCl and total HCl The samples were taken from patients in the fasting state or after a meal In the patients in the fasting state a distinction is made between the "immediate secretion" which represents the 1st sample taken and the "late secretion" comprising samples taken after the removal of the 1st sample, in 10-min. intervals for the following 30 min An "immediate fasting secretion" was found in 94% of the cases In 72% the quantity of juice was less than 40–45 cc. Quantities in excess of 40 cc. were found in diseases assocd with hypersecretion Quantities larger than 60 cc contained food residues and were due to pyloric stenosis Free HCl was found in 78.57% of the cases, this percentage increases with the "late secretion" or after a meal In general the immediate fasting secretion varied with the different gastric disorders and a relation between secretion and disease could be established In diseases assocd with hyperchlorhydria the secretion was generally abundant (25–60 cc.), while in diseases with normal or subnormal HCl the secretion was small (5–25 cc.) In the diseases with little secretion the content of free HCl was very slight About 30 cc. is considered as the normal immediate fasting secretion The "late secretion" was in general more abundant in cases with hyperchlorhydria and less abundant in cases with hypochlorhydria and anachlorhydria, the av quantity secreted within 30 min is 35–50 cc. The content of free HCl was generally greater in the late secretion than in the immediate secretion and slightly smaller than in the secretion after the meal The late secretion was quite frequently (30%) contaminated because of duodenal regurgitation, therefore this test is only of relative value The importance of the examn of the fasting gastric secretion is emphasized with respect to its value in the diagnosis. G Schwoch

*Uricidemia in diabetes mellitus.* Alfredo Ricci *Arch farmacol sper.* 51, 41–8(1930) —The uric acid of the blood was detd in 18 fasting diabetic patients who in the days previous to the expts had been given a diet low in purine-contg foods The uric acid was normal in the cases treated with insulin and was increased in the cases not treated with insulin Since the detns were carried out according to the method of Folin and Denis, and since xanthine and guanine give the same reaction with this method, R assumes that the oxidation of the intermediate products in the purine metabolism, for which the kidneys are impermeable, is retarded, thus giving rise to the accumulation of these products in the blood This hypothesis is supported by expts which were conducted to exam the degradation of the exogenous purine substances One normal person and 11 diabetics were given a meal consisting of 150 g liver and 50 g calf's tripe Three hrs later the uric acid was elevated in the healthy person and 6 hrs later it had almost returned to its initial value In the diabetics the uric acid was increased after 3 hrs and was still far above normal after 6 hrs. The uric acid curve of the diabetic treated with insulin was similar to that found in the normal person These results indicate that the purine metabolism is intimately linked with the carbohydrate metabolism, when the latter is deranged, as in the diabetic, the purine metabolism is also affected Insulin administration to diabetics restores the carbohydrate metabolism to normal and consequently the purine metabolism is also restored to normal G S

*Chloremia and azotemia in cardiopaths.* Serafino Manca *Arch farmacol sper.* 51, 81–94(1930) —Urea N and Cl of the blood and Cl of the urine were detd in 20 patients with heart disease who had been kept on a const diet for 2 or 3 days before the test The patients with compensated heart disease showed values similar to those obtained from 8 healthy people In the patients with non-compensated heart disease the Cl of the blood and urine was diminished while the non protein N of the blood was augmented The more the non-compensated state was reduced by proper treatment, the more the Cl and urea N approached normal values, without ever completely equaling them These findings are probably related to the fact that in these cases slight renal lesions persist even after compensation has occurred G Schwoch

*Lactacidemia in renal insufficiency.* Alfredo Ricci *Arch farmacol sper* 51, 141–4(1930) —Lactic acid was absent in the plasma of 12 patients with partial renal insufficiency, it was present (0.019 and 0.015%) in 2 cases of complete renal insufficiency Its presence signifies an unfavorable prognosis G Schwoch

The question of the effect of unilateral eye exturpation. Bernhard Dürken *Biol generalis* 6, 511–52(1930) —D had found in the course of earlier investigations on frog larvae that after unilateral eye exturpation the normal development of the midbrain extremities and non operated eye is inhibited The controls developed normally in the same water Further expts revealed that the water used in those expts. contained a small amt. of Zn which originated from a zinc plated storage basin. Recent investigations showed that in many cases the development of extremities, midbrain and eye, was

that of normal fowls This is a primary change resulting apparently from an overflow into the blood stream of the glucolytic enzyme, which Warburg showed to be in tumor tissue in greatly increased amounts An examn of the glucolytic activity of the blood of 16 patients with malignant tumors gave values that are within normal limits The detn of the glucolytic activity of the blood is, *therefore, of no clinical value in studying* malignant conditions The discrepancy between the glucolytic activity of the blood of hens with the Rous sarcoma No 1 and that of the blood of patients with malignant conditions is probably due to the greater ratio of tumor tissue to normal tissue in the fowls with the sarcoma H G WELLS

Immunological relationships among the pneumococci. V. Anaphylaxis and precipitation between antigens and antisera of yeast of type II pneumococci. JOHN V SLOCG AND JAMES M NEILL. *J Exptl Med* 53, 527–34(1931) —A report is given of the interactions of anaphylaxis and pptn between antigens and antisera derived from Type II variety of pneumococcus and from one variety of yeast That the reactions occurred only with Type II and not with Types I and III is proof that the pneumococcus antigen responsible for the anaphylaxis of the antiyeast sensitized animals was the type-sp carbohydrate (S) C J WEST

Bilirubinemia. E S GUZMAN BARRON *Medicine* 10, 77–133(1931) —An exhaustive critical review of the literature of the physiology and chemistry of bilirubin, methods of detn and their clinical application, with a bibliography of 290 references H G WELLS

Biochemistry of Rous sarcoma of fowls. I. Biophysics. V. Coagulation of the serum. JIŘÍ HOLÝ *Z Krebsforsch* 33, 133–45(1930), cf *C A* 24, 5858 —In all cases the quantity of serum proteins of normal fowls showed wide variations, quite as great as in disease, and the proteins show the same coagulation properties, whether normal or pathol, with most precipitants With $CuSO_4$ and $Cd(NO_3)_2$ some irregular differences were obtained VI. Alterations in the crystal form of sodium chloride. *Ibid* 146–54 —A difference was found in the crystal forms when serum from normal and sarcomatous fowls was evapd to dryness H G. WELLS

Vitamin A content of melanosarcoma of horses. SK. V GUDJONSSON *Z. Krebsforsch* 33, 155–7(1930) —The amt. present in the tumors and in the adjacent muscle tissue is very small. H G WELLS

Sulfur impoverishment of the body and the tendency to cancer. GRUMME *Z Krebsforsch* 33, 376–7(1931) —Purely speculative. H G WELLS

The stimulation of epithelial growth with synchronous disturbance of connective tissue growth in tissue cultures by substances which affect surface tension. M KATZENSTEIN AND ELSE KNAKE *Z Krebsforsch* 33, 378–410(1931) —Substances with high surface effects have a sp action on tissue cultures of the chicken embryo Cholesterol or amyl alc. depresses connective tissue growth and stimulates epithelial proliferation. Other substances exert a similar effect in direct proportion to their surface effects H G WELLS

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## H—PHARMACOLOGY

A N RICHARDS

Avertin F B PARSONS. *Brit Med J.* 1930, II, 554–7, cf *C A* 24, 5373 — A review of the chem properties and the clinical uses of this drug J B. BROWN

Sodium amytal and other derivatives of barbituric acid. L. G ZERFAS. *Brit Med J* 1930, II, 897–902 —A review J B BROWN

The elimination of ethyl iodide after inhalation and its relation to therapeutic administration HERRMAN L BLUMGART DOROTHY ROURKE GILLIGAN AND JACOB H SWARTZ *J Clin Investigation* 9, 635–50(1931) —Following the introduction and inhalation of 1 to 3 cc. of EtI in the inspired air, 45% is immediately exhaled during the treatment, 9% is exhaled during the next 2 hrs and 31% is excreted by the kidneys as iodide. A total of 85% of the dose is accounted for, the remainder being probably excreted in the sweat, etc. Eighty-five % of the urinary excretion appears in the first 24 hrs. and 97% in 48 hrs. To maintain high iodide concn in the body daily administration must be given, the treatment being omitted every 3rd or 4th day to avoid iodism. The % of EtI retained in the body is independent of the size of the dose J. B BROWN

Studies in congestive heart failure VIII. The effect of the administration of

dibasic potassium phosphate on the potassium content of certain tissues. J. Alfred Calhoun, Glenn E Cullen, Gurney Clarke and T. R Harrison *J Clin. Investigation* 9, 693–703(1931), cf *C. A.* 25, 1283.—Detns of total solid and K were made on skeletal muscle, cardiac muscle from both ventricles and on liver and kidney in subjects dying without cardiac disease, with congestive heart failure without K and with congestive heart failure when K was administered during life The controls showed a higher K content in both wet and dry tissues than the heart failure cases The administration of K to the heart cases increased the tissue K, but the difference was most striking with skeletal muscle and least in heart muscle J B Brown

The toxicity and balantidicidal action of "di-hydranol" in guinea pigs. Norman A David and Chauncey D Leake *Proc Soc Exptl Biol Med* 28, 196–9(1930).—"Di-hydranol" (2,4 dihydroxyphenyl *n* heptane) caused death in the guinea pig in about 4 days with symptoms of loss of wt, diarrhea and lethargy at an av single dose of 400 mg per kg of body wt It cures *Balantidium coli* infested guinea pigs when given in doses of 75–100 mg per kg at 1–2 day intervals until the total amt. administered is 200–225 mg per kg of body wt Doses slightly higher than the curative range may be toxic C. V. Bailey

Value of hexuronic acid in the treatment of Grave's disease with suprarenal cortex. David Marine, Emil J Baumann and Bruce Webster. *Proc Soc. Exptl Biol Med* 28, 327–9(1931).—Marked clinical improvement followed the oral administration of a glycerol ext of fresh ox suprarenal cortex in patients with Grave s disease A hexuronic acid, readily destroyed by exposure to air, had been found in suprarenal cortex (cf *C A* 23, 1423) Large doses of hexuronic acid concentrate, 400 mg twice daily, given by mouth did not relieve the symptoms of Grave's disease and did not add to the therapeutic value of the suprarenal cortex ext C V Bailey

Effects of the halogenation of hydroxyquinoline on biological activity. H. H Anderson, N A David and Dorothy A Koch *Proc Soc. Exptl Biol. Med* 28, 484–5(1931).—Toxicity increased with halogenation of hydroxyquinoline and in proportion to the at wt. of the halogen The addn of both I and Cl to hydroxyquinoline caused a considerable increase in toxicity which was slightly reduced by the addn. of a solubilizing group The balantidicidal action in naturally infested guinea pigs was also increased by halogenation In monkeys naturally infested with *Endameba histolytica*, 900 mg per kg of body wt of iodochlorohydroxyquinoline given in divided doses over a 6 weeks' period eradicated the amebae. C. V. Bailey

Blood-sugar response to intravenous insulin in normals and in diabetics. Wm S Collens and Harold G Grayiel. *Proc Soc. Exptl Biol Med* 28, 487–9(1931).—Equivalent intravenous doses of insulin on the basis of body wt. produce a much greater depression in the blood sugar level in diabetic than in normal man The absence of an insulin-inhibiting substance in the blood of diabetics is inferred C. V. Bailey

Parathyroid and fluoride hypocalcemia. R Gerschmann *Compt. rend. soc biol.* 104, 411–2(1930).—See *C A.* 25, 348 E. J. C.

Parathyroids and hyperglucemic curves. R. Gerschmann *Rev soc. Argentina biol.* 6, 35–9(1930).—See *C. A* 25, 348 E. J. C.

Bromide poisoning with the picture of typhus abdominalis. Heinrich Mayrhofer and Alfred Feszler *Wiener klin. Wochschr.* 43, 1315–6(1930).—A case is described D. B. Dill

The comparative effects of diuretics containing mercury. Elisabeth Berger. *Wiener klin. Wochschr.* 43, 1505–8(1930).—The diuretic properties of $NH_4Cl$, $NH_4Br$ and *HCl* are due to acid formation in the organism. They are used together with *salyrgan* and *decholin* when these alone are ineffective D B Dill

The effect of age upon the action of thyroxine. Emil Abderhalden and Ernst Wertheimer *Z. ges exptl Med.* 68, 1–19(1929).—*Loss of weight and toxicity are* more marked in older or heavier guinea pigs and rats when given thyroxine than in younger or lighter animals The glycogen losses are more marked in the older animals. No definite differences were made out with regard to gaseous and N metabolism at different ages, following administration of thyroxine Increasing the dosage of thyroxine from 0 3 to 3 mg per day in young animals results in but very little increase in toxicity. F. L. Dunn

Ketonuria in experimental hyperthyroidism. I. Abelin and A. Jordi. *Z. ges. exptl. Med.* 68, 20–31(1929).—*Following thyroid ext. feeding* or injections of thyroxine in rats there is an excretion of acetone, diacetic acid and β hydroxybutyric acid in the urine, the last being in greatest amt. Maximal excretion occurs on the 10–14th day. It is much less than that observed following phlorhizin or alkaloids. F. L. Dunn

The influence of thyroxine on the blood iodine in myxedema. B. Eisler and

A SCHITTENHELM *Z. ges exptl Med* 68, 487-92(1929) —The I content of the blood is markedly lowered in myxedema Thyroxine administration (oral or intravenous) raises the blood I above the normal values for a short period after which it remains *normal* The blood I in normal individuals is not altered by thyroxine feeding F. L. DUNN

Mechanism of action of small doses of salts and "Trunecek-serum." K. I. KOTELNIKOV *Z. ges exptl Med* 69, 297-320(1930) —Subcutaneous injection of inorg. salts (5–15–25 mg) and Trunecek serum results in *definite changes in the acid base* balance measured by alveolar air $CO_2$ F. L. DUNN

Intravenous injection of ethyl alcohol for anesthesia. I. I. NITZESCU *Compt rend soc biol* 104, 25–8(1930) —See *C. A.* 24, 5865 G. G.

Action of arsenite on tissue respiration. ALBERT SZENT GYÖRGI. *Biochem J.* 24, 1723–7(1930) —Arsenite strongly inhibits respiration of minced liver tissue, but has no effect on O activation, and little effect on H activation. In yeast, arsenite in higher concns inhibits respiration but has no effect on alc. fermentation B. H.

*Ethylene and carbon dioxide.* JAMES TAYLOR GWATHMEY AND M. HILLEL FELDMAN *Dental Cosmos* 72, 1164–6(1930) —The use of $C_2H_4$, $N_2O$, $CO_2$ and $O_2$ for general anesthesia is described JOSEPH S HEPBURN

Effects of strontium administration on the histological structure of the teeth of rats. HENRY KLEIN, J ERNESTINE BECKER AND E V MCCOLLUM *J. Dental Research* 10, 733–8(1930) —A *ration, adequate in all respects except its* Ca content and contg Sr chemically equiv to 0.6% Ca, produced a proliferation of dentinoid, *i. e.*, the uncalcified ground substance, when fed to rats JOSEPH S HEPBURN

Contraction of the extrinsic muscles of the eye by choline and nicotine. W. S DUKE-ELDER AND P. M. DUKE-ELDER *Proc Roy Soc* (London), B107, 332–43(1930) —Choline, acetylcholine and nicotine produce a slow, tonic contraction of the normal extrinsic muscles of the eye, which is unaffected by atropine, increased by adrenaline and abolished by nicotine plus curare JOSEPH S HEPBURN

Experimental addiction of animals (monkeys) to opiates. LAWRENCE KOLB *U. S. Pub Health Repts* 46, 698–726(1931) —The relative effects in the order of their severity of the 3 drugs given to monkeys in one toxic dose or in smaller daily doses were toxicity *heroin* was decidely most toxic, *morphine* least toxic, general health *codeine* was *decidedly most harmful heroin least harmful, dependence producing properties morphine* was most potent, *codeine* very slight or nonexistent. J A KENNEDY

Intraperitoneal iron. CLIFFORD G GRULEE AND HEYWORTH N SANFORD. *Am. J. Diseases Children* 41, 53–61(1931) —Fe injected intraperitoneally into rabbits becomes deposited in the liver rather than in the spleen The hemoglobin and erythrocyte *contents of the blood remain unchanged* The *intraperitoneal administration of Fe to* children with secondary anemia appears to be a safe and easy way of introducing Fe into the organism and creating a reservoir upon which the body may draw Following the intraperitoneal injection of 5–8 mg of Fe, as colloidal $Fe(OH)_3$, at 3-day intervals, the hemoglobin content of the blood and the no of erythrocytes become markedly increased. The injections are combined with exposure to ultra-violet light or with blood transfusions. E. R. MAIN

The blood constituents in acute rheumatism before and after salicylate treatment. EVELYN M HICKMANS AND SIDNEY H EDGAR *Arch Disease in Childhood* 5, 387–96 (1930) —The urea, non protein N and uric acid contents of the blood are somewhat higher than normal in acute rheumatism The values tend to remain high during treatment with salicylate The urea tends to become increased after the treatment while the administration of the same *quantities of salicylate to normal children does* not affect the urea content of the blood The treatment with salicylate may further decrease the degree of renal efficiency in acute rheumatism. E R. MAIN

Quantitative studies on local anesthetics A RABBENO. *Boll soc ital biol sper.* 5, 1094–8(1930) —The method used consisted in the application, to the dorsal skin of the leg of the *decerebrated frog, of a rectangular piece of cotton satd with the* soln. under examn., this was left for a definite time, and the reflexes were tested with disks of paper wetted with *N* AcOH By varying the time of application of the drug, at const. concn., the min. time necessary to obtain the abolition of the reflexes is detd. and with *successive tests at varying concns* a curve of the min time of anesthesia as a function of the concn. of the drug is obtained The curve is bound by 2 limiting values of concn the one which provokes immediate anesthesia (1 m.n) and that which acts after several hrs of application Pyrryl alkyl or aryl ketones (α acetyl, α-propionyl, α butyryl, α benzoylpyrrole) The curve which graphically represents the manner with which the min. time of anesthesia of pyrryl ketones varies with varying concns of the drugs is

an arc of an hyperbola, represented by the equation $y = a + (b/x)$ (1), where $y$ = min. time, $x$ = concns., $a$ and $b$ are consts. When $y = 0$, $x = b/a$, that is, for zero time, the curve intersects the axis of $x$ at a concn equal to $-b/a$. For concns equal to or greater than this, anesthesia is almost immediate. From the intersection at $x$, the curve rises with varying rapidity as indicated by the numerical value of the const $a$ (acetylpyrrole —58.8, propionyl and butyryl —4). For values of $y$ between 60 and 140 min. the relation between the concns. is a const. and the conclusion is that the anesthetic activity of the acetyl-, propionyl-, butyryl and benzoylpyrrole increases as 1:10:110:250. Referred to cocaine, the activity of the acetyl and propionyl derivs. is less, while that of the butyryl and benzoyl derivs. is 8 times greater. Cocaine and cocaine substitutes (cocaine, stovaine, alypine, novocaine, eucaine B and tutocaine HCl). The curves for the min. time for these drugs resemble those of the pyrryl ketones. Cocaine gives values corresponding to equation (1), novocaine to $xy = b$, and the others to $y = b/(x - a)$. It was observed that the ratio alypine/cocaine, tutocaine/cocaine, stovaine/cocaine and eucaine/cocaine is const. only for very high values of min. time (150–200 min.) while for novocaine/cocaine it is 60–150 min. For lower values of min. time (10, 30, 60 min.), different numerical values are obtained. Conclusion: The activity of the local anesthetics used, tested by the method described, is less than that of cocaine. For brief intervals of anesthesia, alypine has just slightly less, tutocaine and stovaine has 2/3–3/4, eucaine 1/2 and novocaine 1/20–1/80 the activity of cocaine. PETER MASUCCI

Chloroform narcosis and radon. P. MASCHERPA. *Boll. soc. ital. biol. sper.* 5, 1167–72(1930).—White mice narcotized with $CHCl_3$ and kept in an atm. rich in Ra emanations showed more rapidly phenomena of excitation and the narcosis intervened more quickly than in the control mice that were also narcotized but kept in ordinary air. Also on awakening, the radioactivated animals required a longer time to reëstablish normal functions than the controls. PETER MASUCCI

Uroselectan in pyelography. JUAN SALLERAS. *Semana méd.* (Buenos Aires) 1931, I, 570–1.—Uroselectan was given intravenously. In most cases satisfactory results could not be obtained. A. E. MEYER

Irradiated ergosterol in the treatment of tuberculosis. F. MEERSSEMAN AND G. TRICAULT. *Semana méd.* (Buenos Aires) 1931, I, 595–6.—In 11 human cases, improvement was observed. Tuberculous guinea pigs treated with irradiated ergosterol lived longer than the controls, and the lesions were found to be less severe. A. E. MEYER

The treatment of asthma with sulfarsenol. FÉLIX J. LICEAGA. *Semana méd.* (Buenos Aires) 1931, I, 636–51.—Clinical cases of successful treatment are reported. A. E. MEYER

Clinical investigations into the effect of intravenous injections of insulin. V. The action of adrenaline on the stomach secretion. KAJ ROHOLM. *Acta med. scand.* 74, 359–69(1931); cf. *C. A.* 25, 353.—It was found that injections of insulin stimulate gastric secretion and that this stimulation was really an adrenaline effect. However, adrenaline injections have no effect upon the secretion of the fasting stomach. S. MORGULIS

The effect of colloids on histamine action. BEHREND BEHRENS. *Biochem. Z.* 231, 92–4(1931).—Small amts. of kaolin or talcum do not affect the action of histamine but large amts. may cause inhibition. S. MORGULIS

The fate of parenterally administered sulfur. R. MEYER-BISCH AND F. TECHNER. *Biochem. Z.* 231, 110–2(1931).—No changes either in the water content or in the hydrolyzable and total S of the liver have been found in rabbits receiving S parenterally. The changes in S metabolism must therefore be attributed to processes occurring in more peripheral organs, such as cartilage, skin, etc. S. MORGULIS

Influence of insulin on blood and organ lipoids. IRVINE H. PAGE, L. PASTERNAK AND MARIE L. BURT. *Biochem. Z.* 231, 113–22(1931).—The most pronounced effect of insulin is manifested in the phosphatide content of serum, which diminishes 30%. The cholesterol contents of the blood, kidney and brain are higher than those in the non-insulinized controls. The aliphatic acid contents of brain, blood and serum seem to diminish under insulin, but the $I_2$ nos. of the acids increase in some (brain, liver) and decreases in other tissues (blood, serum). S. MORGULIS

The relative toxicities of some organic salts of triethyl lead hydroxide. HENRY GILMAN AND O. M. GRUHZIT. *J. Pharmacol.* 41, 1–4(1931).—The m. l. d. intravenously to rats, and the m. l. d. for the first 3 intramuscularly to rabbits are given for the following: triethyl lead salicylate, triethyl lead phenyl acetate, triethyl lead furoate, triethyl lead *p*-toluenesulfonate, triethyl lead *p*-aminobenzoate, triethyl lead furylacrylate. All the compds. were extremely irritating and produced nervous symptoms. C. RIEGEL

Notes on the importance of exact preparation of tincture of digitalis and on the number of pigeons in the pigeon-emesis method. P. J. HANZLIK, A B STOCKTON AND S S DAVIS *J. Pharmacol* 41, 5–10(1931).—The min emetic dose (m em d) of digitalis tincture varied with the length of time allowed for extn of the digitalis leaves The practicability of using as the m em d that amt. causing emesis in 2 out of 3 pigeons is confirmed by detns on larger groups C. RIPGEL

Some clinical actions and therapeutic uses of racemic synephrine. A B STOCKTON, P T PACE AND M L. TAINTER *J. Pharmacol* 41, 11–20(1931).—Racemic synephrine raised the blood pressure in patients when 0.2 g intramuscularly or 0 05 g intravenously was given the rise being from 25 to 30 mm Hg, and lasting ½ to 1 hr It was ineffective in asthma, and did not prolong the action of procaine in local anesthesia Applied to the nasal mucous membrane it produced shrinkage of the mucosa without irritation, engorgement or swelling Solns of synephrine are stable and could be sterilized by heat. C RIEGEL

The effect of mechanical constriction of the hepatic veins upon the anticoagulant action of Witte's peptone. ELIZABETH CRANSTON AND O R CAILLET *J. Pharmacol* 41, 65–70(1931).—Constriction of the hepatic veins previous to injection of the peptone produced a delay in the appearance and a reduction in the intensity of its anticoagulant action, and a less marked reduction in platelet count. C RIEGEL

Apomorphine tolerance and its relationship to morphine tolerance. FRANK CO TUI *J. Pharmacol* 41, 71–82(1931).—Dogs habituated to apomorphine develop a tolerance to its emetic action, but not to its other effects Dogs tolerant to apomorphine are tolerant to the emetic action of morphine, and vice versa There is no cross tolerance as regards other effects Neither morphine- nor apomorphine-tolerant animals are tolerant to the emetic action of pilocarpine C. RIEGEL

Glycogen storage in the white rat when fed the roots of Arctium lappa. JOHN C. KRANTZ, JR., AND C. JELLEFF CARR *J Pharmacol* 41, 83–7(1931).—Glycogen storage in the liver was increased in rats fed the roots or the carbohydrate prepd from them, over that in rats fed only on a basal diet of cacao butter C. RIEGEL

The influence of insulin on the formed blood elements, on the sedimentation rate of the erythrocytes, and on the bleeding and coagulation time. GIULIO LEGA. *Arch farmacol sper* 51, 1–23(1930).—In the blood of the diabetic there exists in general a diminution of hemoglobin and red cells, a slight and inconst. increase in leucocytes and bleeding time, and an almost const increase in coagulation time and sedimentation rate The graver the condition of the diabetic is, the more marked are these changes, though they are not directly related to the degree of glucemia Dietetic treatment resulting in an improvement of the general condition of the patient causes an increase in erythrocytes and hemoglobin, but it does not influence the leucocyte formula, coagulation time, bleeding time and sedimentation rate. Insulin treatment resulting in a notable improvement of the general condition of the patient has a remarkable influence on the factors under examn, since coagulation time, bleeding time, sedimentation rate and no of formed blood elements returned rapidly and almost constantly toward physiol conditions G SCHWOCH

The behavior of experimental glucemia in cases of diabetes mellitus treated with insulin. GIULIO LEGA *Arch farmacol sper* 51, 33–40(1930).—When 20 g of glucose in 200 cc. water was given to healthy persons, the blood sugar, which was detd. every 30 min for 3 hrs, rose to a max during the 1st hr after ingestion of the glucose Then it decreased and finally reached values below the normal level When the same test was carried out in diabetics, the rise in blood sugar was much greater, the values remained at an elevated level for a considerably longer period, the decrease was much slower, and the original level was not reached at the end of the 3rd hr The grave cases presented the strongest deviations from the normal curve The more a case improved under insulin treatment, the more closely the glucemic curve approached the normal type The improvement in the condition of the patient is due to the improved functioning of the pancreas brought about under the influence of insulin Thus the test described may serve as a method of detg the functional ability of the pancreas with respect to its internal secretion G SCHWOCH

Is codeine without influence on the blood pressure? LUIGI SCREMIN *Arch. farmacol sper* 51, 97–110(1930); cf *C. A* 24, 4648.—Intravenous injections of small doses of codeine caused an increase in blood pressure in rabbits and guinea pigs In the cat the blood pressure was raised by very small doses of codeine, somewhat larger doses, which, however, were still far below the min convulsive dose, caused a considerable decrease in blood pressure G SCHWOCH

The action of photodynamic substances on the carbohydrate metabolism. II.

GABRIELE MONASTERIO *Arch. farmacol. sper.* 51, 111–24(1930).—In an earlier study M had investigated the influence of trypaflavine on the blood sugar of rabbits In this work its effect on the blood sugar of dogs was studied Intravenous doses of 5 mg per kg were without effect on the blood sugar Ten mg caused a pronounced hyperglucemia, while 40 mg caused hypoglucemia after about 7 hrs Trypaflavine is quite toxic for dogs, and therefore the 40 mg dose was given in single doses of 10 mg each at intervals of 1 hr This method of subdividing the dose is probably the reason why the hypoglucemia was preceded by a hyperglucemia The symptoms of hypoglucemia consisting of generalized tremors and sometimes convulsions disappeared after glucose injection, but the animal remained in poor condition because of the intoxication caused by the trypaflavine When rabbits injected with 20 mg trypaflavine per kg were irradiated by ultra violet rays the hyperglucemia produced in them was much more intense than when they were kept in the dark after injection of the same dose Other expts were concerned with the influence of antiphotodynamic substances injected simultaneously with or after, the administration of trypaflavine When small doses of resorcinol totalling about 0 5 g were injected into dogs, which a few hrs previously had received sufficiently large doses of trypaflavine, the hyperglucemia developed normally, but the onset of hypoglucemia was greatly retarded When the resorcinol was injected at the beginning of the expt., the onset of hyperglucemia was retarded Eosin injected subcutaneously or intravenously did not alter the blood sugar of normal rabbits The hyperglucemia induced in rabbits by adrenaline or subcutaneous injection of glucose was intensified after eosin administration On the other hand, the hypoglucemia producing effect of insulin was attenuated by eosin Of some other acridine derivs studied, acridine orange and, to a slight extent, flavicid are capable of producing hyperglucemia Rivanol was without effect Inconst results were obtained with acridine yellow and acridine red G SCHWOCH

**Changes in the osmotic pressure of the organs after intravenous injection of urea** LUIGI SCREMIN *Arch farmacol sper* 51, 129–34(1930), cf Messini *C A* 24, 657.—The expts were carried out on 8 rabbits to which quantities of urea varying from 2 10 to 0 80 g per kg were slowly administered by intravenous injection of a 13% soln. The animals were bled to death 90 sec after the injection was completed and the osmotic pressure of the blood serum and various organs was detd by the cryoscopic method In normal rabbits Δ rises in the organs examd in the following order serum, brain, muscle, heart, kidney, liver In the exptl animals Δ generally increased with increasing doses of urea For a certain dose, serum always showed the lowest values, slightly higher values were found in the brain, while muscle and liver gave the highest figures However, the relative increase was greatest in the serum and was smallest in the kidney and liver The results obtained are discussed in connection with the pathogenesis of uremia, but no definite conclusions are drawn G SCHWOCH

**Influence of some carbohydrates on the toxicity of potassium cyanide.** P MORPURGO AND G MUSCOLINO *Arch farmacol sper* 51, 135–40(1930).—Mixts of 4% KCN soln and glucose soln (10–30%) were allowed to stand at 37° for 24 hrs When such mixts. in quantities corresponding to 2, 4, and 10 times the m l d of KCN were injected intramuscularly into pigeons, the animals remained alive and well It is calcd from the quantities of glucose added that 1 g KCN is neutralized *in vitro* by 15 g glucose or less After a certain period of time the KCN-glucose solns assume a distinctly ammoniacal odor however, the reactions of Wortmann and Pagensteeher Schönbein remain positive In attempting to hydrolyze the glucose in the glucose-KCN complex a mixt of KCN and glucose soln was treated with yeast After the treatment the mixt. does not reduce Fehling soln., which shows that KCN, after combining with glucose, has lost its antienzymic properties, however, its toxicity was not restored Similar expts. in which glucose was replaced by other carbohydrates showed that fructose, galactose, mannose and lactose also neutralized KCN, while dextrin, sucrose and gum arabic did not Starch was only very slightly effective as a neutralizing agent. G SCHWOCH

**The action of yohimbine on the blood pressure and the reversal of the blood-pressure action of adrenaline and adrenalone by yohimbine.** MASASHI YAMAUCHI. *Okayama Igakkai-Zasshi* 40, 1220, *Chem Zentr* 1929, II, 3029.—Small doses of yohimbine cause an increase in blood pressure by exciting the vascular muscle itself The blood-pressure reducing effect of larger doses of yohimbine seems to be due to the ability of the poison to render the sympathetic fibers insensitive for the adrenaline, which always circulates in the organism, therefore only the action of adrenaline on the vasodilators becomes manifest, which then surpasses the exciting action of yohimbine on the vascular muscle By a previous treatment with yohimbine the action of adrenalone is inhibited more strongly than that of adrenaline G SCHWOCH

Reversible coagulation in living tissue. I WILDER D BANCROFT AND J. E RUTZLER, JR. *Proc Natl Acad Sci.* 17, 105–11(1931).—Anesthesia and anaphylactic shock are due to the reversible coagulation of protein in certain nerve colloids. Intravenous injection of a 10% NaCNS soln., which peptizes protein, hastens the return of consciousness of rabbits under ether, amytal or morphine anesthesia and prevents death from strychnine or histamine. It prevented anaphylactic shock in rabbits sensitized by subcutaneous injection of egg white sol. KCNS cannot be used because of its high toxicity. D. S. SEARLE

The influence of insulin and adrenaline on the sugar content of the spinal fluid. J. LUKÁCS. *Magyar Orvosi Archivum* 30, 591–7(1930).—The sugar of the spinal fluid is decreased after the injection of insulin. Decrease in blood sugar sets in sooner than that in spinal fluid. Preceding the decrease in the sugar of the spinal fluid a temporary increase takes place, this is not true for blood sugar. Adrenaline raises the sugar in the spinal fluid and also in the blood, however, the increase in blood sugar takes place first. H. TAUBER

The action of histamine on human blood vessels. J. POGÁNY. *Magyar Orvosi Archivum* 32, 51–6(1931).—0.001–0.002 mg. of histamine intravenously injected into the human vein causes a rise in venous pressure, which sets in immediately after injection but only in veins affected first by adrenaline. 0.01–0.02 mg. histamine also raises venous pressure. The rise sets in after 25–60 sec. and is manifested by accompanied *warmth. This can be eliminated if the vein is shut off in the capillary region.* H. TAUBER

The action of histamine on human adrenaline sensibility. J. POGÁNY AND G. PILAU. *Magyar Orvosi Archivum* 32, 57–61(1931).—The adrenaline sensibility is increased considerably 30–50 min. after subcutaneous injection of small doses (0.005–0.01 mg. per body wt.) of histamine. This effect is attributed partly to the dilatation of peripheric small vessels and partly to the characteristic histamine distribution in the blood. H. TAUBER

Induction of lymphocytosis and lymphatic hyperplasia by means of parenterally administered protein. BRUCE K. WISEMAN. *J. Expl. Med.* 53, 499–510(1931).—In this study 2 animals received chick "embryonic ext." intraperitoneally, 2 intravenously and 1 subcutaneously, 2 received egg albumin intravenously and 1 subcutaneously, 1 received normal horse serum intravenously and 1 received normal salt intravenously, each injection carried approx. 50 mg. of protein in 60 cc. normal salt soln. The injections caused an increase of lymphocytes in the peripheral blood varying from 23 to 139%. It seems probable that the degree of response is conditioned upon the type of protein used. At autopsy the lymph nodes and spleen showed hyperplastic changes. The thymus did not participate in the hyperplasia. C. J. WEST

## I—ZOOLOGY

R. A. GORTNER

The oxidation-reduction potential in slugs (Agriolimax agrestis). EUGÈNE AUBEL AND ROBERT LÉVY. *Compt. rend. soc. biol.* 105, 358–9(1930).—Oxidation reduction indicators were injected into living slugs. The oxidation reduction potential figures for slugs were identical with those formerly obtained for caterpillars. The physiol. $r_H$ in aerobiosis is about 20, in anaerobiosis, it is lowered to a limit between 5 and 6. B. C. BRUNSTETTER

The action of placenta on the metamorphosis and on the development of the smooth muscles in tadpoles. G. GANFINI. *Boll. soc. ital. biol. sper.* 5, 949–53(1930).—The larvae of *Bufo vulgaris* were fed with raw beef, raw and cooked human placenta, aq. ext. of placenta and planktons. Raw, cooked or exts. of human placenta contained substances which accelerated the development and metamorphosis of tadpoles and activated the development of the smooth muscles. The amt. of these substances was, however, greatest in the beef. PETER MASUCCI

The importance of arginine-phosphoric acid in the metabolism of the reacting crustacean muscle. EINAR LUNDSGAARD. *Biochem. Z.* 230, 10–8(1931).—The metabolism of the reacting crustacean muscle is altered exactly like that of the frog muscle when its lactic acid production is stopped by poisoning with $CH_2ICOOH$, whereby the arginine-$H_3PO_4$ of the crustacean muscle behaves just as the creatine-$H_3PO_4$ of the frog muscle. *It is therefore concluded that the hydrolysis* of either arginine- or of creatine $H_3PO_4$ must be considered as a source of energy. The crustacean muscle is very much less sensitive to $CH_2ICO_2H$ than is frog muscle. S. MORGULIS

Hydrogen-ion concentration in a unicellular body. S. DATE. *Compt. rend. soc.*

*biol* 106, 89-93(1931) —The $p_H$ of the protoplasm of *Amoeba proteus* in the culture ($p_H$ = 8 0) is 6 4 to 7 3 (it is more acid during movement than during repose), the $p_H$ of the nucleus is a little higher than that of the protoplasm When the exterior $p_H$ varies from 5 to 9, it does not greatly influence the interior $p_H$ ALBERT L RAWLINS

A radioactive indicator method for estimating the solubility of acid lead arsenate within the alimentary tract of the silkworm. F C CAMPBELL AND CHARLES LUKENS *J Econ Entomol* 24, 88-94(1931) —This study describes the use of a radioactive indicator method for the detn of the amt of Pb evacuated by the silk worm (*Bombyx mori*) after being fed known dosages of $PbHAsO_4$ and $Pb_4(PbOH)(AsO_4)_3$ $H_2O$ An arsenate of Th B, a radioactive isotope of Pb, is mixed with known quantities of Pb arsenate The mixt is then fed to an insect The Th B accompanies the Pb wherever it goes in the body and the ratio of Th B to Pb will remain the same as in the original mixt regardless of the reactions into which the arsenate may enter The prepn which was fed to the insect was tested in an electroscope to obtain the quantity of Pb present The ash of the excrement was similarly tested and from this information the quantity of Pb, and therefore of the Pb arsenate evacuated, was obtained Results At least 25% of a moderately lethal dose of $PbHAsO_4$ (0 12 mg per g body wt ) passes into soln within the intestine during the survival period Basic lead arsenate was much less sol within the intestine C H RICHARDSON

The catalase content of the Colorado potato beetle during metamorphosis DAVID F FINK *J Agr Research* 41, 691–6(1930) —The variation in the activity of catalase during the metamorphosis of the Colorado potato beetle, beginning with the mature larva, was ascertained by making daily detns of the quantity of $O_2$ per g of tissue evolved from $H_2O_2$ by the action of catalase during prepupal and pupal development Analysis of the resulting data indicated a reduction in catalase of 10% on the first day of histolysis and 19% on the second, followed on the third day of histolysis by an increase which, when the pupa was formed, reached the max of 6% above that of the mature larva The decline in content of catalase during pupal development was continuous thereafter until a reduction of 51% below that of the mature larva was reached with the formation of the adult The curves obtained for catalase content and those previously reported for $O_2$ consumption and excretion of $CO_2$ (*C A* 19, 2536) were similar for the prepupal period of histolysis During pupal development, however, the catalase curve declined rapidly whereas the curves for $O_2$ and $CO_2$ followed the usual growth curve W H. ROSS

Phosphorus distribution, sugar and hemoglobin in the blood of fish, eels and turtles. C M MCCAY *J Biol Chem* 90, 497–505(1931) —The distribution of P in blood fractionated by Youngburg's method (*C A* 25, 1857) was detd by a modification of the method of Kuttner and Cohen (*C. A.* 22, 606); $HClO_4$ was used in place of $H_2O_2$ for the oxidation The total P in 100 cc. whole blood of pike is 87 mg., carp 92 mg., bullhead 77 mg., *Chelydra serpentina* 49 mg., compared with beef blood 22 9 mg. Figures for the P distribution, blood sugar and Fe are given During spawning the hemoglobin and reducing sugar in the blood of lamprey eels decreases while the total P is unchanged K V THIMANN

Physicochemical properties of crocodile blood. D B. DILL AND H T. EDWARDS *J. Biol Chem* 90, 515-30(1931) —The concn of protein in the serum and of hemoglobin in the blood of crocodiles is lower than in man The buffer value of the blood is also much less, although that of the serum protein itself is higher than in man The change in strength of acidity on oxygenating crocodile hemoglobin is twice as great as in human blood, and correspondingly the effect of $p_H$ change on the $O_2$ affinity is twice as great. The content and distribution of water, Na, K, Ca, Mg, Cl, $HCO_3$, phosphates, lactate and proteinate in the plasma and cells were also detd K V. THIMANN

*Effect of inorganic salts on photic orientation in Allolobophora foetida* (Sav.). VI. Magnesium sulfate, nitrate and chloride. IKITARO NOMURA AND SHINRYO OHFUCHI *Science Repts Tôhoku Imp Univ* [4], 5, 669–89(1930) —A large no of data are given to show that immersion of the worm in solns of $MgSO_4$, $MgCl_2$ and $Mg(NO_3)_2$ alters the degree of orientation to light The forward crawling mechanism in the brain and ventral nerve cord is also affected The effects are complex K V. THIMANN

Effect of light on porphyrin from the integument of the earthworm Allolobophora foetida (Sav.). SATARO KOBAYASHI *Science Repts Tôhoku Imp. Univ.* [4], 5, 703–78 (1930) —The worms were extd with 20% HCl alc., centrifuged, the filtrate was neutralized and extd with $Et_2O$. The well-washed ext was treated first with glacial HOAc, then with 20% HCl, re-extd with $EtO_2$ each time, washed and evapd., the whole operation being carried out in the dark. A yield of 1.5 g was obtained from 2 kg. worms. The spectrum of the porphyrin in 20% HCl alc slowly fades on illumination, but in 25%

HCl, in ale AmOH, $Et_2O$ or 6% HOAc ale., the 4 bands move slightly toward the violet and 2 new bands appear in the red at 643 and 670μμ With the appearance of the new bands the intensities of the others decreases The spectrum agrees approx with that *given by Fischer and Schaumann* (*C A* 17, 3349), and is entirely different from that of hematoporphyrin *The changes occur very rapidly and support the view that these pigments of the erythrocytes are photodynamically sensitive* K. V THIMANN

**Analysis of the proteolytic enzymes of Maja squinado by the adsorption method.** J J MANSOUR BEE *Proc Acad Sci Amsterdam* 33, 858–70(1930) —The ext. of the small intestine contains a protease, carboxypolypeptidase, aminopolypeptidase and dipeptidase The $p_H$ optimum of the protease of the raw ext *is* 6 0 on casein and 6 1 on gelatin, while that of the purified protease is 7 4 and 8 1 The raw ext is not activated by HCN, $H_2S$ or enterokinase, while the purified ext is activated by the latter Separation of the enzymes was achieved by differential adsorption on kaolin and on fuller's earth The protease was purified by repeated adsorption on $Fe(OH)_3$ J J WILLAMAN

## 12—FOODS

P C BLANCK AND H A LEPPER

**Chemical and physical methods in the examination of food products.** EGGERT. *Pharm Presse Wiss prakt Heft* 1931, 20–1 —An address is given which deals with some of the more recent methods W O E.

**International agreement for the unification of the presentation of analytical results on foodstuffs for man and animals** ANON *Ann falsi* 24, 69–75(1931) —Final text of the International agreement for the unification of the presentation of analytical results established as a result of the International conference held in Paris on May 13, 1929, by which a unanimous decision was reached A PAPINEAU COUTURE

**Determination of water in foods, condiments, etc.** B BLEYER AND W. BRAUN. *Z anal Chem* 83, 241–65(1931) —Water may be detd (*a*) by thermic expulsion and weighing the residue, (*b*) by distn with a high boiling liquid which is immiscible with water and measuring the vol of water in the distillate, (*c*) by treatment with $CaC_2$ and measuring the vol of $C_2H_2$ formed and (*d*) by detn of the dielec. const. These methods are discussed, and a no of typical food ingredients and food products were examd comparatively Conclusion There is no one method which is always preferable, but preliminary tests will show which particular method is best for a given material W. T. H.

**Biochemical data on wheat harvested at the experiment station of Bordenave.** CARLOS ALBIZZATI *Rev facultad cienc quim* (*Univ La Plata*) 7, Pt. 2, 53–7(1930) —Analysis of wheat in the processes of grinding and baking led to the development of an index designated as the "value of utilization" Any wheat having a utilization value of 95 or above is considered suitable Before discarding a wheat variety because of its low utilization value agronomical and ecological expts should be made with a view to a possible increase in the utilization value No conclusions are drawn with regard to bread making qualities and the diastatic properties of the wheat because of the insufficient no of expts performed B S LEVINE

**Artificial refrigeration in mill industries and its influence on the quality of flours.** S GOMÓRY *Magyar Mernok Epiteszegylet Kozlonye* 64, 387–92(1930) —The heat of the rollers has a bad influence on the chem and phys properties of flours Flours ground on cooled rollers contained about 0 5% more moisture and had their water-absorbing capacities increased by 1–2 cc for 100 g of flour Bread baked from such flours had a somewhat greater vol and was more homogeneous The glutenin content of flour did not change, but its quality changed because of its increased moisture content. Intensive refrigeration during rolling prevents evapn. of moisture from wheat, formation of pulpy knots in the flour and eventual fermentation. The flour yield of wheat ground under cooled rollers increased, *since peel particles are more easily sepd. from starch and aleuron* particles when the moisture content is higher S S DE FINLY

**Analytical control of imported flours.** JOS. KUTMAN *Chem Listy* 25, 53–9 (1931) —The methods for analyzing flours suspected of chem. treatment are described. Sp methods for N oxides, Cl, peroxides, bromates and iodates are given. F. M

**The significance of the acidity in baking.** E ELION AND L. ELION *Chem Weekblad* 28, 103–5(1931) —Twenty five g wheat flour extd with 500 cc. water contg 50 mg. tartaric acid gave an ext. (I) of $p_H$ 5 9 and with a *diastatic activity* more than twice as high as the diastatic activity of an ext. of the same flour made with water alone ($p_H$ 6 6) Adjusting the $p_H$ of I with alkali to 6 6 did not change the diastatic activity of this ext.

By extn. in the presence of tartaric acid the diastase is apparently either extd in larger quantity or changes to a more active form. F. DE LEEUW

New method for determining the swelling capacity of bread. L. KARÁCSONYI *Magyar Chem. Folyóirat* 36, 59–61(1930).—Detn. with a viscometer is made as follows: Cut up and moisten 10 g. bread crumbs. After 5 min. press through a sieve 10 cm. in diam. covered with Dufour's silk. Dil. the pulp with water to 100 g. with an exactness of 0.01 g. Pour the homogeneous pulp into an Ostwald viscometer (Lüers and Ostwald, *C. A.* 14, 1167) in a 20° thermostat, mix with an air current and measure the time required for flowing within 0.2 sec. Calc. the av. of 4–5 measurements. The results were well reproducible in the case of wheat breads. Detns. can be made in 30–40 min. as compared with the 24 hrs. of the sedimentation method according to Katz. S. S. DE FINÁLY

The distribution of electrolytes in milk and in the dialyzate. ALESSANDRO ROSSI *Boll. soc. ital. biol. sper.* 5, 1060–3(1930), cf. *C. A.* 24, 5359.—Milk, 20 cc. samples in collodion sacs, was dialyzed against 25 cc. of distd. $H_2O$. When osmotic equil. was reached, samples from the inside and outside of the sacs were analyzed for Ca, K and P. The results are given in tabular form. Conclusion: the K in the bound form is rather *labile and is dependent on the concn. of the diffusible fraction.* PETER MASUCCI

Dialysis of milk. I. MICHIO SAITO. *J. Agr. Chem. Soc. Japan* 6, 1087–92(1930).—Milk was dialyzed for 5 hrs. The outer soln. was evapd. under diminished pressure. The ppt. thus obtained was a mixt. of phosphates and Ca salts. In the *filtrate lactose and lactic acid were found. A substance giving no biuret reaction* but giving the ninhydrin reaction was found. Boiled milk was also dialyzed. The dialyzable N substances increased markedly, owing to the production of $NH_3$ by the heating. Y. KIHARA

*Does filtered milk keep longer?* K. VAS. *Kisérlet. Közlemények* 32, 342–55(1929), *Chimie & industrie* 25, 453(1931).—Filtration removes the coarser impurities but facilitates the dispersion of bacteria throughout the mass of the liquid, favoring more rapid decompn. of the milk. Of ten samples, in 1 the result was clearly unfavorable, in 3 no difference was noted, in the remaining 6 there was a retardation (up to 11 hrs.) in the rate of coagulation. It would appear that filtration is efficacious only if it is carried out immediately after milking, before the bacteria originally adherent to the larger particles of fecal matter and dirt have become distributed through the milk. A. PAPINEAU-COUTURE

The distribution of phosphorus in cow milk and a scheme for the separation of phosphatides. RINJIRO SASAKI. *Bull. Agr. Chem. Soc. Japan* 6, 52–61(1930).—Milk powder, dried by the Buflovak drum drier below 70°, was used. The greater part of the phosphatides was more easily sol. in warm alc. or warm acetone than in ether. The existence of much P in the phosphatide fraction has been proved. Y. KIHARA

Commercial sour cream. F. J. DOAN. *Creamery and Milk Plant Monthly* 20, No. 2, 21–2(1931).—A method of mfg. com. sour cream is given. Before the starter is added, the cream is pasteurized for 30 min. at 180°F. Pasteurization at the high temp. yields a cream which will increase in acidity more rapidly during ripening and which will reach max. viscosity in a shorter time. Homogenization of the cream after pasteurizing is desirable, as the sour cream produced from homogenized cream will be thicker in body and smoother in texture than sour cream produced from unhomogenized cream. Increased body of the sour cream may also be obtained by using cream of higher fat content, by adding solids in the form of plain condensed milk, by the use of gelatin and by the use of rennet. The cream is caused to sour by the addn. of 1–2% of lactic starter. The souring is allowed to proceed at 70°F. until 0.6 to 0.65% acid (as lactic) has developed, whereupon the cream is cooled and bottled. A. H. JOHNSON

The basic viscosity of ice cream mix. J. C. HENING. *Ice Cream Trade J.* 27, No. 2, 41–5, *J. Dairy Sci.* 14, 84–92(1931).—Mech. agitation of ice cream mixes reduces their viscosity by a partial splitting of fat clumps. The viscosity of mechanically agitated ice cream mixes may be further reduced by passing them through the homogenizer at low pressures. Different conditions of agitation may vary in their effectiveness in splitting fat clumps and introduce a variable factor in the magnitude of the basic viscosity. The term basic viscosity, as now used for ice cream mixes, denotes a value secured under specified conditions and not a correct min. value from the viewpoint of its being the lowest possible viscosity in the absence of fat clusters. A. H. JOHNSON

Determination of the egg content of egg pastes. O. SZAKACS. *Kisérlet Közlemények* 32, 459–60(1929), *Chimie & industrie* 25, 309(1931).—Digest 2 g. of paste with 100 cc. distd. $H_2O$ for 1 hr. shaking at 15 min. intervals; let stand 30 min.; to 70 cc. of clear soln. add 5 cc. of 5% $\beta$ naphthosulfonic acid, coagulate on a water bath at 90°, cool

without shaking and centrifuge The egg content is obtained by comparing the coagulum obtained with that of a blank detn As the results are very const., a graduated tube may be used instead of comparison with a blank. A P.-C.

Hawaiian honey. JAR. SVOBODA. *Chem Listy* 24, 462–3(1930) —*Hawaiian honey* imported into Czechoslovakia during 1927 had a powerful aroma and a saline taste. A complete analysis is given The salty taste was due to a high ash content (0 47–0 88%), in which the NaCl (0 03–0 09%) and KCl (0 19–0 29%) predominated FRANK MARTSH

Note on the manufacture and analysis of chocolates. RAOUL LECOQ *Ann fals* 24, 11–22, 96–104(1931) See *C. A* 25, 153, 1295 A PAPINEAU COUTURE

Refrigeration an essential in candy manufacture. TRESPER CLARKE *Refrigerating Eng* 20, 219–22(1930) —C. outlines the manner in which temp control has been applied to the candy industry The temp of the chocolate mix dets the viscosity of the mix and other properties assocd with viscosity. The proper rate of cooling of chocolate candy makes it possible to prevent "graying" or dulling Also the rate of cooling of sugar candies enables one to control the type of crystn. and to obtain the type of crystal desired. Dry rooms are maintained by removing excess moisture from the atm. by cold water or brine circulating in pipes Maintenance of proper temp and humidity makes it possible to store candy for 6 months to 1 year without deterioration. A H JOHNSON

The disappearance of ozone in cold-storage rooms. ARTHUR W. EWELL. *Refrigerating Eng* 20, 358–60(1930) —Under practical conditions the rate of decompn of $O_3$ *follows the equation for* monomolecular reactions With an initial concn. of 1 part of $O_3$ per million by vol the absorption in one half hr by the several food products studied was eggs 0 03 p p m., fresh apples 0.33 p p m., apples previously exposed to $O_3$ 0 06 p p m , fresh meat 0.38 p p m , meat previously exposed to $O_3$ 0.20 p p m. and cauli flower 0.21 p p m A H JOHNSON

A new method for the prevention of mold on marmalades, jellies, fruit pastes, etc. RUDOLF RIPA. *Konserven Ind* 1931, 171–3 —After jellification has begun, but before complete cooling, the surface of the product is coated with a thin layer of pectin soln. *The pectin soln. dries to a glaze which prevents mold growth. After complete cooling* the container is sealed. FRANCIS P. GRIFFITHS

Blue and green molds of oranges G B TINDALE AND S FISH *J Dept Agr. Victoria* 29, 101–4(1931) —The atm of the packing shed and the dust on the grader are *the important sources of infection of oranges with blue and green molds Both molds* may spread to sound fruit by contact. The optimum temp for infection with both types of mold is 70–78°F With shallow inoculations development of the molds is completely controlled by keeping the fruit at 94°F for 5 days. Oranges, however, will *not stand a temp of 94°F for more than 4 days without developing a bitter flavor* Storage of the fruit at 94°F for 3 days, which gives about 90% control of the molds, is recommended. K. D JACOB

Organic solvents for aiding the removal of spray residue from waxy or oil-covered fruit. R. L. ROBINSON *J Econ Entomol* 24, 119–25(1931) —*The removal of spray* residues from apples which have been sprayed with petroleum oils, or which are covered with an excessive wax formation, is difficult The addn. of certain org solvents (alc., $C_6H_4(CH_3)_2CO$, kerosene) to the HCl washing soln renders removal of the residue most effective. *Kerosene appears to be the most practicable for this purpose* C H R.

A simple test for sulfur dioxide content of dried apricots. W. R. JEWELL. *J. Dept Agr Victoria* 29, 90–1(1931) —Add 500 cc. of water to 2 oz. of the minced sample contained in a stoppered bottle and shake thoroughly every 10 min for 2 hrs Add a teaspoonful of starch soln , *prepd by boiling a teaspoonful of starch with 2 cups of water*, and 18 cc. of 0 1 *N* I soln , and shake vigorously for 15 sec. If the dark blue color persists at the end of this period, the sample contains less than 14 grains of $SO_2$ per lb. of fruit. A gray or apricot color indicates the presence of larger amts. of $SO_2$ If a green color develops, the test should be *repeated with the addn. of a larger amt. of starch soln.* The method is designed for rough testing at the packing shed K. D JACOB

The supposed relation between the $p_H$ value and acid taste of aqueous solutions, particularly wines. P CRISCI. *Ann chim. applicata* 20, 566–83(1930) —Although there is undoubtedly a relation between the $p_H$ *value of a wine and its acid taste, other* factors influence this taste markedly, such as sugar, EtOH, glycerol, salts, tannins, etc. The undissocd org acid radicals also affect this taste, as the addn. of org acids affects the acid taste noticeably, while it only affects the $p_H$ value slightly Dilu. of sour wines with water does not affect the $p_H$ *value much, but it greatly changes the* taste. A W CONTIERI

Refrigeration and the fishing industry (Finn) 13. Electricity in modern dairy plants (Dreux, Brunner) 4. Isolation of phytosterolin from wheat embryo (Nakamura, Ichiba) 10. Cherries cultivated in the Modena Province (D'Ippolito, Alberti) 11D. Biochemistry of tomato pigment (von Euler, *et al*.) 11D. Water requirements [in creameries] (Keihren, Stommel) 14. Activating metals or alloys [for containers for milk, butter or cheese] (Austrian pat. 121,243) 3. Cascading apparatus for drying cereals, etc (U S pat 1,796,324) 1.

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Treating meal. Erich Staudt Ger 515,843, May 22, 1926 Foodstuffs, especially meal, is sterilized, matured and bleached by treatment with compds contg. $ClO_2$ In the example, wheat or rye flour is treated with gaseous $ClO_2$ mixed with air and $CO_2$ The gas is absorbed by the meal

Improvement of the baking capacity of cereal flours. M Vuk and S. Gömöry. Hung 101,845, Nov 12, 1929 A paste-like pulp is formed of the flour with water. This pulp is kept at a temp higher than that at which albumins coagulate (drying, however, is avoided) until the outlines of starch particles begin to fade under the microscope. Then it is dried at a temp lower than that of caramelization and is ground to dust. Of this product 4–6% is added to flours to improve them

Heat treatment of flour. D W Kent-Jones, C. W Chitty and Woodlands, Ltd. Brit 338,603, Aug 23, 1929 Various details of app and procedure are described for heating cereal flours for use in ordinary manner or as addns. to untreated flour to improve its properties

Complex organic peroxides. Pilot Laboratories, Inc. Brit. 339,336, Aug 29, 1929. Mixts of the acid chlorides of higher fatty acids and benzoyl chloride, chlorobenzoyl chloride or bromobenzoyl chloride are treated with peroxidizing agents. Products are obtained suitable for bleaching flour, oil seed meals, soaps, oils, fats, waxes, egg yolk and other foods products, etc Acid chlorides derived from the mixed fatty acids of coconut oil may be used as an initial material Various details of procedure are described

Bread, etc. Jean J. Putscher Fr 37,165, June 28, 1929 Addn to 657,741. Petrolatum oil, glycerol and dextrin are added to the cooking salt ordinarily used in the manuf. of bread, etc, dough.

Irradiating bread or other products in baking ovens. Albert Wörner. U. S. 1,796,134, March 10. A Hg-vapor lamp is mounted in a baking oven with a reflector arranged to deflect the rays from the lamp so that all the irradiation is by reflected rays. This is stated to avoid impairment of taste such as direct irradiation may cause

Use of pectin in baked food products. Arnold S Wahl (to E W. Stewart & Co). U. S. 1,795,980, March 10 In making baked goods such as sweet rolls or cake, pectin is added to a sugar soln. used as an ingredient, in order to improve the texture and yield. The proportion of pectin may be about 5% the wt of the flour used.

Pectin. Roger Paul and Robert H. Grandseigne. Fr. 695,204, Aug 24, 1929. Neutral pectic juices are caused to solidify slowly to a gel at ordinary temp. by adding 2–10% of conc HCl The gel is afterward finely ground and washed free from HCl by water.

Milk preparation free from milk sugar. Jacob Pohlmann and Jacobus R. F. Rassers Ger. 515,894, Sept 13, 1928 See Brit 320,497 (*C. A.* 24, 2512)

Apparatus for pasteurizing milk, etc. Fritz G. Cornell, Jr. (to Jensen Creamery Machinery Co) U. S 1,795,932, March 10 Structural features

Corrugated heat-exchange shell apparatus suitable for pasteurizing milk Edgar B Nichols. U. S 1,797,014, March 17. Structural features

Tubular heat-exchange apparatus suitable for treating milk, cream, etc. Fritz G. Cornell, Jr. (to Jensen Creamery Machinery Co) U. S. 1,795,837, March 10 Structural features

Apparatus for pasteurizing, aerating and degasifying cream. OLIVER V. JONES and ALVIN SCHNEIDER U S. 1,796 051, March 17.

Apparatus for sterilizing milk. RICHARD SELIGMAN. Ger. 518,462, July 10, 1928 See Brit 302,743 (*C A* 23, 4279).

Apparatus for spray desiccation of materials such as milk. FRANK H DOUTHITT (one half to Chester E Gray) U S 1,797,055, March 17. Various structural details and details of operation are described Cf *C. A.* 24, 4560.

Conserving animal and vegetable matter, especially foods. RICHARD WILLSTÄTTER. Ger 515,900, Apr. 16, 1929. Addn. to 513,665 (*C. A.* 25, 1921). As in 513,665, HCN is used as the conserving agent. In conserving meat, 20 mg. HCN is packed with each kg of meat

Preserving food materials such as fruits, vegetables and meats. U. GIOMI Brit. 338,768, Dec. 17, 1929 Fruits such as strawberries, peaches, grapes or apricots are immersed in pure alc. and then dried before packing Vegetables and meats may be packed in vessels and then sterilized with steam, and all such products, placed in suitable receptacles, are subjected to a vacuum treatment, treated with an inert gas and then sealed App is described

Preserving foods such as fish or meats. M. T. ZAROTSCHENZEFF Brit. 339,172, Feb 16, 1929 The materials are rapidly chilled or frozen for preservation or transport by subjection to air satd with a highly atomized liquid such as fresh or sea water or brine in the form of fog and at a low temp (suitably about —22° to —25°) and may be subsequently defrosted by treatment with a fog laden atm at a temp. above freezing App. and details of procedure are described

Apparatus for freezing foods such as fish. ALEXANDER H COOKE (to Atlantic Coast Fisheries Co) U S 1,795,330, March 10 Heat-conducting elements depending from an endless-belt carrier serve as heat transfer means between the cooling agent and the articles to be frozen. Various structural details are described.

Meat extracts, etc. BEEFEX, LTD., and J. E ARS. Brit. 338,808, Jan. 30, 1930. Cubes of material such as meat exts. are toasted to sterilize them and harden their surfaces so that they can be handled without wrapping. Various details of treatment are described

Vacuum treatment of corn, fruits, etc. A E. JONSSON Brit. 338 635, Sept. 9, 1929 Vegetable products are subjected to a vacuum in the presence of a regulated proportion of water which is vaporized by heating during the continuation of the vacuum treatment (a temp of 30–45° being suitable for corn)

Apparatus for conditioning raisins or other fruits by dry air treatment. THOMAS W W FORREST (to Sun Maid Raisin Growers of Calif). U. S 1,795,302, March 10 Structural features

Filter press for raisins, etc. PAUL COMBESCURE Fr 695,211, Aug 27, 1929

Machine for extracting grape juice. KARL MAURER Ger 515,925, Aug 14, 1928

Cocoa preparations. G SENFTNER Brit. 339 034, Sept. 28, 1929 Radioactive chocolate is prepd., *e. g.*, by admix with sugars which have been dehydrated and then allowed to cryst. in water contg emanation or radioactive salts.

*Coffee preparations* W PÄFFGEN Brit. 339,543, Sept. 18, 1929 Caffeine and "roasting toxins" are stated to be removed by use of absorption paper impregnated with finely divided active C

Stock feed. GAGE A KENT U S. 1,796,031, March 10 Pea or nut-sized pieces of cracked pressed oil cake are provided with a substantially uniform and continuous coating of sorghum molasses, and each molasses-coated piece is further provided with a final coating of powd oil-cake meal which prevents adhesion

Preserving green fodder. SIGMUND VON KAPFF Ger. 518,463, Oct. 26, 1927. The fodder is sprayed with a soln. contg HCOONa and a salt or acid capable of liberating HCOOH therefrom

## 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Good lighting—*an executive problem* DEAN M. WARREN *Ind Eng Chem* 23, 512–6(1931). G G.

The use of emulsions in industry V KUBELKA *Chem Listy* 24, 354–7, 372–4 (1930), cf *C. A* 24, 5393.—The use of much com app for prepg lab or theoretical emulsions on a com scale is discussed FRANK MARESH

**Metafiltration.** GEORGES GENIN. *Rev prod chim* 33, 613-6(1930); cf *C. A.* 23, 1186; 24, 1961.—This method of filtration is described P THOMASSET

**The injurious action of smoke, dust, gases, factory fumes, etc., on plants.** ANTONIN ROLET *Rev gén sci* 42, 111-20(1931).—A discussion is given of the origin in the atm of chem gases, vapors from tar roads, illuminating gas and other contaminations, and their effect on plants J T SULLIVAN

**Heat transfer in superheaters.** W GUMZ AND F MICHEL. *Feuerungstech* 18, 129-31, 152-5(1930) E I S

**Measurement of air temperatures.** M TOMLINSON *Heating, Piping and Air Conditioning* 2, 769-70(1930) E. I S

**Predicting the flow of liquids in pipes.** R E GOULD *Heating, Piping and Air Conditioning* 2, 850-2(1930) E. I. S

**Heat transmission to water flowing in pipes.** A E LAWRENCE AND T K. SHERWOOD *Ind Eng Chem* 23, 301-9(1931).—Expts indicate that for heating water in turbulent flow the effect of pipe length on the film coeff of heat transfer is negligible D GORDON

**Heat transfer through air spaces** P D CLOSE *Heating Piping and Air Conditioning* 2, 875-8(1930).—A résumé of important investigations Brief abstracts are presented E. I S.

**Calculation of loss of head in straight channels.** D KESTLICHER *Rev. univ. mines* [8] 3, 271-91(1930).—A theoretical mathematical discussion leading to the construction of a logarithmic chart for computation of loss of head in rectilinear channels carrying water, oil, steam or air, account being taken of the viscosity of the fluids E I S

**Method for demustardization of one-ton mustard containers** H P AVERILL AND I W LANE *Chem Warfare* 17, 032-3(1931).—The containers to be demustardized were 2 steel drums which had held mustard for 10 years For reasons given it was impracticable to use corrosive agents or solvents for mustard to destroy the mustard remaining after emptying the drums The drums were steamed for a period of 8 hrs with steam at a pressure of 5–15 lb per sq in This destroyed (hydrolyzed) practically all the mustard, only traces remaining in the approx 75 lb of residual S A L KINYER

**Refrigerants show similarities.** J E STARR *Refrigerating Eng* 20, 302-3 (1930).—Similarities between 16 different substances were shown in terms of pressure-temp and compressor displacement relations From a knowledge of one point on the pressure temp curve it is possible from the curves given to predict the pressure exerted by a gas at any given temp This was done for $CCl_2F_2$ and exptl. results agreed fairly well with those predicted from the curves A. H. JOHNSON

**Refrigeration and the fishing industry.** D B FINN *Refrigerating Eng.* 20, 287-90(1930).—Rapid freezing results in the formation of min ice crystals Small ice crystals do not rupture the cell walls of the material frozen and therefore when thawed such material more closely resembles the fresh food product than if slow freezing had occurred with consequent formation of large ice crystals. In order not to allow the crystals to grow the storage temp must not be allowed to fluctuate Also fluctuations of temp set up internal pressures which tend to cause oil to ooze from the material frozen Loss of moisture from frozen material during storage may be reduced by keeping all objects within the storage chamber at as near the same temp. as possible. In such a case moisture will not condense on colder surfaces such as cooling coils, etc. Sufficient insulation so that the temp differential between the cooled product and the coils is low will prevent serious shrinkage. The occurrence of "rusting," the yellow discoloration which occurs in oily fish during cold storage, may be reduced by using low storage temp "Rusting" appears to be concerned with a change in the fat or oil, but nitrogenous constituents and possibly H-ion concn are thought to play an important part A. H. JOHNSON

**Dangerous liquids** B L. HUNSTIS *Safety Eng* 60, No 3, 174, 176, 178-9 (1930).—The main considerations in selection of containers for shipment are, strength and tightness, possible reaction of liquid on containers, and proper handling of container, both loaded and empty. L. I. S.

**Role of gas masks in mines.** P. ESZTÓ *Bányás Kohás Lapok* 63, 55-60 (1930).—Modern gas masks (respirators), *e. g.*, the "All-Service-Mask" exam'd by the U S A Bureau of Mines in May, 1921, yield perfect defense against CO. Therefore gas masks should be used in mines instead of expensive air-regenerating app., as the cost of the former is only 12–15% that of the latter. S S. DE FINÁLY

**The moisture in technical gases. III. Examples.** FRIEDRICH LÜTH *Arch*

*Eisenhüttenw* 4, 281-7(1930); cf. *C A*. 25, 1924.—Numerical examples (10) showing the applications of the method of calcn. are given J. BALOZIAN

Control and regulation of distilling columns. M. PÉRARD *Chimie & industrie* 25, 286–90(1931).—A brief discussion is given, from a practical operating standpoint, of various points regarding the control and regulation of continuous distg columns, more particularly columns for distg alc. A PAPINEAU COUTURE

Vacuum as an insulator. CHARLES O DUBVEL, JR *Refrigerating Eng* 20, 223–8 (1930).—D reviews the subject of heat transfer in vacuum insulation and in gases An app is described by the use of which it is possible to measure thermal cond. of vacua and gases A H. JOHNSON

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Separation and size distribution of microscopic particles (ROLLER) 2.

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BRADY, GEORGE S Materials Handbook. 2nd ed, revised. New York: McGraw Hill Book Co, Inc. 600 pp. $5

Chemiehütte. *Taschenbuch für den praktischen Chemiker. Edited by* AKADEMISCHEN VEREIN HÜTTE, E V. Berlin Wilhelm Ernst & Sohn. 914 pp Linen, M. 28, leather, M 31

Deutsches Bergbau-Jahrbuch, 1931. 22nd year Jahrbuch der deutschen Braunkohlen-Steinkohlen-, Kali und Erzindustrie, der Salinen, des Erdöl- und Asphaltbergbaues Edited by H HIRZ AND W POTHMANN Halle (Saale): W. Knapp M. 16

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LEIGH, C W, AND MANGOLD, J F Practical Mechanics and Strength of Materials. 2nd ed New York McGraw-Hill Book Co, Inc. 420 pp. $2 75 Reviewed in *J. Western Soc Eng* 35, 495(1930).

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Purifying gases. UNION CHIMIQUE BELGE S A Fr 37,418, May 17, 1929. Addn. to 650,516 (*C A* 23, 3284) The pptn of the $(NH_4)_2SO_4$ is localized in the part of the app where the $NH_3$ is dissolved and is prevented in the part where the cooling takes place The fall of temp of the satd soln is reduced during the cooling but is afterward repeated several times Cf *C. A* 24, 3843

Separation of gas mixtures, and nitric acid production. N CARO and A R. FRANK. Brit 338,497, Aug 13, 1929 A constituent of a gas or vapor mixt is sepd by condensation by cooling under such conditions that the mixt leaving the condenser is unsatd with respect to the sepd constituent Various details of app and operation are described Hot aq nitrous gases, produced by oxidation of $NH_3$, with addn of steam, H, O or $SO_2$ in some cases, can be treated to sep the water, free from or low in $HNO_3$, and if desired the N oxides may be directly worked up to form nitrates or nitrites by reaction with suitable oxides, carbonates, chlorides, etc. Sepn. of water, etc., may be effected by the method described in connection with the production of Ca cyanamide, HCN and $NH_4$ salts or aq $NH_3$.

Distilling or drying carbonaceous or other solid materials, etc. E. M SALERNI and E M S INDUSTRIAL PROCESSES, LTD Brit. 338,939, July 30, 1929 Operations of this general character or evapn. or other heat treatments of liquids are effected in a described app which may comprise a plurality of juxtaposed troughs through which the material successively passes while at the same time it is subjected to a secondary movement by the action of agitators in a direction counter to that of main passage of the material

Alumino-thermic reactions. E BLÜMMER. Brit. 338,468, March 11, 1930 In effecting reactions such as those of Fe oxide and Al, very high temps are attained by employing one or both of the reacting materials in molten state Various details of app and procedure are described and the operation may be conducted in a vessel surrounded by N under 200 atm. pressure

Regulating the temperatures of chemical reactions. HOLZVERKOHLUNGS-INDUSTRIE A G Brit 339,144, Jan. 18, 1929 In regulating temps such as in the production of acetone from $C_2H_2$ and water vapor, the reacting constituents are maintained in motion in a continuous circuit past heat-exchanging walls which sep part of the circuit from a reaction zone, while part of the constituents are diverted continuously into the reaction zone, the reaction temp is controlled by regulating the speed of travel of the reacting materials in the circuit App is described The procedure is suitable for exothermic or endothermic reactions between liquids or between liquids and gases Brit. 339,148

relates to similar regulation of reactions carried out under pressures above atm. pressure

Furnace operation for chemical reactions. Soc chimique de la Grande Paroisse (Azote et produits chimiques). *Brit. 338,444, Jan 28, 1930* A *jet of O or of air enriched with O* is impinged on a restricted area of a bed of coke to produce a high temp zone in which refractory materials such as silica, alumina and Ca phosphate can be volatilized and caused to react Fine powders are sepd. from the combustion products and in the operation of the process silica or ferric oxide for polishing metals may be reduced to fine powder, and silica or alumina can be caused to react on Ca phosphate for the production of Ca silicate or Ca aluminate and oxides of P. App. is described.

Autolysis or heterolysis of animal or vegetable materials. Soc. française des produits alimentaires azotés Ger. 518,263, Jan 14, 1925. The operation is effected with the aid of an antiseptic mixt. comprising $CHCl_3$ and an alc. of lower sp. gr. than the materials under treatment Thus, fish may be autolyzed with water for 4 days at 40° in the presence of a mixt of $CHCl_3$ and BuOH.

Granulating salts. I G Farbenind. A.-G. (Bodo Haak, inventor). Ger. 518,000, Dec 14, 1927 In granulating salts, particularly fertilizer salts, by causing the *fused salt to fall in drops into a liquid, the path of the salt through the liquid is lengthened* by stirring the liquid so that it circulates around the vertical axis of the vessel contg. it.

Gelatinizing organic liquids such as benzine. I. G. Farbenind. A.-G. Brit. 339,360, July 4, 1929 To facilitate safe handling and storage, liquids such as benzine or petroleum ether have formed in them a voluminous "*framework*" of solid inorg oxide or hydroxide such as may be produced by the action of a base such as $NH_3$ on $SnCl_4$, $SiCl_4$ or a chloride of Fe or of Al

Gel-like benzine. L Lorber. Hung 101,509, May 3, 1930 Soap is boiled in alc., then shaken with benzine and water until the mixt. becomes gel-like; *e g*, 2 g soap and 2 g alc. are boiled, then 500 g benzine and 2 g water are gradually added.

Oil or wax emulsion. L Pócs Hung 101,357, Feb 22, 1930 The aq. phase of the emulsion contains a mol or a colloidal soln of halogenated fatty acid soap as emulsifier. A disinfectant agent can be added or the emulsified oil, *e g*, turpentine oil, *may also have disinfectant qualities*

Oil or wax emulsion. L Pócs Hung. 101,358 March 5, 1930 Oil or wax is emulsified with soap, and sufficient alcohol or alcoholic KOH is added to give permanent emulsion in water. Finally the disinfectant is added

Emulsions, ointments, etc. T Goldschmidt A.-G. Brit. 339,558, March 0, 1929. Emulsions are prepd. by mixing esters (contg non-esterified OH groups) of polyhydric alcs. with higher fatty acids, such as glycerol monostearate or diethylene glycol monostearate, with water or aq solns. in the presence of acylated alkylene diamines or their derivs. such as the C-substituted or N-alkylated derivs., and various other substances may be emulsified or dispersed in the products, such as glycerol, $H_3BO_3$, citric acid, fats, fatty acids, waxes, vegetable or mineral oils, rubber, glue, gelatin or dextrin, terpenes, perfumes, latex, cow milk, lamphlack, talcum or ZnO. Examples are given. Cf. *C. A.* 24, 5437.

Lining liquid containers. Standfasswerke Rostock & Baerlocher and Georg Walter. Austrian 121,533, Oct. 15, 1930. In lining *fermentation vats* and other liquid containers made of concrete or the like with bituminous, resinous or waxy substances the lining substances are applied as aq emulsions Preferably, a relatively stable emulsion is first applied, followed by a relatively unstable emulsion. Fibrous materials and other fillers may be included in the emulsions, and the addn. of a small quantity of a hydraulic mortar is advantageous

Detecting leakage of noxious gases from pipes. Gabriele Windisch. Austrian *121,257, Sept 15, 1930.* The pipes conveying the gases are enclosed in protective pipes, which are connected through a manometer to a suction app. Means for sealing off sections of the protective piping may be provided to assist in locating a leak.

*Use of substances of low-boiling point such as carbon dioxide, ammonia or methyl ether for operating engines.* Olga, Princess zur Lippe and M. Brand Brit. 338,894, June 28, 1929.

Use of hydrochloric acid to prepare bore holes for blasting. V. Tschenn. Brit. 338,454, Feb 11, 1929 Bore holes are provided with spherical enlargements to receive blasting charges by forcing acid such as HCl in fine jets through the nozzle of a described app., and a preliminary charge may be exploded in the bore hole to facilitate the action of the acid.

Drying air surrounding perishable goods during shipment. T. Robbins, F. C.

DEHUMIDIFIER and SILICA GEL, LTD Brit 338,855, July 4, 1929 The air supplied to containers in cars ships etc, is dried by silica gel or like material App is described

**Refrigerating chemicals.** N CARO and A R FRANK. Brit 339,194, Feb 8, 1929 In processes for absorbing at low temps, liquefying or freezing out N oxides, $HNO_3$ and their mixts, an aq $NH_3$ soln is used as the "cold-conveying" medium and substances such as $NH_4NO_3$, metal nitrates and metal thiocyanates may be added to the soln Various details of concns of solns for different temps are given

**Refrigerator boxes formed of Celotex or the like dipped in asphalt.** J C STATON (to Coca Cola Co) Brit 338,959–60, Jan 9, 1929

**Refrigerating apparatus using solid carbon dioxide.** W T HEDLUND (to Electrolux Ltd) Brit 338 795, Jan 12, 1929 Structural features.

**Refrigerating apparatus utilizing solid carbon dioxide.** WALTER S JOSEPHSON and THOMAS B SLATE (to Dryice Equipment Corp and American Patents Development Corp) U S 1 796 907, March 17 U S 1,796,908–9–10 (THOMAS B SLATE to American Patents Development Corp) also relate to app for the same general purpose Cf (1) 24, 446, 2517

**Heat-insulating material suitable for building construction.** GEORGE B STRYKER, JR (to Weatherproof Products Co) U S 1,796,631, March 17. A base of compressed fibrous material such as compressed waste paper and cotton fiber is provided with a top layer consisting of a hardened mixt. of fibrous material with cement, clay and lime Cf *C A* 25, 754

**Heat insulators.** S A I G (SOC. ANON. INVENZIONI, GUADAGNIN) Brit. 338,743, Dec 3, 1929 See Fr 686,226 (*C A* 25, 549)

**Insulating electric wires and cables.** FRANCIS J BRISLEE (to British Insulated Cables, Ltd) U S 1,795 994, March 10 An esterified cellulose compn such as a cellulose acetate compn. in hard and substantially solvent free form is applied in layers with textile supports around a conductor under approx atm. pressure, and the material is then heated to about 100°, at which temp the compn. softens and flows so that adjacent layers unite and impregnation of the textile supporting material is effected

**Insulation of wire for electrical purposes.** I G FARBENIND A.-G Ger 518,328, April 24, 1929 The insulation consists of filaments of butadiene hydrocarbon polymerization or condensation products which have been hardened so that they no longer show the extensibility and elasticity of rubber Hardening may be effected by heat or the action of sulfurizing or oxidizing agents Examples are given

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Water supply work of the U. S. Public Health Service.** ARTHUR P. MILLER *Water Works Eng* 83, 907–8(1930).—The relations of the P H S officials with local health agencies water and sewage treatment plant operators and the like are usually of an advisory character A review of the manner of certifying water supplies to be used on common carriers engaged in interstate traffic is given The objectionable practice of adding ice directly to the drinking water used on railway coaches has been nearly eliminated The effect on the drinking water by careless handling by railway employees is being studied Since the beginning of the certification of water supplies, the P. H. S has assumed the entire responsibility of assuring water of good quality on vessels In 1921 the P H S arranged to do the sanitary engineering work for the National Park Service in the national parks The work included development of water supplies, building of sewage treatment plants, mosquito eradication and disposal of combustible and non combustible waste C H BADGER

**Study of a spring in Monferrato (Italy).** GIOVANNI CALVI. *Giorn farm chim* 79, 543–8(1930).—A qual and quant chem analysis was carried out on the water of an inexhaustible spring G SCHWOCH

**New pipe materials for Dresden water mains.** SCHEMEL. *Gas u Wasserfach* 74, 169–73(1931).—*Various types of* Fe and steel water mains with and without internal coatings, as well as reenforced concrete and wooden mains, are discussed R W R.

**Piping materials for mineral water.** E. MAURER. *Gesundh.-Ing* 53, 333(1930), *Wasser u Abwasser* 27, 369–70.—Most mineral waters in themselves contain no substances corrosive to Fe or other piping By far the most important agent in corrosion is $O_2$, introduced from the air $O_2$ is not normally present in *mineral waters obtained from* deep in the earth $CO_2$ has little or no corrosive effect. Incrustants will deposit on any

pipe but in less quantity where $O_2$ is absent. Hence to reduce both corrosion and incrustation, the piping system should be planned to avoid entry of $O_2$. Wood and galvanized Fe are shortlived while Sn, Pb and Cu pipes are too expensive. Cast Fe is the best all around pipe for mineral waters. C R FELLERS

**Protection of water supply pipe lines system from electrolysis with particular reference to insulation, pipe bonding, electrical drainage and return systems.** J. J. LAUDIG, *et al* *Am Ry Eng Assoc Proc* 32, 415-9(1931), *Bull* 333.—Regular inspections with tests are recommended where electrolysis is suspected and correction is made by insulation or bonding elec drains where needed. R C BARDWELL

**Taste and odor troubles in the Minneapolis water supply.** F RAAB *J. Am Water Works Assoc* 23, 430–4(1931).—Certain types of algae, growing in the filters, were the producers of varying and unpleasant tastes and odors. Alum, chlorine and ammonia were tried without effect. Prechlorination, however, was very successful and increased noticeably the filter runs. D K FRENCH

**Elimination of taste and odor in the water supply of Lancaster, Pennsylvania.** EDWARD D RUTH *J Am Water Works Assoc* 23, 396–9(1931).—Tastes and odors of various kinds were always present. The filter plant was overloaded. Much of the time the water was not safe to drink. By using anhyd ammonia and chlorine, almost perfect results were obtained. D K FRENCH

**Successful superchlorination and dechlorination for medicinal taste of a well supply, Jamaica, N. Y.** FRANK E HALE *J Am Water Works Assoc* 23, 373-86 (1931).—The water contained Fe and Mn, and the growth of *Crenothrix* was quite noticeable. Treatment with Cl as required produced a medicinal taste. Investigation showed that leaking gasoline, rather than algae, was responsible. After much exptl. work it was found that superchlorination followed by dechlorination gave the best results. $SO_2$ was used. The method was inexpensive and quickly applied. D K FRENCH

**Interpretation of water analysis. Equilibrium considerations, determining activities and concentration of ions.** D S MCKINNEY *Ind Eng Chem, Anal Ed* 3, 192-7(1931).—Present methods of detg the anions of the slightly dissocd acids (carbonic and phosphoric and their salts) are stoichiometric, and disregard the equilibria which control the relations of these anions and the H and OH ions and hence give the operator a false impression of the quantity of each anion present. Further, the results obtained by present methods cannot be evaluated when more than one weak acid is present, unless unwarranted assumptions are made. Derivation and a list of formulas for the calcns. of the fractional activity or activity ratios of various ions obtained from $H_2CO_3$ and $H_3PO_4$ at 25° are given. In order to obtain the ion concn and activities, it is necessary to know the activity coeffs. The relation between the activity and the concns may be expressed by means of the simplified equation of Debye and Huckel. Methods of application of the equation to actual water analysis are given and explained. WAYNE L. DENMAN

**An investigation into the clogging of the filter beds at Topchanchi waterworks during hot weather.** B K. MANDAL *Indian Med. Gaz* 66, 84-5(1931).—The growth as well as the actual decay of the lower forms of vegetable life (particularly *Crenothrix*) are the more important factors influencing the clogging of filter beds during hot weather. An increase in temp with an acceleration in the production of org. matter cause a simultaneous reduction in the dissolved $O_2$ content, and the evolution of $CO_2$, these conditions are favorable for the production of the so-called "iron bacterium" and allied forms of life. FREDERICK G GERMUTH

**Chemical control and general supervision of water-treating plants.** R. M STIMMEL, ET AL *Am Ry. Eng. Proc.* 32, 419–22(1931), *Bull.* 333.—Survey indicates field inspection is desirable in addn to lab check, the field-test method for rapid boiler water analysis recommended in A. R. E A Manual is used. Treating plant results should be coördinated with the performance of water in locomotive boilers. R. C. BARDWELL.

**Treats water twice in new plant.** R. V. ZAHM *Ry Eng and Maintenance* 27, 363–4, 377(1931).—The Missouri, Kansas and Texas R. R. installed a complete 30,000 gal per hr water-softening plant at its Franklin, Mo., terminal in 1929. Lime, soda ash and Na aluminate are used to soften and clarify a reservoir water ranging from 5 0 to 7 5 gr. per gal total hardness and 4 0 to 20 0 gr per gal. suspended matter. Addnl. treatment with alum to neutralize OH and Na hypochlorite for sterilization is given that portion used for drinking purposes with subsequent filtration. A Sparling meter is used for lime and soda ash control. Aluminate is added separately by an automatic dry feeder. A min. settling time of 6.8 hrs with a max. of 13 8 hrs. clarifies the water satisfactorily. Hardness of treated water averages consistently under 1 5 gr. per gal. R C B

Results of water treatment. T. F Powers *Ry Age* 90, 329–31(1930).—In 1911 the Chicago and Northwestern RR had a leaky flue failure each 58,633 locomotive miles but with supervised water treatment this had been reduced by 1929 to one failure per 4,343,302 Corrosion and pitting still constitute a problem and embrittlement is a potential danger A properly supervised wayside treating plant has been found a most satisfactory method for correcting water quality R. C. Bardwell

Lump or hydrated lime? O T Rees, *et al.* *Ry. Eng and Maintenance* 27, 276–8, 385(1931) —Available CaO for use in water treatment can be obtained in lump lime at as much as 55% lower first cost than in hydrated lime. However, rapid deterioration of lump lime in shipment and storage affects the reliability and where more uniform results and greater accuracy of treatment are required together with greater ease of control, use of hydrated lime is favored R. C. Bardwell

Experiments with chlorinated copperas as a coagulant. A Clinton Decker. *Water Works Eng* 83, 887–8(1930). cf *C A.* 23, 5525, 24, 1447, 2818 —The source of supply for the Chickasaw, Ala , filtration plant originates in springs and flows through a heavily cypress wooded territory which imparts to the water a color ranging from 40 to 130 p p m Alky , total hardness and turbidity are low. Color removal was complete when 0 7 grain per gal of copperas, mixed with 2 16 p p m $Cl_2$, was added as a coagulant. The $Cl_2$ added was sufficient to oxidize the Fe and also to satisfy the $Cl_2$ demand of the raw water The filtered water is adjusted with lime to a $p_H$ of 7 0–7.2. The increase in color is less when the lime is introduced into the clear water well than when introduced into the coagulating basin The length of the filter runs has been increased by this process as compared with alum and lime, thus lessening by 50% or more the wash water required The cost of chemicals is approx $10 less per million gal water. C. H. B

Clarification of water movement (phenomena). A Reuther *Gesundh.-Ing* 53, 164–7, 180–5, 194–202(1930), *Wasser u Abwasser* 27, 163 —A math discussion is given with formulas C. R. Fellers

Economics of reservoirs. Paul Hansen. *Water Works Eng* 83, 943–4, 982–6 (1930) —Impounding reservoirs should be formed which will meet the requirements for water during the dryest period likely to occur within the period of anticipated demands. Because of the cost of constructing dams and spillways and the difficulty of bonding new work on dams with old it is not usually economical to provide impounded storage for less than 10 yrs and often provision for 20 to 30 yrs is justified There should be sufficient filtered water storage to neutralize the differential (for ordinary domestic purposes $^1/_8$ to $^1/_4$ the total day's consumption is usually required) between the uniform rate of filtration and the variable rate of consumption, plus a suitable reserve for fires and that needed for washing filters, less elevated storage on the distribution system. Cost of elevated storage should be balanced against cost of pumping Steel is considered best for tanks built on towers At present, 2 million gal is the max practicable size for such steel tanks For the construction of the smaller sizes of exposed reservoirs built on top of the ground steel is cheaper than reënforced concrete. For covered reservoirs steel has a small advantage in first cost with capacities up to 5 million gal. Tables showing the comparative costs of constructing different types of reservoirs are given. C. H. B

Overcoming algae troubles in a clear-water reservoir. V. Bernard Siems *Water Works Eng* 83, 739–40(1930) —The water supply at Greenville, Pa , is obtained from a stream on which are located 2 reservoirs in series with a sedimentation basin at the lower end The water then flows to rapid sand gravity filters and $Cl_2$ is added to the effluent which passes to the clear water reservoir. Doses of 2 p p m. $CuSO_4$ to the clear water reservoir cut off for several days, followed by doses of 1 p p m. $CuSO_4$ to the sedimentation basin, did not satisfactorily prevent algae, especially in hot weather At present, 1 0 p p m $NH_4OH$ is added between the lime and the alum dosages. The $Cl_2$ dosage is 1 5 p p m. which gives a residual $Cl_2$ of 0 2–0 3 p p. m in the distribution system. Results obtained during 2 months' operation indicate that more $Cl_2$ can be added without causing tastes and odors, as was formerly the case This permits a higher factor of safety in sterilization. In addn $Cl_2$ is more effective. C. H B

Turbidity, plankton and mineral content of Detroit water supply. Bert Hudgins *J Am. Water Works Assoc* 23, 435–44(1931) —As a result of the shallowness of Lake St. Clair, the water could readily become turbid and carry plant and animal life. Several types which give the most trouble in water were identified. At the present time little trouble is being experienced and the present plant is considered satisfactory. The natural conditions which are combating the growth of objectionable forms are discussed. D. K. French

Water softening for small municipalities C P. Hoover *Am City* 42, No 3, 7 (1930), cf *C A* 23, 656; 24, 4106 —Most of the 322 incorporated communities in

Ohio with populations of less than 10,000 use well water for their municipal water supplies Many such supplies are hard and contain considerable Fe. A hardness of 90 p p m. or less seems to be acceptable in this section. High per capita cost together with limited and mediocre technical supervision makes the designing of water-softening plants in small communities difficult. Carbonation has overcome the objections to the taste of softened water and has also made it possible to distribute softened well water without filtration C H. BADGER

**Water softening: Some properties of certain base-exchange materials.** L AUSTIN R. MARTIN *J Soc Chem Ind.* 49, 389–94T(1930); cf *C A* 24, 1688.—A discussion is given of the bulk ds and vol of interstitial spaces, exchange values at various rates of flow of water, regeneration, mech disintegration and losses and contamination of water with $SiO_2$ of Basex, Doucil, Borromite, Kenzelite, Zepholite, Refinite, Natrolith and Nat-Rol There is greatest exchange value and mech disintegration in the synthetic material O M SMITH

**Effect of the disposal of water-softening-plant sludge through the sewage-disposal plant.** E F ELDRIDGE Mich Eng Expt Sta., *Bull* 34, 7 pp (1931).—Twelve 1500 samples of fresh solids were placed in individual 3-l bottles which were connected to inverted glass cylinders for gas collection and measurement Two bottles contained no added softening plant sludge, 2 were treated with a dry wt of lime-softening-plant sludge equiv to 25% of the total solids in the sewage sludge, other samples contained 50, 75, 100 and 150%, resp., of the softening-plant sludge The total wts of sewage solids in all of the samples were practically identical at 41 6–42 6 g Max gas production, 5 2 l., was obtained from the samples contg 50% added softening-plant sludge The optimum $p_H$ for sludge digestion is approx 7 2–7 6 Excessive amts of the lime sludge produced an unfavorable $p_H$ for sludge digestion The expts are being continued. C R FELLERS

**Concentration control of boiler water.** HERBERT S WHITON *Power Plant Eng* 35, 452–4(1931).—Control of concn is necessary to avoid foaming and steam contaminated with impurities, sol or insol., from the boiler In certain cases the Baumé hydrometer, especially calibrated, can be used In others, the titration of chloride as a measure of total concn is valuable Cond methods also have a place Frequent chem. analyses may be necessary The concn by products of various methods of treatment are described Blowing down the boiler will reduce its concn and various methods for its regulation are given D K. FRENCH

**Relative cost of eliminating impurities in locomotive boiler waters and the value of treatment with respect to chemicals and compounds applied direct to locomotive boilers and roadside tanks, and conditions under which they may be desirable.** C. H. KOYL, *et al Am Ry Eng Assoc Proc* 32, 402–5(1931), *Bull* 333.—The phys. condition of the sludge formed is important in the successful internal treatment of locomotive boiler waters. Chemicals forming large heavy particles are desirable. A limit of 15 gr per gal alkali salts is recommended. Good results can be obtained with soda ash or proprietary compds under careful supervision, the cost varying with the quality of the water. R. C. BARDWELL

**Boiler-tube corrosion halted by hot-process treatment.** R E. COUGHLAN. *Ry. Age* 89, 855–6(1930); *Ry Eng and Maintenance* 26, 550(1930).—The Chicago and Northwestern RR eliminated serious pitting in six 500 h p. water tube boilers using Chicago city water, by installation in 1928 of a hot-process softener using lime, soda ash and Na aluminate, this replaced unsatisfactory internal treatment R. C. B.

**Experiments and results with boiler-water recycling.** FEIGE AND WEISS *Arch Wärmewirt* 12, 16–8(1931).—A rather full account is given of practical expts on a 1000 h p boiler in returning blow-down to the feed water continuously through a 3 mm. orifice No difficulty was experienced, and the indicated saving was 1500 M per year. ERNEST W. THIELE

**Water requirements in the textile industry.** KEHREN AND STOMMEL. *Z ges Textilind* 32, 651–3, 676–7, 698–700, 798–800, 811–4, 830–1, 845–7, 860–2(1929); *Wasser u Abwasser* 27, 170.—Ground waters and their suitability for use in dye factories, bleaching plants, laundries and creameries are discussed, together with methods of softening, Fe and Mn removal, filtration, Al coagulation and deoxidation. C. R. FELLERS

**Past and present developments in sewage disposal and purification.** H. W. CLARK. *Sewage Works J.* 2, 561–71(1930).—A general discussion touching on all phases of sewage disposal with particular reference to the developments at the Lawrence Expt. Sta. E. HURWITZ

**Review of present sewage-disposal technic.** HERMANN BACH. *Vom Wasser* 4,

160–86(1930), *U S Pub Health Eng Abstracts* 11, S. 25(Feb 28, 1931).—A comprehensive review C. R. FELLERS

**Conditions affecting general layout of sewage-treatment works.** PAUL HANSEN *Sewage Works J* 2, 572–81(1930).—*In the design of sewage treatment works provision must be made for population growths and changes in character of sewage Each element of the works should be so arranged that future extension can be made contiguously to the initial installation for economy and improved operating control* E. HURWITZ

**Operation and control of sewage-treatment plants.** CHAS C. AGAR. *Sewage Works J* 2, 597–614(1930).—A report of the Division of Sanitation, New York Dept. of Health contg suggestions on operation and control of all units which might be embodied in a treatment plant E. HURWITZ

**Laboratory service in sewage treatment.** M. STARR NICHOLS *Sewage Works J.* 2, 591–6(1930).—N proposed classifying lab service in 4 divisions (1) operator's lab (2) field-control lab, (3) central or state lab and (4) central or field research lab The duties of each division are specified E. HURWITZ

**Sewage filter media and loadings** WM F STANLEY. *Sewage Works J.* 2, 486–94 (1930).—See *C A* 25, 1928 E. HURWITZ

**Chert gravel as sewage filter stone.** J C LAMAR *Sewage Works J.* 2, 495–9 (1930).—Natural chert stream gravel gave satisfactory results in that part of the filter more than 3 feet from the surface of the bed The gravel supported biol growth and *was not materially affected by soln* Chipping at the surface of the bed indicated that under long-continued use it might in time have caused "pooling" E. HURWITZ

**Use of domestic sewage purifiers.** L DE FINÁLY *Technika* 11, 20–6(1930).—A general review is given of different systems, the principles of domestic purifiers based on artificial biol oxidation methods are discussed, and two newly erected purifiers with activated sludge treatment are described S. S DE FINÁLY

**Observations on scum in the Imhoff tanks of the Ruhr District.** KARL IMHOFF *Sewage Works J* 2, 549–54(1930).—See *C A* 25, 309 E. HURWITZ

**Effect of gases on growth of bacteria.** R G UPTON. *Proc. 12th Texas Water-Works Short School* 1930, 151–3 *U S Pub Health Eng Abstracts* 11, S. 23(Feb 28, 1931), cf *C A* 24, 184.—In order to test the effect of partially vacuumizing Imhoff tanks to remove the gases of decompn, lab expts with flasks contg sewage were partially vacuumized and the effect on bacterial nos was noted In general, there was a slight increase in nos by the agar plate method where the samples were held under 15–8 in Hg vacuum *There was no significant difference in the nos. of $H_2S$ formers* or anaerobes Conclusion The toxic effect of sewer gas on bacteria and other organisms that might aid in decompn of sewage sludge in the digestion chambers is slight or negligible C. R. FELLERS

**Activated-sludge experiments at the Calumet Sewage Treatment Works.** F. W. MOHLMAN AND C E WHEELER *Sewage Works J.* 2, 529–48(1930).—The paddle-wheel diffused air process of activated sludge shows considerable promise in reducing power requirements *The scheme is readily adaptable to large units and is* flexible in that requirements for agitation and for O may be adjusted separately so that the air rate need not be excessive merely to maintain the required degree of agitation. The tests indicated that 10 to 15 h p per million g is sufficient to produce a satisfactory effluent With the 2 stage process for activated sludge good results were obtained with small quantities of air However, this process is very sensitive biologically and requires careful control Bulking of sludge occurred occasionally in the first stage. The sludge produced by the 2nd stage was generally well flocculated and readily settleable. E. HURWITZ

**Effect of iron on the anaerobic decomposition of sewage sludge.** L. R SETTER *Sewage Works J* 2, 504–20(1930).—Gasification of sewage sludge is not affected by $FeCl_3$ in amounts up to 5 p p m Amounts of $FeCl_3$ from 5 to 20 p p. m. cause a progressive retardation of gas formation with consequent doubling or tripling of the digestion period Retardation was partly eliminated by neutralization of the acidity caused by the hydrolysis of $FeCl_3$ Addn of $FeCl_3$ up to 10 p p m was not toxic to the organisms of sewage sludge, greater amounts showed decided reductions of organisms and amounts as high as 20 p p m completely reduced the microbial population with the exception of the sewage fungi Iron added as the element, oxide or hydroxide had no appreciable effect on digestion, the acetate, citrate, $FeCl_3$ and $FeSO_4$ caused slight retardation. E. HURWITZ

**Rejuvenated sludge.** MAX PRÜSS *Sewage Works J* 2, 477–85(1930).—Sludge can be rejuvenated by daily vertical mixing of the fresh solids with all the old sludge in a digestion tank Vertical mixing with the app described is so thorough that there are

no fresh sludge pockets and fly and odor nuisance due to pumping fresh sludge on to the drying beds is eliminated Mixing increases the gas yield 100%, reduces the org. content of the sludge, breaks up scum formation and tends to equalize the $p_H$ value and maintain a uniform temp throughout the tank. E. HURWITZ

Correlation between biochemical oxygen demand and suspended solids of activated-sludge effluent. H GLADYS SWOPE *Sewage Works J.* 2, 500–3(1930) — Results of expts show that the biochem O demand of activated-sludge effluents increases with an increase in suspended solids The relative increase in biochem O demand is greater as the period of incubation is lengthened. E. HURWITZ

Biological oxidation of sulfur. IV. Influence on ammonification and nitrification in activated sludge. C V R AYYAR *J Indian Inst Sci* 13A, 165–71(1930) —Suspensions of sulfur and activated sludge, constantly aerated with ammonia free air, showed a rapid fall in ammonia during the first 3 days with a corresponding decrease in bacterial numbers. But ammonia was rapidly produced from the 11th to 18th day and large numbers of fungi appeared. After the 10th day, nitrates accumulated steadily until acidity developed to about $p_H$ 5 4 With phosphates present, the active nitrification proceeded longer before being hindered by the acidity Development of acidity $p_H$ 2 4 reduced the ammonia somewhat in the second 3 weeks A sudden decrease in ammonia from the 20th to the 22nd day may have been caused by fungus activity The steady increase in ammonia after the 22nd day may have been due to the colloids, flocculated by the $H_2SO_4$, leaching out the adsorbed ammonia With phosphate present, the changes in the second 3 weeks were similar but less intense M E. L

Making and interpreting a sanitary survey. EDWIN C HURD *Sewage Works J* 2, 582–90(1930) —The manner of making a survey, the elements to be considered, and the method of obtaining desirable information are considered E HURWITZ

Recent progress in air conditioning. W H CARRIER *Refrigerating Eng* 21, 187–9(1931) —Air conditioning is discussed in relation to the comfort of the individual, fields of application and mech and engineering requirements A H JOHNSON

Air conditioning on passenger equipment. R. W WATERFILL *Ry Age* 90, 233–4 (1931) —Air-conditioning equipment being tested in passenger car service, weighing approx 5 tons, operates by thermostatic control supplemented by hand dampers regulating raw outdoor air The refrigerating app uses Carrene ($CH_2Cl_2$) and Trieline ($C_2HCl_3$) which are non inflammable and safe. Practical air conditioning in railway cars is considered to be in the early development stage. R. C. BARDWELL

Soot particles in New York City air. E. E. FREE. *Fuels and Steam Power* (A.S M E Trans.) 53, 9–12(1931).—Counts were made by an impact dust counter. The more important variable affecting results was the direction of the wind. Another is clumping of the soot particles, the cause of which has not been detd. An av of approx. a half million dust and soot particles is to be found in each cu ft. of N. Y. City air. At least 90% is ordinary soot or unburned C The following were also found. auto, tire rubber, asphalt, brick, rock, org materials, slivers of glass, glazed tile, leather, cotton fiber, hair and a few living mold spores The size varies from 0 0001 to 0 0500 in. At 100 ft above the street level the no of soot particles decreases 25 to 50% at 5th Avenue and 23rd St.; no high level counts were made at other points. For the air over the entire city the av. amt of suspended matter is 4 to 5 short tons The relative absence of ash indicates that most of the city's soot and air dust comes from small fires in apartment houses, office buildings and homes, rather than from smoke stacks of the large power houses or other industrial plants H. C. PARISH

Investigation of atmospheric pollution—report of superintendent of observations. J S OWENS, *et al Dept Sci Ind Research 16th Rept* 1931, 7–26 —The rept. contains a list of stations, results obtained with the deposit gage, results obtained with the automatic filter, measurement of daylight and deposit of microörganisms at Stockport Tables show the mean monthly deposits recorded in 1929–30, classification of mean monthly deposits recorded in 1929–30, expressed as % of the general av. for the respective stations and hourly variations of suspended impurity, in different seasons Eighty-four stations have deposit gages and 11 have automatic filters No conclusions are drawn W. H BOYNTON

Stream pollution from the operator's point of view. EARLE B PHELPS *Sewage Works J.* 2, 555–60(1930) —There are 3 types of stream pollution with which the operator of a sewage plant has to contend, namely, phys., chem and bacteriol. Sewage-treatment works are designed to deal with each of these types independently or as a whole depending on the capacity and limitation of the stream into which the effluent is to be discharged and on the uses to which the stream is to be put A knowledge of conditions down stream facilitates the intelligent operation of the plant E H

Importance of the vacuum system of sludge removal and septic-tank cleaning. A. RINGEL *Gesundh.-Ing* 1930, 308–14, *Wasser u. Abwasser* 27, 176.—The advantages of the method are outlined C. R. FELLERS

Removal of ordinary sewer gases. A SALMONY-KARSTEN *Wasser u. Gas* 1930, 785–7, *Wasser u. Abwasser* 27, 177, cf. *C. A.* 25, 1313.—A patented app. is described C. R. FELLERS

Packing-plant waste treatment. M. STARR NICHOLS AND JOHN C. MACKIN *Sewage Works J.* 2, 435–42(1930).—Treatment of packing house waste by plain sedimentation and sprinkling filter resulted in 90% purification based on removal of suspended solids, org. N and fats and about 80% based on reduction in biochem. O demand I. HURWITZ

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Use of sewage gas as city gas (FULWEILER) 21. Leather, sanitation and colloid chemistry (WILSON) 29. Mottled enamel (MCKAY) 11G. Filter [for water] (Ger. pat. 515,852) 1.

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PLANCHON, RENÉ. Traitement industriel et rationnel des sous-produits d'abattoires et des déchets organiques. Paris: Dunod. 460 pp. F. 140, bound, F. 150.

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Filter suitable for filtering water through sand. STANISLAUS J. RICKS and CHARLES E. DOUGLAS. U. S. 1,796,960, March 17. Structural features.

Apparatus for softening water with base-exchange materials. S. A. KRÜGER. Brit. 339,510, Dec. 21, 1929. Structural features.

Transportable plant for sterilizing water by chlorination. JOSEF MUCHKA. Austrian 121,020, Aug. 15, 1930.

Apparatus for addition of corrosion-preventive chemicals to water in hot-water systems. *HENRY L. SHULDENER. U. S. 1,796,407, March 17. Structural features.*

Electric system for protecting boilers. ALEXANDER KIRKALDY (to Electro Anti-Corrosion Corp.). U. S. 1,796,715, March 17.

Device for degasing boiler-plant water. MASCHINENFABRIK OERLIKON. Ger. 515,597, Mar. 27, 1928.

Boiler-scale remover. Z. V. PIVNEV and S. N. IGNATCHENKO. Russ. appl. 44,852, Apr. 12, 1929. A mixt. of $K_2CO_3$ and $CuSO_4$ is placed in the boiler. The mixt. is then removed with water together with the scale after a certain period.

Use of sodium aluminate to increase the rate of anaerobic digestion of sewage solids. WILLEM RUDOLFS (to National Aluminate Corp.). U. S. 1,797,157, March 17.

Rotary sewage distributor. E. HARTLEY. Brit. 338,650, Sept. 20, 1929. Structural features.

Aeration tank (with a power-driven agitator) for sewage treatment by activated sludge. KARL IMHOFF, FRANZ FRIES and FRIEDRICH SIERP (Fries and Sierp to Imhoff). U. S. 1,797,147, March 17. Structural features.

Apparatus for incinerating garbage, etc. ALEXANDER A. GOLOVTCHIKOV (one-half to Shun Ichi Ono). U. S. 1,795,771, March 10. Structural features.

Apparatus for clarifying waste waters of the paper, cellulose, etc., industries. ERNST BUCHHAAS. Ger. 518,063, June 5, 1928. See Austrian 114,184 (*C. A.* 24, 189).

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## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Method and procedure of soil analysis used in the Division of Soil Chemistry and Physics. W. O. ROBINSON. U. S. Dept. Agr., *Circ.* 139, 1–19(1930).—The fusion method of soil analysis developed for use in the soil chemistry lab. of the Bureau of Chemistry and Soils is described. Directions are given for the prepn. of the soil sample after it reaches the lab. The limits of error allowable in a satisfactory analysis are discussed and the limits of error for various elements are given in percentages and in lbs. per acre. Methods and procedures are given for the detns. of moisture, loss on ignition, org. matter, Cl, F and the oxides of Si, Ti, Al, Fe, Mn, Ca, Mg, K, Na, P and S. The method is designed to show accurately the ultimate comp. of the soil for scientific purposes, but it is claimed to have only a very general application to problems involved in soil fertility studies. W. H. ROSS

The study of the dynamics of the absorbing complex of soils. M. A. VINOKUROV. *Pochvovedenie* (Pedology) 23, No. 3–4, 46–92 (in English 92–3)(1928).—In a series of

expts. on the A and B horizons of a chernozem soil the amt. of exchangeable Ca and Mg, exchange capacity and unsatn. were detd. during the vegetation period on different systems of cropping, and during the various seasons. It was noted that the Ca was higher in the fall and lower in the spring. The reverse is true for Mg. The total bases was lower in the spring. The base-exchange capacity as detd. by the $BaCl_2$ method showed some variations. During the first part of the growing season the total exchange capacity decreased slightly, whereas the Ca increased. In the spring the soil was found to be slightly unsatd. In the B horizon the unsatn. was greater in the spring, and in A it was greater in the fall. In some cases, especially on the soils in sod the total Ca and Mg absorbed was greater than the base-exchange capacity. The suggestion is made to consider the absorption capacity as detd. by the Ba method as the exchange or true absorption capacity. The increase in absorption capacity is also to be considered as absorption capacity, but the cations are not exchangeable. During the summer and winter seasons there is an increase in absorption capacity. Vinokurov ascribes this increase to the changes in $p_H$ and perhaps mech. absorption. The quantity of highly dispersed particles of the absorption complex drops beginning with the spring season up toward the middle of summer. It is due to the state of satn. of the complex, it is more unsatd. in the spring. J. S. Joffe.

Experiences with the Neubauer method for determining mineral nutrient deficiencies in soils. S. F. Thornton. *J. Am. Soc. Agron.* 23, 195–208(1931).—Comparisons are made of the 0.2 *N* $HNO_3$ extn., Neubauer method, Illinois phosphate test, Hoffer stalk test, pot tests and field yields on 6 soil series. The Neubauer method gives results which agree most closely with those of pot and field tests. The 0.2 *N* $HNO_3$ extn. and Illinois phosphate tests give extremely high $P_2O_5$ results for all soils having received applications of phosphate rock and for soils of the Culver sand series regardless of previous fertilization. The Neubauer method sets as tentative limits for deficiencies for field crops under Indiana farming conditions 4 mg. $P_2O_5$ and 10 mg. $K_2O$. Nutrient absorption by seedlings is greatly affected by the selection of seed and temp. control and in a minor way by light intensity, moisture content, soil reaction and the presence of other nutrients. J. R. Adams.

A method of oxidizing and dissolving soil for the determination of total and filtrable manganese and phosphorus. E. M. Emmert. *Soil Science* 31, 175–82(1931).—Soils are prepd. for total Mn and P analyses by the use of $H_2SO_4$ and $NaClO_3$ to destroy org. matter and to bring minerals into soln. One g. of soil is placed in a Kjeldahl flask, 2 g. $NaClO_3$ added, then 25 cc. of 50% (by vol.) $H_2SO_4$, and the flask is gently heated. If the acid concn. is correct and the heat applied properly, $ClO_2$ will not accumulate in sufficient quantity to cause an explosion. P detd. in solns. prepd. in this way is greater than when the $Mg(NO_3)_2$ method is used. A method for detg. available Mn and P consists of shaking 200 g. of soil with 400 cc. of $H_2O$, filtering through a Whatman No. 2 filter paper and making detns. in the filtrate, which may contain some colloidal material. It is assumed that the soln. contains the approx. amt. of Mg and P present in available form. M. S. Anderson.

Profile studies in the western province with reference to hardpan formation. M. S. Du Toit and J. Reyneke. *South African J. Sci.* 27, 280–95(1930).—Complete chem. analyses are given for soils of 3 profiles. There appear to be 2 extreme modes of hardpan formation: one involves accumulations of $SiO_2$ under arid and alk. conditions and in some cases subsequent dehydration and building up of complex silicates, while the other mode consists of accumulation of sesquioxides and in some cases humus or both. Later desiccation of this may result in the formation of $Fe_2O_3$ concretions and $Fe_2O_3$-cemented sand grains. Between these 2 extremes there may exist a great variety of pans of varying degrees of intensity. A study of the behavior of $Fe(OH)_3$ and $Al(OH)_3$ in the presence of $SO_4$ and Cl ions indicates the possibility of a sol. state beyond the point of complete coagulation. M. S. Anderson.

The potash requirement of South African soils. I. de V. Malherbe and M. H. Slabber. *South African J. Sci.* 27, 236–52(1930).—Analytical data are given for a large no. of South African soils. The detns. made include mech. analyses, $p_H$, $K_2O$ sol. in strong HCl and in citric acid, $K_2O$ by the Neubauer seedling method, and $Al_2O_3$ sol. in HCl. The soils are, for the most part deficient in $K_2O$. Fertilization with $K_2O$ prevents leaf scorch on certain varieties of fruit trees and berry fruits under arid conditions and increases the quality of the fruit and its keeping qualities. Fairly const. ratios exist between $K_2O$ dissolved in concd. HCl, citrate-sol. $K_2O$, and $K_2O$ by the Neubauer method. Approx. crit. values of these several ratios are proposed for these soils when grain crops are grown. The sandy soils are particularly deficient in $K_2O$, and frequent applications involving relatively large quantities of $K_2O$ are required for

markedly increasing the quality of fruit and for preventing leaf scorch under the arid conditions prevailing M. S ANDERSON

The nature of soil acidity as affected by the $SiO_2$-sesquioxide ratio. L D BAVER AND G D SCARSETH *Soil Science* 31, 159-73(1931).—A study is made of the colloidal material from 21 different soils representing various kinds and states of weathering The $SiO_2$-sesquioxide ratio, the total base-exchange capacity, and certain characteristics of the nature of the soil acids have been detd on each of these colloids The nature of the soil acids varies considerably in different soils In weathered soils the nature of the acids is solely a function of the kind and extent of weathering and is independent of the parent material This indicates that there is more than 1 type of soil acid Colloidal material of high $SiO_2$-sesquioxide ratio extd from well weathered soils tends to be more highly buffered and to exhibit stronger acidity than colloids having a low ratio Total exchange capacity is also higher The nature of the soil acids may prove a valuable criterion in the classification of soils Buffer capacity of the colloids appears to be primarily a function of the nature of the soil acid The exchange complex may develop by removal of certain constituents from the original aluminosilicate minerals, by mutual flocculation of colloidal oxides of Al, Fe and Si, and by pptn of Al, Fe and Si from soln There is no one direct relationship between $SiO_2$-sesquioxide ratio and the total exchange capacity of the colloid, or the nature of the soil acid Free oxides of Al, Fe and Si may be present in colloids, and it is suggested that it might be desirable to eliminate these when considering the relation of the compn of colloidal material to physicochem properties M S ANDERSON

The development of roots related to the calcium content of soils. JOH GÖRBING *Zuckerrübenbau* 12, 125(1930), *Listy Cukrovar* 49, No 12, Rozhledy 9, Cf. *C. A* 25, 553.—The growth of fine roots was studied in soils of various $p_H$ values, the greens were normal in soils in which the roots were stunted In the more acid strata, the roots became stunted regardless of the depth of stratum in which they were planted In neutral or alk strata, a luxurious development of roots occurred FRANK MARSH

The influence of drying the soil on the microbiological processes in the soil. V. K. ZALESSKII AND A M KUKHARKOVA *Pochvovedenie* (Pedology) 23, Nos 3-4, 94-111 (in German 111-2)(1928).—Drying the soil increased the soly. of org matter, the amt of available N and P compds Peptone added to dried soil upon wetting did not increase the activity of the flora, whereas mannitol and glucose did Drying the soil decreases the absorption power of the soil for microbes, hence there is a greater activity providing available org matter is furnished The addn of carbohydrates to a dried soil stimulates the activity of the microörganisms, and they use the available N and P The disappearance of nitrates from the soil is due primarily to the absorption by plants and microorganisms J. S JOFFE

The fungus flora of the soil. H L. JENSEN *Soil Science* 31, 123-58(1931), cf *C A* 25, 1934.—A study of the fungus flora of 100 Danish soils of reactions varying from $p_H$ 3.34 to 8.35 shows the largest amt of mycelium in acid soils rich in org matter There is no clear relationship between no of fungi and soil type or soil reaction except that very heavy clay soils are relatively low in fungi The addn of lime does not markedly depress fungi, but greatly stimulates bacteria and actinomyces Some fungi will grow in soil made as acid as $p_H$ 1.5, while others are checked at $p_H$ 3.7 to 4.2 M S ANDERSON

Soil bacteria. II. YOSHIHIKO YAMAMOTO *J. Agr Chem Soc Japan* 6, 873-83 (1930).—Mucors are classified into 2 groups (1) monomucors (sporangiophores not branched) and (2) polymucors (sporangiophores branched) The list of soil Mucorales was mentioned. Y. KIHARA

Reducing the consumption of sulfuric acid in reworking of phosphorite of Izyum. M. A EGOROV *Ukrainskii Khem Zhur* 5, No 2, Tech Pt. 43-63(1930).—Agricultural expts have shown that a certain part of Ca contained in the phosphorite of Izyum (I) possesses unusal mobility and acts as a very strong retrograding agent on the phosphoric acid (II) in I, rendering it sparingly sol and thus only slightly available for plant vegetation. Instead of the costly process of removing Ca from I (Rozhdestvenskii, *C A* 22, 2022) the present investigation gives methods of chemically binding Ca, whereby its deleterious action on the mobility of II in I may be entirely eliminated. Conclusions The activation of II in I by citric acid (III) is greatly increased with the addn. of oxalic acid (IV), KCl and NaCl. The activation of II by IV is increased with NaCl Under some conditions IV *per se* can entirely remove II from I. The activity of $H_2SO_4$ on I is greatly increased by addn of alkali oxalates (which is not the case with phosphorites of other origins), whereby the entire II in I may be rendered $H_2O$-sol. and the consumption of $H_2SO_4$ may be reduced about 2.5 times. With the aid of a

little $H_2SO_4$ and some $(COONa)_2$ a phosphate was prepd which produced in 1929, with cultivation of sugar beets, results equal to those of superphosphate, the prepn of which consumes 3 times as much $H_2SO_4$ The work is being continued CHAS BLANC

The electrodialysis of phosphorite of Izyum. K. N TARANOV. *Ukrainskii Khem Zhur.* 5, No 2, Tech pt 65–75(1930), cf *C A* 23, 460.—The investigation has been undertaken for the reworking of low grade phosphorite (I) of Izyum by electrodialysis, whereby its $P_2O_5$ may become available for plant vegetation Conclusions: By the electrodialysis method it is possible completely to decompose I and sep all of the $P_2O_5$ and Ca in the form of aq solns The residue of I has an acid reaction (AcONa) By the double-chamber process of sepn of $P_2O_5$ from I, there are formed residua of I, which proved as effective as superphosphates in vegetative expts (oats) The enrichment of residua with $P_2O_5$ is due to the removal of some components, such as Ca, $CO_2$, Cl, etc. By the electrodialysis method only $H_2O$ and the elec current are required Questions pertaining to such factors as tension and strength of the current, the relation between the electrode surface and the mass of I, etc., have not yet been studied CHAS BLANC

Experiments on the production of thermophosphates from the Khibinsk apatite. S I VOLFKOVICH AND S S PERELMAN *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 570–80(1930).—By a flotation method a product was obtained from the Khibinsk apatite with a 40 5% $P_2O_5$ content This and 2 other samples contg 27 12 and 19 47% $P_2O_5$ were fused with $Na_2CO_3$ By using 30 2 parts of the 40 5% $P_2O_5$ sample for 100 parts of the phosphate at 900–1200° a product was obtained with a 70% coeff of decompn, the latter representing the ratio of citrate sol $P_2O_5$ to the total With a 25% excess of $Na_2CO_3$ the coeff increases irrespective of the temp from 900° to 1200° With a 50% increase the proportionality between the $Na_2CO_3$ and increase in $P_2O_5$ disappears At 1100° the coeff drops from 75 3 to 60 7% and then again increases at 1200° to 92 6% At 1300° the mixt fuses but there is no increase in $P_2O_5$ The optimum conditions were found to be at 1200° with 1 5 times the amt of soda used originally, *i. e.*, 45 parts of $Na_2CO_3$ to 100 parts of apatite With the 27 1% $P_2O_5$ sample at 1000–1200° with 20 parts of $Na_2CO_3$ to 100 parts of phosphate the coeff of decompn was 70–80% A 25% increase of $Na_2CO_3$ increased the coeff of decompn almost to 100% Even at 900° such a mixt gave an 82 2% coeff With the 19 5% $P_2O_5$ sample at 1200° with 22 parts of $Na_2CO_3$ to 100 parts of the phosphate almost 100% of the phosphate became citrate sol Addns of 10% $SiO_2$ to the mixt slightly increased the coeff of decompn $SiO_2$ alone had no effect An increase of the $SiO_2$ to 20% produced neg results Addns of $CaCO_3$ alone had no effect, but with the $Na_2CO_3$ an increase in the coeff. took place The time factor of heating the mixt. brought out the fact that 30 min. gives the optimum The cooling of the mix immediately after 30 min heating increased the soly of the product. Heating with various chlorides gave neg results With $Na_2SO_4$ and charcoal a product was obtained with a coeff of 80%. Vegetation expts. with thermophosphates show that it is just as good as Thomas slag, but it is slightly inferior to superphosphate J. S JOFFE

The relation between the geological origin and the available phosphoric acid of a soil. L. NEUBERGER *Kunstdünger u. Leim* 28, 77–8(1931).—Review. C. J S

A colorimetric determination of phosphoric acid in soils. A NĚMEC, LAVÍK AND KOPPOVÁ. *Vestník svazu výzkumných ústavu zemedelských* 5, 18(1930); *Listy Cukrovar* 49, No 4, Rozhledy 2.—The König-Lemmermann method requires a long time for analysis, and soils high in Ca make the ignition of citrate salts very difficult For routine work the method is: shake 10 *g* of soil with 100 cc. of a 1% citric acid soln (soils high in Ca have to have a correction factor) for 1 hr Repeat the process for 1 hr. on a subsequent day Filter or centrifuge, treat 5 cc. of the clear soln with 10 cc. of 40% $H_2SO_4$, bring to a boil, and treat with 0 1 *N* $KMnO_4$ until a faint but permanent pink color remains Remove any excess of $KMnO_4$ with $H_2O_2$ Digest the soln on a water bath for 30 min., drain into a 100-cc vol flask, treat with 4 drops of α-dinitrophenol, and neutralize with 15% $NH_4OH$ Cool the soln and treat with 2 cc. molybdic acid and 0.3 cc. $SnCl_2$ This produces a blue color, make up the soln to 100 cc. and compare colorimetrically. The standard soln is made from $K_2HPO_4$ contg 0 05–0 5 $P_2O_5$ per 10 cc. The values run higher than those with the K.-L. method, N ascribes this to a more thorough extn FRANK MARESH

The use of the Neubauer method for determining phosphoric acid supplies in soils. A. NĚMEC *Zemedelský arch* No 3, 129(1930), *Listy Cukrovar* 48, No 52, Rozhledy 11.—The Neubauer method of sprouting plants yielded low $P_2O_5$ values in soils which were adequately supplied according to fertilizer tests The cause of a lowered resorption of P was found to be due to a low N content All soils had a low N and low nitrifica-

tion power The Neubauer method does not take into consideration the laws of minima. Fertilizing with N increased the resorption of P in which low Neubauer values were obtained. FRANK MARSH

Efficiencies of phosphoric acid of various fertilizers for spring- and autumn-sown barley. IWAO OMAI *Ann Agr. Expt Sta Government-General of Chosen* 3, 394–402 (1930).—Application of $Na_2HPO_4$ bone meal and superphosphate gave about 100% greater yield and 130–140% more of absorbed $P_2O_5$; rice polish and $AlPO_4$ gave 150% greater yield and 60–70% more absorbed $P_2O_5$ than when no $P_2O_5$ was applied In general autumn sown barley showed higher absorption and higher yield than spring-sown barley Tests for residual $P_2O_5$ after the first crop showed great value for the second crop K. KITSUTA

A contribution to the evaluation of requirements for fertilizing soils with phosphorus. A NĚMEC *Vestník Ústř Jednoty Repařů Csl* 11, 277(1930), *Listy Cukrovar* 49, No. 4, *Rozhledy* 1.—The use of $P_2O_5$ in fertilization is closely allied with Ca; soils with adequate Ca should have more available $P_2O_5$ than soils deficient in Ca. Other elements controlling the availability of $P_2O_5$ are Fe and Al, soils contg more than 50 mg Fe freely sol in 1% citric acid fail to respond to $P_2O_5$ treatments, even though they show a $P_2O_5$ deficiency by the König Lemmermann method The method for detg. the available P by evaluating only the $P_2O_5$ sol. in $H_2O$ becomes of no value for soils contg less than 3 mg $P_2O_5$ (sol.) per 1 kg soil Soils contg large quantities of Fe did not react to $P_2O_5$ fertilizations, even though the sol $P_2O_5$ was high or low All available methods were inadequate to det. what soils would respond to $P_2O_5$ treatments. Soils deficient in both Fe and $P_2O_5$ gave increasing yields of beets, N attributes this to $SiO_2$, for only soils contg less than 12 mg sol $SiO_2$ per 1 kg of soil reacted to $H_3PO_4$ treatments regardless of whether the $P_2O_5$ was high or low In soils with a high Fe content, $P_2O_5$ fertilizers fail to increase the yield of beets, even though the sol $SiO_2$ may be less than 12 mg per kg of soil. FRANK MARSH

The retrograding action on phosphates of the soil under various conditions. F. V. TRIFONOV *Ukrainskii Khem Zhur* 5, No 2, Tech pt 77–91(1930).—The influence of moisture on the retrogradation of phosphates is considerable Thus the soly. in $H_2O$ of $CaHPO_4$ decreases by 30% with an increase of 30–100% in the moisture based on the total moisture capacity of the soil. The soly of Izyum phosphate in citric acid increases to 65% with an increase in moisture The highest amt. in soln was observed at a moisture content of 80–100% of the total moisture capacity The influence of temp. on the retrogradation is different for different phosphates, *e. g.*, temp changes do not affect solns. of Izyum phosphorite in $H_2O$ or in citric acid, while increase in temp greatly decreases the soly of $CaHPO_4$ in both water and citric acid. The retrograding action on phosphates of soils of the region of forest steppe varies greatly, there is a regular decrease of retrogradation with declining richness of the soil. CHAS. BLANC

The constitution and citrate solubility of tricalcium phosphate and of phosphate rock. K. D JACOB *Phosphorus Digest* (April, 1931), pp 7–9; cf. *C. A.* 25, 1619.—When 0.5-g samples are used, 65–75% of the total $P_2O_5$ in pptd. $Ca_3(PO_4)_2$ and in steamed bone meal is sol in neutral $NH_4$ citrate soln., but when the wt. of the sample is increased to 2.0 g., only 25–30% of the total $P_2O_5$ goes into soln. The citrate soly. of ground phosphate rock is only about 12% of that of $Ca_3(PO_4)_2$ and bone. The low soly of phosphate rock seems to be due principally to the fact that the phosphate is combined with F to form a complex Ca fluophosphate of the same type as cryst. fluorapatite. K. D JACOB

Can superphosphate and its components increase the solubility of soil potash? C. DREYSPRING AND K. BRINKMANN *Superphosphate* 4, 69–75(1931), cf. Dreyspring and Heinrich, *C. A.* 25, 1935.—The increased soly of soil potash as a result of the application of superphosphate is due principally to the presence of free $H_3PO_4$ in the superphosphate. The $Ca(H_2PO_4)_2$ and $CaSO_4$ in superphosphate also increase the soly. of soil potash. K. D JACOB

Superphosphates enriched with ammonia. S. I VOLFKOVICH, L. E BERLIN, I. L. HOFMAN AND A. A. IONAS *Udobrenie i Urozhai (Fertilizers and Crops)* 7, 495–504 (1930).—Tests were made of mixing $H_2SO_4$ with $NH_4H_2PO_4$, with $(NH_4)_2HPO_4$, with a mixt. of both, and with $(NH_4)_3PO_4$. The factors studied were the quant. relationship of the reagents, order of mixing, duration of process and temp involved. A definite amt. of $H_2SO_4$ was placed in a Pb container, and the various $NH_4$ phosphates were added gradually A stirrer was started and raw phosphates were added slowly, lumping being avoided. The stirring lasted 1–2 min., after which the mixt. was placed in a thermostat at 95–105°. After 3 hrs the mixt. was weighed, to follow the loss in wt., and placed in thin layers on paper, it was left that way for 2 days and weighed again. Analy-

ses were then made. Total $H_2O$-sol and citrate-sol $P_2O_5$ were then detd Methods of prepg. the various $NH_4$ phosphates, as well as the amts of $H_2SO_4$ used with them, are given J S JOFFE

**Organic fertilizers. VII.** KIYONAO YOSHIMURA, KOTARO NISHIDA AND ARITOMO YAMADA *J Agr. Chem Soc, Japan* 6, 999–1002(1930) —Steamed bone powder was kept with water for 55 days. The av temp was 32 8° The aq ext of the putrefaction products was analyzed: total N 2 550% protein N 0 044%, $P_2O_5$ 0 019% Ninety % of total N was changed into $NH_3$ One g histamine (Au salt), 3 31 g putresine-HCl and 280 74 g $NH_4OH$ were isolated from 10 kg of the bone powder Y K.

**The economical and profitable use of commercial fertilizers under present conditions.** O ENGELS *Kunstdünger u. Leim* 28, 126–36(1931) —A general discussion C J SCHOLLENBERGER

**The use of sawdust as a fertilizer.** MARCEL H MOTTE *J agr. prat* 95, 192 (1931) —Sawdust used exclusively in large quantities on the soil has generally given an excellent plant growth without any apparent lack of nitrate and with normal nitrification Artichokes, leeks, sugar beets, maize and strawberries all have produced good crops without any other fertilizer J R ADAMS

**The Gerard manure pit.** F MAGNIEN *J agr prat* 95, 71–4(1931) —The conditions governing the transformation of barnyard manure into a fertilizer contg available nutritives are listed The Gerard manure pit is intended to satisfy these conditions and is described in considerable detail J R ADAMS

**Potash fertilizer for sugar beets.** J-PH WAGNER *Compt rend acad agr France* 17, 77–9(1931) —Sugar beet cultivation calls for a soil with a $p_H$ of 7–7 5, which can be obtained by liming Max yields have been obtained when approx 1,000 kg / acre of sylvinite kainite has been added to the soil The yields have amounted to 761 kg of sugar per acre. The large amts of $K_2O$ aid the plant in obtaining an early and vigorous growth and greater resistance to disease They also sensibly increase the saccharin content J R ADAMS

**The nitrification of ammonium sulfate as influenced by soil reaction and degree of base saturation.** JAMES A. NAFTEL. *J Am Soc. Agron.* 23, 175–85(1931) —There appears to be a relationship between the percentage base and Ca satn and the nitrification of $(NH_4)_2SO_4$ After 10 days' incubation nitrification occurred at $p_H$ 4 1 only in the soil with a high percentage base and Ca satn Lower base satn prevented nitrification All the soils had a higher percentage nitrification of $(NH_4)_2SO_4$ at the highest $p_H$ values studied. In most cases plant growth was better at $p_H$ 6 5 than at the very acid reactions Nitrification varied considerably in different soils and showed a fairly good correlation with plant growth data J R. ADAMS

**Experiments with calcium nitrate-I.-G.** F. X. KREŠL. *Listy Cukrovar* 49, 261–2(1931) —The $Ca(NO_3)_2$ was prepd by the I G. firm and contained N 15 5% and CaO 28%, which corresponds to 50% $CaCO_3$, the N is rapidly utilized by plants. Expts were carried out in 18 sections of an estate, with varied results Because of the sol form of N, less $H_2O$ is required for soln than for any other nitrate fertilizer, the $Ca(NO_3)_2$ maintains a porosity during periods of drought, and on account of its fine dispersion the Ca is equally distributed and swells and aerates the soil Plots fertilized with 400 kg superphosphate and 200 kg of a 40% K salt per ha. showed an increased yield of sugar beets over unfertilized plots, adjacent plots fertilized with 100 kg $Ca(NO_3)_2$ per ha showed about the same increase as those with the superphosphate mixt F. M.

**The action of chromium on the growth of plants.** EL. HASELHOFF, F. HAUN AND W. ELBERT. *Landw Vers Sta* 110, 283–6(1930) —The addn of Cr to the soil has a detrimental action on the plant growth as shown by the effect on the yield of summer barley and mustard. The amts. used were not greater than 0 003% This action depends on the compd of Cr used and is greater with chromic acid than with chromic hydroxide. The injurious action is greater in sandy than in loam soils J R H

**The action of arsenic on plant growth.** E HASELHOFF, F. HAUN AND W ELBERT. *Landw Vers Sta.* 110, 287–9(1930).—Addns of As up to 0 003% have no effect on the yield of summer barley This result is not in disagreement with the work of König because different compds and amts of As were used JOHN R HILL

**The nutrition requirements of vegetable plants. I. Cabbage, beet, carrot and onion.** FELIKS KOTOWSKI *Roczniki Nauk Rolniczych i Lesnych* 24, 372–449 (450–2 English) (1930).—Fertilizer expts. carried out on a rather poor sandy loam in 1928 near Warsaw are described Beets, carrots and onions were sown in exptl plots in rows 40 cm apart. The food supply consisted of mineral fertilizers and stable manure in the ratio of 600 kg per 100 sq m after the tomato crop Cabbages and carrots received 90 kg. N, 40 kg. $P_2O_5$ and 120 kg $K_2O$, beets 63 kg N, 28 kg $P_2O_5$ and 84 kg $K_2O$, onions 28

kg $P_2O_5$ 84 kg $K_2O$ and 63 kg N per hectare N was applied as $NH_4NO_3$, P as superphosphate and K in the form of 20% potash salts Sampling for chem analysis was done at various intervals of plant development, the last sample being taken at harvest time The results are presented in tables and the following conclusions are drawn For (*a*) Brunswick short stem cabbage, (*b*) dark red flat Egyptian beet, (*c*) Chanteney carrot and (*d*) Zittau onion the max intake of N, P, K and Ca falls in *a* in the second *b* in the fourth *c* in the third and *d* in the fourth months after transplanting of (*a*) and germination of (*b*, *c*, *d*) A crop of (*a*) 500 000 kg heads and 370,000 kg refuse parts (*b*) 500 000 kg roots and 200 000 kg leaves, (*c*) 250,000 kg roots and 80 000 kg leaves (*d*) 294 000 kg bulbs and 72 000 kg leaves per hectare removes from the soil 150, 122, 80, 80 kg N, 80, 34, 30, 20 kg $P_2O_5$, 225, 200, 120, 116 kg $K_2O$, and 180, 76, 100, 58 kg CaO resp The N, $P_2O_5$ and $K_2O$ ratios are 3 1 4, 3 5 1 5 5, 2 5 1 4 and 3 1 4 5 resp As compared with cereals cabbages, beets carrots and onions are remarkable for their high N, P, K and especially Ca contents There is also a considerable difference in the N, $P_2O_5$ and $K_2O$ ratio, which is on an av 2 1 2 in cereals and 3 1 4 in the plants reported here These differences, therefore, should be considered in any fertilizer program J KUČERA

**The role of humic materials in fertility.** A DEMOLON *J. agr prat* 95, 109–11 (1931).—The maintenance of humic reserves in the soil is almost always indispensable in maintaining a high fertility and in particular for obtaining the max use from mineral fertilizers They are excellent soil conditioners and aid the soil in retaining $H_2O$ Colloidal humic material increases the nutritive absorptive capacity of soils The value of farm manure and the manuf of artificial manure are discussed J R ADAMS

**Brief study of (reasons for) beneficial action of brown coal upon the development of cultivated plants II** ALEXANDER KISSEL. *Brennstoff-Chem* 12, 101–7(1931), cf *C A* 25, 371.—Investigations during 1924 29 with grain growing in arable soil fertilized with coal dust show a growth increase by kernel weight of 24 55%, depending upon the amt of coal dust used This is believed due to improved germination and branching rather than to any change in soil compn Potatoes also showed tuber-weight increases but with sugar beets the sugar content fell off with root-weight increases Structural aggregates in the soil are formed by the freshly pptd water insol humic acid salts which lose this cementation property on drying The impregnation of soil with coal dust or humic compds thus increases the resistance to water influx into individual soil particles and increases water seepage and aeration in upper soil layers and, in general, restores its fallowness Small quantities of coal dust increase the soil resistance to machinery but large amts decrease it It is contended that difficulties encountered in the use of artificial agricultural fertilizers are to be traced to factors other than the amt of mineral matter made available The structural compn of the soil its phys characteristics and the total content of org humic combinations are also involved F W JUNG

**Decomposition of rotenone in solution.** HOWARD A JONES *Ind Eng Chem* 23, 387 8(1931).—The decompn of rotenone is accelerated by access of air but is not affected by differences in amt of light or by the presence of water Pyridine solns of rotenone decompose most rapidly and in a few days crystals of dehydrorotenone and rotenononone are formed by oxidation Rotenone is completely sol in benzene, and in a benzene soln there is no appreciable decompn Acetone may be used for a water sol solvent J R ADAMS

**The relation of chemical composition of cultivated and wild green-manure plants to decomposition of the nitrogenous constituents.** HIDEO MISU, IWAO OMAI AND TADAO HIBINO *Ann Agr Expt Sta Government-General of Chosen* 5, 1–126(1930).—Twenty-two varieties of cultivated and wild green manure plants were decompd by fermentation for 48 days under conditions simulating those in soil with upland and lowland systems of culture The relations of ammonification nitrification and the yield of titrable acids to the chem compns of green manures are as follows Ammonification differs greatly with the different raw materials used under both upland and lowland conditions In upland conditions, it decreases later Nitrification is negligible under lowland conditions, but it differs greatly under upland conditions with the different raw materials used, and it decreases later *Attainment of max ammonification is favored* by the increase of total N, ash, CaO, or CaO + MgO and disturbed by the increase of crude fiber, N free ext., crude-fiber protein, and N free ext /protein Attainment of max. nitrification is favored by the increase of total N, $K_2O$ and CaO + MgO and disturbed by the increase of crude fiber, N free ext., and N free ext /protein Attainment of max titrable acidity is favored by the increase of total N and of CaO+MgO and disturbed by the increase of lignin N free ext., and N free ext /protein The max ammonification and the

development of max acidity were greater in lowland conditions than in upland conditions
K KITSUTA

**Availability of nitrogen of green manure for rice and the supplementary value of various fertilizers.** HIDEO MISU AND H SHIMOHIRA *Ann Agr Expt Sta Government General of Chosen* 4, 65–94(1929) —The availability of N was lower in dried than in fresh green manure The value of N of dried green manure was greatly increased by replacing ½ of the N with $(NH_4)_2SO_4$ Although the N of fresh material appeared less available, the yield obtained was better than that with fermented green manure Superphosphate, $K_2O$ and CaO had great value as supplements to green manure, increasing availability of the N and yields Yields with fresh green manure were 83 4 and 80 3% of those with soy bean cake and $(NH_4)_2SO_4$, resp K KITSUTA

**The availability of nitrogen of air-dried green manures for rice.** HIDEO MISU *Ann Agr Expt Sta Government General of Chosen* 4, 167–72(1929) —Green manures showed lower availability of N and lower yield than did soy bean cake and $(NH_4)_2SO_4$
K KITSUTA

**Nitrogen in the intensive exploitation of pastures.** CAMILLE MATIGNON *Chimie & industrie* 25, 271–5(1931) —A discussion is given of the advantages, from the double standpoint of yield and quality, of the use of N fertilizers on pasture lands A P-C

**Comparative value of nitrogenous fertilizers on the growth of fall and spring barley.** IWAO OMAI *Ann Agr Expt Sta Government General of Chosen* 3, 317–54(1930) —Among 15 tested materials Chilean $NaNO_3$ and $(NH_4)_2SO_4$ gave the highest percentage of recovery of N by the plants (60–66%) and the best yield $CaCN_2$, dried fish meal, dried blood, soy bean cake, bone meal and human excrement showed 45 55% recovery of applied N by the plants with 68 87% yield compared with the yield by $(NH_4)_2SO_4$ as 100% Heavy application of mulch made of weeds was rather injurious on the first crop as a result of its fermentation, and the benefit to the second crop was small in comparison with the loss of N by fermentation The efficiencies of the N in stable manures from swine and cattle were very small The value for the second crop of any residual N after the first crop was rather small K KITSUTA

**The effect of various fertilizer treatments on the crop-yield factors and the structure of leaves of barley and wheat.** K BORKHOLT *Z Pflanzenernähr, Düngung u Bodenk* 9B, 289–300(1930) —Stooling, weight per 1000 grains, grains per single head, weight of grains per head and total yield are affected by various single fertilizers and combinations K has little effect on stooling P more and N most The 1000 grain weight and weight per single head are least with N A mixt of N, P and K usually gave the highest values for all the factors mentioned and always the highest yield The leaf surface varies with the fertilizer treatment, *e g*, if no treatment is 100, then a mixt of K and P is 97 8, a mixt of K and N 128 9, a mixt. of P and N 144 4, a mixt of K, P and N 134 7, and 2 pts K, 1 pt P and 1 pt N 130 7 The microanatomic structure also varies with different fertilizer treatments H B. SIMS

**Effect of ammonium sulfate on field germination of rape and turnips.** J W WOODCOCK *New Zealand J Agr* 42, 89–90(1931) —Germination of rape and turnip seed fertilized with $(NH_4)_2SO_4$, either alone or mixed with other fertilizer materials, at the rate of 100 lb /acre was only 10 to 44% of the germination obtained when the seeds were fertilized only with a mixt of 100 lb of superphosphate plus 100 lb of ground limestone Fertilization with superphosphate alone gave germination counts 66 to 100% of those obtained with the mixt of superphosphate and ground limestone In all cases the fertilizers were applied with the seed in 14 in rows. K. D JACOB

**Fertilizer experiments on citrus seedlings.** I TAKAHASHI *J Okitsu Hort. Soc* (Japan) 25, 38–50(1930) Pot expts with seedlings indicated that N is the most necessary element for growth The requirements of $P_2O_5$ and $K_2O$ were ½ and ⅓, resp, of the N requirement Requirement of $P_2O_5$ for growth of the citrus tree was not very great, but deficiency of this element retarded growth markedly The requirement of $K_2O$ was greater than that of $P_2O_5$, however, the growth continued uninterruptedly without $K_2O$ for a certain time by compensation with the supplement of the other elements
K. KITSUTA

**Fertilizer experiments with Satsuma orange.** K. TASAKI, Y. INOUE AND N. MATSUOKA Imp Hort Expt Sta (Japan), *Research Bull* 13, 60 pp (1930) —Plots were arranged into those with no fertilizer, N, P or K and complete fertilizer treatment No fruit was obtained from the trees in the plot without N. When P was omitted, the yield was much decreased, and the acidity of the fruit was high Lack of K caused decrease in yield, poor color of skin and small sized fruits the spoilage of fruits during storage was 5 5 times higher than that of the fruits from the completely fertilized plot
K KITSUTA

Is fertilization to prevent frost injury practical? WALTER OBST. *Kunstdünger u. Leim* 28, 29–7(1931).—The resistance of plants in general toward injury from cold is increased by complete fertilization, excess N being avoided. C. J. S.

The importance of artificial fertilizers in modern pond culture. K. HEITZ. *Kunstdünger u. Leim* 28, 27–8(1931).—Growth of plankton serving as food for fish is greatly increased by proper fertilization with $K_2O$ and $P_2O_5$. The application of CaO to a drained pond during winter is advised as a sanitary measure. C. J. SCHOLLENBERGER

Carbon dioxide in relation to glasshouse crops. V. An analysis of the response of the tomato crop to an atmosphere enriched with carbon dioxide. H. L. WHITE. *Ann. Appl. Biol.* 17, 765–82(1930).—The enrichment of the atm. has the following effects upon the tomato plant. It shortens the period between opening of the flower and picking of the fruit. A high percentage of blossoms develop into fruit. Less fruit is retarded in ripening. There is better development of the truss. There is earlier development and ripening of trusses. There is better swelling of fruit at end of season. Conclusion. Increased $CO_2$ concn. is most beneficial to the plant at periods of low fruit production. C. H. RICHARDSON

A study by foliar diagnosis of the influence of temperature on plant nutrition. H. LAGATU AND L. MAUME. *Compt. rend.* 190, 1516–8(1931); cf. *C. A.* 24, 4575; 25, 2234.—Potatoes were grown on plots receiving various fertilizer treatments, and the leaves were analyzed for P at intervals. During May the temp. averaged about 14°, and the P content remained rather const. During June, when the temp. averaged 21°, the P content decreased markedly on the plots which received N, but did not on those without N. The explanation offered is that with added N tuber development is more abundant, and this tends to deplete the P in the leaves. J. J. WILLAMAN

*Some studies on the use and action of mercuric chloride as a fungicide.* J. L. HOWATT. *Twenty-first Ann. Rept. Quebec Soc. Protect. Plants* 1928–9, 40–2(1929). *Rev. Applied Mycol.* 10, 196–7.—The control of fungicides in certain seed borne diseases by use of $HgCl_2$ is due to retardation of the germination of the spores sufficient for them to be outgrown by the host and so removed from the meristematic tissue. Stimulation of the seed after treatment is attributed to indirect partial sterilization effect on the soil. Temp., concn., time of action, age of spore and host plants, assocn. and type of seed are considered to affect the toxicity. ODEN E. SHEPPARD

Titrimetric determination of arsenic in plant-protecting agents. J. PÁSKUY. *Magyar Chem. Folyóirat* 36, 76–83, 95–101(1930).—The agents are destroyed with $HNO_3$ and $H_2SO_4$, then dild. to a concn. of about 50% $H_2SO_4$. Now 30 cc. concd. HCl, 5 g. crystd. $FeSO_4$, and 2 g. KBr are added, 25 cc. is distd. and As titrated in the distillate according to Gutzeit with 0.1 *N* $KBrO_3$ soln. Detns. may thus be made within 1–5 hrs. Also a micromethod was worked out, the results of which quite agree with those of the macromethod. Hydrazine sulfate should replace the $FeSO_4$ in the micromethod. S. S. DE FINÁLY

The biochemical influence of arsenic. J. PÁSKUY. *Magyar Chem. Folyóirat* 36, 111–8(1930).—Spores of *Tilletia tritici*, Bjerk. Winter, adsorb some As of $H_3AsO_4$ and arsphenamine but no As of other arsenicals, either inorg. (arsenites, arsenates) or org. (arsacetin, atoxyl, solarson, cacodylic acid, etc.). Adsorbed As does not kill spores but hinders their multiplication. Agents of which no As is adsorbed have no influence at all on spores. Spores treated with arsenites and dried without washing off the agent were killed. Arsenates did not show such results. S. S. DE FINÁLY

Effect of arsenic on the composition of citrus fruits. I. TAKAHASHI. *J. Ohita Hort. Soc.* (Japan) 25, 153–63(1930).—Spraying citrus trees with arsenates caused a decrease in acidity and an increase in sugar content of fruit juice. The reduction of acidity depends greatly upon the time of spraying, amts. of other spraying materials mixed with arsenate and the method of application. Excessive use of arsenate should be avoided, as it affects the yield and taste of fruit. A decrease in acidity and an increase in sugar content of fruit caused poor keeping quality, therefore, in warmer regions caution must be exercised in spraying with arsenicals. Beside controlling harmful insects, spraying arsenates may be of benefit by hastening maturity or reducing excessive acidity of fruit. K. KITSUTA

Effects of some sulfur sprays on fruit-bud development. C. E. PETCH AND J. L. HOWATT. *Twenty-first Ann. Rept. Quebec Soc. Protect. Plants* 1928–9, 39(1929); *Rev. Applied Mycol.* 10, 197.—Comparative tests of koloform (prepd. by fusing bentonite with S, with Ca caseinate added to assist the mixing in water) and lime-sulfur on the development of apple trees shows that koloform treated buds were 0.4903 in. long when those sprayed with lime-sulfur were 0.3979 in. long. This difference is attributed to absence of injury in koloform treated foliage, whereas burning and dwarfing of foliage

was evident on the trees treated with lime sulfur Koloform was applied at the rate of 8 lbs , and lime-sulfur at the rate of 1 gal to 40 gals water. ODEN F SHEPPARD

**The mineral nutrition of plants in relation to their predisposition or resistance to attack by pathogenic agents.** L. PETRI. *Boll R. Staz Pat Veg N. S* 10, 121–52 (1930), *Rev Applied Mycol* 10, 200.—The action of different fertilizers (including nitrogenous and phosphatic fertilizers, lime, sulfur, gypsum, potash, iron and aluminum sulfates, and manganese salts) on the anatomical and physiol properties of plants with reference to their resistance to injurious inorg agencies as well as to various fungus and animal parasites was studied In general, nitrogenous dressings aggravate susceptibility, whereas phosphatic and potash dressings reduce it The action of the fertilizer is indirectly on the mechanism of the host resistance and is influenced by local factors, comparative tests must be carried out under identical conditions ODEN E SHEPPARD

**Spraying and dusting experiments with potatoes on Long Island.** H. C. HUCKETT. N Y State Agr Expt Sta , *Bull* No 592, 1–38(1931).—Expts in spraying and dusting Irish Cobbler (I) and Green Mountain (II) potatoes have been conducted during 5 successive seasons, 1926 1930 With the exception of applications contg nicotine, Bordeaux mixt (4–6 50) was used in sprays and $CuSO_4 \cdot H_2O$ and $Ca(OH)_2$ (20–80) for dusts For biting insects $CaAsO_4$ was added to Bordeaux mixt at the rate of approx 5 lbs or to dust mixts at 10–12 lbs per acre Arsenical treatments were usually made 3–4 times each season to combat Colorado beetle and flea beetles For sucking insects nicotine sulfate (40% soln ) was added to Bordeaux mixt or a mixt of dolomite and $Ca(OH)_2$ (10–50) at the rate of about 1 pint or 3 pints per acre, resp There were no significant differences in the results from dusting and spraying in the case of I. Also nicotine treatments in spray or dust form did not give rise to addnl increases in yield over other spraying and dusting operations With II Cu treatments in spray form gave on an average slightly superior results to Cu treatments in dust form Nicotine treatments in dust form were more reliable, and in years when aphids were a limiting factor gave superior results to nicotine in spray form J KUČERA

**The effect of gypsum upon the growth and common scab of the potato.** J G COULSON. *Twenty first Ann Rept Quebec Soc Protect. Plants* 1928–9, 64–80(1929), *Rev Applied Mycol* 10, 202.—Increasing applications of gypsum above 500 lbs per acre in field tests progressively reduced the number of tubers formed and gave an increased amount of scab infection A lab test showed that addn of gypsum did not effect the $p_H$ of the soil Addn of gypsum to potato dextrose agar from 0 5 to 50% caused no difference in the rate of growth of *O scabies* ODEN E SHEPPARD

**Seed treatment for controlling covered smut of barley.** R. W. LEUKEL. *U. S Dept of Agr. Tech Bull* 207, 1–22(1930), *Rev Applied Mycol* 10, 173–4.—Satisfactory control of covered smut (*Ustilago hordei*) of barley was obtained by steeping the seed grain for 1 hr in either 1 in 320 formaldehyde, 0 5% semesan, 0 5% corona 620, 0 5% uspulun, 0.25% germisan, 0 25% tillantin or 0 5% Bayer compd Expts. with more than 45 dusts indicated that their effectiveness is independent of soil reaction, but a soil moisture content of less than 25% satn. decreases the efficacy of most dusts. Hochst, abavit B, and ceresan are the most effective dusts and give satisfactory control Use of dusts avoids the seed injury common with steeping treatments, and thus better stands and yields are obtained ODEN E SHEPPARD

**Dry pickling for control of smut in oats.** W B. MILLER AND J A. MORROW. *J Dept Agr. Victoria* 29, 86–9(1931).—Good control was obtained by dusting the seed with Cu carbonate at the rate of 2 oz per bushel Treatment of the seed with formalin solns gave better control of the smut but adversely affected germination of the seed K. D. JACOB

**Action of low potencies.** W. MAAG. *Suddeutsche Apoth -Ztg.* 71, 143–5(1931).—The results obtained in a series of expts on the germination of wheat in the presence of varying low potencies of HCl, $H_2SO_4$ and $CuSO_4$ are illustrated, as also those obtained with paper strips vertically suspended and just dipping into varying potencies of KOH and $H_2SO_4$ W. O E.

**Control of the webbing spider (Lampona obscoena) of citrus trees.** S A COCK *J. Dept Agr. Victoria* 29, 83–5(1931).—Good control is obtained by spraying the webs with an emulsion of 2 pints of kerosene and 4 ounces of soap in 3 gallons of water to which is added 1 5 lb of pyrethrum The kerosene serves to penetrate the web, while the pyrethrum acts as the killing agent. K. D. JACOB

**The destruction of weeds by chemical procedures.** M. BARBUT. *J. agr. prat* 95, 9–11(1931).—Comparisons are made of the efficacy of the weed eradicators used for those weeds which are harmful to cereals A 6–8% soln of $H_2SO_4$ gives excellent results, destroying charlock, chenopodium and polygonum The objection is that it is

very active in delimng the soil. Dehydrated iron sulfate and a nitrocopper compd are very effective against charlock, but both these materials are somewhat more expensive. A special powd. sylvinite is perfectly satisfactory against some of the weeds such as charlock, but great care must be used, as large quantities of this material are injurious to the crop. J. R. Adams

Cucumber disease investigations on Long Island. E. E. Clayton. N. Y. State Agr. Expt. Sta., *Bull.* No. 590, 3–20 (1931).—The cucumber diseases, mosaic, wilt and mildew or blight, can be best checked by treating the seeds with org. Hg compds. when the seed is sown early, by using wet and dry sprays with dust mixts. such as $Ca_3(AsO_4)_2 + CaSO_4.2H_2O$ (1–15), copper lime, kayso-$Ca_3(AsO_4)_2$ (3–3–50) and by breeding disease-resistant varieties. Spraying does not control mosaic. J. K.

Study of the warble and its eradication. A. Ganesser. *Schweiz. Leder-ind. Ztg.* 1930, No. 3–4. *J. Intern. Soc. Leather Trades Chem.* 14, 324. cf. *C. A.* 20, 2223.—The hypocostine (nicotine salve) treatment previously described has worked well in practice. The treatment seems to have a lasting prophylactic effect. H. B. M.

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Recovering of $NH_3$ in beet-sugar manufacture [for use as fertilizer] (Vostokov, Kotlyarenko) 28. Detection of F in soils (Reckendorfer) 7. Organic solvents for aiding the removal of spray residue from waxy or oil-covered fruit (Robinson) 12. Estimating the solubility of acid Pb arsenate within the alimentary tract of the silkworm (Campbell, Lukens) 11. Quinquennial review of the mineral production of India for the years 1924 to 1928. Saltpeter (Pascoe) 18. $(NH_4)_2SO_4$ (Hung. pat. 101,900) 18.

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Keen, Bernard A. The Physical Properties of the Soil. New York: Longmans, Green and Co. 388 pp. $8.

Vermorel, V. Agenda agricole et viticole, 1931. Paris: Dunod. 384 pp. F. 6.50.

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Reagent for treating alkali soils. Chivoly, Ltd. Hung. 101,149. Jan. 4, 1930. S bacteria and $NH_4$ salts are added to a mixt. of powd. gypsum and S, *e. g.*, a mixt. of 45% $CaSO_4$ is made of 4.5% S and 50.5% powd. peat inoculated with S bacteria.

Fertilizers. Chemieverfahren G. m. b. H. Fr. 37,452, Sept. 21, 1929. Addn. to 682,081 (*C. A.* 24, 4351). Crude phosphate is attacked with $HNO_3$, and the Ca is pptd. as $CaSO_4$, by a mixt. of $K_2SO_4$ and $MgSO_4$, or a corresponding natural compd. The amt. of Mg is equiv. to that of $P_2O_5$ in conformity with the formula $MgHPO_4$. The $CaSO_4$ is pptd., $K_2CO_3$ is added to the soln. to ppt. $MgHPO_4$, and the rest of the $P_2O_5$ is pptd. as $Mg_3(PO_4)_2$ by adding more $K_2CO_3$. $KNO_3$ is obtained by evapn.

Fertilizers. Odda Smelteverk Aktieselskap and Erling Johnson. Fr. 37,494, Oct. 7, 1929. Addn. to 682,423 (*C. A.* 24, 4351). The soln. contg. phosphoric acid obtained by treating natural phosphates with $HNO_3$ is neutralized or caused to react with substances forming a fertilizer, such as $NH_3$, compds. of $NH_3$ and $CO_2$, urea, cyanamide or its salts or natural phosphates, so that on removing the water a dry stable fertilizer is obtained. Other salts of K, $NH_3$, etc., may be added in the solid state.

Fertilizers. Édouard Urbain. Fr. 693,221, Aug. 29, 1929. A fertilizer contg. $P_2O_5$ 30–34, $K_2O$ 8–11 and N 10–11% is made by using natural phosphate and aluminosilicate rocks in suitable proportions. Lime is introduced in such amt. that a utilizable slag is obtained.

Fertilizers. I. G. Farbenind. A.-G. Fr. 37,217, July 16, 1929. Addn. to 673,093 (*C. A.* 24, 2538). Compd. fertilizers are prepd. contg. $NH_4NO_3$ but not $CaCO_3$.

Fertilizers. Herbert J. Krase, Harry C. Hetherington and Lotus A. Pyeck (to Arthur B. Lamb, trustee). U. S. 1,797,093, March 17. See Fr. 678,693 (*C. A.* 24, 3399).

Fertilizers. Odda Smelteverk Aktieselskabet and E. Johnson. Brit. 339,340, Oct. 27, 1928. See Fr. 682,423 (*C. A.* 24, 4351).

*Calcium phosphates and fertilizers.* Odda Smelteverk Aktieselskabet and E. Johnson. Brit. 339,900, Dec. 14, 1928. The mother liquor obtained by treating rock phosphate with $HNO_3$ and sepg. a substantial proportion of $Ca(NO_3)_2$ by cooling as described *in Brit.* 339,340 (*preceding abs.*) is treated with gaseous or aq. $NH_3$, $NH_4$ carbonate or alkali metal carbonate; pptd. di-Ca phosphate is sepd., and the filtrate is used for the production of products contg. N and phosphoric acid, or the di-Ca phosphate may be treated together with the soln. to obtain solid products. By suitably restricting the quantity of $Ca(NO_3)_2$ sepd., relatively pure $NH_4NO_3$ can be obtained by evapg. the filtrate. Production of tri-Ca phosphate and various fertilizer mixts. also is described.

Fertilizer comprising urea and calcium nitrate. I G Farbenind A.-G. Brit. 338,644, Sept. 16, 1929. A fertilizer contg. the double compd. of urea and $Ca(NO_3)_2$ is prepd. by melting together the anhyd. components preferably in the mol. proportions of 4 and 1, resp., and subdividing by spraying or other suitable treatment. Oil may be added to increase the stability of the product in storage. Cf. *C. A.* 25, 554.

Mixed ammonium compounds suitable for use as fertilizer. R. Tern. Brit. 338,869, Aug. 22, 1929. Gases produced by roasting crude S or spent oxide from gas and coke-mfg. plants are mixed with ammoniacal gases produced by heating the gas-water from the scrubbers, and the material is ionized by a high tension current of 70,000–80,000 v., a mixt. being produced which comprises $NH_4$ sulfate, sulfite and imidosulfonate and other compds. of S and $NH_4$, which may be elec. pptd.

Stimulant for tap roots and tubers. I G Farbenind A.-G. (Georg Wesenberg and Eduard Bischkopff, inventors). Ger. 515,884, Mar. 28, 1926. Salts of polythionic acids act as a stimulant and increase potato, turnip, etc., yields. Examples state that mixts. of $Na_2S_2O_3$ or $BaS_2O_3$ or $CuS_2O_3$ $Na_2S_2O_3$, with kieselguhr, cause 20–50% increases in potato crops.

Fungicides. I G Farbenind A.-G. (Adolf Steindorff, Kaspar Pfaff and Georg Dahmer, inventors). Ger. 518,097, Mar. 30, 1928. Products comprising finely divided $Cu(OH)_2$ pptd. in the presence of fatty acids of high mol. wt. (or their salts) are used. Thus, wool fat acids may be dissolved in NaOH, the soln. treated with solid $CuSO_4$, and the pasty product mixed with talc, dried and ground.

Organo-mercury compounds. T. W. F. Clark. Brit. 338,963, Aug. 29, 1929. Phenolphthalein, fluorescein or their homologs or halogen derivs. are treated with Hg oxycyanide (or a mixt. of Hg oxide and an alkali cyanide), or reaction is effected with an alkali cyanide on Hg compds. of phenolphthalein, fluorescein or their homologs or halogen derivs. contg. the group HgX in which X represents OH, $NO_3$, $SO_4H$, halogen, etc. The *products are bactericides and fungicides*. Several examples are given.

Insecticides. Établissements et laboratoires Georges Truffaut. Fr. 695,164, Aug. 16, 1929. Insecticide solns. are prepd. by adding as adhesive one or more substances which lower the surface tension of water such as sulfite cellulose lyes, substituted amides of fatty acids or salts of sulfonic acids.

Insecticides. Union chimique belge. Ger. 515,633, Aug. 21, 1929. Prepns. contg. the insecticidal constituents of *Pyrethrum cinereaefolium* are obtained by extg. the plant with hydrocarbon solvents, evapg. off the solvent and dissolving the residue in pyridine or ethyl lactate. Examples describe the extn. of the pulverized flowers with such solvents as pyridine, petroleum ether and alc.

Insecticide and fumigant. Guy H. Buchanan (to American Cyanamid Co.). U. S. 1,795,593, March 10. A compn. is described which comprises the reaction product formed by fusing together of Ca cyanamid, C and NaF.

Pest-destroying composition. Permutit A.-G. (Otto Liebknecht, inventor). Ger. 515,348, June 15, 1926. Addn. to 472,738 (*C. A.* 23, 3049). Seed goods, etc., are protected against animal and vegetable pests by a powder contg. insol. or nearly insol. Cr compds. instead of the gaseous Cr compds. of 472,738. The prepn. may contain $Cr(OH)_3$, $Cr_2O_3$, $CrF_3$, $CrPO_4$, chromates and bichromates, mixed with talcum, etc.

Composition for protecting plants. Chinoin Gyógyszer és Vegyészeti Termékek Gyára R. T. (Keresztyy és Wolf). Austrian 120,877, Aug. 15, 1930. Plant protecting compns. comprising an aq. dispersion of S and a hydrocarbon are prepd. by stirring a concd. aq. soln. of $(NH_4)_2S$ and a hydrocarbon contg. an emulsifying agent into a large amt. of water. The hydrocarbon may be petroleum or tar oil, preferably free from phenol, and the emulsifying agent may be Turkey red oil or an $NH_4$ soap. Examples are given.

Preventing infection of plants. Établissements et laboratoires Georges Truffaut. Fr. 695,165, Aug. 16, 1929. Cryptogamic infections of plants are combatted by the use of org. dyes, such as dimethyldiaminonaphthophenasoxonium hydrochloride, mixed with products which lower the surface tension of water.

Disinfecting seeds. Ignaz Kreidl. Austrian 121,349, Sept. 15, 1929. Fungicides are applied in paste or pulp form, *e. g.*, by mechanically mixing the seeds with the paste or pulp. Fungicides sol. or insol. in water may be used, and solid diluents, glycerol, etc., may be included in the mixts. Examples are given.

Dry-canterizing seed goods. I. G. Farbenind A.-G. (Wilhelm Bonrath, Wilhelm Schepss and Carl Taube, inventors). Ger. 515,957, June 7, 1928. The goods are treated with alkyl Hg compds. of the general formula RHgX, where R = an aliphatic hydrocarbon residue and X = OH or an acid residue. Examples mention talcum and C mixed with EtHgCl, PrHgBr, BuHgAcO or EtHgAcO.

# 16—THE FERMENTATION INDUSTRIES

C. N. FREY

Formation of kojic acid from sugars by Aspergillus oryzae. FREDERICK CHALLENGER, LOUIS KLEIN AND T. KENNEDY WALKER *J. Chem. Soc.* 1931, 16–23.—A strain of *Aspergillus oryzae* was used in these expts. in a medium contg. inorg. salts and designated "medium K." (Cf. *C. A.* 23, 4966.) Two expts. were made with dihydroxyacetone, one contg. 11 cc. of medium K and 0.5 g. of dihydroxyacetone, the other contg. 5% dihydroxyacetone. The temp. of incubation was 31–2°. Kojic acid was identified in both cases by its m. p. and further characterized in the form of the diacetyl deriv. Kojic acid was also obtained by the fermentation of glycerol by a strain of *Aspergillus oryzae*. Fermentation expts. with 5% ethylene glycol, 2% Ca gluconate, 2% KH saccharate, 2% K citrate and 1% glyceric acid were neg. The action of *Aspergillus niger* on glycerol was studied. Trioses were produced when *Aspergillus niger* acted upon a 5% glycerol soln. with the salts of medium "M." After 9 days the liquid was filtered, made faintly alk. with ammonia, concd., pptd. with Pb acetate and decompd. with $H_2S$. Oxalic acid was obtained and identified by titration with 0.02 *N* NaOH and 0.02 *N* $KMnO_4$ and by formation of the di *p*-bromophenacyl ester. Neither tartronic nor saccharic acid could be detected. S. JOZSA

Selective fermentation. II. Fermentation of sugar mixtures by Sauterne yeast. HARRY SOBOTKA AND MIRIAM REINER. *Biochem. J.* 24, 1783–6(1930). cf. *C. A.* 25, 166.—Sauterne yeast ferments fructose preferably to glucose in a mixt. B. H.

Notes on the determination of cane sugar in sweet wines. H. JAHR. *Z. anal. Chem.* 83, 321–38(1931).—The detn. of sugar in wine was carefully studied and it is pointed out that in detg. cane sugar it is necessary to proceed as in the detn. of the original reducing sugar and use Pb acetate together with AcOH. It is recommended, moreover, to simplify the official method of analysis as follows. If the wine contains, *e* g. of ext. per l., take about 3000/*e* g. for the analysis. Weigh out the sample accurately in a weighing beaker, transfer to a 100 cc. measuring flask and make up to the mark at 15°. Shake and transfer to a somewhat larger dry flask. Add 1.5 g. of freshly ignited bone-char and allow to stand 10 min. with occasional mixing. For the detn. of the directly reducing sugar, take 25 cc. of the filtrate in a 150-cc. measuring flask and neutralize with *N* NaOH. Make up to the mark at 15°, treat 50 cc. with Fehling's soln. as in the official method. Take 50 cc. of the filtrate from the bone-char clarification for the detn. of the cane sugar. Make up to 75 ml. in a measuring flask with marks at 75 cc. and 100 cc. and invert according to the official directions. After the inversion, take 50 cc., dil. to exactly 100 cc., neutralize with NaOH and treat with Fehling soln. as in the detn. of the original reducing sugar. W. T. H.

The acidity of wine and the new (French) regulations. L. FERRÉ. *Ann. fals.* 24, 75–80(1931).—A plea for the adoption of more precise definitions of total, free and volatile acidity, and for the adoption as official of methods capable of yielding results conforming with the definition thus adopted. A. PAPINEAU COUTURE.

Detection of fruit wine in grape wine by Werder's sorbitol method. A. SCHREMPP. *Chem.-Ztg.* 55, 52(1931), cf. *Chem.-Ztg.* 54, 765, 997(1930).—S. states that the cause of contradictory results is due to samples contg. very small quantities of fruit wines. The method of detn. is discussed, the difficulties are emphasized and greater accuracy is suggested. Conclusion. The accuracy and reliability of the method do not depend primarily upon the size of the sample to be analyzed. S. JOZSA

Brandy wines and wine-brandy products. H. ZELLNER. *Chem.-Ztg.* 54, 925–8(1930).—The summary and conclusions of 246 analyses are given. The fusel oil and ester content of brandy wines, distillates and wine brandies are discussed. The figures obtained for yield do not give reliable results in every case, and it is necessary to taste the product for complete estn. The importance of the sense of taste is emphasized and its correlation to various analytical results set forth. S. JOZSA

Infectious turbidity in beer. DE GRONCKEL. *Bull. assoc. élèves inst. sup. fermentations Gand* 32, 117–25(1931).—An address dealing with causes and remedies. A. PAPINEAU COUTURE.

Brewery yeast in the chemical industry. FABER. *Brasserie & malterie* 21, 13–5(1931).—The possibility of production of nucleic acid, amino acids, ergosterol, vitamins and bios from brewery yeast is briefly discussed. A. PAPINEAU COUTURE.

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The supposed relation between $p_H$ value and acid taste of wines (CRISCI) 12. Control and regulation of distilling columns (PÉRARD) 13. The methylene-blue staining

red color obtained on warming it with AcH The red product is sol in $CHCl_3$ and 90% EtOH, but insol in $Et_2O$ A W Dox

**Aconitine from Cashmerian Aconitum chasmanthum.** K H Bauer and Tara Chand Radjhan *Pharm Zentralhalle* 72, 146–52(1931) —An aconitine which differed from all aconitines hitherto reported was isolated from the Cashmerian aconite The m p and cryst. form are identical with those found for indaconitine, but differs markedly in being insol in $Et_2O$ W. O E

**Examination of liquor cresoli saponatus** H Noerdlinger *Süddeutsche Apoth-Ztg* 71, 159–61(1931) —The method suggested by Kaiser has been subjected to renewed study with the conclusion that it cannot be depended upon to reveal the true compn of cresol soap soln In the absence, therefore, of a better method, recourse should be had to the official pharmacopeial procedure. W. O E

**New drugs and pharmaceutical specialties during the 4th quarter of 1930** F. Zernik *Suddeutsche Apoth Ztg* 71, 165–8(1931) —The more important novelties of this period are enumerated and to some extent described W. O E

**Percolation or diacolation.** Breddin *Suddeutsche Apoth-Ztg* 71, 172–3(1931), cf *C A* 24, 4896 —The apparent phys and hence economical advantages of the diacolation method (involving multiple cylinders) over percolation (the so-called American method) in the extn of crude drugs are emphasized and fully discussed W O E

**The reactions of novocaine.** L Ekkert *Magyar Gyógyszerésztud Társaság Értesitoje* 6, 221(1930), cf *C A* 24, 4897 —A dark red to carmine red color is formed by adding 2 drops of 10% $NaNO_2$ soln and 10 drops of an alk soln of α naphthol to dil HCl contg a soln of novocaine chloride or nitrate The soln of novocaine is mixed with 10 drops of $CaOCl_2$ soln and 0 01 g phenol and $NH_4OH$ added The mixt becomes green on warming A soln of chloramine may be used instead of the $CaOCl_2$ soln S S de Finály

**Hungarian procedure of morphine manufacture.** J Kabay *Magyar Gyógyszerésztud Tarsaság Értesitoje* 6, 226–34(1930), cf *C A* 24, 3322 —Opium poppies are cut up and extd to a jam like pulp of about 0 4–0 8% morphine content. The washing liquid contains free $H_2SO_3$ which binds Ca and forms easily sol alkaloid salts, prevents the further hydrolysis of chlorophyll and the fermentation or oxidation of the concd ext The mixt. of alkaloids is then sepd and chlorophyll obtained as a secondary product S S de Finály

**New reaction for the identification of guaiacol carbonate.** K Szahlender *Magyar Gyógyszerésztud Társaság Értesitoje* 6, 235–6(1930) —One-half g guaiacol carbonate is mixed with 0 5 g $ZnCl_2$ and heated in a dry test tube A dark brown melt is formed with a very intense smell of guaiacol The reaction may be brought about faster by using dried or melted $ZnCl_2$, since then it is not necessary to wait until the hygroscopic moisture evaps S. S de Finály

**Evaluation of insulin.** A Stasiak and B Zboray *Magyar Gyógyszerésztud Tarsaság Értesitöje* 6, 268–74(1930) —Cross tests of Marks (*C A* 23, 5272) for the evaluation of insulin are modified by injecting into each animal 0 5 cc soln equal to 1 international standard Three blood tests are taken for sugar detns 1 5, 3 and 5 hrs after injection This method gives as exact data as that taking 5 blood tests The sensitivity reaches 10% in 10-10 expt series, 6 animals being used in each case S S de F

**Early products in the history of drugs.** J Horváth *Magyar Gyógyszerésztud Tarsaság Értesitoje* 6, 292–5(1930) —An address S S de Finály

**Comparative studies of camomile.** P Rom *Magyar Gyógyszeresztud Tarsaság Értesitöje* 6, 296–9(1930) —The essential oil content of Hungarian camomile was detd (1) by measuring the oil on the surface of the water during distn as carried out in factory practice and adding the oil content of the cohobation water (Results, 0 22 and 0 20%, resp , total oil content, 0 42%), (2) by using the method prescribed by D A B 6 (result, 0 49%) Earlier Hungarian data gave smaller contents since the oil content of the cohobation water was not detd Some German samples contained 0 6–0 8% a Russian one 0 58% This latter was a yellow oil rather more sol in water than that of Hungarian or German camomile Examn of 11 samples of Hungarian camomile of various regions showed oil contents of more than 0 4% for each The sand content varied from 0 8 to 1 1% and the ash content from 10 to 11% German samples contained 9–10% ash and 0 4–1 0% sand, Russian samples 11 5–15% ash and 2 7 5% sand S S de Finály

**Russian flores chamomillae.** Á Boros *Magyar Gyógyszerésztud Társaság Értesitoje* 6, 300–6(1930) —Four samples of the Russian drug were examd It may be distinguished from the Hungarian drug by the presence of *Agropyrum* (*Triticum*) *prostratum* L and *Salsola tamariscina Pall* and further of animal particles of *Amphicoma*

*vulpes* var *hirta* Fabr and *Dulaea Lichatschoi* Humm, which species do not occu territories east of South Russia S S DE FINA

**The evaluation of commercial Solanaceæ drugs.** S PERCSY JÓNÁS *Mc Gyógyszerésztud. Társaság Értesítője* 6, 307–12(1930).—Folia belladonnæ (I), belladonæ (II), folia stramonii (III) and folia hyoscyami (IV) of Hungarian origin examd for alkaloid content according to Ph Helvetica IV I contained 0.18–0.2 II 0.59–0.66%, III 0.21–0.33% and IV 0.11% alkaloids Ash and sand contents detd by the method of U S National Formulary, p 428 The values (in %) obtaine ash and sand contents, resp, were I 16.09–17.04, 5.51 5.84, II 6.35–7.52, 0.68–4 III 18.67 23.80, 2.68 10.00, IV 22.04–22.23, 7.30 7.63 S S DE FINÁ

**Determination of alkaloids, especially the determination of morphine in prep tions.** E SCHULEK *Magyar Gyógyszerésztud Társaság Értesítője* 6, 442–51(1930 The indicators used for the titrimetric detn of alkaloids should have $p_H$ intervals a ing with the $p_H$ of the alkaloid soln after titration The morphine detn metho Ph Hung 3 cannot be used in the case of some opium prepns (*e. g.*, pantopone drugs) A micromethod was therefore worked out Mix 0.605 g of opium po with some water, dil to 6 cc and filter through dry filter paper Put 4 cc of th trate into a 30-cc bottle, add 0.20 cc *N* $NH_4OH$ and filter the ppt through dry paper Suck up a part of the filtrate with a micropipet, put into a 30 cc Erlenm flask and add 1 cc purified PtOAc and 0.4 cc *N* $NH_4OH$ Shake the mixt for 15 r again add 1 cc PtOAc, shake and after 10 min pour the PtOAc soln on a filter pa Now again add 1 cc EtOAc, shake occasionally and pour first the PtOAc soln and the whole liquid on the filter, wash out the flask 3 times with 1 cc water each t Dissolve the cryst morphine in 10 cc boiled 0.02 *N* $H_2SO_4$ and titrate back the ex acid with 0.02 *N* NaOH For the evaluation of tinctura opii evap 5 g., dissolve residue in 2–3 cc water, add 0.2 cc *N* $NH_4OH$ and dil to 6 cc Filter the mixt, 5 cc of filtrate into a 30 cc Erlenmeyer flask, add 0.4 cc *N* $NH_4OH$ and det morphine as above For the evaluation of extractum opii triat 0.3 g ext with a drops of water and work up as above The method of Buchbinder (U S Drug trol Laboratory) may well be used for the detn of the morphine content of pulvis Do S S DE FINÁ

**Water-soluble oils.** K GÖLLNER *Magyar Gyógyszerésztud Társaság Értes* 6, 452–9(1930).—Sulfonation expts were made on olive, sesame, peanut, rape neat's foot oils and on pure white olein Sulfonated neat's foot oil gives the fi emulsion It is suitable for cosmetic and skin treating purposes Cf *C A* 25, S S DE FINÁ

**The adsorption capacity of bolus alba (kaolin) for different drugs.** Z CSU *Magyar Gyógyszerésztud Társaság Értesítője* 6, 460–7(1930).—One to 35 g of b alba was treated with 100 cc of different solns and shaken for 30 min After s mentation 10 cc was examd for its content of reagent remaining 14.4–98.0 methylene blue was adsorbed from a 1% soln, 0.8–6 mg $HgCl_2$ from a 1.30% s 2.52–11.9 mg I from a 50% ale soln, and 0.0–0.95 mg nicotine from a 1% soln reagent was adsorbed from a 1% soln of phenol or a 3% soln of HCHO. Non st bolus adsorbed 4.8 water vapor, sterilized bolus 7.2%. The ultraporosity of b is small since it has large but not many pores which bind only reagents having l mols Sterilization often increased adsorptive power S S DE FINÁ

**Researches on coffeinum natrium benzoicum.** A HEGEDÜS *Magyar Gyógyszer tud Társaság Értesítője* 6, 468–73(1930) Expts showed that 2 mols caffeine ar mols Na benzoate form an addn compd The prepn can be made by mixing 0 caffeine with 20 g ether and 10 g Na benzoate to pulp and evapg the ether detn of the caffeine and Na benzoate can be made as follows: Dissolve 0.30 g coffei Na benzoicum in 5 g distd water, shake with 10 and 5 cc $CHCl_3$, resp, for 5 and evap the $CHCl_3$ soln at a temp not higher than 40°. The residue should w 0.15 g Now add 2 cc HCl to the caffeine free aq soln and again shake with 2 portions of $CHCl_3$ for 5 min Add 30 cc concd ale to the $CHCl_3$ ext and titrate 0.1 *N* NaOH with phenolphthalein as indicator About 10.3–10.4 cc should be (1 cc is equiv to 0.0141 g Na benzoate) S S DE FINÁ

**Examination of solutions of cresol soaps.** I LÉVAI *Magyar Gyógyszerész Társaság Értesítője* 6, 474–80(1930).—Five samples of com liquor cresoli sapon and two samples of home-made liquors (one made according to Ph Hung 3 and other according to D A. B 6) were examd for cresol content and for the quality quantity of the K soap contained The fatty acid content and I-Br no were d The presence of soap made of oleum jecoris was proved by the cholesterol react of that made of sesame oil, by the furfural reaction, and finally the presence of naphth

colophonic or linoleic acids by the $CuSO_4$ reaction of Charitschkov The following method was used to det cresol content Dissolve 10 g liquor in a mixt of 100 cc water and 30 cc 10% KOH soln, add 30 cc 10% $BaCl_2$ soln, shake the mixt and dil to 200 cc Ba soap ppts Filter 100 cc of the purified upper part of soln contg alkali cresolates of 5 g of the original liquor Divide the filtrate into 2 parts, to each of them add 10 cc dil HCl and shake with 25 cc petroleum ether Evap the solvent and dry the cresol for 30 min at 100° The av of 2 detns multiplied by 40 gives the % content of liquor in cresol 42–50% was found in the samples The soap examn may be replaced by the detn of the emulsifying capacity in the case of cresol soaps of naphthoic and colophonic acids The cresol content was detd by the method of Ph Russ 7 and by steam distn with $CaCl_2$ The former method gave higher values, since colophonic acids are also distd at the high temp of the former method and increase the no of cc of NaOH used S S DE FINÁLY

**Present state of chemical evaluation of ergot (Secale cornutum).** P LIPTÁK *Magyar Gyógyszerésztud Társaság Értesítője* 7, 9–23(1931).—The method of Keller-Fromme dets other materials besides the sp alkaloids The method of Forst is exact but too complicated for drug store practice The D. A B method may give inexact data since Mg soaps may be formed and $Na_2CO_3$ may get into the ether, giving too high a value for alkaloids Detns based on the cornutine reaction of Keller-Fromme are inaccurate A simple acid no detn may give some information about the proper storage and age of ergot S S DE FINÁLY

**Determinations of the essential oil content of Hungarian coriandrum.** S PERCSNÉ JÓNÁS *Magyar Gyógyszerésztud Társaság Értesítője* 7, 24–9(1931).—Hungarian coriandrum formerly contained more than 1% essential oil, but in the present harvests it has diminished to 0.6–0.3% content The sp gr diminishes with the increase in oil content Simple distn of coriandrum with superheated steam gave higher values for essential oil content than did the method prescribed by D A B 6 This may be explained by the very slight soly of coriandrum oil in water S S DE FINÁLY

**Colloid-chemical methods in drug stores and laboratories.** J VONDRASPEK. *Magyar Gyógyszerésztud Társaság Értesítője* 7, 59–72(1931).—An address S S DE F

**Lycopin.** L CHOLNOKY *Magyar Gyógyszerésztud. Társaság Értesítője* 7, 95–107 (1931).—Lycopin was extd from *Tamus communis* and *Solanum dulcamara* The crude product was purified by recrystn from $CS_2$ petroleum ether Combustion of this product gave 89.23–89.43% C and 10.63–10.84% H (theoretical compn of $C_{40}H_{56}$ 89.48% C and 10.52% H) The mol wt detd ebullioscopically in $CHCl_3$ was 526, 564 and 565 (theoretical, 536), that detd cryoscopically in $CHBr_3$ 649, agreeing with Montanari's result obtained in benzene (cf *Lestazione sperimentali agrarie italiane* 37, 909 (1904)) *Tamus* lycopin m 170°, *Solanum* lycopin m 174°. No secondary pigments could be found The data in the botanical literature should be corrected, since the above plants contain lycopin only S S DE FINÁLY

**The volatility of nicotine.** L NAGY *Magyar Gyógyszerésztud. Társaság Értesítője* 7, 125–30(1931).—Expts made with nicotinum purum, Merck, showed that large losses of nicotine occur during distn of the solns Only about 10 cc of nicotine solns can be distd without any appreciable losses in the case of solvents with high b p (as petroleum ether, alc.) About 100 cc. can be distd without significant losses in the case of solvents with low b p (ether or a mixt of ether and petroleum ether) The loss of nicotine by evapn is greater from beakers than from Erlenmeyer flasks About 0.6 mg of pure nicotine is volatilized in 5 min at 20–22°. S S DE FINÁLY

**Senega roots adulterated by sarsaparilla.** I TEMESVÁRY *Magyar Gyógyszerésztud Társaság Értesítője* 7, 131–4(1931).—An ext of a com sample of senega roots gave too brown a liquor No green color was obtained on adding liquor ammonii anisatus but stronger darkening was observed On examn under a magnifying glass the sample was found to be adulterated with about 30–5% of sarsaparilla roots Microscopic examn showed the structural texture of sarsaparilla roots The saponin content was detd by dissolving defibrinized blood with ext of sarsaparilla particles in physiol NaCl soln S S DE FINÁLY

**Cascara.** T J STARKER AND A. R. WILCOX. *Am J Pharm* 103, 73–97, 147–75 (1931).—A dissertation covering names, species distribution, description, medicinal value, silvics of cascara, growth, collection and curing of the bark, safeguarding the future supply, the industry, est of existing stand, prospects of future stands and artificial propagation of cascara A bibliography is appended. W. G GAESSLER

**The analysis of the more commonly used ointments of the British Pharmacopeia containing an inorganic principle as the active constituent.** EDWIN H BUNCE. *Indian*

*Med Gaz* 66, 137–8(1931).—Methods are given for the detn of the base in boric acid ointment, mercury ointment and other ointments that find general employment
FREDERICK G GERMUTH

**The potentiometric titration of alkaloids with potassium iodomercurati.** LOUIS MARICQ *Bull soc chim Belg* 39, 496–502(1930), cf *C A* 24, 1705, 4895.—The method previously reported for the titration of atropine, hyoscyamine, pilocarpine, cinchonine and sparteine is extended The accuracy is as good as before A L H

**Chemical composition of certain homeopathic tinctures.** JOSEPH S HEPBURN AND ALAN E SMITH *J Am Inst Homeopathy* 23, 1207–9(1930).—Detn (as g per 100 cc) of (*A*) total solids, (*B*) ash, (*C*) total N, (*D*) ether ext of certain homeopathic tinctures yielded the following results *Dioscorea villosa A* 2.415, *B* 0.275, *C* 0.03670, *D* 0.082 *Hydrastis canadensis A* 1.408, *B* 0.275, *C* 0.03123, *D* 0.161 *Iberis amara A* 2.791, *B* 0.338, *C* 0.03092, *D* 0.164 *Sarracenia flava* (pitcher) *A* 1.927, *B* 0.340, *C* 0.02123, *D* 0.212 *Sarracenia minor* (pitcher) *A* 2.205, *B* 0.084, *C* 0.03123, *D* 0.313, (rhizome) *A* 3.150, *B* 0.095, *D* 0.098 *Sarracenia purpurea* (entire plant) *A* 0.855, *B* 0.255, *C* 0.00812, *D* 0.080 *Sarracenia rubra* (rhizome) *A* 4.280, *B* 0.075, *Sarracenia drummondii* (rhizome) *A* 1.930, *B* 0.045, *C* 0.02955, *D* 0.142 *Tectona grandis A* 0.908, *B* 0.233, *C* 0.01078, *D* 0.100 The presumptive test for the presence of alkaloids was pos with the tinctures of *Hydrastis canadensis, Iberis amara, Sarracenia flava* pitcher and *S rubra* rhizome, and neg with the other tinctures The alc content ranged between 56.15 and 76.62% by vol., and between 49.89 and 69.73% by wt J S H

**A comparison of assays of homeopathic tinctures made according to the American Homeopathic Pharmacopeia and the Homeopathic Pharmacopeia of the United States. (A. I. H.).** RAYFORD E WRIGHT AND JOHN A BORNLMAN *J Am Inst Homeopathy* 24, 61–70(1931).—Assays for alkaloids were made of tinctures of aconite, belladonna, gelsemium and nux vomica prepd according to each of the 2 pharmacopeias "The results of the assays indicate that tinctures made according to the Pharm of the Am. Inst of Homeopathy are actually 0.1 drug strength tinctures, and that they come up to the requirements of the U S Pharm The results further indicate that the alkaloidal content of tinctures made according to the Am Homeopathic Pharm. is variable, and that the assay of these tinctures (particularly Class I tinctures) is far below the assumed standard" JOSEPH S HEPBURN

**The determination of cineole in cajaput oil.** A RECLAIRE AND D B SPOELSTRA *Ber. Afdeel Handelsmuseum Ver. Koloniaal Inst* No 54, 8 pp (1930).—The method of Cocking (*Perfumery Essent Oil Record* 18, 165(1927), cf *C A* 21, 3252) was tested *on known mixts of turpentine oil, cineole, terpineol and citronella oil as well as on* several samples of cajaput oil from the Dutch East Indies and found to be very useful Up to 12.5% terpineol does not influence the results, but in case of a higher percentage a correction must be applied which can easily be calcd from a table given It is pointed out that the *o* cresol used in the detn must be freshly distd., otherwise the results are too low J C JURRJENS

***The preparation, composition and value of the sirup of iodotannate.*** Z WEINSTOCK. *Rev facultad cienc quím (Univ La Plata)* 7, Pt 2, 83–95(1930).—There is no loss of I through volatilization in the prepn of the sirup according to the formula given in the French Codex Supplement of 1920 Detn of the I according to the Pharm of Brazil is simple, rapid and exact as is the method of Ugarte The entire I in the sirup is in the form of HI It is therefore proposed that the sirup be replaced by a simple sirup of HI, thus eliminating the astringent tannins and their products of oxidation The prepn and essay methods of Machado and Sonol (cf *C A* 24, 5938) are considered unacceptable B S LEVINE

**Determination of moisture in tobacco by means of the hygrometer.** N M MILOSLAVSKII AND A I PALANT *Ukrainskii Khem Zhur* 5, Tech Pt., 117–25(1930).—Expts show the absence of a simple relationship between the moisture in tobacco and that in the atm. This can be explained on the ground that the amt of moisture in tobacco is detd by its biol condition and by the adsorptive capacity of the leaf itself. The hygrometer is not applicable to the measurement of moisture in tobacco, because the tobacco leaf is neither chemically nor biologically definite S L MADORSKY

**A new method of determining arsphenamine preparations.** S KEIMATSU AND K WADA *J Pharm Soc Japan* 51, 65–80(1931).—The sample (0.1–0.2 g.) was digested gently with $K_2SO_4$ (10 g.), $KClO_3$ (1 g.), water (10 cc.) and dil $H_2SO_4$ (40 cc. of 1.1d by vol.) On cooling, 0.5 cc. of 50% soln of glucose was added and the mixt digested again When the soln became clear it was titrated against 0.05 *N* $KBrO_3$ soln with methyl orange as indicator F. I NAKAMURA

**Oil of ambrette.** R N *Parfums de France* 9, 32–8(1931) (in French and Eng-

lish) A review of the compn of oil of ambrette and of the constitution of its principal constituents A PAPINEAU-COUTURE

The bitter orange and its products. GUIDO ROVESTI *Rivista ital essenze e profumi* 13, 35–61(1931).—From the bitter orange plant are produced the fluid ext, neroli oil, the concrete flower essence, bitter orange water, petitgrain essence, petit grain water and bitter-orange juice The fluid ext is produced by extg the dry powd peels with 60° alc It is a limpid green-yellow liquid with bitter taste and pleasant odor sol in water and sugar sirups Neroli oil is obtained together with bitter-orange water by distg the flowers with steam After distn neroli oil is nearly colorless, with time it becomes red with a blue fluorescence It keeps best in the dark Ligurian neroli oil has $d_{15}$ 0 8815–0 831 $[\alpha]$ 0 5–6 9, $n_{20}$ 1 4710–1 4728, sapon no 28–67 5, esters as linalyl acetate 9 80–23 5%, soly in 80° alc 1–1 2 vols Calabrian neroli oil has $d_{15}$ 0 727–0 8755 $[\alpha]$ 5 30–6 48 $n_{20}$ 1 4715–1 4720, sapon no 52–63, esters as linalyl acetate 17 64–21 56% soly in 80° alc 1–1 2 vols Sicilian neroli oil has $d_{15}$ 0 860–0 924 $[\alpha]$ —2 54–5 65, $n_{20}$ 1 4680–1 4740, sapon no 6–127. Neroli oil contains pinene I, camphene I, limonene dipentene, paraffin, phenylethyl alc, linaloöl, nerol, terpineol, nerolidol, geraniol, farnesol decylaldehyde, linalyl acetate, Me anthranylate, benzoates, palmitates phenylacetates, acetates of different alcs, indole, phenylacetonitrile, a ketone analogous to jasmone, and acetic and palmitic acids There are 35% of terpenes, 30% of linaloöl, 18% of linalyl acetate and 1% of Me anthranylate; the ketone gives the perfume The yield in essential oil depends on the meteoric conditions during the collection of the flowers The greatest is obtained on warm and dry days Bitter-orange water is the by product of the neroli oil distn Its preservation is difficult as it is attacked by the microörganisms The product has in suspension much neroli oil The concrete flower essential oil is prepd with petr ether, it is of ointment consistency, having an agreeable odor and coffee color The yield is 0 230–0 390% The abs essence is obtained from the flowers with 4 alc. washings, followed by cooling to —15°, filtration, and evapn of the alc *in vacuo* The yield is 0 45–0 55% It has $d_{15}$ 0 9105–0 9228, $[\alpha]$ —0 74 to —5 48 $n_{20}$ 1 4658–1 4729, sapon no 105–137 8, esters as linalyl acetate 36 7–48%, soly in 95° alc 1 1 by vol Petitgrain essence is obtained by distg the twigs of the bitter-orange tree It is yellow, with the odor of the leaves, and contains pinene I, limonene, dipentene, camphene, linaloöl, geraniol, terpineol, linalyl acetate geranyl acetate, Me anthranylate and furfural The Ligurian product has $d_{15}$ 0 890–0 900, $[\alpha]$—2 5 to —6 7, $n_{20}$ 1 460–1 465, sapon no 115–170, esters as linalyl acetate 50–59%, soly in 70° alc 1 vol in 2 5–3 vol Calabrian petitgrain has $d_{15}$ 0 8971, $[\alpha]$ —6 12, sapon no 214 60, esters as linalyl acetate 75 10%, soly in 80° alc 1 vol in 1 3 vol The yield is 250–280 g per 100 kg Petitgrain water is obtained during the distn of the bitter-orange twigs Bitter-orange juice is obtained from the ripe fruits it is an intensely yellow liquid, the chem compn of which is not much different from that of sweet oranges, excepting for the bitter principles present Its principal constituent is limonene (90–97%) Seven hundred g is obtained per 100 kg of fruits The consts are d 0 852–0 856, $[\alpha]_{D}$ 88–96, $n_{20}$ 1 473–1 475, sapon no about 9 R SANSONE

Lemon and orange oils. E BERTE *Rivista ital essenze e profumi* 13, 75–7(1931).—A large no of lemon oil samples sponge extd, had the consts $[\alpha]_{15}$ 56° 0′ to 62° 0′, $d_{15}$ 0 8560–0 8590, aldehydes as citral 4 50–6 00%, evapn residue on the water bath 2 50–3 50%, $n_{20}$ 1 474–1 4739 Sweet-orange oil had $[\alpha]_{15}$ 98° 0′ to 100°, $d_{15}$ 0 8485–0 8500, evapn residue 1 50–2 50%, $n_{15}$ 1 473–1 475, soly in 90° alc 1 8 In Sicily there exist zones producing lemon oil with $d_{15}$ lower than 0 8560 There is no lemon oil with $d_{15}$ above 0 8600, except that from green fruits, having the low $[\alpha]_{D}$ 50° 0′ to 54° 0′, and a $d_{15}$ sometimes above 0 8600 In 1930 were found lemon oils with $[\alpha]_{15}$ 67° 0′ and 70° 0′ and $d_{15}$ under 0 855 Samples of directly prepd and of distd lemon oil taken in 1931, had $n_{15}$ 1 4740–1 467 and 1 4723–1 4745, $d_{15}$ 0 8560–0 8581, citral 3 85–4 45% In Nov., 1930, orange oil had the av consts $[\alpha]_{15}$ 98°, 20′ to 100°, 15′, $d_{15}$ 0 8480–0 8498, residue on the water bath 1 50–2 65% R SANSONE

The essential oil of Satureia nepeta. L PEPPINO LIOTTA *Rivista ital essenze e profumi* 13, 93–4(1931).—The oil is a light caramel brown, b 214 5°, showing the absence of terpenic hydrocarbons The soly in 80° alc confirmed the presence of considerable amts of oxygenated products The consts were $d_{17}$ 0 9335, $[\alpha]_{D}^{17}$ 109° 30′ soly in 80° alc 1 1, evapn residue 4 82%, sapon no of residue 156 It contained 69% of pulegone On boiling, the rotatory power rapidly decreases With 50 min of steam distn all the oil is obtained from the plant R. SANSONE

Microsublimation. A CHALMETA *Anales soc españ fis quim* 28, 1407–19

(1930).—The convenience of microsublimation with caffeine and theobromine and with glucosides is discussed E M Symmes

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Biphenyl [as source of intermediates for drugs] (Morgan, Walls) 25. Alloys [for speculums] (Ger pat 515,788) 9. Emulsions, ointments, etc (Brit pat 339,558) 13.

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**Therapeutic solutions of soporific drugs.** I G Farbenind A G Brit 338,985, Aug 29, 1929 The method of prepg aq solns of barbituric acids (described in Brit 325,847, *C A* 24, 4121), by use of a monoalkylated amide of a lower aliphatic acid, is applied to the prepn of solns. of other soporific drugs such as the urethan of trichloroethyl alc, tribromoethyl alc. and bromodiethylacetamide In examples given, *N*-ethylacetamide is used as a solubilizing agent

**Medicinal product.** E K Frey and Heinrich Kraut Ger 518,292, Feb 24, 1926 A medicine affecting the circulation of the blood and the action of the heart *is prepd from urine by freeing this from phosphates in the usual manner adding uranyl* acetate, filtering off the ppt., decompg the ppt with $(NH_4)_2HPO_4$ soln filtering, removing phosphates from the filtrate, and then removing other salts by dialysis. The final filtrate may be purified by treatment with kaolin or like adsorbent followed by extn of the adsorbent with $(NH_4)_2HPO_4$ soln Alternatively, the adsorbent may be added to the dephosphatized urine Examples are given

**Synthetic drugs.** Schering-Kahlbaum A G Brit 339,436, Oct 31, 1929 Dihydroketo-1-alkylhalopyridine compds. are prepd by treating 2 hydroxypyridine derivs. contg a halogen atom in the 3 or 5-position (or both) with a simple alkylating agent or with one which contains a carboxy group (preferably in the presence of an acid binding substance) Examples are given of the production of 1,2-dihydro-1-methyl 2 keto-5-iodopyridine, 1,2-dihydro-2 keto-5-bromopyridine-1 acetic acid, 1,2 dihydro-2 keto-3,5-dibromopyridine-1-acetic acid, 1,2-dihydro-2 keto-5-iodopyridine-1 acetic acid, 1,2-dihydro-2 keto-3,5-diiodopyridine-1-acetic acid and 2-hydroxy-3-bromo-5-iodopyridine. The products are sol in water.

**Synthetic drugs, etc.** I G Farbenind A-G Brit 339,350, Aug 14, 1929 Basic compds. are prepd by condensation of a satd or unsatd fatty acid contg at least 10 C atoms, or an ester, chloride, amide or imido ester of such an acid (such as palmitic or oleic acid chlorides) with an aromatic primary or secondary amine having a side chain contg tertiary N such as *p*-β-diethylaminoethoxyaniline, *p*-aminobenzoyldiethylaminoethanol and unsym ethyl(or methyl)diethylaminoethyl-*p*-phenylenediamine

**Synthetic drugs.** I G Farbenind A G (Karl Streitwolf, Alfred Fehrle, Paul Fritzsche and Walter Herrmann, inventors) Ger 518,208, June 16, 1929 *Acylaminobenzenestibinic acids substituted in an o-position to the stibinic acid residue are prepd* by the customary processes. Thus, *m* or *p*-acylaminoanilines substituted in the *o*-position to the $NH_2$ group, *e g*, with OH, $OCH_3$, $CH_3$, or halogen, and free from or contg substituents, may be diazotized and then treated with an antimonite Alternatively, *m*- or *p*-aminobenzenestibinic acids substituted in the *o*-position to the acid residue, and free from or contg other substituents, may be acylated Examples are given The products are effective against diseases caused by trypanosomes, and may be administered *per os*

**Alkaloids.** Georg Knoth Ger 516,283, Nov 28, 1928 Addn to 497,630 In obtaining volatile alkaloids by steam distn by the methods of 497,630 (*C A* 24, 4121), 500,294 (*C A* 25, 560) and 500,998 (*C A* 24, 4901), the distn takes place at a steam pressure of above 2 atm The process is especially applicable to nicotine, a mash of

tobacco being treated with a base such as NaOH to free the alkaloid before distn In the example the nicotine yield is increased *from 0 16% to 2 12% by increasing the* steam distn pressure from a pressure of 0 5 atm to 5 atm

Caffeine Kaffee Handels A G Ger 515 604, Oct 23 1923 Caffeine is extd *from raw coffee* beans by moistening the beans and extg with $CCl_2H_2$ at low temps

Aqueous solutions of pure glucosides. G Richter, Ltd Hung 101 049, June 28 1930 *Glucosides sepd from various plants or drugs are made water sol* by adding salts or mixts of cholic acid or its derivs

Anthraquinone glucosides from drugs such as cascara and frangula. Friedrich Kayser and Karl Schranz (to Winthrop Chemical Co) U S 1,706,109, March 19 The water sol anthraquinone glucosides may be isolated in substantially pure form by *a procedure involving the treatment of ale or other exts* of the drugs with $Fe(OH)_3$, Mn hydroxide or Al hydroxide, thereby sepg substantially all of the inert material, and subsequent drying of the solns of the glucosides so isolated *The dried products*, thus obtained in the form of fine leaflets, represent the substantially pure effective anthraquinone glucosides or mixt of glucosides contained in the drugs They are sol in water with a slightly acid reaction forming clear solns generally of a brownish color, adaptable for use as purgative injections Examples with details of treatment of cascara and *frangula are given*

Betaine thiocyanate I G Farbenind A -G Ger 515 515, June 29, 1927 See Brit 316, 693 (*C A* 24, 1937)

1-(*m*-Aminophenyl)-2-methylamino-1-propanol. Firma E Merck (Otto Dalmer and Max Oberlin, inventors) Ger 518,212, May 16, 1929 The customary re*duction methods are applied to* 1-(*m nitrophenyl*) 2 *methylamino*-1 *propanone* Examples are given The therapeutic properties of the product compare favorably with those of 1 phenyl 2 methylamino-1 propanol *Cf C A* 25, 1264

Basic tertiary alcohols. I G Farbenind A G (Fritz Mietzsch, Josef Klarer and Hans Hahl, inventors) Ger 518,211, Mar 3, 1928 Compds in which an amino or alkylamino group is linked by an aliphatic residue to an aromatic, hydroaromatic, or heterocyclic ring attached to a tertiary alc group, are prepd by the action of org *Mg compds on esters of cyclic carboxylic acids contg an aminoalkyl or alkylamino*alkyl residue directly substituted in the nucleus or attached thereto through N or O Thus diphenyl *p*-(diethylaminoethylamino) phenyl carbinol may be prepd by treating ethyl *p*-diethylaminoethylaminobenzoate with the Grignard reagent from Mg and PhBr Other examples are given also The products are therapeutically useful and resemble ephedrine, hardenine and adrenaline in their effects

Hydroxyanthraquinone derivatives Walther Straub Ger 518,215, Feb 6, 1929 *The total content of hydroxyanthraquinone derivs, both free and combined, is* extd from drugs contg them, *e g*, cortex frangulae, by means of a moist org solvent not completely miscible with water, *e g*, $Et_2O$, $CHCl_3$ or $C_2HCl_3$ An example is given

Gold compounds of succinimide. W. J. Pope Brit 338,506, July 19, 1929 *Therapeutic compds* (various formulas of which are given) are prepd by the interaction of chloroauric acid or Au hydroxide or a salt thereof, or fulminating gold, with succinimide in the presence of a base (suitably by heating in alc) Compds contg *Br and the CNS radical also are mentioned*

Increasing the hypoglucemic action of insulin. G Richter, Ltd Hung 101,262, Jan 28, 1930 Insulin is mixed with ext of tonsilla

Antirachitic preparation from yeast. Gy Fenér Hung 100,696, Aug 4, 1927 Yeast is boiled with water and KOH or NaOH, then mixed with org solvents The upper phase is sepd, concd and cooled The fluffy crystals *formed are recrystd from* ale, dried and irradiated in thin layers by a mercury lamp The product is incorporated *in cacao butter, mixed with sugar* and pressed into tablets

Vitamin-containing products. Aage W Owe Ger 472,814, Oct 11, 1924 See Norw 44 018 (*C A* 25, 1336)

Liver esterase. Heinrich Kraut Ger 518,024, Jan 5, 1928 Liver exts are dialyzed against running water, whereby salts are removed and part of the albumin content is flocculated The *residual soln is treated with an adsorbent, e g, kaolin* or $Al_2O_3$, which adsorbs the remaining albumins. The purified solns so obtained are *suitable for therapeutic use An example is given*

Hormones Sigmund Fränkel Austrian 121,007, Aug 15, 1930 Details are given of the extn of hormones from testicles by a process similar to that described in Brit 292,962 (*C A* 23, 1474-5) Cf *C A* 24, 3608

Active lipoids. Henri Iscovesco (to Health Products Corp) U S 1,796 027, March 10 Dry pulverized organs such as testes, heart muscle, brain, adrenal cortex,

adrenal total, intestine, stomach, ovary, corpus luteum, red corpuscle, mammary gland, thymus, kidney, pancreas, total pituitary, placenta, prostate, lung, spleen, thyroid and liver are extd with ether, $CHCl_3$ and alc The solns thus obtained are treated with acetone to effect pptn of a lipoid contg material, and the ppt is sepd from the soln. and is treated successively with cold abs alc, ether and $CHCl_3$ to effect purification if desired by soln and subsequent repptn. with acetone The starting material, such as cod livers, may be given a preliminary extn with acetone. Various details and modifications of procedure are described

Purifying olive oil or other vegetable oils. H Hatakeyama and H Watanabe Brit 339,011, Sept. 12, 1929 Remaining traces of fatty acids in partially purified oil are esterified with an aromatic alc such as benzyl alc., phenylethyl alc., hydroxybenzyl alc. or cinnamic alc to prepare a fully purified oil suitable for use as a *solvent for medicinal injections*

Sterilization vessel for injection liquids. Rudolf Schmitz Ger 515,947, Mar 19, 1929

Soaps, creams, etc. Aubert C J Parent Fr 695,218, Aug 28, 1929 Esters of the *p*-aminobenzoic and phthalic series are incorporated in soaps, creams and other toilet prepns. Those esters classed as toxic are excluded

Vermicidal composition. Wm E Waterhouse U S 1,796,070, March 10. A compn suitable for killing worms consists of a water-sol brown powd material prepd. from powd oil-extd. mowrah seeds by first extg with water and then evapg this soln to dryness

Improvement of tobacco and tobacco products. I Schön and I Herczegh Hung 100,779, Sept 24, 1929 Tobacco is moistened with a soln contg hygroscopic disinfectant and must preventing agents, *e g*, 1000 g water, 2 5 g camphor, 1 g saffron flour, 100 g sirupus kaliumsulfoguajacolicus, 100 g dild alc and 6 oz $ZnSO_4$

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E M Symmes

Manufacture of synthetic nitric acid and its salts. E Guerin *Rev chim ind* 39, 258–62(1930) —A review P Thomasset

The process of intensive production of sulfuric acid. E Owsiany *Chem-Ztg* 55, 76(1931) —App is inserted between Glover towers and the first chamber, and between the first 2 chambers, mechanically to disperse, compress and expand the components, to ensure better contact. The consumption of pyrites was increased from 36 3 to 46.8 tons, and the $H_2SO_4$ made in the chambers decreased 11.8%, the balance being produced in the intensive mixers E. M. Symmes

The navy's sulfuric acid plant. H M. Coster *U S Naval Inst Proc.* 57, 317–9(1931) —This plant, at the Naval Powder Factory, Indian Head, Md, is of the Grillo-Schroder type with Pt-$MgSO_4$ contact mass, having a rated capacity of 70 tons of 100% $H_2SO_4$ per 24 hrs. Several special features of the plant are described (1) *a $SO_2$ recorder* operating on thermal-cond principles, which enables the operator to supply gas of uniform $SO_2$ content to the converter, (2) a special *app for detg. the strength of oleum* by cond. measurement; (3) a unique method for adding automatically the necessary water to the absorbing towers by admitting a mixt. of water and steam into a by-pass line in the circulation system. These features greatly reduce the cost of operation and simplify plant control C. G Storm

Problems of a Hungarian nitrate factory. T. Szappka. *Technika* 10, 155–60, 185–91, 247–52(1929).—Methods of nitrate manuf in different countries are described. The Hungarian factory should avoid arc fixation of $N_2$, and should only use Ca cyanamide or synthetic $NH_3$ methods. S S de Finály

The manufacture of potassium metabisulfite. I. Ferran. *Quim e ind* 7, 277–9 (1930) —The manufacture of $K_2S_2O_5$ is described. Cost figures (in pesetas), in a plant making $Na_2S_2O_5$ at the same time, are 1027 kg of 92% KOH 1129 7, 1422 kg of 98% $K_2CO_3$ 1707 6, 1138 kg of 98% S 318 65, 247 kw. hrs 74 1, water and light 10, 1400 kg. of Cardiff coal 112 0, salaries 135.3, 27 workmen 189, watchman 50, amortization 44 45, charges 71.7; metabisulfite obtained 3100 kg; cost per 100 kg of metabisulfite 117 4. S L. B. Etherton

Outline of a potassium dichromate plant. Victor Maida. *Chimica e industria* 3, 470–4, 510–3(1928).—$K_2Cr_2O_7$ is obtained by an oxidation of chromate or Cr ore in the presence of CaO and $Na_2CO_3$ The app required and a plant sketch, with a calcn.

of cost for a daily production of 3000 kg $K_2Cr_2O_7$, is given in detail. In Brazil $K_2Cr_2O_7$ can be produced for 870 reis per kg. R. D. BUMBACHER

The production of potassium sulfate from potassium chloride and sulfur dioxide. E. BRITZKE, S. VOLFKOVICH AND M. KAMENSKAYA. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 492–5(1930).—Expts. with a no. of catalytic agents to speed up the reaction between KCl and $SO_2$ in the presence of water vapor were made. At 500°, without a catalyst, only 4.5% of the KCl decompd. in 20 hrs. $CoSO_4$, $Co(NO_3)_2$, $Fe_2O_3$, $Fe(OH)_3$, $Al_2O_3$, CuO, burned pyrites and a series of slags contg. oxides of Al, Fe, Si, Ca and Na were tried. These were prepd. in the lab. or taken from com. plants. Max. effects were obtained from the slags contg. oxides of Fe, Al, Si and Na. The slag was ground to pass a sieve with 4900 holes per sq. cm., and 0.5% of the slag was added to the salt, which was ground to particles of 0.2–0.4 mm. diam. The yield of sulfate reached 98.2–99.8% in one hr. With 0.1% $Fe_2O_3$ or 0.01% $Fe(OH)_3$ (of the wt. of KCl) the yield was 78–83% in 3.75 hrs. Burned pyrites gave a yield of 70% in 2 hrs. when 1% was used. With 0.5% CuO the yield reached 44% in 30 min. Various other slags were tried out, but without much improvement. J. S. JOFFE

Formation of carbon disulfide from hydrogen sulfide and coke. T. J. DRAKELEY AND W. J. BAKER. *J. Soc. Chem. Ind.* 49, 475–8T(1930).—$CS_2$ in coal gas may be formed by decompn. of org. S compds. in the coal, or by reactions between C and free S derived from pyrites. When $H_2S$ was passed over heated wood C or coke, an extended delay occurred before evolution of gas and $CS_2$ formation, caused by $H_2S$ absorption by C. Small quantities of $CS_2$ were formed by the action of $H_2S$ on wood C between 700° and 1000°, or on coke between 600° and 950°. In the tests the max. $CS_2$ yield was obtained at 2.4 l. of $H_2S$ per hr. passed over. $CS_2$ was not obtained by the action of $H_2S$ on coke from coal carbonized above 950°, nor was $CS_2$ obtained from $H_2S$ and C at less than 500° or above 975°. Over 99% of $CS_2$ is decompd. on passing over wood C or coke at 850–1000°. E. M. SYMMES

Titanium oxide. RENÉ SPETTEL. *Rev. prod. chim.* 34, 1–5, 40–4(1931).—A review. P. THOMASSET

The kinds of lime and their manipulation. F. EISERMANN. *Tonind.-Ztg.* 55, 239–40(1931). F. O. ANDEREGG

Quinquennial review of the mineral production of India for the years 1924 to 1928. Saltpeter. E. H. PASCOE. *Records Geol. Survey India* 64, 287–92(1930).—The Gangetic plain is famous for its production of saltpeter which is extd. from the earth (1–20% salt). Wood ashes are added to decompose $Ca(NO_3)_2$. The liquors analyze NaCl 15.25, $KNO_3$ 7.24, KCl 0.40, $MgCl_2$ 0.29, $CaCl_2$ 0.10, $CaSO_4$ 0.10 and $MgSO_4$ 0.10%. ALDEN H. EMERY

The solubility of salt, alone or in combination, in water and brines at temperatures below and above 100°. W. FROEHLICH. *Mitt. Kali-Forschungs Anst.* 1929, *37–66*, *Chem. Zentr.* 1929, II, 2485.—F. detd. the solubilities of KCl, NaCl and $MgSO_4$ in $H_2O$, of NaCl in the presence of KCl in $H_2O$, of $MgSO_4$ in $H_2O$ contg. different quantities of $MgCl_2$, of NaCl in the presence of KCl in technical sylvinite extn. liquor and in van't Hoff's liquor Q 20, and of carnallite in the liquor Q 20. All detns. were made in an autoclave between 100° and 200°, in a few cases also some known figures at temps. below 100° were reëxamd. The values obtained are plotted in wt. %, and the curves are continued to the fusion temp., where the relation of salt to solvent becomes 100:0. For quantities of KCl + NaCl dissolved simultaneously in 100 g. soln. this line is absolutely straight, and at 722° it meets the m. p. of a mixt. contg. 1 mol NaCl + 4 mols. KCl, according to the known fusion diagram of the mixt. of both chlorides, while from 120° downward NaCl shows an unvaried soly. of 16.4%. The most recent detns. of the soly. of $MgSO_4$ were confirmed, and deviating results obtained by F. or earlier investigators were traced to the presence of sediments consisting of labile hydrates. these hydrates hold an intermediate position between the stable hydrates $MgSO_4.6H_2O$ and $MgSO_4.H_2O$. G. SCHWOCH

The processing of sylvinite at temperatures above 100°. Dissolving, crystallizing and heat consumption. W. FROEHLICH AND E. RITTER. *Mitt. Kali-Forschungs-Anst.* 1929, 67–89, *Chem. Zentr.* 1929, II, 2485.—By means of the figures obtained for soly. in solns. satd. with NaCl and KCl (cf. preceding abstract) the sepn. of dissolved salt on cooling the soln. is calcd. The soly. of NaCl in a soln. satd. with KCl is greatest at 80°. Thus when such a soln. is cooled, NaCl + KCl is sepd. down to this temp.; NaCl is just dissolved again by solns. satd. at 150° and cooled to 20°, provided that the solns. are thoroughly agitated. Thus at a soln. temp. below 150°, KCl free from NaCl can be produced, while above 150° only KCl contg. NaCl is obtained. When the cooling is accompanied by evapn. of $H_2O$, as occurs especially in the vacuum cooling app.,

a mixt. of NaCl and KCl is obtained, which affects the results accordingly In any case, a quantity of $H_2O$ sufficient to keep the NaCl in soln can be added The kind *and proportions of salts and liquor, as well as the $H_2O$ to be added, are calcd. for a* dissolving temp of 100° and 200°, and for cooling with or without evapn and with or without addn of $H_2O$ These calcns. are carried out with reference to the practical conditions met with in the soln of sylvinite These conditions are discussed, together with thermotheroretical considerations on soln at temps above 100°. G S

**Modern arrangements for extracting salt from the ocean in East Africa.** Fr. Riedig. *Intern Bergwirtsch u Bergtech* 23, 142–3(1930), *Kali* 24, 271–3, 294–7(1930) — A brief description of the salt-extn plant in the Italian colony Somaliland, claimed to be the largest ocean salt works in the world E I S

**Commercial manufacture of hydrogen.** E Guerin *Rev chim ind* 39, 354–7 (1930) —A short description is given of the methods in use P Thomasset

**Mechanical mining and treatment of sulfur.** J B Nealey *Eng Mining J* 131, 253–5(1931) —*The practices at the Hoskins Mound and Bryanmound, Tex., plants of* the Freeport Sulphur Co are described W H Boynton

**Mica.** J H Frydlender *Rev prod chim.* 33, 549–54, 584–6, 616–9, 654–5 (1930) —A review. P Thomasset

**Bleaching earths.** O Eckart *Seifensieder-Ztg* 58, 132–3(1931) —Kaolins without bleaching properties yield their $H_2O$ at 450–700°, while bleaching earths give off *their $H_2O$ rather uniformly between 200° and 900°, the nearer this curve comes to a* straight line, the better is the bleaching power A bleaching earth that has been acid treated follows the same rule, thus indicating that bleaching earths possess a gel body and non-bleaching earths a cryst body By mixing 10 g of oil with 10 g of earth at room temp bleaching earths showed an increase in temp ("heat of wetting") of 4–13°, while non bleaching earths showed a rise of 1° P Escher

**Washing and bleaching clays of Azerbaidzhan (bentonites and floridines).** S A Kovalevskii *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 50 pp (1931) —Natural deposits are described Bleaching clays as yet discovered require activation with $H_2SO_4$, but scarcity of acid prevents their immediate utilization V K

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Preparation of HCN (Gluud, Keller) 6. Apparatus for mixing acids (Brit pat 338,440) 1. *$HNO_3$ production (Brit pat 338,497) 13*

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**Kali-Kalender, 1931.** Taschenbuch für Kalibergbau und Kaliindustrie Edited by C. Hermann. Halle (Saale) W. Knapp M 5.20

Kausch, Oskar: **Die Kontaktstoffe der katalytischen Herstellung von Schwefelsäure, Ammoniak und Salpetersäure.** Halle (Saale). W. Knapp. 216 pp M 21, linen, M. 23

Lendel, E: **Interferometrische und spektroskopische Untersuchungen zum Nachweis von Unterschieden zwischen natürlichen Quellsalzen und ihren künstlichen Ersatzprodukten.** Berlin Schoetz. 39 pp M. 3

Standage, H C **Cements, pastes, glues and gums.** London Crosby Lockwood 164 pp. 3s 6d

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**Chromic acid and sodium bisulfate.** Harshaw Chemical Co Brit. 338,938, July 30, 1929 Reaction between oleum and $Na_2Cr_2O_7$ is effected in an *app.* (details of which are described) so that molten products are produced directly which are then sepd. by centrifuging or settling; either or both products may be solidified by spraying or atomizing.

*Nitric acid.* N Caro and A R Frank. Brit. 338,566, Aug. 13, 1929 $NH_3$ is oxidized with O or gases contg. O under normal pressure, resulting N oxides are compressed to "several atm." pressure in a turbo compressor and at this pressure are converted into $HNO_3$ by condensation and absorption. Cf. *C. A.* 24, 5946

**Sulfuric acid.** Willi Büsching. U S 1,795,995, March 10. See Fr 673,105 (*C. A.* 24, 2552).

***Concentrating sulfuric acid.*** *P. I Kharitonov. Russ appl 58,870, Nov 23,* 1929. $H_2SO_4$ is concd. by hot vapors from the Kessler and Gaillard app by first directing these gases contg. $SO_2$ and $SO_3$ into a superheater, where they are heated to 900–1200°, followed by their recycling through the concn. app. to conc. new portions of $H_2SO_4$ and to eliminate losses in S oxides by means of a continuous recycling of gases used for heating

***Material resistant to acids and alkalies.*** Kábelgyár, Ltd *Hung 101,471, Jan*

24, 1930) S and Se are used together with animal hairs, paper sheets, waste cloth or materials which in themselves are not resistant to acids and alkalies. The mixt. is pressed to forms, then heated under pressure to a temp. higher than the m. p. of S or of Se.

**Alkali and alkaline earth metals.** JAN H. DE BOER (to N.-V. Philips' Gloeilampenfabrieken). U. S. 1,797,131, March 17. See Brit. 323,718 (*C. A.* 24, 3329).

**Alkali and alkaline earth carbonates and chlorides.** SOC. ANON. ALCALINA. Brit. 339,330, Aug. 1, 1929. See Belg. 358,292 (*C. A.* 24, 925).

**Alkali chromates.** BOZEL-MALETRA (SOC. INDUSTRIELLE DE PRODUITS CHIM.). Fr. 37,257, Jan. 28, 1929. Addn. to 683,604. The amt. of alkali used is limited to the equiv. necessary for the formation of dichromate instead of chromate.

**Alkali chromates.** O. F. TARR (to Mutual Chemical Co. of America). Brit. 338,469, April 3, 1929. See U. S. 1,752,863 (*C. A.* 24, 2553).

**Alkali chromites.** BOZEL MALETRA (SOC. INDUSTRIELLE DE PRODUITS CHIM.). Fr. 37,256, Jan. 25, 1929. Addn. to 683,179 (*C. A.* 24, 4593). Alkali chromites are prepd. by heating ores of Cr in the presence of alkalies in a reducing atm. or in a reducing medium, with or without pressure. The Fe obtained is sepd. by known means.

**Alkali and alkaline earth metal cyanates.** DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Brit. 339,220, April 10, 1929. Urea is heated in the absence of solvents (suitably to 120–150°) with basic alkali metal compds. such as soda or potash or alkali hydrides (but excluding alkali hydroxides) or with alk. earth metal compds. such as CaO, $Ca(OH)_2$, or Ca carbide, hydride, amide or carbonate. $NH_3$ is evolved and recovered, and $C_2H_2$ also is formed when $CaC_2$ is used. Alk. earth metal cyanates obtained may be treated in aq. suspension or soln. with alkali metal compds. such as NaCl to produce alkali metal cyanates.

**Cyanates and cyanamides.** I. G. FARBENIND. A.-G. Brit. 339,371, Sept. 13, 1929. Cyanates and cyanamides are prepd. by heating urea with oxides or carbonates of bivalent metals such as the alk. earth metals (including Mg) and metals above Hg in the electromotive series such as Zn, Cd, Cu, Ni and Pb. At temps. between 130° and 400° mainly cyanates are formed, and at higher temps., cyanamides. $NH_3$ and $CO_2$ can be used instead of urea, and various modifications and details of procedure are described.

**Cyanides and ferrocyanides.** EMIL HENE. Ger. 515,850, Dec. 22, 1928. Alkali sulfates, CaO and $H_2S$ are allowed to react to produce alkali hydrosulfides and $CaSO_4$. The latter is removed by filtration. The hydrosulfides are obtained by evapn. and heated with $C_2N_2(NH_2)_2$ to produce alkali thiocyanate and $NH_3$. The thiocyanate is heated with Fe or H or both to produce alkali cyanide and FeS or $H_2S$. The FeS reacts with the alkali cyanide to form ferrocyanide. Extn. with cold water removes the alkali cyanide, and extn. with hot water removes the ferrocyanide and alkali sulfide, which are sepd. by fractional crystn. The alkali sulfide is worked up to alkali sulfate.

**Alkali metal hydrides.** HERMANN FREUDENBERG and HARRY KLOEPFER (to Deutsche Gold und Silber Scheideanstlat vorm. Roessler). U. S. 1,796,265, March 10. Finely divided alkali metal is subjected to the action of H at temps. of about 180–300°.

**Alkali phosphates; hydrogen chloride.** METALLGES. A.-G. Ger. 518,203, Dec. 30, 1928. These are prepd. from alkali chlorides and $P_2O_5$ by introducing vaporized or solid $P_2O_5$ into a melt of alkali chloride into which steam is led.

**Alkali sulfates.** KALI CHEMIE A.-G. Ger. 515,930, Jan. 18, 1927. In producing alkali sulfates from alkali chlorides by treating them with flue gases and steam, a 1% addn. of surface active material such as clay, bauxite, $SiO_2$, etc., is present. Thus, the chlorides may be briquetted with rock salt, burned clay or fuller's earth before submission to the flue gas and steam.

**Aluminates.** MAX PASCHKE. Ger. 518,204, Feb. 15, 1927. Water-sol. aluminates are obtained as by products in the manuf. of crude Fe, by adding Na compds., particularly $Na_2CO_3$, to the blast furnace charge. The aluminates are extd. from the slag with hot water.

**Metal salts by the double decomposition of salts with sulfates.** I. G. FARBENIND. A. G. (Otto Balz, inventor). Ger. 514,651, Nov. 15, 1927. $HPO_3$ or its salts are added. Gypsum is obtained as a by product if Ca salts are used. Thus, $Ca(NO_3)_2$ soln. is treated with $HPO_3$ and hot 90% $K_2SO_4$ soln. The resulting $KNO_3$ soln. is readily sepd. from the coarse $CaSO_4$ produced. Other examples are given.

**Metal carbonyls.** I. G. FARBENIND. A.-G. Fr. 37,284, July 29, 1929. Addn. to 677,548 (*C. A.* 24, 3329).—The process of the prior patent is carried out by mixing the primary material with liquids or molten masses and afterward treating with CO

to produce carbonyls under such conditions that the liquids or molten masses are in the gaseous phase or almost exclusively so during the reaction.

Aluminum chloride. I. G. Farbenind. A.-G. Fr. 693,124, May 6, 1930. See Ger. 515,033 (*C. A.* 25, 1644).

Ammonium nitrate. E. E. Lider and I. E. Koroschanskii. Russ. appl. 35,845, Nov. 22, 1928. $NH_4NO_3$ is prepd. from $HNO_3$ and $NH_3$ in a vacuum neutralizer connected by pipes successively with a column which acts as a trap for $NH_3$ and with a heat exchanger used for preheating $HNO_3$ passing into the neutralizer.

Ammonium nitrate. Odda Smelteverk Aktieselskapet and E. Johnson. Brit. 339,562, March 4, 1929. See Fr. 690,757 (*C. A.* 25, 1342).

Ammonium sulfate. I. Balint. Hung. 101,900, May 26, 1930. $Na_2SO_4$ is treated in soln. with $NH_3$ and $CO_2$. $NH_3$, however, is not regenerated from the mother liquor after the pptn. of $NaHCO_3$, but evapn. is continued and the soln. cooled until $(NH_4)_2SO_4$ is produced. To mother liquor contg. $(NH_4)_2SO_4$ may be added $NH_4NO_3$ in order to produce the double salt for use as fertilizer.

Borax. American Potash & Chemical Corp. Fr. 37,316, Aug. 10, 1929. See Brit. 330,453 (*C. A.* 24, 5949).

Carbon disulfide. Zahn & Co. G. m. b. H. Fr. 37,206, July 10, 1929. Addn. to 672,766 (*C. A.* 24, 2252). The $CS_2$ is cooled in the condenser to a temp. a little below its b. p. so that only a small quantity of $H_2S$ is absorbed, which is afterward removed in known manner in the separator. Preferably, the gases liberated from the condenser are brought into a second condenser of the same kind but of smaller dimensions, from which the condensed materials are returned to the retort.

Separating calcium and magnesium chlorides from brines. Wm. R. Collings (to Dow Chemical Co.). U. S. 1,796,920, March 17. Tachydrite crystals are sepd. from a mother liquor having a higher proportion of $CaCl_2$ to $MgCl_2$ than the original soln.; the crystals are dissolved in a limited quantity of water with heating such that a soln. is produced from which on cooling to about 30° crystals of $MgCl_2$ hexahydrate will be pptd. and the filtrate remaining from the crystals will be of approx. 42.5–43° Bé. This filtrate retains the $CaCl_2$ in soln. at 30°.

Calcium-magnesium chloride. Wm. R. Collings and John J. Shafer (to Dow Chemical Co.). U. S. 1,796,885, March 17. A free-flowing non-caking mixt. of hydrated crystals of chlorides of Mg and Ca is pptd. as crystals of tachydrite and $CaCl_2$ dihydrate from a soln. satd. with the chlorides, and the crystals are superficially dehydrated to the point which avoids caking together. U. S. 1,796,886 relates to superficially dehydrating crystals after pptn. as crystals of the hydrated double chloride $MgCl_2.2CaCl_2.6H_2O$ and $CaCl_2$ dihydrate. Cf. *C. A.* 24, 927.

Calcining lime or dolomite. W. Voss and Vulcan-Feuerung A.-G. Brit. 339,108, Nov. 27, 1929. Water which is injected into a shaft kiln for calcining lime or dolomite is cooled nearly to the f. p. to prevent its conversion into steam before it contacts with the charge.

Hydrating lime. Clarence R. Rex. U. S. 1,796,396, March 17. Various details are described for mixing a measured quantity of water with a measured quantity of quicklime, detg. the vol. of the water and the rate of supplying it to the lime and mixing to approx. a constant temp. during the reaction (the reaction being checked as complete by predetd. increase in vol.) so as to constitute a standardized com. operation.

Copper sulfate briquets. Hungária Műtrágyagyár, Ltd. Hung. 101,213, Feb. 1, 1928. $CuSO_4$ crystals of 0.25 to 5.00 mm. are formed by interrupted crystn. and briquets are formed from these. Generally no cementing matter is required since postcrystn. takes place after briquet formation. The briquets may be moistened with concd. mother liquor.

Hydrogen peroxide. Elektrochemisches Werke-München A.-G. Ger. 515,595, Sept. 7, 1926. Solns. of $H_2O_2$ in caustic alkali are preserved and used in vessels of Al or its alloys.

Ferric phosphate. Metallges. A.-G. (Freiherr Conwav von Gise wald and Hans Weidmann, inventors). Ger. 518,315, May 30, 1929. The manuf. of $FePO_4$ by roasting ferro-phosphorus in air is accelerated by addn. of a catalyst, *e. g.*, NaCl or $Na_2CO_3$.

Iron carbonyl. I. G. Farbenind. A.-G. (Alwin Mittasch and Carl Müller, inventors). Ger. 518,387, Dec. 16, 1924. Addn. to 490,296 (*C. A.* 24, 4127). The method of Ger. 490,296 is extended to the use of Fe in non-spongy form. The preliminary reduction, if applied, should take place in a vessel sep. from that in which the carbonyl is prepd.

Liquefying nitrogen oxides. I. G. Farbenind. A.-G. (Christoph Beck and Heinrich Diekmann, inventors). Ger. 518,386, Aug. 19, 1927. In sepg. $N_2O_4$ from gas

mixts with or without other oxides of N, by liquefaction at atm or raised pressure, the vapor pressure of the $N_2O_4$ is reduced by addn of up to 10% of $HNO_3$ in liquid or vapor state The added acid may first be enriched in oxides of N. If the gas mixt is moist and contains O, the necessary acid may be formed *in situ* Cf *C A*. 24, 670

Apparatus for adsorbing nitrogen oxides. V I Malyarevskii and V. V. Papkov Russ. appl 21,946, Nov 28, 1927, 37,713 and 37,714, Dec. 28, 1928 Mechanical features

Separation of salts of radium and barium. Ivan Ya Bashilov Ger. 515,681, July 24, 1925 See Russ 6046 (*C A* 23, 1059)

Separation of rubidium or cesium salts from alkali salts. Kali Forschungs Anstalt G m b H (O F Kaselitz and Hans Grasshoff, inventors) Ger. 515,851, Mar 22, 1930 Complete sepn of technically pure Rb or Cs salts from alkali salts is effected by pptg the Rb and Cs as alkali Mg double phosphates Thus, carnallite contg 4% $RbCl$ is dissolved in water and treated with $Na_2HPO_4 \cdot 12H_2O$ The ppt is Rb-free $MgHPO_4 \cdot 7H_2O$ The filtrate is treated with further $Na_2HPO_4 \cdot 12H_2O$ and neutralized The salt $MgRbPO_4 \cdot 6H_2O$ is pptd, free from K. This ppt. is sepd and dried A further example is given

Caustic soda; ammonium chloride Alfred Mentzel. Ger 510,093, Mar. 27, 1929 $NaHCO_3$ prepd by the ammonia-soda process is mixed with C and treated with N at a high temp The NaCN so obtained is treated with steam, NaOH and $NH_3$ being obtained The latter is returned to the ammonia-soda process and ultimately recovered as $NH_4Cl$

Sodium peroxide. Hector R. Carveth (to Roessler & Hasslacher Chemical Co) U S 1,796,241, March 10 $Na_2O_2$ is made by treating with O a pulverulent mixt of $Na_2O$ and not over 10% of finely divided metallic Na at a temp of 200-350°. App is described

Titanium dioxide. Joseph Blumenfeld (to Commercial Pigments Corp). U. S 1,795,467, March 10 A soln of a Ti salt such as the sulfate is slowly added to water or to a soln of lesser concn while agitating so that colloidal particles of $TiO_2$ are produced Cf *C A* 24, 4175

Verdigris. A. A Svitzuin Russ. appl. 35,471, Nov. 17, 1928. Cu powder, obtained by pulverizing molten Cu, is treated with $Cu(OAc)_2$

Treating silicates. F Jourdan. Brit. 339,028, Oct. 22, 1928. See Fr 682,764 (*C. A.* 24, 4504)

Treating greensand and other materials containing potassium. Arthur Lambert (to Cosmic Arts Inc.) U S 1,797,002, March 17. The material is treated with an acid such as HCl or $H_2SO_4$ and with a basic Na compd such as $Na_2CO_3$ to produce a substantially neutral soln contg K and Na salts, and the Na is then pptd as $NaHCO_3$, the K salts being left in soln Various modifications of procedure are described

Treating kaolin, etc. R. Illner Brit. 338,726, Dec 13, 1928 Materials such as clay, kaolin, diatomaceous earth and sericite earth are improved by treating them in suspension with a slightly sol salt such as $CaSO_4$ or $CaSO_3$ by stirring with such salts (which may be formed *in situ*) The material may also be treated with a bleaching agent or mixed with ultramarine or indanthrene blue for improvement of color. Brit 338,730 describes stirring the material in acid suspension with $Na_2S_2O_4$, blowing with air, and adding $Ca(OH)_2$ with or without addn of blue coloring substances

Stabilizing solutions of per-compounds. Österreichische Chem Werke G. m b H Ger 518,402, Sept 22, 1926 See Austrian 119 036 (*C. A* 25, 385).

Activated carbon. Soc. de recherches et d'exploitations pétrolifères. Fr 695,212, Aug 27, 1929 Carbonaceous materials are heated with combustion gases or combustion residues and then activated with activating gases which are of such a compn that they produce combustible gases Activating gases which may be used are O, steam or $CO_2$, alone or mixed with Cl or HCl Cf *C A*, 24, 2558

Reactivating carbon. Metallges. A G Brit. 338,500, June 8, 1928 Reactivation of C in lump form is effected en masse in a container such as an adsorber by preheating at least a portion of the material and then treating it with a gas or gas and vapor mixt. contg less than 8% O The preheating is then discontinued and the heating gas supplied at a temp not substantially greater than 250° and preferably below 200° (thus effecting a localized reactivation zone formation, with travel of this zone in the direction of the gas flow) Cf *C A* 24, 1188

Dispersion of carbon black in water. Charles R Park (to The Goodyear Tire and Rubber Co) Can 309,276, Mar. 10, 1931. Carbon black is exposed to the vapors of a material selected from a class comprising petroleum distillate and pine distillate to increase its dispersibility in latex.

Bone black. T. L. Wheeler and J B Carpenter (to Baugh & Sons Co.). Brit. 338,476, April 11, 1929 See Ger. 512,484 (*C A* 25, 1045)

Amorphous carbon from tar. Alexander L. Ullrich. U. S 1,796,815, March 17. A solvent such as benzol is added to tar liquefied by heating, and to this mixt. there is added a relatively heavy hydrocarbon material such as fuel oil or kerosene in proportion to cause pptn of the carbon particles of the mixt.; the ppt. is removed and treated with a solvent such as a light oil to remove sol. constituents, and the remaining substantially pure carbon is dried after being sepd from the assocd solvent.

Sulfur from sulfide ore. Raymond C. Benner and Alfred P Thompson (to General Chemical Co ) U. S. 1,795,705, March 10 A mixt of sulfide ore such as pyrites or pyrrhotite and a carbonaceous reducing agent such as coal is contacted in co-current flow with an oxidizing gas such as air, and the carbonaceous material is employed in sufficient quantity to effect reduction of the S to its elemental form. App is described. Cf *C. A.* 24, 2557

Condensation products containing sulfur. I G Farbenind. A.-G Brit. 338,604, Aug 24, 1929. Condensation products such as those formed from glycerol, ricinoleic acid and phthalic anhydride or similar initial materials, of oily to resin-like character, are heated with S or S compds such as S monochloride (suitably at 160–70°) to produce products sol in hydrocarbons and oils and suitable for use in the manuf. of stains, filling or priming compns , cements and varnishes, together with oils, resins, cellulose derivs , softening or plasticizing agents and siccatives Several examples with details of procedure are given

Sulfur and bentonite mixture suitable for use in making molded products. Carleton Ellis (to Ellis-Foster Co ) U S 1,795,364, March 10 A dry mixt contg S 90 and bentonite 10% is prepd by grinding the materials with water and drying the dispersion thus formed at a temp below the sintering point of S Quicklime 1% may be added, and the compn may be used with asphalt for waterproofing roofing, etc.

Artificial substances. Soc. anon pour l'ind chim. à Bâle Fr. 37,496, Oct. 7, 1929 Addn to 646,922 (*C A* 23, 2257) Artificial substances are prepd by condensing in the presence of acid 1 mol of an aromatic amine with almost 1 mol of an aldehyde or the equiv of an agent capable of liberating an aldehyde and converting the fusible resin thus formed, after elimination of acid, either alone or mixed with fillers, dyes, softening agents, etc., to the infusible state with hardening agents Examples are given. Cf. *C A* 24, 5119, 25, 1046

Preparing artificial masses. G S Petrov and A. K. Petrov Russ. appl 35,158, Nov. 12, 1928 Addn to pat 360 Artificial masses obtained according to pat 360 are also prepd. from powdered substances such as are obtained in the treatment of cellulose with hydrating substances, *e g*, $ZnCl_2$, KSCN or caustics.

Plastic material. K. I Tarasov Russ appl 24,198, Feb 25, 1928, 29,211, June 22, 1928. Addn to pat. 10,398. Gypsum or a mixt. of gypsum with kaolin or chalk or with hydrocellulose or wood flour is mixed with casein which was preliminarily treated with condensation products of phenol and formalin, and the whole is treated according to pat. 10,398.

Plastic composition. Stefan Dissmaier Austrian 121,553, Oct. 15, 1930. The compn. comprises wood pulp and comminuted leather waste, in approx. equal amts , and a water-insol. org. binder, *e g*, resin size. It may be used for coating masonry, protecting steam or water pipes, making buttons, etc.

Adhesive for bronze printing, etc. Reinhold Wolffram. Ger. 515,522, Mar 20, 1929. A cement of sufficient adhesiveness for bronze printing, etc., is prepd by incompletely fermenting a mixt of dextrin and glucose with yeast and adding $H_2O_2$ or $Na_2O_2$ The fermentation is carried out at about 24°, and 0.3 to 1% NaOH and a small quantity of aq. castor-oil emulsion may be added A conserving agent such as $BzONa$ may also be added.

Cement for uniting glasses of bi-focal spectacle lenses. A. Banister. Brit. 338,555, Aug. 20, 1929. A mixt. is used comprising cellulose acetate, glucose and acetone oil.

"Basing cement" for uniting lamp bulbs to bases. Cletus C. van Voorhis (to Westinghouse Lamp Co ). U. S 1,795,746, March 10. A conducting substance such as graphite and an alc.-sol. gum such as shellac are used with $BaSO_4$, marble flour and a volatile solvent such as alc.

Decorating asbestos-cement slabs. Hawenta-Platten-Ges. m. b. H. Ger. 477,210, July 16, 1927 See Brit. 327,871 (*C. A* 24, 5129).

Wetting, etc., agents. H Th Böhme A.-G. Fr 37,134, June 18, 1929. Addn to 671,456 (*C. A.* 24, 2257). Wetting, cleaning and impregnating agents for use in

the textile and other industries are made by sulfonating alcs of high mol wt of the fatty acid or oleic acid series in the presence of anhyd. org acids, their anhydrides or chlorides *Cf C A* 24, 5952

Wetting, etc., agents I G Farbenind A G Fr 37,163, June 29, 1929. Addn to 632,155 Non aromatic hydrocarbons contg more than 8 C atoms in the mol and their derivs are sulfonated with gaseous $SO_3$, preferably in the presence of an org diluent Examples are given

Wetting, etc, preparations. I G Farbenind A-G Fr 37,122, June 24, 1929 Addn to 624,010 Prepns having the properties of soaps to a very high degree and also a wetting and emulsifying power are composed of sulfonic acids of aliphatic, hydroaromatic, aromatic or heterocyclic compds having the properties of soaps, or salts of these acids, and, besides, free sulfonic acids or other org compds not having in themselves pronounced soap properties. Thus, propylnaphthalene sulfonic acid is mixed with naphthalene sulfonic acid Cf *C A*. 24, 4900.

Wetting, foaming, emulsifying, etc., agents. I G Farbenind A-G. Ger. 518,408, Jan 31, 1929 These are prepd. (1) by the reaction of nuclearly halogenated aralkyl halides with aromatic or partly hydrogenated aromatic sulfonic acids during or after the sulfonation process, or (2) by condensing nuclearly halogenated aralkyl halides with aromatic or partly hydrogenated aromatic hydrocarbons and sulfonating the products Thus, a mixt of $C_{10}H_8$ and trichlorobenzyl chloride may be sulfonated, or first heated with $ZnCl_2$ and then sulfonated Examples are given

Detergent. Electric Smelting & Aluminum Co Brit 339,355, Sept. 7, 1929. See U S 1,745,844 (*C A* 24, 1712)

Detergents and lubricants containing fatty acid salts. P Spence & Sons, Ltd., and T. J. I Craig Brit 338,919, May 21, 1929 A fatty acid such as stearic acid is treated with a soln of alkali combined with a metal oxide sol in the alkali such as that of Al or Zn, to produce products such as normal or basic double stearates, palmitates, oleates, etc., suitable for thickening lubricants, use with $H_3BO_3$ in polishing compns., etc.

Polishing agent. Arthur van der Brugge Fr 37,403, April 15, 1929. Addn. to 667,300 (*C A* 24, 1191) The polishing agent is made by adding the $PhNO_3$ to the collodion and the acetone to the petroleum to facilitate the mixt. of the petroleum with the collodion in the presence of the $PhNO_3$

Composition for cleaning and polishing silver. Cinderella Raisch U. S. 1,795,676, March 10 NaCl 8 oz., quinine chloride 1 oz., $MgSO_4$ 1 5 oz and indigo 4 drops

Treating magnesium articles to prevent tarnishing Edward C. Burdick (to Dow Chemical Co) U S 1,795,473 March 10 The articles are subjected to the action of 10–30% $H_2SO_4$ soln and then washed

Bleaching powder. E Krebs. Brit 338,940, July 30, 1929. Lime is treated with Cl in a vertical shelf absorber and air is admitted in the bottom portion of the absorber while Cl is admitted at one or more higher points. Various details of the app and its operation are described

Trade-marking carbon paper Samuel A Neidich (to Neidich Process Co). U S 1,796,966 March 17 Marking is effected by applying an acid material such as oleic acid capable of increasing the capacity of the web for absorption of waxy, oily transfer material previous to application of the latter

Carbon papers for manifolding or transfers. P. Meyer. Brit. 338,673, Oct. 11, 1929 Water sol soap and a water sol dye are used together (suitably with addn of a small proportion of oil) in prepg coating compns.

Transfer material W S Lawrence and Kalmagraph Co. Brit. 338,611, Aug 27, 1929 Transfers are formed with a paper base and a compn contg ethyl or benzyl cellulose, a resinous material such as cumar, a blown oil such as blown castor oil, and coloring material, and other substances such as Et lactate, tricresyl phosphate, Et abietate and glycol monoethyl ether also may be used in various mixts

Duplicating printed or written matter. Wilhelm Ritzerfeld U S. 1,795,378, March 10 Reproduction from originals furnished with reverse characters is effected by making the original stencil on a sheet of paper which is thick and soft but has a smooth and dense surface, such as a paper contg chalk, so that upon producing the stencil the characters are impressed deeply into the paper and form raised reversed characters on its back from which copies are made onto previously moistened copy sheets.

Stencil paper Daniel A Williams (to A B Dick Co) U. S 1,795,461, March 10 Paper is coated with a compn comprising a cellulose ester such as nitrocellulose

cellulose acetate, glycerol (suitably in a quantity several times that of the cellulose ter), a relatively small proportion of a resin and a solvent which together form a soft ible product easily displaceable by impact of type Cf *C A* 24, 4598

Sound-record compositions. H J Billings (to A D Little, Inc) Brit 339,335, ly 17, 1929 Records are formed with a backing (suitably formed of sheets of paper ernating with sheets of fibrous material mixed with a thermoplastic binder), a record eet (which may comprise shellac 48, graphite 25 and paper pulp 22% together with C ick and rosin), and a thin coating comprising shellac which may be mixed with a ler and pigment. Various details of manuf are described

Combined sound and picture records. I G Farbenind A-G Brit 338,817, b. 22, 1929 Sound and picture records are produced on a single film, and both cords are then copied on a single film having a fine grained colored emulsion of steep adation (there being placed before the film bearing the sound record a screen of color mplementary to that of the colored emulsion)

Light-diffusing panels. Frank Collins (to Mutual-Sunset Lamp Mfg Co). S 1,795,294, March 10 A fine-gauge wire screen fabric is immersed in a clear equer which solidifies on exposure to the air and forms a continuous transparent eet encasing the fabric, there is then applied to one surface of this sheet a translucent lor medium such as a colored lacquer compn to form a design, and the entire opposite rface is treated with a translucent color medium contrasting in color with the design id providing a background

Freezing-point depressant for use in automobile engine cooling systems, etc. ohn W. Orelup and Oscar I Lee U S 1,795 883, March 10 Dispersed V oxide used in compns such as $CaCl_2$ solns in order to protect metal parts of the cooling stem from corrosion. Dispersed compds of Th, Zr, Mo, Ta Cb, Ti, W or U also ay be used

Dual-effect compression method and apparatus for producing carbon dioxide snow. ustus C. Goosmann U S 1,795,772, March 10 Various details of construction and peration are described

Artificial snow. Ignaz Kreidl. Austrian 120,806, Aug 15, 1930. Artificial ow for decorative purposes is prepd by pouring hot water on to a mixt. of a solid tty acid and an alkali carbonate and beating the mass

Apparatus (with agitators, screen and brush) for slaking lime. Edwin J Shaut o Baker Lime Machinery Co, Ltd) U S 1,796,411, March 17

Substitutes for sugars in industrial processes I G Farbenind A-G (Otto chmidt and Egon Meyer, inventors) Ger 518,196, June 14, 1927 Water-sol ndensation products obtainable from aliphatic aldehydes are used as substitutes for ucose and other sugars in processes such as *printing or dressing textiles, filling transrent soaps, improving the elasticity of cements and adhesives, chrome tanning* and *agulating latex.* Suitable condensation products may be obtained from $CH_2O$, glycolic dehyde, glyoxal, or mixts of $CH_2O$ and AcH by treatment with a mild alk. reagent a temp. between 0° and 100° Examples are given

Magnetic structures or cores. Jack C Chaston and John P. Johns (to Western lec. Co) U. S. 1,795,639, March 10 Particles of magnetic material such as a Ni-Fe loy contg. 80% Ni are insulated (suitably by $CrO_3$, Na silicate and talc) and the nsulated particles are compressed to suitable form and then subjected to the action a fluid such as moist air for a sufficient time to appreciably change the character of ne insulating material as by swelling, and the resulting product is then heat treated.

Material for brake linings, clutch facings, etc. Aurborn L Hager and Lon S Hager. U. S. 1,797,141, March 17 A fabric material is impregnated with a liquid ixt. comprising graphite, white lead and creosote U S 1,797,142 relates to manuf similar material by weaving a fabric and during the weaving impregnating it with a quid mixt. comprising graphite, white lead and creosote, and heating the woven npregnated material to harden the white lead and graphite

Fireproofing peat, etc. E Dyckerhoff Brit 339,067, Oct 30, 1929 Peat or milar material is rendered substantially fireproof and non smouldering by treatment ith fireproofing solns such as $H_3PO_4$ (suitably with heat and pressure), and the treated aterial is pressed and dried and may be formed into peat meal or shaped or pressed rticles

# 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

O. P. BARTON, C. H. KERR

**Glass.** K. LOENBERG-HOLM. *Arch. Rec.* 68, No. 4, 327–58(1930).—The properties of glass as a building material are discussed. E. J. S.

**Expansion measurements of several glasses by means of a self-registering apparatus.** WILLIAM COHN. *J. Am. Ceram. Soc.* 14, 265–75(1931); cf. *C. A.* 24, 4434.—The app. registers photographically. Quartz glass is used as a control material. Slight variations which might escape visual observation can be detected. If results thus obtained are used a close regulation of annealing is made possible. C. H. KERR.

**Variations caused in the heating curves of glass by heat treatment.** A. Q. TOOL AND C. G. EICHLIN. *J. Am. Ceram. Soc.* 14, 276–308(1931).—Variations in heating curves, due to previous heat treatment, are fully indicative of the nature of such treatment and they also bear a relation to changes in other characteristics of the glass. Differences in heating curves arise from differences in thermal properties, especially exothermic and endothermic effects. It is possible by rapid cooling to suppress the exothermic processes to a great extent and thus prep. the way for relatively large exothermic effects on subsequent heating. Annealing procedures may often be so manipulated that the resultant changes in certain properties, such as *n*, will cause a glass to meet certain standard specifications, when otherwise it would not. Also in *Bur. Standards J. Research* 6, 523–52(1931). C. H. K.

**Devitrification.** F. W. PRESTON. *Glass Ind.* 12, 1–3(1931).—During the slow cooling down of a soda lime-silica glass melt, the first crystals which form are usually tridymite, wollastonite, or $Na_2O\ 3CaO\ 6SiO_2$, especially the last compd., according to Morey, *C. A.* 24, 5448, rather than cristobalite and wollastonite as stated by Dietzel, *C. A.* 24, 5447. Diagrams are given showing which cryst. phase may be expected if devitrification does occur in soda lime silica glass of any known compn. H. F. K.

**Influence of water content of clays on their properties in drying and firing.** V. F. ZUBCHANINOV AND D. I. SMIRNOV. *Trans. Ceram. Research Inst.* (Moscow) No. 24, 30–62(in German 62–5)(1930).—The authors investigated (1) shrinkage and porosity of clays after drying to 110°, (2) shrinkage and porosity of bodies after firing to vitrified states, and (3) shrinkage and loss in wt. at different periods of drying and changes taking place during these processes. Satisfactory results were obtained in measuring the vol. change, loss in wt. and vol. porosity of samples while drying and after firing to Seger Cones 010 and 10. Three periods can be distinguished during drying. In the first, shrinkage and loss of water proceed with const. velocity; shrinkage in vol. of the body remains equal to the vol. of the water evapd. In the second, the decrease in water (pore water) proceeds with changing velocity while the vol. of the clay body remains const. When drying in the air a certain part of the water remains in the clay. During the third period the hygroscopic water is removed by heating to 110°. The quantity of shrinkage water depends on the initial water content, but the quantities of the pore and hygroscopic water do not. The extent of shrinkage depends only on the quantity of the shrinkage water. The relation between the amt. of shrinkage and the amt. of pore water is a characteristic property of each clay. The relative content of pore water in kaolins is larger than in clays, although kaolin is more porous than clays. The water content of the paste has no influence on the change of the d. and size of the clay piece during firing. M. V. KONDOIDY.

**Ammonium hydroxide as a deflocculant for clay suspensions.** ANGELO CASTIGLIONI. *Industria chimica* 5, 1465–8(1930).—$NH_4OH$ (0.888), when added in proportions as low as 0.02% by wt. to clay suspensions, increases the fluidity markedly, thus making possible the use of much more concd. suspensions. In the manuf. of molded ceramic ware it permits the use of suspensions of d. 1.85 which remain as fluid as suspensions of d. 1.72 when $Na_2SiO_3$ is used as deflocculant. A. W. CONTIERI.

**Experiments in weathering plastic fireclays.** STUART M. PHELPS AND C. G. DENNEY. *J. Am. Ceram. Soc.* 14, 319–24(1931).—Changes produced in weathering cannot be readily detected by the usual clay testing methods. Either weathering changes are over-estd. or the present test methods are inadequate. C. H. KERR.

**High-alumina firebricks.** J. F. HYSLOP. *Roy. Tech. Coll. Met. Club J.* (Glasgow) 1929–30, No. 7, 18–9.—For max. refractoriness, resistance to stresses and resistance to corrosion by slag it is desirable to have a high $Al_2O_3$ and thus a high mullite ($3\ Al_2O_3\ 2SiO_2$) content. Spalling tendency is greatly increased by the presence of free $SiO_2$. While a high $Al_2O_3$ content is desirable, refractories with 60% or more

$Al_2O_3$ tend to become more liable to spalling as the expansion coeff. increases with the $Al_2O_3$ content Because of the cost it is economical only in extreme cases to employ materials with high $Al_2O_3$ derived from diaspore, bauxite, cyanite or corundum. Properly made bricks from clays approaching 45% $Al_2O_3$ show high resistance to temp, as well as to corrosion and spalling H C. Parish

Oldenburg clinker. Werner Domm *Ziegelwelt* 61, 571–4(1930).—Clinker differs *from the ordinary brick in that it has been burned to a sintering point* To make clinker it is essential to use a clay rich in alkali and $Fe_2O_3$, but low in $CaCO_3$ and $MgCO_3$ A suitable clay analyzed $SiO_2$ 70 22, $Al_2O_3$ 13 67, $Fe_2O_3$ 6 80, CaO trace, MgO 1 30, $K_2O$ and $Na_2O$ 3 37, ignition loss 5 30 per cent The clinker is commonly 22 × 10 5 × 5 cm in size Well-burned units are very dense, hard, tough and very satisfactory as paving and heavy building materials H F. Kripge

Correlation of the crystal structures and hardness of nitrided cases. O E. Harder and George B Todd *Fuels & Furnaces* 9, 295–7(1931), *Steel* 88, 51–2 M. S

Recent developments in the German ceramic industry. Felix Springer. *Bull Am. Ceram Soc* 10, 85–7(1931) C. H Kerr

Moisture expansion of glazes and other ceramic finishes. H G Schurecht and G R Pole *J Am Ceram Soc* 14, 313–6, *Bur Standards J Research* 6, 457–63 (1931), cf *C A* 23, 5554; 24, 3871.—Some glazes show expansion, due to moisture, similar to that of the body. This means less liability to crazing when the ware is exposed to moisture Artificial weathering treatment (exposure to steam at 150 lb. sq in. for 1 hr.) caused an av. expansion, in lustrous glazes, of 0 004%, in mat glazes, 0 011%, in vitreous slip finishes, 0 005%, and in porous slip finishes, 0 033% The moisture expansion of one of the mat glazes was 30% of the av for a ceramic body with approx 12% absorption C H Kerr

Electrical porcelain. H M Kraner. *Elec Eng* 50, 209–11(1931).—American and European samples of standard insulating porcelains show similar characteristics in the finished product despite the variations in raw materials and mfg processes A table gives the modulus of rupture of ceramic materials including tests on quenched samples. W H Boynton

Comparison of bodies containing blended feldspars and one-mine feldspar of similar composition C. W Parmelee and C. R Amberg *J Am Ceram Soc* 14, 309–12 (1931).—Tests were made with an elec porcelain body mixt Since it is impossible to consider more than 2 factors in the blending of 2 materials, all but 2 factors should be uniform and this can be obtained only from one-mine materials C. H Kerr

*Stoneware in the chemical industry.* F Weinrer *Chemistry and Industry* 50, 213–4(1931).—Because of its strength, its machinability and resistance to acids and bases, *steatite* may in the future find more application in the chem. industry. Its high expansion coeff limits its use At present the ceramic industry has not succeeded in making a material combining d with the ability to resist high temps The porosity of stoneware has caused a considerable monetary loss from absorption of precious *metals in electrolytic baths* A *sillimanite* mass can be used for making very dense vessels with an absorption of only 0 01% H. C. Parish

Economy in selection and design of chemical stoneware. J. M. W. Chamberlain *Chem Met Eng* 38, 142–4(1931). K. D. Jacob

Manufacture of stoneware. T. W Talwalker *J. Indian Ceram Soc.* 2, 21–27, 65–74, 83–97, 130–43(1930).—Expts were carried out in a factory mfg acid jars Economics of the industry and materials and processes are discussed. T. concludes that it is possible to make a low-temp, highly resistant body, by using frit in the body, and using a fritted glaze high in resistant materials such as ZnO, $B_2O_3$ and $ZrO_2$ John M. Ladino

The use of refractory natural stone. H Kalpers *Zentr. Europ Giesserei-Ztg* 2, No 2, 1–3; *Chem Zentr* 1929, II, 1196. *Giesserei* 17, 1045–7(1930).—The refractory natural brick of Hugo Schlenkermann (cf O Beckmann, *Giesserei-Ztg* 25, 156–9) contains $SiO_2$ 90 59, $Al_2O_3$ + $TiO_2$ 6 85, $Fe_2O_3$ 0.20, MgO 0 15, $K_2O$ 0 22 and $Na_2O$ 0 00% The loss on ignition is 1 10% The refractoriness of these bricks varies from cone 35 to 36 The behavior of these bricks under pressure was tested with the app constructed by the Chem Lab für Tonindustrie The bricks were also examd with regard to their behavior toward changes in temp. and their ability to keep their vol. Their fitness for cupola and reverberatory furnaces is emphasized Hollow spaces and gaps between the bricks are filled with a special stamped material. G. Schwoch

Refractory pastes for use in laboratories. Manuel Feliu. *Quim e ind.* 7, 280 (1930).—F mentions various pastes and recommends the Pythagoras paste made by Haldenmanger, porcelain manufacturers, in Spandau, Berlin It is a mixt. of kaolin,

$Al_2O_3$ and feld-spar The kaolin decomposes into $Al_2O_3$ and a glass which with the $Al_2O_3$ gives sillimanite Tubes made of this paste withstand all temps up to 1700° and above The paste is used in protecting tubes for thermoelec. elements and such tubes are impermeable to gases even above 1700° S. L. B. TURRTON

Special refractories for metallurgical research. DONALD TURNER *Trans Faraday Soc* 27, 112-24(1931).—A description of the refractory materials developed for use in various investigations at the National Phys Lab., and the methods of production employed CURTIS L. WILSON

Investigations on the slagging of refractory materials. IV. Investigations on the corrosive power and the constitution of iron-smelting slags. HERMANN SALMANG AND FRIEDRICH SCHICK *Arch Eisenhüttenw* 4, 299-310(1930), cf *C A*. 22, 3272.—The corrosive power of the oxides present in Fe smelting slags (CaO, FeO, MgO, MnO, $Fe_2O_3$, $Mn_2O_3$ $Al_2O_3$ $TiO_2$ $SiO_2$ $P_2O_5$ and also $K_2O$, $Na_2O$, CaS, and $CaF_2$) on fireclay (at 1410° and 1500°) and on sillimanite (at 1580°) was detd synthetic binary, ternary and quarternary slags being prepd from these oxides. In the fusions, CaO is found to be the strongest oxide FeO, MnO and MgO following next in strength Oxides of the type MO (M = metal) react as bases, while those of the type $M_2O_3$ react as acids Thus the latter oxides do not attack fireclay and check the attack of bases In silicate fusions $Fe_2O_3$ is stable up to 1580°, while $Mn_2O_3$ decomposes at 1500°. Contrary to expectation from the heats of formation of the silicates of the corresponding oxides, the alkali oxides behave as weak acids at these high temps., while the alk. earth oxides act as strong bases $P_2O_5$ checks the attack of bases, and when present in large amts. in the slag, the excess attacks strongly (especially at the higher temps.) The attack on these refractories increases about 50% from 1410° to 1500° and from 1500° to 1580°, from which it is concluded that the dissocn of the melt increases in the same ratio J. BALOMIAN

Preparation of chamotte-free fireproof and acidproof objects. P. P. BUDNIKOV, S. N. ZHIKHAREVICH AND I. G. SHAKHNOVICH *Ukrainskii Khem Zhur* 5, Tech Pt., 93-103(in German 104)(1930).—Chamotte-free fireproof and acidproof objects can be prepd by using artificially prepd lean lime to the extent of 85-93% of the mixt. The process lends itself easily to mech treatment. For the dehydration of lime a drying drum is required working on the counter-current principle. To make brick by this process a pressure of 250 atm. is required This method eliminates prepg the mixt before shaping the objects and drying before firing S. L. MADORSKY

Standards and tests for coated abrasives. E. C. SCHACHT. *Am Soc. Mech. Eng.*, Advance Paper, Oct 16-17, 1930, 7 pp E. I. S.

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Cr plated molds (STOCKFISCH) 4. Coating for lamp bulbs (Can. pat. 309,250) 4

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Apparatus for feeding mold charges of molten glass. GEORGE E. HOWARD (to Hartford Empire Co.) U. S. 1,796,923, March 17 Structural features.

Device for withdrawing or delivering measured quantities of fused glass. ADOLF SCHILLER Ger 518,236 July 29, 1926

Glass leer of the muffle type with an endless conveyor for carrying articles through it. WM. A. MORTON (to Amsler Morton Co.) U. S. reissue 18,004, March 17. Reissue of original pat. No. 1,684,239 (*C. A.* 22, 4218)

Glass-gathering apparatus. GEORGE E. HOWARD (to Hartford Empire Co.) U. S. 1,797,206, March 17 Structural features

Glass furnace and associated apparatus for making spun glass. LOUIS MATHIEU U. S. 1,796,571, March 17 Structural features.

Apparatus for pouring molten glass into sheets. N.-V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN Fr. 37,359, Aug. 22, 1929 Addn. to 579,444

Furnace and associated apparatus for sheet-glass manufacture. SAMUEL C. CRITT (to Libbey-Owens-Ford Glass Co.) U. S. 1,795,983, March 10 Structural features.

Apparatus for sheet-glass manufacture JOHN L. DRAKE (to Libbey-Owens-Ford Glass Co.) U. S. 1,796,836, March 17. Structural features.

Apparatus for drawing sheet glass WERT FRENCH (to Libbey-Owens-Ford Glass Co.) U. S. 1,795,943, March 10 Structural features.

Apparatus for manufacture of sheet glass by rolling. CHANCE BROS. & CO., LTD., and A. L. FORSTER. Brit. 339,535, Jan. 23, 1930 Structural features.

Rolling glass sheets. Y. BRANCART Brit. 338,477, April 20, 1929 Various details of procedure are described for insulating glass sheets from their receiving surfaces during rolling, by a gaseous cushion of combustion products.

**Apparatus for plate-glass manufacture (roller construction).** V. Brancart. Brit. 339,546, Feb. 14, 1929

**Pressed molded glassware.** Chance Bros. & Co., Ltd., and R. Brown. Brit. 339,484, Dec. 3, 1929. Various mech. details of manuf. are described.

**Marbled or multicolored glassware.** C. Lockiller. Brit. 339,583, April 9, 1929. Masses of glasses are prepd. which are of different colors but of substantially the same compn., they are melted in sep. pots or furnaces, and one of the glasses is treated with sep. quantities of the others. Various details of temps., etc., are given.

**Cooling oven for glass.** N.-V. Maatschappij tot Beheer en Exploitatie van Octrooien. Ger. 516,193, June 15, 1929. Addn. to 470,927 (C. A. 23, 3785).

**Blowing and molding articles of fused silica.** Quartz et Silice. Brit. 338,456-7, April 10, and 17, 1929. Mech. features.

**Blown articles of fused silica.** Quartz et Silice. Brit. 339,107, Oct. 30, 1929. Various details of manuf. are described.

**Fusing together grooved sections of fused quartz, etc.** Irish Sanitar (to Thermal Syndicate Ltd.). U. S. 1,700,401, March 17. Mech. features.

**Uniting glass sheets with non-brittle transparent material.** Libbey Owens Glass Co. Brit. 338,088, Aug. 30, 1929. The surface of the intermediate sheet is roughened by spraying onto it a discontinuous layer of an adhesive material such as a mixt. of equal parts of an ester of phthalic acid such as dibutyl phthalate and of a polyglycol deriv. such as monoethyl ether or diethyl glycol. The inner surfaces of the glass sheets may be coated with a soln. of a cellulose deriv. and a synthetic resin, with or without a plasticizer, and may also be coated with adhesive and the sheets are united under pressure while heated. Cf. C. A. 23, 1962.

**Reënforced glass.** Soc. des verres cimentés Rhône Poulenc. Fr. 37,119, June 22, 1929. Addn. to 638,563 (C. A. 23, 5291). The compound sheets of glass are heated without pressure to a temp. above the ordinary after removal from the bath of plastifying material.

**Bricks.** Franco Bandini. Austrian 120,972, Aug. 15, 1930. Clay contg. at least 20% of water is warmed to about 95° and molded in a press maintained at the same temp. The bricks are dried at once in a moist atm. in an oven in which the temp. is initially the same as that of the bricks, but is gradually raised.

**Bricks and mortar from magnesite or magnesia.** Magnesitbar, Ltd. Hung. 101,353, July 20, 1929. Overheated natural or artificial magnesia is powdered, particles smaller than 0.1 mm. are removed, and 5 to 35% of a substance rich in Al matter, *e. g.*, bauxite, corundum or corundum slag, is added. Bricks made of this mixt. are very refractory.

**Tunnel kiln for bricks.** Vojtěch Lašrovička. Austrian 120,977, Aug. 15, 1930.

**Extracting clay and other aluminous raw materials with acids.** Oskar Jonas, Kurt Wiegk and Gotthard Trebitz (to I. G. Farbenind. A.-G.). U. S. 1,700,107, March 10. Material such as calcined clay is treated with acid such as HCl in large batches *in situ*. The reaction is started by flooding the charge with acid washing water from a previous operation and adding in preheated condition a small portion of the total acid required for the reaction, with further acid addn. to obtain a strong alumina soln., simultaneous withdrawal of satd. ext. to maintain a const. level of liquid on the charge and maintenance of a min. temp. of 105° in the reaction zone by the heat of reaction.

**Ceramic noble metal preparations.** Deutsche Gold- und Silber-Scheideanstalt vormals Roessler (Franz Schelling, inventor). Ger. 515,588, Oct. 14, 1927. Noble metal prepns. for decorating and coloring ceramic ware are obtained from dispersions of the metal or its compds. in cellulose derivs., in the presence or absence of solvent and flux. Thus, a 30% $AuCl_3$ soln. in ale. is stirred into a soln. of nitrocellulose in ethyl glycol and cyclohexanone. Several addnl. examples are given. The method is stated to be applicable to all metals.

**Apparatus for dipping pottery or earthenware into glazing or coloring liquid.** G. Wade & Son, Ltd., and G. A. Wade. Brit. 339,505, Sept. 27, 1929. Structural features.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**A new shaft-kiln cement plant.** Horst Lauger. *Tonind.-Ztg.* 55, 322-3(1931).—The shaft kiln with rotating grate recently erected in Ankara (Angora) is described.

F. O. Anderegg

*The enumeration of French cement plants.* PAUL RAZOUS *Ciment* 36, 13–8, 59–61(1931) —A list is given of the different companies and plants in France making the following cements natural, Roman, artificial (portland), high-early-strength, alumina, slag (with lime), grappier (from flint nodules), iron (70% portland with 30% granulated blast furnace slag) and blast furnace (containing less clinker than iron cement)
F O ANDEREGG

Modern cement burning HEINRICH LUFTSCHITZ. *Tonind-Ztg* 55, 184–6(1931) —A description is given of the Schröder kiln, in which the dry, powd raw material falls through a shaft heated by powd coal falling through an outer annular space (Ger pat, 495,001, *C A* 24, 3340) The Rigby patent (Ger. pat., 478,632, *C A*. 23, 4792) for spraying slurry into a kiln is also described
F. O ANDEREGG

Cement synthesis in the four-component parallelogram and the degree of lime saturation according to Kühl. M SPINDEL. *Tonind-Ztg* 55, 305–7(1931) —The parallelogram for the 4 components $CaO$, $SiO_2$, $Al_2O_3$ and $Fe_2O_3$ may also be conveniently used for Kühl's degree of lime satn HANS KÜHL. *Ibid* 320–2 —K prefers his quotient based on mol wts M SPINDEL, HANS KÜHL. *Ibid* 366–8 —More polemics
F. O ANDEREGG

To secure cement of uniform quality. W. SACH *Tonind-Ztg* 55, 291–3(1931) —Proper feeding, weighing and mixing, obtained with suitable automatic equipment, are useful in maintaining a uniform quality
F. O ANDEREGG

High-early-strength cements and their increases in strength. P MAY. *Tonind-Ztg* 55, 171–3(1931) —Generally increasing strengths have been encountered up to 5 years, with occasional temporary retrogressions
F O ANDEREGG

German specifications for alumina cement. HUGO VIERHELLER *Tonind-Ztg* 55, 325–6(1931) —Fineness is to be not more than 2% on the 75- and not more than 15% on the 180-mesh sieve Tests are to be made at 15° to 20°. Specimens are to be stored 24 hrs. in a damp closet and then under wet cloths The min strengths are to be compression 400, 500, 600 and tensile 25, 30 and 45 kg per sq cm after 24 hrs.' 28 days' wet and 28 days' combined storage, resp
F O ANDEREGG

Tentative specification for high-alumina cements *Structural Eng* 8, *No* 10, 369–73(1930)
E I S

Asbestos-cement pipes—their production, characteristics and uses. A. SCHOTTAK. *Gas u Wasserfach* 74, 293–7(1931) —Up to the present, the use of asbestos-cement pipes has been limited because of their small production These pipes are made by mixing 1 part of ground asbestos with 5 parts of cement and sufficient water to give a thin grout This grout is then collected in a 0.2-mm layer on an endless belt which transfers the material to an iron roll of the internal diam of the desired pipe This roll presses out the surplus water, and when the coating becomes heavy enough the roll is removed and a new roll substituted The tube is removed from the iron roll while still soft and placed on a wooden mandrel of similar size The pipe is then allowed to harden in a damp, fairly warm room These pipes have found use for flue pipes, house-drain lines, etc Some difficulties have been encountered with their use for gas and water, but these difficulties are being solved and the pipe can be used up to moderate water pressures The pipes can be sawed, burned or bored with ordinary wood working tools They may be dropped 6 ft. on a concrete floor without damage Breaking strengths, etc., are given, as well as hydraulic tests Joints are described and illustrated The pipe is said to cost about 1/3 less than cast iron or steel pipe
R W RYAN

Rapid determination of magnesia in portland cement. CH ROGOZINSKI *Tonind-Ztg* 55, 355–6(1931) —Remove silica and add *N* NaOH till a ppt forms and the supernatant liquor is clear Filter into an excess of 0.2 *N* HCl, and titrate the excess with 0.2 *N* NaOH with phenolphthalein indicator
F O ANDEREGG

Zeolites and hydraulic cements. HENRI LAFUMA *Rev matériaux construction trav publics* 1931, 1–5 45–9 —The properties of hydrated Ca aluminates and silicates are reviewed and compared with those of zeolites The best explanation of the setting and hardening of the silicates seems to be the development of a network structure
F O ANDEREGG

The influence of free lime in cement clinker on the solubility of lime and clay. KATSUZO KOYANAGI *J Soc Chem Ind., Japan* 34, Suppl binding 56–8(1931), cf *C A* 25, 1353 —Well burned, low lime clinker shows high soly for clay and low for lime An increase in lime greatly decreases the soly of clay and increases that of lime Low lime cement when mixed with $H_2O$ forms K aluminate crystals first, then $Ca(OH)_2$ and gels; with high lime the process is reversed.
V. F HARRINGTON

Suitability of argillaceous sands for cement mortar and concrete. WERKEN *Zentr. Bauverwaltung* 50, 671–3(1930) —Report on original tests, using sands with per-

centage of impurities up to 13 6 W. advises strongly against the use of impure sands. E. I. S.

**Determining the proportions of mortars and concretes.** Ludwig Schuster. *Tonind Ztg* 55, 221–5, 243–4(1931).—Examples are given of analyses of old mortars and concretes from which the approx original compn can be calcd The analysis of the aggregate, if available, simplifies the calcn F O Anderegg

**Theory of composition and structure of concrete** A M Gönzberg *Rev matériaux construction trav publics* 1930, 477–81, 1931, 21 5.—The space between the largest aggregate grains in concrete may range from 73 to 29%. To obtain the latter, very exact placing of each particle is required, which is hard to accomplish Therefore, an intermediate range is selected with the ratios of sizes lying between 1 15 225 and 1 30 000, *e g*, cement 0 03 mm, sand 0 45 to 0 9 mm gravel 7 to 27 mm and plums 100 to 800 mm This type of grading gives good packing The water content is very important G suggests that the addn of solutes, by lowering surface tensions, should reduce the voids in concrete To get a porous concrete select those sizes and shapes which give poorest packing F O Anderegg

**The uniformity of concrete and its control on the job** Fritz Emperger *Tonind Ztg* 55, 382–3(1931).—Cubes and beams are made on the job and broken at 7 days F O Anderegg

**Calculation of the best composition of aggregate for concrete.** H Richarz *Tonind -Ztg* 55, 113–4(1931).—An example is given of a suitable blending of Rhine sand and Monier gravel that produced a grading closely approaching the ideal F O A

**Testing protective coatings for concrete.** P Mierke *Tonind Ztg* 55, 322(1931).—For accurate solvent detn in bituminous prepns, place 5 g in a small foil box contg a small roll of gauze After one hour at 100° distribute the bitumen evenly over the gauze and sides of the box and dry to const wt at 110° To test the resistance to chem effects cover a mortar slab with three coats after a cylinder has been cemented to the slab with neat cement Place the soln to be tested in the cylinder F O Anderegg

**Cracks in concrete.** M. E Rossbach *Rev matériaux construction trav publics* 1931, 12–7.—Cracks developing in concrete result from a combination of shrinkage and insufficient tensile strength Emphasis should be laid in securing a greater tensile elasticity in concrete, even at the expense of compressive strength, because concrete seldom fails in compression F O Anderegg

**Researches on the protection of concrete against corrosive waters.** Otto Graf *Zement* 19, 936–41, 970–4, 995–8, 1041–3, 1066–8(1930).—The study of the corrosive action of water on concrete involves many factors beside the concn of salt solns Corrosive action increased with stirring of the solns coarseness of cement used in the test pieces and poor gradation of cement particles, fineness of the sand used and quantity of mixing $H_2O$ used, a deficiency being as objectional as an excess. The addn of 3% clay to the specimens decreased their resistance to $MgCl_2$ solns, if they had not been air-cured The compressive and tensile strengths were not decreased by clay addn A curing period of 21 days in air after 6 days under $H_2O$ made the mortar specimens (1:3) resistant to the attack of a 10% $MgCl_2$ soln during 20 months' exposure H. F. K.

**The extraction of bitumen for testing from street paving material and the determination of sulfur in bitumen** Fr Seelig *Chem -Ztg* 55, 145–6(1931).—Directions are given for the extn of the bitumen (the method is claimed to be more accurate and reproducible) and for the complete combustion of the bitumen in the detn of S V. F H

**Moldering of natural building stones and prevention of their quick decaying.** O Lăczay-Fritz *Magyar Mérnök Epitészegylet Közlönye Hivatalos Füzetei* 7, 1–21(1930).—The process of moldering is described The ideal preventive agent should keep water out but should let the original moisture evaporate from the stone. The stones of the Hungarian Parliament Building were treated by Möller's method This consists in spraying the stone surface with a paraffin liquid and repeating this process twice, each time after complete drying The impregnation requires warmth, so is easiest in summer If the stone is not warmed enough by the sun's rays, it must be heated artificially. The surface should be quite pure and dry. The cost of the treatment tried at the Cathedral at Pécs did not reach 40 (Hungarian) cents per sq m. of surface. S. S de Fnály

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Concrete coverings for pipe lines (Hough) 22. Separation and size distribution of microscopic particles (Roller) 2. Substitutes for sugars [in improving elasticity of cements and adhesives] (Ger pat. 518,190) 18. Compositions containing rubber and cement (Brit pat. 339,002) 30. S and bentonite mixture for use [as roofing] (U. S. pat. 1,795,364) 18.

is well mixed with about an equal amt. of water before the combustible material is added A small quantity of HCl may be added to the plastic mass before firing.

**Artificial marble.** Barthélemy J. Brunel. Fr. 37,177, Jan 5, 1929. Addn. to 597,896 Ferrotitanium is used with $MgCl_2$ and $MgSiO_3$ for the production of artificial marble

**Making artificial marble from cements of various colors.** Karl Waldert. Austrian 121,563, Oct 15, 1930 Manipulative details are described

**Using the residues of the artificial marble industry.** Alexander Stafge Ger. 515,510, Apr 16, 1930 Addn to 514,710 (*C A* 25, 2261) The MgO contg residue from the artificial stone and marble processes is extd with dil HCl and the remainder used as flux for portland cement

**Blocks and other shaped articles of alabaster and gypsum.** F J G Garner. Brit. 338,165, Feb 28, 1930 In order to give the articles the hardness and appearance of marble they are dried by heating to 150–200°, impregnated with a soln formed of water 1 gal., concd Na silicate soln 1 lb., $MgSO_4$ 1 oz and fused $CaCl_2$ 1 oz., and then polished and rubbed with raw linseed oil

**Roofing material.** George D Crabbs U S 1,700,861, March 17 A flexible foundation material contg a major proportion of mineral fiber such as asbestos is satd with a relatively hard asphalt having a penetration not exceeding 11 at a temp of 25°

**Roofing composition.** George A Osterday (one-half to Edward Dome) U S 1,700,474, March 17 A mixt is formed of pitch 25–40, asphalt 25–50, cork 25–50 and asbestos 5–10%

**Dampproofing and waterproofing walls.** Joseph Rose U S 1,700,269, March 10. The inner surfaces of walls are coated successively with a cementitious material such as a portland cement mixt contg emulsified asphalt, an overlying bonded coating of waterproofing material such as an asphalt paint and a finishing coating such as plaster, which is protected from dampness seeping through the wall by the underlying coatings

**Wires and wire netting for carrying plaster.** C Schröder Brit 338,755, Dec 10, 1928 The wires are first coated with an adhesive such as glue, then treated with sand or volcanic ashes to form a facing, and then sprayed or washed with an aq concrete mixt or the like (leaving the meshes of the netting open)

**Drying lumber, etc.** Henry W Cowan U S 1,700,141, March 10 The material is placed in a chamber the air in which is heated to a temp capable of damaging the material on prolonged exposure, and hot moisture laden air is periodically removed while dry air simultaneously admitted is to cause periodical reductions in temp to below the damaging point through absorption of moisture from the material by the newly admitted dry air (which is heated to a suitable temp in the chamber) App is described.

**Apparatus for partly impregnating timber.** Franz Krausz and Ludwig Tramer. Austrian 121,250, Sept 15, 1930. Means is described for sealing the tank in which the trunk is partly immersed

**Impregnating wooden loom shuttles.** I G Farbenind A.-G Brit 338,070, Aug 30, 1929 The wood is impregnated with chlorinated org compds such as chlorinated naphthalenes or solid chlorinated biphenyl, suitably with conjoint use of a substance of lower m p such as paraffin or montan wax Various details and examples are given

**Preserving wood.** Soc. de recherches et de perfectionnements industriels Brit 339,217, April 8, 1929 The process of wood impregnation described in Brit. 310,805 (*C A* 24, 707) is modified by the use of a soln of As sulfide in an alkali sulfide such as Na sulfide as the first injected soln which may also contain acetates and phenols, and this treatment may be followed by a second impregnation as described in Brit. 310,804 (*C A* 24, 707) Various details and modifications of procedure are described

**Wood-preserving composition.** Basilius R. V. Malenkovic. U S 1,705,658, March 10 A stable cryst addn. product of 2,4-dinitro-1-chlorobenzene and α naphthylamine is used, suitably with various other preservatives

## 21—FUELS, GAS, TAR AND COKE

A C Fieldner and Alden H. Emery

**Alcohol automobile fuels.** K. R. Dietrich. *Chem.-Ztg.* 55, 215–6(1931).—See *C. A.* 25, 576 G G.

**The use of alcohol for motor-fuel mixtures.** Karel Loskot. *Chem Listy* 25,

nil in the first 2 ranges to 755 and 2165 cu ft per ton, resp, in the last 2 temp ranges With immature brown coals it is always possible to distinguish 3 successive and inde pendent changes, resulting in successive expulsions from the coal substance of (1) $CO_2$ and $H_2O$, as if by internal condensation, (2) methane, higher paraffins and olefins, as if by the elimination of aliphatic side chains from the coal complex, oils also appearing, and (3) H With increasing maturity of coals these successive steps overlap and are not easily distinguishable on distg well-matured bituminous coals The "Soxhlet method" of benzene-pressure extn. of coals at 250, 500 and 700 lb per sq in and results obtained thereby are outlined The 4 different fractions obtained by this method from bituminous coals are described and their effects on coking properties discussed Recent results from extn expts appear to furnish an explanation to the problem of the develop ment of coking propensities during the maturing of coals Extn of certain immature brown coals yielded none of the usual Fractions III and IV but in their place a quantity of phenolic compds (among which phenol, *p* cresol and catechol were identified) and phenolic esters Expts on Canadian lignitic coals of somewhat greater maturity showed that brown lignites from Saskatchewan yielded phenolic compds instead of frac tions III and IV while with laminated black lignites from Alberta phenolic compds were not obtained, but in their place a substance simulating fractions III and IV began to ap pear These laminated black lignites appear to represent a transition stage in the de velopment of fractions III and IV obtained from bituminous coal with coking properties This conclusion is strengthened by recent exptl proofs of the benzenoid character of frac tion IV yielded by coking coals The yields of fractions I II, III and IV totaling 1 25–15 6% of the coal substance obtained from 9 different kinds of coal are tabulated The last section of the paper is on the benzenoid character of the main coal substance (85% + of the coal) as shown by its oxidation with alk permanganate (*C A* 24, 5967) The C H ratio of the original dry coals and of the dry residue after benzene pressure extn and the percentage of volatiles of the original dry ashless coal and of the dry ashless residues are given for 6 coals varying from immature brown coal to strongly coking bituminous coal. The C H ratio was always higher in the dry residues and the percentage of vola tiles always less than in the original coal The wts of acetic, oxalic and crude benzenoid acids obtained from 3 of the coals and the C H in crude benzenoid acids are tabulated A table on C balance of the oxidation shows the percentage of original C of the coal substances appearing as $CO_2$, acetic, oxalic, succinic and benzenoid acids With the Morwell brown coal total C accounted for equaled 99 7%, with the Durham "Busty" coking coal 99 4%. The oxidation products from 3 of the coals have been completely investigated. From the Canadian Estevan brown lignite the products were. $CO_2$, and the acids: acetic, oxalic, succinic, phthalic, isophthalic, terephthalic, tri mellitic, hemimellitic, trimesic, pyromellitic, mellophanic, benzenepentacarboxylic and mellitic. The same products except trimesic acid were obtained from Australian Mor well brown coal and with the exceptions of succinic, hemimellitic and trimesic acids from Durham Busty coking coal. The possible benzene ring condensation compds or con densed nuclei with aliphatic side chains present in the coal substance which give on oxi dation the various acids isolated are discussed The large new fields in coal chemistry opened up by this discovery and the possible great economic value of continued research along these lines are suggested An extended discussion follows the article

W W. Hodge

**Proximate analyses of coals from North China.** S. D. Wilson *J Assoc. Chinese and Am Eng* 11, No 7, 9–22(1930), cf. *C. A.* 24, 5460 E. I. S

**Unit coal studies on some Virginia coals.** F. H. Fish and J A Addlestone *Ind. Eng Chem, Anal Ed.* 3, 155–8(1931).—The 3 formulas most commonly used for correcting the calorific value of coal to an ash free basis are given and briefly discussed. To det. which formula could best be used in correcting ash to obtain unit B t u for some Virginia coals, expts. were carried out on coal from 10 different seams and on 28 samples from the Merrimac seam Coals from the 10 seams were ground to 20 mesh and float-and-sink sepns made with $CCl_4$ + $C_6H_6$ of sp. gr. 1.35 Two tables give: (1) percentages of ash, S, observed B. t. u, calcd B t. u by the 3 formulas and differences *for untreated, float and sink coal from the 10* seams, and (2) percentages of ash, S, observed B t. u and calcd B. t. u for the 28 samples of Merrimac coal with deviations from the av. B. t. u From these data the unit B t u values calcd by the Fieldner modification of the Parr formula were in best agreement. However, the differences were rather large and a second series of expts was run to correct for $CO_2$ A description and a diagram of the app used for detg the $CO_2$ in coal are given Two other tabula tions summarize the new data obtained by modifying Parr's formula to correct for $CO_2$: its unit B. t. u. = (B. t. u. − 5000 S)/(1 00 − [1.08(ash + $CO_2$) + 22/40S]) and

Fieldner's formula unit B. t. u. = (B. t. u. − 4650S)/(1.00 − [1.08(ash + $CO_2$) + $^3/_4$S]). With these *modified formulas the unit coal* B. t. u.'s *are in closer agreement.* For the 10 coals examd. the av. of differences in unit B. t. u. between the untreated, float and sink portions of each coal was 82 B. t. u. by the Parr formula and 90 B. t. u. by the Fieldner formula. For the 28 samples *from the same seam the av. deviation from the* mean is ±75 B. t. u. by the Parr formula and ±86 B. t. u. by the Fieldner modification of this formula. These variations may be due to the inherent variations in the different layers of the coal seam, but if this factor is neglected the av. deviation is *not much greater* than the exptl. error in the B. t. u. detn. W. W. Hodge

Hungarian coal and coal-oil problems. I. Vitális. *Bányás. Kohás. Lapok* 62, 299–304, 323–32, 347–56(1929).—Expts. were carried out with *highly bituminous* brown coals of the Upper Oligocene of Bakony Mountain in Hungary. The quality of the extd. bitumen and of low temp. tars corresponds with that of pyropissite found near Halle, Germany. S. S. de Inály

Preparation and drying of briquetting coals. A. Gebhardt. *Braunkohle* 28, 283–304(1929). E. I. S.

Temperatures in briquets during briquetting. H. Schuster. *Braunkohle* 28, 185–92(1929).—Three methods of detg. temp. of 7-in. room heating briquets during briquetting are described. E. I. S.

Ash and clinker of upper Silesian coals in furnace operation. Paul Fuchs. *Arch. Wärmewirt.* 12, 7–9(1931).—The compns. of the coarse stone and the finely divided ash in the coal proper are very different, the fly ash resembles the latter more than the former. It is not possible to tell from the compn. of a refractory whether it will be *attacked* by the ash. Effects of local overheating, both on brickwork and on iron parts, are often wrongly attributed to the slagging effect of the ash. Ernest W. Thiele

Portable equipment for crushing and quartering samples of coal, coke or other lumpy materials. L. S. Pettyjohn. *Ind. Eng. Chem., Anal. Ed.* 3, 163–4(1931).—Dimensioned drawings are given with the descriptions of a portable steel quartering hopper and crusher. The hopper is an inverted cone and the coal is discharged from it on to crossed angle irons and received into 4 triangular boxes of approx. 1½ cu. ft. capacity. The crusher consists of a steel plate perforated with 1 in. holes, surrounded by an 18" high hopper and with a receiving drawer fitted below the plate. A steel tamper is used to crush the coal until it passes the holes in the plate. Directions for using the app. are given. P. has used the app. for sampling coal up to 8 in. lumps. W. W. Hodge

Short tube mills for pulverizing coal. C. Praill. *Rev. matériaux construction trav. publics* 1931, 25–9.—For efficiency and low cost of installation, short tube mills with circulating *loads have many advantages.* F. O. Anderegg

The present state of the pneumatic process for dry-cleaning coal. I. II. III. Kenelm C. Appleyard and Edward O'Toole. *Blast Furnace and Steel Plant* 18, 1834–5, 19, 208–72, 418–22(1931). E. H.

Industrial heating with powdered coal in the inorganic industries. J. Deporge. *Rev. matériaux construction trav. publics* 1930, 469–73, 1931, 5–10, 49–53, 101–5.—The advantages include complete combustion of the fuel *with ready starting, stopping and* control, and the possibility of using lower grade fuels. The disadvantages are danger of accidents, which can be largely overcome by proper design and training of personnel, the difficulty of handling cinders, which can usually be *handled in designing the equipment*, and the cost of installation, which is sufficient to require a very careful study before making a new installation. F. O. Anderegg

Burners for pulverized-coal boilers in their relation to development of combustion chambers. J. Gwosdz. *Braunkohle* 28, 389–95, 413–9(1929). E. I. S.

A useful combustion chart. A. Alison. *Colliery Eng.* 8, 102–4(1931).—A chart is described for detg. excess air in the combustion of coal, depending on the proportion of N and uncombined O present in the flue gas. Ann Nicholson Hird

*Valuation of coal used for heat source.* H. Matsunami. *Japan Govt. Rys. Bull.* (Tokyo) 18, No. 34, 25 pp.—The meaning of the chem. constituents of coal and their influence on combustion are discussed. E. I. S.

*Lignite research and pollen analysis.* F. Kirchheimer. *Braunkohle* 29, 448–63 (1930).—The microfloral, especially pollen analytical, method as an aid in lignite research is discussed. Bibliography. E. I. S.

Improvement of Hungarian lignites by drying. G. Szelényi. *Magyar Mérnök Épitészegylet Közlönye* 63, 225–32(1929).—Drying can be accomplished with good results either by Fleissner's method (treating with steam at 10–20 atm.) or by the method adapted by Mátravidéki Coal Mine, Ltd. (boiling with high-pressure water). The

removal of 1 kg moisture requires 0 6 kg steam Dried lignite, especially that dried by the 2nd method, has good grain size and contains little waste dust. The ash content diminishes about equally in both methods Reply. H KLEIN *Tüzelőstech* 2, 39–42(1930) —K. states that Fleissner's method is more useful for effecting drying. Reply. G SZELÉNYI. *Ibid* 43 —S insists on his former views on the basis of his own expts. S S DE FINÁLY

Preparation of pulverized lignite with pneumatic circulation drying. P. ROSIN AND E RAMMLER. *Braunkohle* 29, 557–63(1930) —Circulation drying is a pneumatic process according to which the transport and drying of wet products in suspension are effected by hot gases which circulate at high speed through a pipe system Details of a circulating drier are given E I S

Calculations and investigations of lignite-briquet cooling. H SCHUSTER. *Braunkohle* 28, 305–18(1929) —It is technically possible to cool briquets to about 2 to 3% of the surrounding temp and loading at this temp without the possibility of further cooling in car is considered safe in respect to quality of briquet and self ignition hazard E I S

By-product ammonia. H HOLLINGS AND E W SMITH. *Inst. Gas Eng Communication* No 19, 25–30(1930) —A discussion is given of possible ways and means for increasing the net value of $NH_3$ at the gas works, which in many cases under existing conditions does not pay the cost of its removal from the gas Production in Great Britain is equiv to 150,000 tons of $(NH_4)_2SO_4$ annually At the present time the Comm cannot indicate any new research in this field with any reasonable prospect of economic advantage H L OLIN

Preparation of ammonium sulfate in the form of coarse thick plates. W GLOUD, W KLEMPT AND H RITTER. *Ber ges Kohlentechnik* 3, 371–84(1931) —The effects of various conditions upon the cryst. form of coal-tar $(NH_4)_2SO_4$ were studied Temp and rate of crystn and the quantity of such impurities as pyridine, tar acids, phenol and As appeared to have no effect upon the form of the crystals, but Fe did appear to be the detg. factor To det the effect of Fe salts, the Fe present in the crude liquors was pptd out with $H_2S$ and then definite quantities of Fe salts were added $Fe^{III}$ ion had an injurious effect upon the cryst. form, only a fine crystal brew being obtained in its presence Cr and Al have the same effect, but the lower-valence forms of Fe, Mn and Co on the other hand have very favorable effects The quantities of Fe, Mn and Co used were 2 4 g of sulfate per l If it is desired to get the same cryst. form of sulfate as is obtained from synthetic $NH_3$, it is necessary to remove the Fe. This is accomplished by oxidation to $Fe^{III}$ and pptn as hydroxide by making alk with $NH_3$ H STOERTZ

Naphthalene removal with tetralin. P. DEUTSCH. *Gas u Wasserfach* 74, 245–7 (1931) —A satisfactory naphthalene solvent to be introduced into gas mains must be (1) a good solvent for naphthalene, (2) of low vapor pressure to avoid too great losses, (3) of higher vapor pressure than naphthalene in order to be present in sufficient amts. to dissolve the condensed naphthalene The vapor pressure of naphthalene and a series of possible naphthalene solvents, as well as the soly. of naphthalene in these solvents, are given for 0° and 20°. Tetralin satisfies the above conditions best. A given gas contained 13 g naphthalene per 100 cu. m On cooling from 20° to 0° 8 5 g of naphthalene will be deposited per 100 cu m of gas. 62 5 g of tetralin is required to dissolve this amt. of naphthalene at 0° (satd soln ) and 60 g to sat. the gas at 0° or a total of 122 5 g. of tetralin per 100 cu. m of gas. The vapor pressure of tetralin is such that gas at 20° can carry 200 g per 100 cu m Xylene can dissolve 20 8 g of naphthalene per 100 g at 0° so only 32 3 g of xylene is required to dissolve the naphthalene. However, the gas requires an addnl amt. of 1690 g xylene to sat itself at 0°, or a total of 1722 g must be added to the gas to insure sufficient xylene condensate to dissolve the naphthalene when the gas is cooled to 0°, over 10 times as much as with tetralin At Bremerhaven tetralin costs 55 25 marks per 100 kg The total cost of adding tetralin for the first year was 2 9 pfg per 100 cu. m. The typical app for vaporizing tetralin is described and illustrated Experiences in other cities are given D regards tetralin as the single satisfactory means for combating naphthalene and removing tarry deposits from mains R. W. RYAN

Esthonian combustible shales. OTAKAR VONDRÁČEK. *Chem Listy* 24, 471–3 (1930).—Combustible shales are located between the cities Tapa and Narva and cover 2470 sq. km. The shales contain 70% org matter which came from a rich sea fauna; the shale burns with a luminous flame and emanates an oily odor. The shales are used in the industry and in firing locomotives, a great deal of fine ash forms which penetrates everywhere. The ash nuisance is obviated by using an oil prepd. by the destructive distn. of shale. FRANK MARESH

The Italian gas industry R. DECKERT *Gas u. Wasserfach* 74, 203-4(1931) —[illegible] figures are given for the Italian gas industry R. W. RYAN

*Determination of the heating value of gases by explosion.* HANS LÖFFLER *Arch. exp. path.* 11 4 (1930) cf *C. A.* 25, 397 An app is described and illustrated in which the gas mixed with a definite vol of air and exploded, the heating value being [illegible] in temp of a Hg thermometer placed in the center of the pipet, which is [illegible] Dewar flask The calibration appears to be empirical P. W. T.

The 25th report of the Joint Research Committee of the Institution and Leeds University Examination of the products of combustion from typical gas appliances. V. *Inst. Gas Eng. Communication*, No 16, 60 pp (1930) —Tests on [illegible] adjusted surface combustion water heaters showed CO in waste gas less than 0.01%. Similar tests with inverted incandescent mantle burners indicated a higher rate of CO production than with the Bunsen flame especially at gas rates lower than normal The rapid increase of CO when the burner was turned low points to the advantage of using a smaller unit at full capacity when little light is required H. L. OLIN

Some further experiments on the combustion of inflammable gases by electric sparks. J. D. MORGAN *Phil. Mag.* [7] 11, 158-63(1931), cf *Phil. Mag.* 43, 369 (1922); *C. A.* 17, 2505 —Weak mixtures of coal gas with air at atmospheric temp and pressure were subjected to a stream of high tension sparks, maintained without burning in the gas Combustion in the mixture is proportional to the heat energy of the spark discharge when the gap width is constant, and proportional to the gap width when the heat energy is constant The results are consistent with the previous theory. ARTHUR FLEISCHER

The 27th report of the Joint Research Committee of the Institute and Leeds University. First report on the back-run process for the manufacture of carbureted water gas. THOMAS HARDIE, *et al.* *Inst. Gas Eng. Communication* No 18, 47 pp (1930) —This report covers an elaborate test made to det the efficiency of production of carbureted water gas in a modern, automatically operated plant, equipped with generator boiler and self-clinkering grate and designed to use the back run principle of heat regeneration Results are given in condensed form: time of test, 96 hrs., coke to generator, 151.3 tons thermal value of coke, 12,910 B. t. u.; oil to carburetor, 20,183 gallons, thermal value, 19,640 B. t. u. per lb., total steam (30 lb. pressure) to generator, 313,000 lb., av. percentage of steam decompd., 60.8, total carbureted water gas made (purified) 9,534,000 cu. ft., thermal value of gas, 503 B. t. u., efficiency of production of carbureted water gas, 69.3%, efficiency of production of blue water gas, (*a*) accounting for extra steam to generator and steam to auxiliary plant, 49.3%, (*b*) without accounting for such steam, 55% H. L. OLIN

The 26th report of the Joint Research Committee of the Institution and Leeds University. Second report on the use of creosote in the manufacture of carbureted water gas. THOMAS HARDIE, *et al.* *Inst. Gas Eng. Communication* No 17, 7 pp (1930) —Gas oil, light and heavy creosote and mixts. of gas oil and creosote were cracked over a temp. range of 700–900° in atms. of $H_2$, $H_2$ and CO, and $H_2$, CO and steam The tabulated data indicate the highly unsatisfactory results obtained

| Kind of oil | Therms per gal. of oil | Percent tar | Percent naphthalene |
|---|---|---|---|
| gas oil | 1.211 | 30.1 | 3.0 |
| light creosote | 0.489 | 67.7 | 16.0 |
| heavy " | 0.167 | 80.3 | 18.3 |
| mixt. of 80% gas oil–20% light creosote | 1.054 | 40.1 | 6.3 |

H. L. OLIN

V. D. I. rules for gas-flow measurement with standard nozzles and orifices. K. BUNTE AND L. ZIPFERER *Gas u. Wasserfach* 74, 250-4(1931) —Flow formulas are given as well as drawings of standard nozzles and orifices, and practical applications R. W. RYAN

Testing gas-distribution systems with ethyl mercaptan. A. THAU *Gas u. Wasserfach* 74, 247–50(1931) —A discussion is given of the expts. carried out in 2 American cities with Et mercaptan to detect leaks in distribution system, and possible application to German conditions R. W. RYAN

Simple flue-gas diagram for excess air. L. ZIPFERER. *Gas u. Wasserfach* 74, 199–200(1931) —A simple diagram is given for facilitating the estn. of flue-gas contents for a given gas with various amts. of excess air R. W. RYAN

**The dew point of the flue gases of solid fuels.** W. Gratzich *Feuerungstech.* 19, 26-8(1931).—G asserts that the H content on a wet basis is nearly the same for all solid fuels. This assumption enables him to draw a simple diagram relating dew point of flue gases to the water content of the fuel and to the excess air. Ernest W. Smith

**Coal gas for heating retorts in small gas works.** Albert Dubois *Gas u. Wasserfach* 74, 269-71(1931).—The alternative use of coal gas may permit better balances between gas send out and coke demand. An economic study is necessary to det. the desirability of using coal gas for heating retorts in each case. R. W. Ryan

**Use of sewage gas as city gas.** W. H. Ludwig *Sewage Works J.* 2, 421-31(1930). The collection of gas from digestion or Imhoff tanks is not justified in the U. S. as a substitute for city gas because (1) it has a relatively high sp. gr. (0.77) which would necessitate greater expenditure of power for pumping and decrease the capacity of the distribution system, (2) it has a very low H content which gives rise to undesirable flame characteristics, (3) the max. production which could be expected is only 1% of that required for city gas and this would be produced in summer when it is least required, and (4) the enriching quality which sewage gas possesses because of its high B. t. u. value (650 to 800) is obtained at considerably lower cost by the use of bunker oil. F. Hurwitz

**Valves for blast-furnace and producer gas.** A. Johansson *Jernkontorets Ann.* 114, No. 7, 368-72(1930). Detailed description of 600 mm., 300 mm. and 180 mm. valves used in Swedish iron works designed to prevent soot accumulation on the valve seat. I. I. S.

**The gas producer. I. Continuous producer. II. Operation and items related to operation. III. Conduction of gas-producer fuel tests.** John W. Rouse *Am. Gas J.* 133, No. 2, 47-8, No. 3, 41-5, No. 4, 68, 73-4, No. 6, 45-6, 59(1930), 134, No. 1, 51-5(1931). E. H.

**The disposal of liquor effluents from gasworks.** A. C. Monkhouse and W. Titterton *Inst. Gas Eng. Communication* No. 21, 12-30(1930), *cf. C. A.* 24, 5502.—The report is presented under 3 heads (*a*) methods of reducing the higher tar acid content of $NH_3$ liquor (*b*) the evapn. of effluent liquor on producer bars and (*c*) the biological purification of effluent liquors. The principal studies under (*a*) were directed on the effects of keeping the heavy tars out of contact with the main effluent liquors and thus keeping tar acids out of the latter. Highly promising results with the Cottrell electrostatic tar sepn. and with the Cyclone tar extractor are cited. Under (*b*) the method of evapg. "devil" liquor by spraying it on the grates of producers operated in connection with vertical gas retorts was found to be successful since no fumes or other nuisance was noted. It was estd. that the total "devil" liquor output and 27% of the spent liquor from the $NH_3$ still could be disposed of in this way. (*c*) Spent still liquor from the Coventry Gasworks amounting to 7,152,000 gallons in 1930 with an $O_2$ absorption value 0.560 p. p. m. is being reduced to 0.85 p. p. m. by treatment on bacterial beds. The latter, which consist of graded granite about 5 feet deep, are activated during rest periods with sewage. H. L. Olin

**Catalytic desulfuration and hydrogenation of a primary tar fraction.** J. M. Perrurra *Anales soc. espan. fis. quim.* 28, 1147-50(1930).—The S content, existing as $H_2S$, mercaptans, thioethers, and thiophene deriv., of a 180-300° fraction of primary tar, was detd., then the tar fraction desulfurized by passing the vapors by means of a current of dry $H_2$ over oxides previously reduced and heated to 300-350°. Two passages over the catalyst reduced the S content 60%. A second catalyst following the first reduced the base content 61.2% and the tar phenols 13.3%. In hydrogenating com. primary tar from which fractions boiling below 180° had been removed previously, by the Berglus process with Fe and Mo oxides as catalysts, there is obtained a benzine, b. 50-185°, with a content of phenols and bases reduced 73.0% and 59.3% resp., and wholly sol. in $H_2O$, which proves the transformation of the 2.0% "ulmins" of primary tar. F. M. Symmes

**The coking industry and its development in relation to the manufacture of iron and steel.** James K. Dickie *J. West Scotland Iron & Steel Inst.* 38, Pt. 4, 45-55(1931). E. H.

**Influence of water in the by-product coke oven.** G. E. Foxwell. *Colliery Eng.* 7, 397-9, 418-20(1930).—The occurrence of hygroscopic moisture seems to depend on the presence of minute pores in the material. Coke made from coal contg. much hygroscopic moisture is very reactive. Water vapor affects the yield of $NH_3$. Financial effects are discussed. Ann Nicholson Hird

**Gas coke as a raw material for household briquets.** R. Kada *J. Fuel Soc. Japan* 10, 210-32(1931); Section 2, 15-7(in English).—K. manufd. briquets by mixing

semi-coke with gas coke in various proportions and studied their properties The equiv. mixt. of semi coke and gas-coke produces most suitable briquets which resemble anthracite briquets in their combustibility K also suggests the production of coke suitable for household briquets by adjusting the temp. of carbonization P. I NAKAMURA

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Formation of $CS_2$ from $H_2S$ and coke (DRAKELEY, BAKER) 18. A new physico-chemical explanation of the formation of humus, peat and coal (ZOLCINSKI) 8. Beneficial action of brown coal upon the development of cultivated plants (KISSEL) 15. Oven for dry distillation of brown coal U S pat. 1,796,264) 22. Phenols (Brit. pat. 338,638) 10 Apparatus for separating peat fiber from liquids (Brit pat. 338,547) 23. Combined reduction of ores and hydrogenation of carbonaceous materials (Brit pat 339,276) 9. Destructive hydrogenation (Brit. pats. 338,544, 338,570 and 339,317) 22. Purifying bitumen, etc (Brit pat 339,470) 22. Distilling or drying carbonaceous materials (Brit. pat 338 939) 13

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RE UMBERTO, AND VARETON, E Carburanti e carburazione. Milan' Ulrico Hoepli. 516 pp L 50 Reviewed in *Ind Eng Chem.* 23, 597(1931)

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**Method and plant for drying fuels with circulated superheated steam.** RUDOLF STEINER and VIKTOR SKUTL Austrian 121,405, Dec. 15, 1929

**Low-boiling liquid fuels from coals, tars, oils or bituminous materials.** A. ROSWALTER Hung 100,880 Dec 5, 1929 The raw materials are powdered or vaporized and treated at 350–550° with a mixt. of CO and steam at a partial pressure lower than 1 atm The low boiling liquid fuels formed are led away in vaporized form

**Motor fuel.** I G FARBENIND A.-G Fr 37,206, Aug 5, 1929 Addn. to 643,785 (*C A* 23, 1739) In the process of the prior patent the extn is carried out in steps under conditions which become more and more severe and the residue is afterward submitted to hydrogenation under pressure

**Fuel briquets.** GUSTAV KOMAREK (one half to Monarek-Greaves & Co., and one-fourth each to George MacPhail and Charles Coryell) U. S 1,796,465, March 17. Petroleum coke is used with a coke product from the destructive distn. of coal

**Charcoal for iron metallurgy.** E GABROVITZ Hung 101,960, Jan 7, 1930 Briquets are formed from charcoal dust and lime-contg water *E. g.*, 22 5 parts CaO is added to 100 parts $H_2O$, then 80 parts of this solution is mixed with 100 parts of powd. waste charcoal and charcoal dust and the forms are pressed under 2–3 atm

**Distilling fine bituminous material.** KOHLENVEREDLUNG A.-G Ger. 515,911, Mar 18, 1924 The finely powd material is treated with a blast of hot gas so that the distn begins at above 800°

**Apparatus for continuously distilling carbonaceous materials and cracking or hydrogenating the vapors.** "INTERCARBO" SOC. ANON POUR LA CARBONISATION ET LA TRAITEMENT CATALYTIQUE DES COMBUSTIBLES. Ger 518,403, Mar 26, 1927 See Brit. 277,404 and 278 041 (*C A* 22, 2635)

**Destructive hydrogenation.** H P. DEAN and IMPERIAL CHEMICAL INDUSTRIES, LTD Brit. 339 040, Oct. 4, 1929 In a described app for the destructive hydrogenation of liquid carbonaceous material, the H is passed into the reaction chamber through an indirect heat exchanger surrounded by the material and which may be made of or coated with catalytic material

**Destructive hydrogenation.** GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G Brit. 339,048, Oct. 8, 1928 Fatty oils such as soy bean oil are converted into products suitable for operation of internal-combustion engines by heating to above their b. ps in the presence of H at a pressure below 45 atm (suitably by use of illuminating gas and a catalyst prepd by pouring dil. $Na_2CO_3$ over Fe oxide and drying and reducing the mixt.) Use of catalysts contg Zn and Cu is also mentioned. If desired, the process may be carried out in 2 sep stages, vapors being formed in the first stage and catalytically hydrogenated in the second stage.

**Apparatus for destructive hydrogenation.** W R. TATE, H P STEPHENSON, J. F. LEHMANN and IMPERIAL CHEMICAL INDUSTRIES, LTD Brit. 339,479, Nov 29, 1929 Various details of app are described, particularly relating to control of the liquid level in a reaction vessel or catch pot.

**Apparatus for low-temperature distillation of solid carbonaceous materials such as coal or oil shale.** OSWALD HELLER (to Bamag Meguin A.-G.) U S 1,796,100, March 10 Various structural details are described of an app comprising rotating drums and adapted for heating the material undergoing distn. by use of preheated heat-accumulating elements which may have a net like cross section.

**Hydrogenating coal, etc.** I G Farbenind A.-G Fr 37,394, Sept. 6, 1929 Addn to 666,683 (*C A* 24, 1201) Other means than that in Fr 666,683 is used to keep the catalyst dispersed in the liquid contained in the reaction chamber, *e g*, the catalysts may be used in the colloidal state so that they remain easily in suspension, or the difference in d between the substances to be treated and that of the catalyst is reduced so that the catalyst remains easily suspended Examples are given

**Preparing peat for briqueting.** Maschinelle Druckentwässerung m b H Brit 338,050 Aug 23, 1929 Raw peat is mixed with peat dust (preferably in such quantity that the wt of dry material in the dust exceeds that in the raw peat), and the mixt is highly compressed (as by a hydraulic press) to ext water Numerous details of app and operation are described

**Lignite distillation.** H Denaeyer Brit 339,129, Dec 17, 1929 Destructive distn is effected in an app such as described in Brit 270,921 (*C A* 22, 1673), first at relatively low temp (300–500°) and then at higher temp (suitably 800°), for removal of heavy hydrocarbons and production of a clean and brilliant coke suitable for making briquets (various details of manuf of which also are given) App is described

**Plate drier for lignite** "Intracit" Braunkohlenwerke und Brikettfabriken and Max Mayer Ger 515,520, Dec 11, 1929 Addn to 514,711 (*C A* 25, 2273). Constructional details

**Phenols from industrial liquors.** Fritz Ulrich (to Zeche Mathias Stinnes) U S 1,705,382 March 10 Phenol bearing liquors such as ammoniacal liquors are treated with tar bases such as pyridine or quinoline in order to improve the recovery of phenols

**Preparing highly concentrated ammonia gas from ammoniacal liquor.** L F Fokin and I L Lider Russ appl 18,221, May 4, 1927 addn to pat No 3856 Concd ammoniacal liquor is dild with hot waste water from the distn column The hot dil mixt is passed through the dissociator for the removal of $CO_2$ and $H_2S$ in gaseous state The partly purified water is then freed from $NH_3$, $H_2S$ and $CO_2$ in the distn column

**Purifying benzenes.** I G Farbenind A.-G Fr 37,363, Aug 23, 1929 Addn to 621,505 The purification of benzene or the intermediate product by a treatment with H under pressure and at a high temp in the presence of catalysts not attacked by S is carried out in a single operation with the hydrogenation of substances such as coal, hydrocarbons or their derivs

**Apparatus for desuperheating steam.** Superheater Co, Ltd, and Compagnie des Surchauffeurs Brit. 339,575, March 19, 1930. Structural features

**Gas production.** A. S. Ramage Brit. 338,005, Aug 21, 1929. Olefins, terpenes or acetylenic hydrocarbons, substantially free from paraffinic hydrocarbons, are passed, at a temp of about 420–700°, over iron, with 20–30% or more of steam, producing mainly H, CO and $CH_4$, and leaving the iron as metal Various details of app and procedure are described *Cf. C A*. 24, 2866

**Fuel gas.** Hermann Hebel. Austrian 121,091, May 15, 1930 In the manuf. of fuel gas by degasifying coal and converting the residual coke into water gas, the degasification is effected by leading a part of the water gas through the degasifying retort and another part around the retort, the latter part being afterward reheated and returned to the water-gas generator with superheated steam The calorific value of the gas may be regulated by controlling the amt of water gas admitted to the degasifying retort, complete degasification being in any case ensured by regulating the temp of the water gas so admitted, and also the temp and the amt of water gas led around the retort *Cf. C A* 24, 228

**Fuel gas.** Anton Kratky. Austrian 121,099, Aug 15, 1930 Gas for heating or for driving internal combustion engines is prepd by the action of steam at 500–1000° on atomized or gaseous or vaporized hydrocarbons in a chamber heated electrically to approx the temp of the steam Alc vapor may be mixed with the steam App is described

**Fuel gas from bituminous materials.** Arthur H Lymn Ger 515,982, Feb 22, 1927. Details of retorts and method of distg are given

**Coal gas.** Maria T. Strache Austrian 121,540 and 121,542, Oct 15, 1930 Addns to 118,062 (*C A* 24, 4021) In the method of Austrian 118,062, uniform distribution of the fresh fuel and tar is effected by feeding the fuel to the generator through the tar, which may act as a seal for the generator App is described (121,540) Addnl tar may be added with the fresh fuel, besides the tar produced in the gasification Low-temp tar, generator tar, wood tar, or lignite tar may be so added Mineral oils or their distn products or residues may be added also (121,542)

**Desulfurizing coal-distillation gases, etc.** István Hunyady and Karl Koller Ger 518,431 May 11, 1928 The gases are freed from tar, $NH_3$ and CN compds, and

then treated with an aq suspension of $Mn(OH)_2$. The sludge of MnS and S so obtained is withdrawn and treated with $SO_2$, to produce a suspension of S in an aq soln of $MnS_2O_4$. The soln is sepd and treated in turn or simultaneously with the gases to be purified and with $SO_2$ whereby $MnS_2O_4$ is converted into $MnS_2O_6$, which is stable to $H_2S$. The soln of $MnS_2O_6$ is then boiled, yielding $MnSO_4$, S and $SO_2$. The $MnSO_4$ is treated with $NH_3$ and O to regenerate $Mn(OH)_2$.

Oil gas. Frank J Nolan. U S 1,796,299, March 17. A mixt. of vaporous hydrocarbon material and steam is introduced to a zone contg a plurality of individually spaced metallic catalysts such as an alloy of Al 50, Ni 15, Cu 10, Ti 10, Ag 2, Mg 10 and Bi 3%, each spanning the zone and heated to above 540° and the mixt. is passed over the catalysts without further addn of steam and the gas produced is withdrawn for collection. App is described.

Oil gas. A S Ramage. Brit. 338,904, Aug 21, 1929. Materials such as heavy mineral oils are passed with 1–2% of steam, over ferric oxide at a temp of about 420–540° and the (largely olefinic) gases thus formed are passed, with 10–40% of steam, over finely divided iron at a higher temp (suitably about 600–800°), producing a gas contg H, CO, $CH_4$, $C_2H_4$ and some aromatic hydrocarbons. Motor fuel is sepd from the gas and various details of app and procedure are described.

Water gas. A F Kunberger (to Humphreys & Glasgow, Ltd.). Brit. 338,804, March 2, 1929. H produced by passing steam over hot iron is superheated and carbureted and then passed with excess steam through the upper part of the fuel bed (the whole of which is used simultaneously in generating water gas by "up-running") and the mixed gas is taken off above the fuel bed. Various details of app and operation are given.

Water-gas producer. Motor Fuel Proprietary, Ltd., and W. Johnson. Brit. 338,877, Aug 26, 1929. Various details are described of an app having an inner generator located within an annular generator, charges in each generator being independently gasified.

Water-gas producer for the continuous distillation of powdered fuel. Julius Pintsch A G. Fr 37,192, July 4, 1929. Addn to 658,586 (*C. A.* 23, 5207).

Apparatus for making water gas from pulverulent fuel. Harald Nielsen and Bryan Laing. Ger 518,427, May 31, 1927. See Brit. 299,485 (*C. A.* 23, 3333).

Gas producer. S I R I, Soc. Italiana Ricerche Industriali. Brit 338,911, Aug 27, 1929. See Fr 680,849 (*C. A.* 24, 3932).

Gas producer (suitable for generating gas from solid fuels on automobiles). Wm W Odell and Earl N. Percy. U. S 1,795,670, March 10. Structural features.

Combined gas-producer furnace suitable for heating metals. R A Hadfield and R. J Sarjant. Brit 338,893, June 26, 1929.

Gas-generating plant. Adolf Weigel. Ger 515,983, May 10, 1925. Details of a surface cooler for the gases produced are given.

Apparatus for producing fixed combustible gas from fluid fuels such as oil. Orrell O Thwing (to General Oil Gas Corp.). U. S 1,796,733, March 17. Numerous structural details are described.

Enriching combustible gases. Herman A Brassert and Charles W. Andrews (to H. A. Brassert & Co.). U S 1,795,829, March 10. A gas to be enriched, together with a regulated proportion of air, is passed through a mass of partly consumed coke at high temp., then through a mass of coke at still higher temp which will effect formation of CO from $CO_2$, and a controlled proportion of preheated air is introduced laterally into the last mentioned coke mass, and the gas is then passed through a mass of coal at a lower temp to effect enrichment. App is described.

Washing flue gases, etc. P J Robinson. Brit. 338,492, May 18, 1929. Gases such as flue gases are passed through a centrifugal dust separator, adjusted to leave a regulable small proportion of fine dust in the gases, and are then subjected to steam or fine water sprays to wet the remaining fine dust particles and effect oxidation of $SO_2$ to $SO_3$ after which the gases are caused to impinge upon baffle plates and are washed with a heavy shower of water to remove the dust and acid. Various details of the app (which may be formed of Ni Cr steel resistant to corrosion) and of operation are described.

Regenerative heat-storing device, especially for preheating fuel gas. Aktiebolaget Ljungströms Angturbin. Ger 515,870, Nov 15, 1927.

Refining tars, oils, etc. I G Farbenind A.-G. (Carl Krauch and Mathias Pier, inventors). Ger 515,523, Aug 15, 1925. The tars, oils, distn products, residues, etc., are treated with H or H-evolving materials at high temps. and pressures, optionally, in the presence of catalyzers. The material to be refined by this process is intimately mixed with up to 30% peat or lignite or a mixt. of both. In an example, lignite gener

ator tar is mixed with 20% crude lignite and heated in a Mn bronze-lined high pressure reaction chamber to 450°, and subjected to the action of H at 200 atm. A 20–35% yield of benzine results Further examples are given Cf *C. A* 24, 4378

Distillation of tar. ALEXANDER A MACCUBBIN and JOSEPH ZAVERTNIK (to The Barrett Co) Can 309,218, Mar 10, 1931 A method and app are specified in which tar is distd at atm pressure to produce distillate oils and a pitch residue. The pitch residue is withdrawn during distn at approx the temp of the first distn and immediately subjected to a high vacuum to effect further distn of high boiling oils by the self contained heat of the pitch Cf *C A* 24, 2585

Removing acid constituents from low-temperature tar or its fractions. CURT BUNGE and FORSCHUNGSINSTITUT FÜR BERGWERKS- UND SPRENGSTOFFCHEMIE SOWIE VERWANDTE GEBIETE Ger 518,210 Sept. 13, 1925 An aq emulsion of the tar or tar fraction is treated with alkali soln The emulsion may be prepd with the aid of soap, and the treatment with alkali soln may be effected in a no of stages

Chamber oven for the production of gas and coke. C OTTO & CO G M B H Ger 515,978, Oct. 20, 1926 Details of heating the distn gas to produce gas of better illuminating quality are given Cf *C A* 24, 4379 5139

Coke oven. RUDOLF WILHELM (to Arnold Beckers) U S 1,795,324, March 10

Coke oven. KOKSOFENBAU UND GASVERWERTUNG A.-G Ger 512,334, Nov 22, 1927 The heating channels are lined with steel or other heat resistant metal.

Regenerative coke ovens. COLLIN & CO Fr 37,387, Sept 2, 1929 Addn to 576,379

Regenerative compound coke oven with twin outlets. C OTTO & CO G M B H Ger 515,849, Aug 18, 1929. Addn to 503,895 (*C A* 24, 5987)

Coke-oven battery with horizontal chambers. THE KOPPERS CO Ger 518,312, Dec. 15, 1928 See Brit. 302,365 (*C A* 23, 4331).

Heating wall for coke-oven chambers. KOKSOFENBAU UND GASVERWERTUNG A.-G. Ger 518,385, April 29, 1926

Coke oven (door construction, etc.). R & J DEMPSTER, LTD., and C E HOLT Brit. 339,557, Feb 19, 1930

Coke-oven door. HEINRICH SCHWARZ. U S 1,795,515, March 10

Coke-oven door. E WOLFF Brit. 338,450, Oct. 9, 1929

Coke-oven cover. ARTHUR KILLING and WILHELM ELBERT Ger 515,538, Aug 19, 1928

Method and plant for drying coke. WESTFÄLISCHE MASCHINENBAU-GES. M. B. H Ger 518,313, June 17, 1930

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Petroleum mine in the old Groznui District. L. LUTOVINOV *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1931, No 1, 57–63.—A complete description is given of the proposed method of mining oil similar to that adopted in Pechelbronn (France) V KALICHEVSKY

Determination of the toluene content of a Mid-Continent petroleum. JOHANNES H. BRUUN, R. T. LESLIE AND SYLVESTER T. SCHICKTANZ *Bur Standards J Research* 6, 363–7(1931).—Com petroleum fractions from an Okla. crude oil were fractionated into 1° cuts and tested for toluene by nitrating to 2,4-dinitrotoluene by means of a nitrating method which was found not to attack the other constituents of the fractions Toluene was found in all the cuts boiling between 90° and 112° The max concn (32.2%) was found in the fraction boiling between 107° and 108° Total toluene present amounted to 1/8 of 1%, based on the crude petroleum. D F BROWN

Separation of normal octane from petroleum by distillation and crystallization. R. T. LESLIE AND SYLVESTER T. SCHICKTANZ *Bur Standards J Research* 6, 377–86(1931).—A fraction b 100–130° from an Okla. crude oil was subjected to an interlocking process of distn. and crystn. to sep octane The method and app are described in detail The b p, f p, refractive index and mol wt of the product are given and compared with the properties of a carefully purified sample of synthetic octane It is estd that not less than 1% of octane was present in the oil investigated D F BROWN

The acids of Baku petroleum. A. E. CHICHIBABIN. *Compt. rend. acad. sci. U. R.*

*S S* 1930A, 382–4 A summary is given of work done on petroleum and naphthenic acids The sepn of the acids from the lower fractions as amides showed that fatty acids with 7 C atoms were present Bromination and sepn of HCOOH from the hydroxy-acids prepd from the bromocarboxylic acids indicated that the carboxyl group is bound to primary radicals as well as to secondary and tertiary radicals By sepg the acids into cyclic and fatty acids by means of their Cd salts, it was found that the petroleum acids b 215–18° consist principally of fatty acids The content of cyclic acids increases regularly with the b p, so that acids b above 268° ($C_{14}$ acids) belong almost exclusively to the cyclic series The consts of the so-called lower naphthenic acids do not agree with those of acids with 6- and 6-C rings The $C_7$ acid, heptanaphthenic acid, is really a mixt of fatty and naphthenic acids L JACOVLIFF

**The refining of light petroleum distillates.** I W SHEEL *Chem. Eng Mining Rev* 23, 171–8(1929) The predominating impurities in straight run distillates are S compds which in undue amts cause corrosion, particularly of the brass and Cu fittings of the carburetor Data are given to show that the S content of distd fractions from any oil increases with rise in b p The chief chem refining processes are described briefly, *i e* the NaOH, Na plumbite, $H_2SO_4$ Frasch and Na hypochlorite processes In the refining of cracked distillates desulfurization with the simultaneous removal of gum forming diolefins is the objective Acid treatment combined with sweetening is usually given these cracked distillates A batch and a continuous treating system are described D F BROWN

**Report of Subcommittee XXVIII on autogenous ignition of petroleum products.** A H NUCKOLLS *et al* *Proc Am Soc Testing Materials* 30, Pt 1, 788–92(1930) —As a result of cooperative tests on aviation gasoline, ordinary gasoline, Stoddard solvent kerosene, motor oil, I to O, acetone, $CS_2$ and heptane, the results of which are given minor changes in the tentative standard D 286-28T are suggested It is recommended that the test be adopted as standard with these revisions and that further cooperative tests be made D F BROWN

**Atmospheric and vacuum distillation of Mid-Continent crude oil.** JOHN PRIMROSE *Refiner and Natural Gasoline Mfr* 10, No 3, 60(1931) —The processes and equipment applicable to atm and vacuum distn are discussed J. L. ESSEX

**Physical properties of mineral oils and their investigation.** I THASS *Magyar Mérnök, Epitészegylet Közlönye Hasz Fűzetei* 8, 25–38(1931) —A general description S S DE FINÁLY

**Refining shale oils with silica gel and with bauxite. II. Filtrations in liquid phase.** B SALADINI *Industria Chimica* 5, 1482–7(1930) cf *C A* 24, 2279, 25, 2276 —Shale oils *contg as high as 0.58% S were filtered through silica gel, bauxite, mixts of these, and also* mixts of each with decolorizing materials Silica gel alone or with decolorants gives the best results removing up to 30% of the total S, whereas bauxite removes up to 18–20%. Mixts contg bauxite, as well as the material itself, cause trouble in filtering, so that silica gel is preferable A. W. CONTIERI

**Black shale deposition in central New York.** EDWARD W HARD *Bull Am Assoc Petroleum Geol* 15, 165–81(1931) —Lab distn tests of N Y black shales show the amt of petroleum increases to the west, but with no corresponding increase in content of volatile matter, indicating that the petroleum was derived from org constituents The bituminous content of these shales seems to be directly related to the type of decompn rather than to the type of org material, and this particular type of decay existed only where the water was truly saline and toxic conditions were present ALDEN H EMERY

**Discovery of oil in White Point gas field, San Patricio County, Texas, and history of the field.** W. ARMSTRONG PRICE *Bull Am Assoc Petroleum Geol* 15, 205–10(1931) ALDEN H EMERY

**Heavy Dutcher oil in Bristow district, Oklahoma.** CHARLES G CARLSON *Bull Am Assoc Petroleum Geol* 15, 211–3(1931) —The gravity of most of the Dutcher oil produced in the Bristow district is 29–34° Be A new well gives oil of 18.3° Bé, asphalt 9.2 S 0.908, gasoline 6 and kerosene 2% ALDEN H EMERY

**Development and production history on the Salt Flat and other fault fields of east central Texas.** H B HILL, E V H BALSERMAN AND C B CARPENTER Bur Mines, *Rept of Investigations* 3039, 46 pp (1931) ALDEN H EMERY

**New productive horizon in California.** WALTER STALDER. *Bull Am Assoc. Petroleum Geol* 15, 201(1931) ALDEN H EMERY

**Can absence of edge-water encroachment in certain oil fields be ascribed to capillarity?** J. VERSLUYS. *Bull Am Assoc Petroleum Geol.* 15, 189–200(1931) —Capillarity cannot hold the oil outside the depleted area around the well and cannot prevent

the edge water from moving toward the well In the depletion zone, when the formation is an unconsolidated sand, 2 conditions are possible the funicular, in which oil and generally gas flow freely, and the pendular, in which gas flows freely and may be followed by oil If the oil bearing formation is consolidated and the interstices are pores with narrowings, the Jamin effect would not stop the flow altogether because the gas would diffuse through the films of oil which shut off the pores in the narrowings Light oils would evap from one film and condense on the next nearer to the well
ALDEN H EMERY

**Some effects of metamorphism on certain débris in source rocks.** TAISIA STADNICHENKO *Bull Am Assoc Petroleum Geol* 15, 161–4(1931) —Geodynamic alteration (carbonization) of the plant substances in the source rocks of petroleum results in raising the temp of fusion and volatilization and in change in optical characters from isotropic to anisotropic
ALDEN H EMERY

**Concrete coverings for pipe lines.** J F HOUGH *Oil and Gas J* 29, No 35 62, 140, 141(1931) —From tests carried out under the most severe conditions it was found that concrete-covered pipe resisted corrosion satisfactorily The best results were obtained by using a concrete with less than 5 gal of water per sack of cement More water causes the concrete to disintegrate Pressures of 1000 lb per sq in did not give pressure cracks in the concrete coverings
J R STRONG

**The compression of hydrocarbon gases.** I N BEALL *Refiner and Natural Gasoline Mfr* 10, No 2, 99, No 3 154(1930) —The math development of formulas pertinent to compression of gases is described Calcn of the percentage of liquefaction on compression, molal vol of hydrocarbons, importance of compression before condensation for certain types of oil absorption plants, compression at high pressures and multiple stage compression are discussed All gases become more compressible as their temp is lowered and deviations from Charles' and Boyle's laws reach a max at equil
J L ESSEX

**Safe-guarding cracking operations from accident.** E M MATSON *Refiner and Natural Gasoline Mfr* 10, No 1, 97, No 2, 122, No 3, 164(1931) cf *C A* 25, 1066 — The hazards of water in a cracking system and the dangers arising from the corrosion of the equipment are discussed Methods of preventing both occurrences are considered
J L ESSEX

**Manufacture of cracked tractor fuel.** V VALGIS *Azerbaïdzhanskoe Neftyanoe Khozyaistvo* 1931, No 1, 64–73, cf. *C. A.* 24, 2588 —Exptl work is described.
V. KALICHEVSKY

**Use of the new natural-gasoline specifications.** S S SMITH. *Refiner and Natural Gasoline Mfr.* 10, No 2, 90(1931).
J. L ESSEX

**Progress in distillation and fractionation.** EARL PETTY. *Refiner and Natural Gasoline Mfr.* 10, No 2, 67(1931) —The changes in distn procedure due to the use of stabilizers are discussed and the use of vacuum in the distn. of heavier lubricating-oil fractions is described
J L ESSEX

**Pressure-distillate stabilization and gas-recovery systems.** A W BURKET *Refiner and Natural Gasoline Mfr* 10, No 3, 75(1931) —The essential factors are given by means of which the basic app can be modified to suit any particular plant. For every vol of propane removed from pressure distillate, 3 5 or more vols of butane can be introduced without changing the vapor pressure A complete description of the equipment necessary for combined stabilization and recovery is given J L E

**Chemistry of fuels greatest problem before refiner and motor builder.** EARL BARTHOLOMEW *Natl. Petroleum News* 23, No 11, 72, 76, 79, 81, 82, 84, 85(1931) — The 2 variables most affecting the relative knock ratings are temp and air fuel ratio Tests have shown that the single-cylinder test conditions give too high an antiknock value for benzene and some cracked gasoline
R W KELLY

**Chemistry of the doctor sweetening process.** ARTHUR LACHMAN. *Ind. Eng. Chem* 23, 354–7(1931) —L verifies the 2 views that the PbS formed during the sweetening reaction reacts to form more plumbite and also acts as a catalyst when a sour gasoline is blown with air in the presence of Na plumbite soln L. claims that $Na_2S$ is also formed, which then oxidizes to $Na_2S_2O_3$ The sensitiveness of the doctor test was found to be 0 00006 molar concn of mercaptan The molar concn. of mercaptan in an av sour gasoline was 0 01. Mercaptans can be oxidized with air alone in the presence of NaOH soln , or in the presence of fine inert solids, provided that the air stream is broken up into small bubbles The quantity of $Na_2S$ in alk soln contg suspended PbS should be kept at a min Air blowing assists in fulfilling this requirement Finely divided free S should be added in the quantity detd by analysis of the distillate for mercaptans
J. L ESSEX

decanted and centrifuged, 0.020%; with 10% earth and decanted, 0.018%; and with 10% of earth, decanted and centrifuged, 0.018% R. SANSONE

**Raw materials and production of mineral lubricating oils.** M. FREUND *Magyar Mérnök Épitészegylet Kozlönye Havi Füzetei* 8, 1–10(1931).—A general description of present production methods S. S. DE FINÁLY

**Principles of chemical investigation of mineral lubricating oils.** M. FREUND *Magyar Mérnök Épitészegylet Közlönye Havi Füzetei* 8, 18–25(1931).—A general description of research methods S. S. DE FINÁLY

**Regeneration of used lubricating oils.** F. SCHNEIDER *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1931, No. 1, 107–8.—$Na_2SiO_3$, NaOH and bleaching earth are almost equally satisfactory V. KALICHEVSKY

**Vacuum.** GERRITT VAN DEN BERG *Refiner and Natural Gasoline Mfr.* 10, No. 2, 88(1931).—A few schemes for preventing leaks are outlined J. L. ESSEX

**Report on coöperative work on the separation of cut-back asphalt.** W. H. FULWEILER *et al.* *Proc. Am. Soc. Testing Materials* 30, Pt. 1, 801–4(1930).—Coöperative results from the use of 2 different methods for sepg. cut back asphalts to det. the amt. and character of both the base and the solvent are given. The first method is described in tentative specification D 20-28T. The second starts with atm. distn. and completes the distn. in a vacuum of not more than 10 mm. of Hg. The second method appears to have certain disadvantages. The work is to be continued and certain modifications suggested are to be tried D. F. BROWN

**Utilization of wood waste in the chemical industries.** B. B. FOGLER *Am. Soc. Mech. Eng.*, Advance paper, Oct. 16–17, 1930, 4 pp.—Principal uses, other than for fuel, for wastes from saw-mill and wood working industries are found in the following chem. industries: destructive distn., manuf. of pulp, paper and building boards and those industries consuming large quantities of wood flour, principally the linoleum, plastics and explosives industries. The paper is intended to present a comparative summary of several outlets which chem. industries afford for salvage of waste from wood working industries. E. I. S.

**Wood chips. I. Motor oils from wood.** OSKARI ROUTALA *Acta Chem. Fennica* 3, 115–8(1930).—A review is given of the methods for cracking oils to obtain the lower fractions for use in gasoline motors. Lignite at 150–200 atm. and 450–80° yields about 80% of oily products, which yield considerable gasoline on cracking. When sawdust is treated with Cu, Fe and Co salts, and then with $NH_4OH$ or NaOH, an impregnation with metallic hydroxides occurs. The latter are reduced to the free metal on treatment of the sawdust with H under pressure at 400–450°. Ni formate, $NH_4$ molybdates and chromates are also used as catalysts, a complete conversion of the sawdust to oily products resulting. At 260°, 50% conversion is obtained. On distn. up to 350° the product gives water 4.45, oil 35.55, residue 52.10, gas 6.73 and loss 1.17%. Of the oil fraction, 74% distd. below 300°. Sawdust at 450° and 100 atm. with Zn and Cu catalysts gave 33% conversion to oils, of which 40% distd. below 200°. Forty five % of the weight of the wood was water-sol., with low acid but high MeOH content. S. A. KARJALA

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Dust explosions, with special reference to wood-working industries (BROWN) **24.** The radioactivity of oil-well waters (VERNADSKII) **3.** Cracking oil by electricity (ROWLAND) **4.** The content of Ra in oil-well waters in the district of Grozny (KHLOPIN, NIKITIN) **3.** Washing and bleaching clays of Azerbaidzhan (KOVALEVSKII) **18.** *Apparatus for low-temperature distillation of oil shale (U. S. pat. 1,796,100)* **21.** Pump and high-speed emulsifier system for bituminous materials (Brit. pat. 338,496) **1.** *Refining oils (Ger. pat. 515,523)* **21.** Detergents and lubricants containing fatty acid salts (Brit. pat. 338,910) **18.** Gel-like benzine (Hung. pat. 101,509) **13.** Gelatinizing organic liquids such as benzine (Brit. pat. 339,360) **13.**

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Converting petroleum oils. ROY CROSS (to Gasoline Products Co.) U. S. 1,797,507, March 17. Oil is raised to a cracking temp. without substantial conversion (suitably by heating in a pipe coil in a furnace), the oil is collected in a substantial body and lighter fractions are distd. off in a vaporizing stage with refluxing and condensation of the vaporized material; unvaporized products are directed to a stagnant pool adapted to be heated to facilitate settling of free carbonaceous matter, the heavy settlings are withdrawn from the bottom of the pool and the liquid, relatively carbon-free oil, is withdrawn from a vertical restricted column in the pool so that turbulency in the oil body is prevented. App. is described

Distillation of petroleum oils. ALEXANDER A MACCUBBIN and JOSEPH ZAVERTNIK (to The Barrett Co.) Can. 309,219, Mar. 10, 1931. A method and app. are specified for distn. of petroleum at atm. pressure to produce distillate oils and residual oils. The residual oil is withdrawn during distn. while it is at approx. the temp. of the first distn. and immediately subjected to a high vacuum to effect further distn. of high boiling oils by self contained heat of the residual oil. The residue from such distn. is passed to a coke still maintained under high vacuum and distd. to coke, and the distillate is condensed under a high vacuum.

Apparatus for chilling liquids such as petroleum distillates to separate solids from them. HENRY TORRANCE (to Carbondale Machine Co.) U. S. 1,796,772, March 17. Numerous structural details are described.

Dehydrating emulsions such as those of petroleum. HAROLD C. EDDY (to Petroleum Rectifying Co. of Calif.) U. S. 1,796,750, March 17. Dispersed particles of the emulsion are mechanically agglomerated (suitably by the action of excelsior or steel wool) and the emulsion is subjected to the action of an elec. field. App. is described. Cf. *C. A.* 25, 409.

Hydrocarbons. GENERAL TECHNICAL CO., LTD. Fr. 695,185, Aug. 20, 1929. Bituminous and asphaltic compds., petroleum exts., tar exts. and natural waxes are submitted to a temp. of 360–440° under ordinary pressure in a retort provided with a system permitting the vapors to pass out to the condensers at a temp. between 170° and 250°, the speed of distn. being preferably such that the hourly amt. of distillate is always above 10% of the wt. of the capacity of the retort. Lighter hydrocarbons such as gasoline and kerosene are obtained.

Solidifying hydrocarbons. ROGER HOLTZMANN. Fr. 695,104, Aug. 22, 1929. Hydrocarbons, such as gasoline, petroleum and mazout, are solidified by incorporating therein before or after heating, a binding agent, such as resin, suitably powd. and then adding while mixing milk of lime. The product is molded under pressure and hardened by immersion in water which preferably contains gallic acid.

Cracking hydrocarbons. I. G. FARBENIND. A.-G. Fr. 37,191, July 4, 1929. Addn. to 653,906 (*C. A.* 23, 5312). Hydrocarbons of high b. p., such as mineral oils, tars, etc., are cracked under such conditions that a limited formation of benzine results, and the residue is afterward subm. to a hydrogenation under pressure, the untransformed fraction being submitted afresh to a cracking. Cf. *C. A.* 25, 1666.

Cracking hydrocarbons. I. G. FARBENIND. A. G. Brit. 339,274, May 30, 1929. Cracking of hydrocarbons in the gaseous or vapor phase is effected in the presence of a catalyst of pieces of Si (which may be molded from powd. Si and may be placed in a quartz tube) or Si deposited on a carrier. The material may be mixed with $N$, $CH_4$, water vapor, etc., and examples are given of the cracking of a mixt. of $C_2H_6$ and $C_4H_{10}$ at 700° to form $C_2H_4$ and $C_4H_8$, and of the cracking of pentane, ligroin, paraffin and petroleum oils. It is stated that no carbon is deposited on the catalyst.

Cracking oils. CHARLES B. BUERGER (to Gulf Refining Co.). U. S. 1,796,138, March 10. Vapors are withdrawn under pressure from a confined body of oil heated under pressure, the pressure on the vapors is released and they are condensed, and the confined body of oil is replenished by oil heated under pressure and introduced under the surface of the body of oil while simultaneously permitting vapors from the preheated replenishing oil to mingle directly with vapors above the confined body of oil. Liquid oil is withdrawn from the main body of oil and mingled with the replenishing oil fed to the preheater. App. is described.

Cracking oils. PANHANDLE REFINING CO. Brit. 339,291, June 29, 1929. Oil is preheated in a pipe coil and is then passed into a vaporizing zone, whence vapors are passed to a cracking coil, and the cracked vapors are fractionally condensed in a series of dephlegmators and fractionating columns by indirect heat interchange with make-up oil or condensate. Various details of app. and operation are described. Cf. *C. A.* 24, 3637.

Cracking oils. ROBERT E. WILSON and RICHARD J. DEARBORN. Can. 309,377, Mar. 17, 1931. A process and app. for converting higher boiling oils into lower boiling oils are specified. A stream of oil is heated in a coil under high pressure to a temp. sufficient to effect conversion, the heated oil is discharged into a conversion chamber maintained under a reduced pressure but substantially above atmospheric, the vapors thus formed are sepd. into several fractions by condensation, the residues from the conversion chamber are expanded into an expansion zone under a pressure below that in the chamber, a portion of the condensates resulting from the first-mentioned sepn. is returned to the heating coil at an intermediate point, another portion of the condensates is delivered into said expansion zone; fresh charge is introduced into said expan-

sion zone, and a fraction of the oil collected in said expansion zone is passed to the heating coil Cf C. *A* 24, 2591

**Vaporizing device (suitable for use with automobile engines) for catalytic decomposition or cracking of liquid fuels.** D Balachowsky, P Cairb and M Levy Brit. 339,251, July 26, 1929 Various structural details are described

**Refining hydrocarbon oils.** Alexander S Ramage (to Gyro Process Co ) U. S 1,796 621, March 17 S and Cl are removed from alc sol hydrocarbon materials such as olefin and naphthene hydrocarbons or crude benzene by dissolving the materials in an alc soln of an alkali metal hydroxide, permitting the soln to stratify and separately removing the purified oil and the alc alk soln contg impurities

**Purifying hydrocarbon oils with liquid sulfur dioxide.** Pan American Petroleum Co Brit 338 482, May 7, 1929 Materials such as lubricating oil kerosene or various cracked distillates are treated at a temp below 0° with liquid $SO_2$ and, after sepn the partly purified oil contg $SO_2$ is further treated, also at a temp below 0°, with fuming $H_2SO_4$ and the purified oil is sepd from $SO_2$ and sulfo acids Numerous details of app and procedure are described Brit 338,483 relates to a generally similar process in which however, the $H_2SO_4$ used is not specified as being fuming acid Brit 338 484 describes a process of treating crude petroleum shale or cracked oils with fuming or concd $H_2SO_4$ in the presence of liquid $SO_2$ (simultaneously or previously added to the oil) preferably at a temp not greater than the b p of $SO_2$ thus freeing the oils from polymerizable, unstable and S bearing hydrocarbons Various details of app and procedure are given

**Treating hydrocarbon oils with aluminum chloride.** John L Coolfy (to Standard Oil Co of Calif ) U S 1,795,761, March 10 A hydrocarbon oil is mixed with $AlCl_3$ in a flowing stream at a temp sufficient to cause reaction and formation of a relatively low-boiling product, the stream is passed to a flash zone in which vapors of low b p are sepd from residual oil and $AlCl_3$, and a stream of the vapors and a sep stream of the oil and tar are passed to a conversion zone in which the still heated vapors are again brought into contact with the oil tar mixt for agitating it and effecting further decompn App is described

**Apparatus for continuous vacuum distillation of hydrocarbon oils.** Klaus Dreyer Ger 515,704, Nov. 1, 1927. Details of arrangement

**Separation of mixtures of hydrogen and hydrocarbon gases.** W K Lewis (to Standard Oil Development Co ) Brit. 338,719, Nov 12, 1928 See Can 305,734 (*C A* 25, 783).

**Purifying mineral oils.** Allgemeine Ges für Chemische Industrie Brit 338,579, July 22, 1929 Material such as the total distillate from crude Persian petroleum up to 400° is treated with liquid $SO_2$ without previous fractionation, or the distillate may be freed from the benzine fraction b up to 100° before treatment The raffinate and ext are freed from $SO_2$ and fractionated Cf *C A* 24, 3109

**Adsorbent clay for decolorizing oils.** Robert E Manley and Merton L Langworthy (to Texas Co ) U S 1,796,799, March 17 The clay is treated with a $H_2SO_4$ soln of about 10% strength to improve its decolorizing properties

**Oven for dry distillation of bituminous shales, brown coal and similar materials.** Johan G Gröndal and Carl L. Carlson (to Patentaktiebolaget Gröndal-Ramén). U. S 1,796,264, March 10 Structural features of an app with a perforated traveling grate

**Destructive hydrogenation.** J. Pohlen. Brit. 338,544, June 21, 1929. In the production of light hydrocarbons from materials such as anthracites, other coals, peat wood, petroleum, asphalts or various org vegetable or animal materials (or from products of pyrogenation of these), nascent H is produced from reacting material introduced independently into the reaction vessel (an example being given of the treatment of shale oil mixed with Fe and Cu shavings, introduced into an autoclave at 300° and 300 atm pressure contg an aq soln of a halide such as $AlCl_3$ 3NaCl for production of light oils) Reaction of water or steam on coke may also be used for obtaining nascent H Cf *C A* 24, 1212

**Destructive hydrogenation.** F. Unde Brit. 339,317, Oct 3, 1928 Low-boiling hydrocarbons are produced from carbonaceous materials such as oils, bitumens, carbon, wood, etc , by heating them with finely divided or spongy iron and water in an autoclave to 400–500° with development of 200 atm pressure during the reaction from the vapor pressure of the water, etc , present (the water reacting on the Fe to form H) The gases generated can be used to regenerate the Fe from the Fe oxide formed in the reaction and hydrogenating catalysts such as Ni, Cu, ZnO or Zn chromate or splitting

Co of Ind ) U S 1,796,857, March 17. A fluid lubricating oil is used with an addn. (suitably in the proportion of about 7%) of a relatively volatile and substantially non-inflammable diluent such as $CCl_4$.

Lubricant suitable for use in drawing and polishing metals. HERBERT L. JOHNSON (to Standard Oil Development Co ) U S 1,795,491, March 10 A salt (such as the Na salt) of a substantially water sol acid obtained from the sludge formed by treating petroleum lubricating oil with $H_2SO_4$ is heated together with water and a fatty oleaginous material such as tallow under such conditions as to effect distribution of the fatty material in the water

Lubricating oil. WM O STEVENS (to Anti Hot Box Co ) U S 1,796,310, March 17 Dried wood ashes are immersed in lubricating oil in order to improve the oil, and the ashes and oil are then sepd

Lubricating oils from petroleum. RED RIVER REFINING CO , INC Ger 515,840, Mar 17, 1923 App for distg the petroleum *in vacuo* at 1–5-mm pressure is described

Apparatus for filtering lubricating oil. WM W NUGENT U S 1,796,613, March 17 Structural features

Bag filter suitable for filtering oil. WM W NUGENT U S 1,796,632, March 17

Regeneration of used lubricating oils. I THAMM Hung 100,735, Dec 20, 1929 An aq emulsion is made of the changed part of the oils which can be sepd by sedimentation from the unchanged lubricating oil Emulsification may be accelerated by adding carbonates or oxides of earth metals to the oil The treatment with steam emulsifies the changed oil particles and carries away the fuel particles which were mixed with the oil Grease can be made of the sepd emulsion and the regenerated oil may be filtered and used again for lubricating

Wood distillation plant. JOHN T MYERS U S 1,795,404, March 10 Various details of construction are described

## 23—CELLULOSE AND PAPER

CARLETON E CURRAN

Some new processes for the separation of fibrous cellulose from plant substances. J MELROSE ARNOT. *World's Paper Trade Rev.* 95, 961–4(1931) —An address in which are briefly discussed some of the most recently proposed pulping processes A. P.-C

Absorption of water vapor by cotton cellulose. ROBERT H. PICKARD *J. Am Chem. Soc.* 53, 1610–1(1931) —Polemical with Pidgeon and Maass (*C. A.* 24, 1974, 4155) Attention is called to work on the same subject at the Shirley Inst.

C. J. WEST

Calculations and numerical data on the nitration of cellulose. L. SAUZAY. *Rev gén. mat plastiques* 7, 83–9, 139–45(1931) —Indications are given regarding the control of nitrating acids and the prepn of mixts of predetd compn A. P.-C

Nitration of cellulose with phosphoric-nitric mixed acids (preliminary communication). E. BERL AND G RUEFF *Ber* 63B, 3212(1930) —Nitration of cellulose with $H_3PO_4$-$HNO_3$ shows some marked contrasts with the ordinary $H_2SO_4$-$HNO_3$ nitration Since $H_3PO_4$ does not sapon cellulose nitrates it is possible, with a suitably adjusted nitrating mixt (slight excess of $P_2O_5$), to obtain readily cellulose nitrates with 14.0–13.7% N The nitration is accompanied by a marked swelling which facilitates the penetration of the $HNO_3$ into the interior of the fiber, resulting in a uniform nitration throughout Unlike the product with much less N obtained with $H_2SO_4$-$HNO_3$, the cellulose nitrates prepd with $H_3PO_4$-$HNO_3$ are perfectly stable after very short boiling, they contain no trace of mixed $H_3PO_4$-$HNO_3$ esters producing instability Nitrates with 11–11.5% N cannot be produced in fiber form with $H_3PO_4$-$HNO_3$ In the nitration with $H_3PO_4$-$HNO_3$ the lattice of the native cellulose changes into that of hydrate cellulose, whereas with $H_2SO_4$-$HNO_3$ not too rich in $HNO_3$ the lattice of the native cellulose is retained in the nitrate With $H_3PO_4$-$HNO_3$ the nitration is relatively slow, and it can be observed that the $HNO_3$ converts the cellulose into mercerized cellulose before esterification begins. With $H_2SO_4$-$HNO_3$ contg. not too much $HNO_3$, $H_2SO_4$ apparently enters the cellulose mol as ester quite rapidly, and the sulfate then reacts to a greater or lesser extent with the $HNO_3$ Partially nitrated cellulose with the lattice of the native cellulose unchanged is no longer mercerized by $H_3PO_4$-$HNO_3$, *i. e.*, the lattice of the native cellulose is retained in such nitrates The nitrates obtained with $H_3PO_4$-$HNO_3$ give a clear point diagram of cellulose trinitrate when the nitration and washing are effected under tension Details of the expts will be published elsewhere. C. A. R.

from a previously prepd chart II. Specific heat of Glauber's salt. KOTARO TANEMURA *Ibid* 324–5.—The mol heat of $H_2O$ of crystn of $Na_2SO_4$ $10H_2O$ was calcd as 9 6 cal The mean mol heat of $H_2O$ of crystn was detd to be 9 6–9 8 cal The mol heat of $Na_2SO_4$ $10H_2O$ was calcd as 128 2 cal and the sp heat of the crystal at 25° as 0 40 III. Properties of sodium sulfate. KOTARO TANEMURA AND SHIGEO MIYOSHI *Ibid* 330–1.—A summary of the physicochem characteristics of $Na_2SO_4$ is given. $H_2SO_4$ lowers the transition temp and increases the soly of $Na_2SO_4$ $10H_2O$, *i. e.*, it lowers the crystn temp of the salt $MgSO_4$ at first lowers the crystn temp of $Na_2SO_4$ $10H_2O$, but increasing $MgSO_4$ concn beyond a certain limit increases the crystn temp., the solid phase then being $MgSO_4$ $7H_2O$ With a normal viscose spinning bath for centrifugal systems, the salt which crystallizes out on cooling is always $Na_2SO_4$ $10H_2O$, completely free from $Na_2SO_4$ and $NaHSO_4$ It forms no double salts with $ZnSO_4$, $FeSO_4$, $MnSO_4$ or $CuSO_4$, *which accumulate in the bath* IV. *Dehydration of Glauber's salt.* KOTARO TANEMURA, SHIGEO MIYOSHI AND MIZUKI YOSHIDA *Ibid* 332–3.—The vapor pressure of the system $Na_2SO_4$ $10H_2O \rightleftharpoons Na_2SO_4 + 10H_2O$ at 25° is 18 4 mm Hg The hydrous salt can be dehydrated in a closed chamber by circulating air dried with concd $H_2SO_4$ and NaOH It also can be dehydrated by treating with twice its wt of 92% EtOH, or with concd caustic; 45 8 g with 100 g 50% NaOH soln yield 21 g $Na_2SO_4$ Heating to the transition temp., centrifuging, cooling to 5° and centrifuging 3 times yields 31 95 g $Na_2SO_4$ from 100 g $Na_2SO_4$ $10H_2O$ If 36 3% of the wt of the decahydrate is added as solid NaOH at the transition temp., the salt is dehydrated V. KOTARO TANEMURA AND SHIGEO MIYOSHI *Ibid* 333–4.—In the *method of sulfate recovery* patented by the authors 0 9 kg $Na_2SO_4$ and 4 kg $H_2O$ are assumed to accumulate as spent bath per 1 kg viscose rayon, 0 9 kg $Na_2SO_4$ combines with 1 1 kg $H_2O$ on cooling When 2 3 kg anhyd $Na_2SO_4$ is added to the spinning bath, and 7 3 kg of the decahydrate is removed on cooling, both 0 9 kg $Na_2SO_4$ and 4 kg $H_2O$ are at the same time removed The necessary equipment, crystallizer, hydroextractor and dehydrator, lasts much longer than an evaporator and is more efficient from the standpoint of heat utilization.

P. S BILLINGTON

**Manufacture of artificial silk. Spinning of viscose.** H L DE LEEUW *Tech moderne* 22, 521–9, 623–7, 720–4(1930), cf. *C. A.* 24, 3643.—A detailed description is given of the methods and app. used and methods of producing artificial silk other than viscose.

P THOMASSET

**Studies on lignin and related compounds. VII. A kinetic study of the action of hypochlorous acid on spruce lignin and its bearing on the constitution of the spruce lignin molecule.** HAROLD HIBBERT AND K. AUSTIN TAYLOR. *Can. J. Research* 4, 240–53(1931); cf. *C. A.* 25, 2010.—The action of HClO on glycol lignin in finely divided aq suspension, and in alk soln., is autocatalytic; the autocatalysis is due to formation of HCl, which catalyzes the reaction strongly. Apparently $HNO_3$ acts only by increasing the concn of undissocd. HCl. The effects of HCl may be a direct catalytic effect of undissocd HCl or may be due to formation of Cl A comparison of the amts. of HClO absorbed and HCl formed by methylated and unmethylated lignin indicates that if ketomethylene groups are present in lignin, they do not enolize sufficiently to play an appreciable part in the rapid reaction between HClO and lignin. The rapid absorption of HClO by lignin dissolved in alkali indicates that there is probably about 15% of a phenol nucleus in lignin This value is supported by the rapid absorption by lignin, dissolved in alkali, of Br from Br water at very low concns and is based on the assumption of only 1 atom of halogen entering the phenol nucleus, which is true with vanillin If 2 or 3 atoms enter the nucleus, this value of 15% must be divided by 2 or 3. It represents in any case a max value The phenol nucleus accounts for only $^1/_3$, or less, of the total rapid HClO absorption The remainder is probably due to addn of HClO to an ethylene linkage, chlorination of a phenol ether or a combination of both reactions

A PAPINEAU COUTURE

**Alpha- and beta-lignosulfonic acids.** PETER KLASON. *Svensk Pappers-Tid* 34, 118–9(1931); cf. *C. A.* 25, 1077.—K gives the analytical data on which he based the formula $3C_{10}H_{10}O_3 + H_2SO_3 + C_{10}H_9N - H_2O$ (cf. *C. A.* 24, 3358) and states that he has also succeeded in making the tetraconiferyl aldehydes

WILHELM SEGERBLOM

**Some notes on the recovery of soda.** J A. WALKER *Proc. Tech Sect Paper Makers' Assocn. Gt Brit Ireland* 11, Pt. 1, 186–202(1930).—A good recovery of soda can be obtained only if an adequate proportion of black liquor is forthcoming at a strength and vol. which can be efficiently dealt with The factors effecting this are discussed The black liquor must be reduced to such a consistency as will permit a const combustion in the rotary The factors on which the efficiency of the evaporator depend are discussed. Troubles which may arise in the system are described The rotary is

discussed The causticizing process is dealt with in some detail, and strict control is urged P. S BILLINGTON

**Soda process studies. III. Action of alkali solutions on sulfite pulp.** J. H. ROSS AND C. R MITCHELL *Research Notes* 3, 21–3(1930) *Pulp Paper Mag Can* 31, 402–3, 414(1931) cf *C A* 24, 4153 When bleached sulfite is treated in a rotary digester for 3 hrs with NaOH solns at 150–80°, the concn of alkali (over the range 1–7%) at temps. below 100° has but little effect on the quantity of material dissolved and on the α- and β-cellulose contents of the residue at higher temps the effect of concn is much more marked For every temp there is an optimum concn of alkali which produces a residue of max alkali resistance and a concn of alkali which produces a max of bulking properties in the fiber The fluidity of solns of the treated pulp increases regularly as the temp of digestion and alkali concn are intensified A PAPINEAU COUTURE

**Bleaching studies. I An integrating attachment for the Hess-Ives tintometer.** F H YORSTON *Research Notes* 3, 11–3(1930), *Pulp Paper Mag Can* 31, 338–9, 366(1931) cf Ross Mitchell and Y, *C A* 25, 1078 The Hess Ives tintometer has been supplied with a device for intensifying the tint of nearly white materials by multiple reflection of light at the surface of the material By its use differences between the reflection factors of different bleached papers, measured through any particular color filter are magnified 2–3 fold Further, since the magnification increases with the value of the reflection factor differences in hue are greatly accentuated **II. Measurement of hydrogen-ion concentration of bleach liquors with the glass electrode.** *Research Notes* 3, 15–6(1930) *Pulp Paper Mag Can* 31, 374–5(1931) –Consistent and accurately reproducible measurements of the H ion concn of bleach liquors can be made with the glass electrode and a vacuum tube potentiometer HOCl acts as a buffer in bleach liquors within the range of $p_H$ 6.5–8.5 A PAPINEAU COUTURE

**Some notes on the Southern yellow pine district—the large sulfate wood reserve in the United States.** FOLKE JOHANSSON *Svensk Pappers Tid* 34, 82–7(1931) —Descriptive WILHELM SEGERBLOM

**The composition of Diospyros ebenum Koen.** YOSHIZO SHINODA *Cellulose Ind* (Tokyo) 6, Abstracts 37(1930) —The sample analyzed as follows moisture 10.5, alc.-benzene ext. 15.1 sol. in 0.2% NaOH 4.5 lignin 30.8, Cross and Bevan cellulose 36.9, purity of cellulose 98.5, pentosans 13.8% Xylose, mannose and galactose were identified P. S BILLINGTON

**Papermaking properties of phormium tenax (New Zealand Flax).** MERLE B SHAW, GEORGE W. BICKING AND MARTIN J O'LEARY *Bur Standards J Research* 6, 411–20(1931) – The caustic soda process and 2 stage cooks using sodium sulfite and caustic soda resp., produced good results as to quality and yield for wrapping and writing papers P. S BILLINGTON

**Utilization of industrial by-products with particular reference to the pulp industry of the United States.** ROBERT W GRIFFITH *J Am Leather Chem Assoc* 26, 180–6 (1931) —An address H B MERRILL

**Wood-pulp flour and shives in mechanical wood pulp.** O M HALSE *Proc. Tech Sect Paper Makers' Assocn Gt Brit Ireland* 11, Pt 1, 18–20(1930) —See *C A*. 24, 5488 P. S BILLINGTON

**The Norwegian pulp and paper research laboratory, 1930.** MAGNUS CHRISTIANSEN *Proc Tech Sect Paper Makers' Assocn Gt Brit Ireland* 11, Pt 1, 3–17(1930) —Descriptive P S BILLINGTON

**Estimation of wood pulp in paper.** E DEBENEDETTI *Boll staz sper carta e fibre tessili vegetali* 9, 134–7(1930) —The chem methods for detecting and detg wood pulp in paper utilize reactions for cellulose and lignin The lignin content varies with different wood pulps, but av values have been detd for the woods and celluloses used in papermaking, and from these values can be calcd approx the wood or mechanical pulp contents in a paper when jute and manilla are absent Reagents used are (*a*) 1 g phloroglucinol, 500 cc. alc., 25 cc. concd HCl; (*b*) 5 g aniline sulfate, 100 cc distd water, 1 drop $H_2SO_4$, (*c*) dimethyl *p*-phenylenediamine Their use is limited to white or light-colored papers The quantity of lignin is detd (1) directly by liberating from the cellulose and weighing, (2) by measuring the consumption of certain chemicals absorbed by the lignin substances, (3) by dissolving the lignin with suitable agents, weighing the residual cellulose, and calcg the lignin by difference Many methods use the hydrolysis of cellulose with strong acids that under proper conditions do not attack the lignin, which can be dried and weighed $H_2SO_4$, HCl and $HNO_3$ alone, or together or with dehydrating agents, have been proposed Cl, Br, phloroglucinol and $KMnO_4$ also are used for detg lignin R SANSONE

**Pulping with chlorine. I. Pulping bagasse.** J. KAWAMURA *J Soc Chem Ind*

*Japan* 33, Suppl binding 302–5(1930).—Air-dry bagasse contained moisture 12.55, $C_6H_6$ ext. 0.91, alc. ext 1.90, $H_2O$ ext. 2.84, 1% NaOH (hot) ext. 29.0%. The NaOH-extd residue contained ash 3.5, lignin 22.3, cellulose (Cross and Bevan) 43.4, pentosans 27.4%. The cellulose contained 69.9% α-cellulose and 9.3% pentosans. Bagasse after extn with 0.5, 1.0 and 2.0% NaOH was chlorinated at about 50% consistence, the change in yield, lignin, pentosan and ash being followed. The more drastic the alk. pre-treatment, the lower were the yield and lignin content for an equal Cl consumption. The pentosan content remained fairly const. at 31–33% of the chlorinated material. Of this, 1/3 was removed by treating for 12 hrs. with cold 10% NaOH, 7% cellulose being likewise removed. II. Reactions of chlorine. 1. *Ibid* 396–8.—The ratio of Cl as HCl to organically combined Cl formed in chlorinating ligno-celluloses has been variously reported from 1.13 to 1.04. K extd bamboo with alc.-benzene and 1% NaOH, chlorinated, washed and extd. the residue 3 times with 1% NaOH. HCl was detd. in the wash water, after expelling free Cl, while organically combined Cl was detd. by heating the NaOH ext. at 250° and detg. as NaCl. The ratio of acid to organically combined Cl was 1.04. III. Reactions of chlorine. 2. *Ibid* 34, Suppl. binding 62–4(1931).—Results similar to those reported above for bamboo were obtained with bagasse. When a large excess of Cl was allowed to act on the bagasse for a long time, the ratio of HCl to org. chlorides was slightly increased, indicating an oxidation.

M. Hering

**The technic of purifying pulp: effect of calcium lime in the production of a bleached sulfite with a high α-cellulose content.** G. P. Genberg. *Pulp Paper Mag. Can.* 31, 199–210, 219(1931).—By cooking bleached or partly bleached sulfite pulp with lime, the α-cellulose content of the final residue is increased appreciably, accompanied by a loss in wt. depending principally on the original α-cellulose content. More than 5–10% CaO has no beneficial effect on the final results and on the loss in wt. of the pulp. More than 70% of the total increase in α-content is effected in the first 4 hrs. at the consistency (4.5%) and temp. (100–40°) used. The most important factor is the initial α-cellulose content, and in order to obtain, under most economical conditions, a final pulp with a max. α-content, it is necessary to start with a pulp so treated that a max. α-content is retained before the CaO treatment is begun. A multiple treatment with CaO has no increased effect on the α-cellulose content, but produces addnl. loss in wt. By omitting washing after bleaching and by starting the CaO treatment immediately after exhaustion of the bleach, a higher α-cellulose content is obtained. Practically the same α-cellulose content is obtained by treatment with 10% CaO and with 5% NaOH, but the CaO treated pulp has a lower Cu no. and suffers a higher loss in wt. The optimum conditions for max. α-cellulose, min. bleach consumption and min. shrinkage were: Unbleached sulfite is given a preliminary bleaching with a ratio of 35% bleach powder to Roe Cl no. of 2:1, treated with CaO, washed and given a final bleaching to a full white color with a 0.75:1 bleach Cl no. ratio. If the ratio of bleach to Cl no. is controlled at 2.0:1, the final α-cellulose content will be independent of the Cl no. of the unbleached pulp, but the shrinkage will be higher with increased Cl no. The use of MgO lime instead of Ca lime is of no advantage. The time to exhaust the bleach is prolonged, and a lower α-cellulose content is obtained when the CaO is added to the pulp at the same time as the bleach liquor and when the bleaching action is allowed to take place in the presence of the CaO. Com. trial runs made by the procedure developed in the lab. produced a sulfite pulp with high α-cellulose content. Sulfate pulp is not affected to any extent by either CaO or NaOH under the conditions applied to sulfite pulp in the investigation. A. P.-C.

**The Rosen process for the production of sulfite pulp from resinous woods.** E. Meunier. *Papeterie* 53, 214–8(1931).—A brief discussion of the process and its merits. The difficulties encountered in pulping resinous woods by the sulfite process have been shown to be due to the fact that the compn. of the resin acids in the heartwood apparently differs from that of the resin acids in the sapwood. Rosen overcomes the difficulty by a preliminary treatment of the chips in the sulfite digester with a weak alk.-earth soln. for 2–5 hrs. at a temp. of up to 110°, followed by washing with salt soln.; this treatment can be repeated if necessary; the chips are then treated with $SO_2$ gas, and are then subjected to the usual low-temp. sulfite cooking, yielding a very pure pulp, low in ash and contg. up to 92.4% of α-cellulose, which can be bleached with 2.5–4% available Cl.

A. Papineau-Couture

**Determining the bleachability of pulps.** R. Karlberg. *Paper Trade J.* 92, No. 11, 41–4(1931).—A review is given of methods developed for the detn. of the amt. of bleaching powder or Cl required for bleaching pulps, in the form of abstracts taken mostly from the German literature.

A. Papineau-Couture

**The childhood of paper making, as illustrated by Kashmiri methods of the present**

day W RAITT *Proc Tech Sect Paper Makers' Assocn Gt Brit Ireland* 11, Pt I, 21–2(1930) cf C A 24, 1975.—Historical Twenty five photographs of great interest to the modern paper maker are given P S BILLINGTON

Fundamental research and the paper industry. T. TREVOR POTTS *Proc Tech Sect Paper Makers Assocn Gt Brit Ireland* 11, Pt I, 115–29(1930).—A résumé is given of past fundamental investigations and the suggestions of some problems for future study P S BILLINGTON

What patents mean to the paper technologist. JOSEPH ROSSMAN *Paper Trade J.* 92, No 14, 38–40(1931) R describes the classification system of the U S Pat Office, outlines the patent holders' rights, interprets the validity of claims, discusses the sulfate process patent of Eaton and Dahl and shows the advantages of patent protection A PAPINEAU COUTURE

The development of paper manufacture from southern pines. R. H STEVENS *Paper Ind* 12, 2019–20(1931) cf C A 25, 590.—A general discussion of the advantages and possibilities of the Southern U S for the production of pulp, particularly kraft, and paper A PAPINEAU COUTURE

The formation of paper. W BOYD CAMPBELL. *Research Notes* 3, 1–3(1930); *Pulp Paper Mag Can* 31, 424–5, 438(1931).—An address dealing particularly with the qualities of pulp which make it suitable for paper The adhesion of cellulose to cellulose is particularly stressed, and C s theories as to the mechanism of the so-called hydration by beating (C A 24, 1976) are explained A PAPINEAU COUTURE

Corrosion reduced by new constructional materials. JAMES A LEE *Paper Trade J.* 92, No 12, 67–8(1931).—A discussion of the merits and possibilities of alloy steels (particularly 18-8 alloy and others of the same type) and of Cu in the sulfite and paper industries A PAPINEAU COUTURE

Simple electrometric methods of analysis in the paper mill laboratory. T. TREVOR POTTS *World s Paper Trade Rev* 95, 1037–8(1931).—Callan and Horrobin's app (C A 23, 789) did not give good results for alkalimetric work with the circuit in the original form suggested by C and H , inserting a potentiometer across the output of the transformer allows of much better control of the voltage of the input to the electrodes, enables better adjustment of the initial reading of the measuring instrument, and prevents damage to the latter if the soln under examn happens to be of high cond The outstanding use of this method in the paper mill lab is the examn of highly colored caustic liquors, but it is also applicable to other titrations, such as sulfates with $BaCl_2$ and pptn of size by alum Attention is drawn to the effects of the presence of dissolved $CO_2$ in ordinary distd $H_2O$ on the potentiometric detn of H ion concn For ordinary paper mill work, direct detn, on the stock taken from the mixing box or stuff chest is preferable to extn of paper with distd water The quinhydrone electrode used in conjunction with the satd calomel electrode is by far the most useful in the paper mill lab. A PAPINEAU COUTURE

Notable recent improvements to high-speed paper-making machines. S RICHARDSON *Proc Tech Sect Paper Makers' Assocn Gt Brit Ireland* 11, Pt I, 131–43(1930).—The increased production from paper machines has been due to increased paper speed, increased wire width, and reduction of over all mfg costs These 3 factors are discussed in some detail P. S BILLINGTON

The application of electrical power in paper mills. JAMES R HARPER *Proc Tech Sect Paper Makers' Assocn Gt Brit Ireland* 11, Pt I, 164–79(1930).—The a. c and d c. systems are compared The placing of a beater-drive motor inside the beater-roll has worked out very satisfactorily The merits of steam vs electricity are discussed P S BILLINGTON

The testing of condenser paper. T. L ROMAN *Proc Am Soc Testing Materials* 30, Pt. II, 1012–24(1930).—A discussion is given of the relationship between several characteristics of condenser paper made from linen stock and the dielec strength (breakdown voltage) of the condensers wound with this paper Variations in the density of the condenser paper have no noticeable effect on the dielec strength of the corresponding condensers It is shown that, when in small nos , conducting paths through the paper have no important effect on the dielec. strength of condensers wound with 2 sheets of the paper between tinfoils, but the percentage of "shorted" condensers or of condensers failing at very low voltages may be expected to increase approx as the square of the no of conducting paths per unit area of the paper Variations in the porosity of the paper are shown to have marked influence on the dielec. strength of the corresponding condensers and *porosity requirements* are suggested for papers used in low voltage condensers and for papers used in high voltage condensers P S BILLINGTON

Variability in results met with in paper strength testing. CYRIL V. OLIVER *Proc*

*Tech Sect Paper Makers' Assoc. Gt Brit. Ireland* 11, Pt. I, 53-84(1930) —See *C. A.* 24, 3366 P. S BILLINGTON

**A critical study of the bursting-strength test for paper.** F. T. CARSON AND F. V. WORTHINGTON *Bur Standards J Research* 6, 339-53(1931) —See *C A.* 24, 1977. P. S BILLINGTON

**Correlation of bursting strength and tensile strength of paper.** JAMES STRACHAN. *Proc Tech Sect Paper Makers' Assoc. Gt Brit Ireland* 11, Pt. I, 86-114(1930), cf. *C A.* 24, 5485 —A math treatment of the subject, and a discussion of the formulas obtained by various investigators The methods of calcn indicated give a means of investigating the degree of cohesion produced between the fibers by papermaking operations, as reflected by the bursting test A voluminous discussion is included P S B.

**The coloring of paper.** N L MATHEWS *Proc Tech Sect Paper Makers' Assoc Gt Brit Ireland* 11, Pt I, 144-63(1903), cf *C A* 24, 5486 —A description of the nature and source of natural vegetable dyes and pigments is given The theory of the org constitution as related to color is briefly discussed, and the theory of dyeing is touched upon The characteristics of direct or substantive, basic, and vat dyestuffs are dis cussed The cause of two sidedness is explained, and the reason for adulteration of the dyestuffs is discussed P S BILLINGTON

**Classes of color used in the dyeing of paper.** HAROLD E PRATT *Paper Trade J* 92, No 14, 57(1931) —A brief review of the application of basic, acid and direct dyes and pigments to paper coloring Their limitations are pointed out A P C

**Further study of paper-coating minerals and adhesives.** MERLE B SHAW, GEORGE W BICKING AND MARTIN J O'LEARY *Bur Standards J Research* 5, 1189-1203(1930), *Paper Trade J* 92, No 14, 52-7(1931), cf Hamill, Gottschalk and Bicking, *C A* 19, 175, 20, 1519, 21, 175 —American clays exam'd compared favorably with foreign clays as paper-coating minerals and produced good printing qualities Diatomaceous earth compd did not adhere well to the base paper The modified starches used did not appear to have as strong adhesive qualities as casein or glue Graded according to their clay suspending property, the adhesives were in the following descending order starch, casein, glue Chem analyses, color measurements and settling data for the minerals used are given A. PAPINEAU-COUTURE

**Animal and vegetable adhesives for paper manufacture.** GIULIO C CIOCCHI *Ind carta e arti grafiche* 33, 265-8, 512-3(1930) —The manuf of glue from bones, hides, etc is described The material generally employed in paper manuf is obtained from the fleshy side of hides, butcher's residues, hide cuttings, and calf and mutton heads Animal glue is a positive colloid, its solns represent dispersed systems with a very fine phase. The reaction of the gelatin must be nearly neutral, since the presence of acids reduces and hinders its fixation in paper. Microörganisms transform gelatin into an unfixable product $SO_2$ eliminates this danger. A good glue absorbs 10–12 parts of water. The value of glue depends on the water and ash contents, m. p., viscosity, swelling capacity, fatty matter, acidity, mineral impurities, the elastic force and adhesive power, all of which are influenced by the $p_H$ Gelatin has two max swelling points in water, $p_H = 2.4$ and $p_H = 11.6$, and has a min swelling point at $p_H = 7.7$. In the hydrolysis of ossein there is a min between $p_H$ 4.7 and $p_H$ 6, the reaction proceeds well with formation of a good product at $p_H = 3$–4. The decompn. of gelatin into proteoses and peptones follows in a 2nd hydrolysis, it is not strong between $p_H = 3$ and $p_H = 8$, but takes place beyond this To avoid hydrolysis during the evapn., the soln is brought to $p_H = 4.7$. Casein must be produced under conditions that effect coagulation in an acid medium with $p_H = 4$–4.1. At this hydrogen ion concn is obtained a product contg. the min quantity of salts The greatest yield with starch pastes is below 100°, above that temp. alteration follows Stayco gum is starch solubilized by oxidation; Osalon and Vosgeline are farina treated with $O_3$ Dextrin prepd. with farina gives a limpid water soln not obtained with starch from cereals. The cohesive power of dextrins decreases with the increase of their soly. in cold water. Gums are not well defined chem products Kordofan gum destroys the capillarity of water solns, having the same viscosity in cold and warm solns. Gum arabic solns of 20° Bé are used in paper making Gum Senegal is less sol. in water than gum arabic, and its more viscous and gelatinous solns sep. the gum more easily with many chemicals R. SANSONE

**Finishing, processing and converting of paper.** NORMAN CLARK. *Paper Trade J* 92, No 13, 53-5(1931) —After a brief summary of developments in the field of finishing, processing and converting paper during the year 1930, the Tech Assoc. of the Pulp and Paper Industry literature relating to coated and processed papers is reviewed. A PAPINEAU COUTURE

**The porosity of paper.** GIRO SILVIO. *Papier* 34, 173-81(1931); cf. *C. A.* 24,

6011 The effects of the thickness of the sheet and the pressure on the detn of the porosity are studied The tests were carried out on 100% soda, unloaded and uncalendered paper, all the samples being made from the same beaterful of stock to eliminate possible differences in degree of beating and sizing *Effect of thickness*· (1) The time required for the passage of a given vol of air through the sheet does not vary directly with the thickness, at least above a certain thickness, which might be called the limiting thickness (2) Above the limiting thickness, the time is practically const for a given pressure *Effect of pressure*· By defining the impermeability as the reciprocal of the porosity and calcg it from the formula $pt/2$, in which $p$ is the pressure and $t$ the time, it was found to be an essentially variable property, increasing with the pressure at which it is detd but varying only slightly above a certain pressure As it has been suggested that the impermeability is rather a function of $\sqrt{p}$, it was calcd from the formula $t \times f(\sqrt{p})$ but was found to be even more variable when expressed in this form. An attempt to find a formula which would give a practically const value for the impermeability at different pressures led to the formula $I = t/2 \times p^{1.75}$, but even this did not give absolutely const. values It is therefore considered preferable always to carry out the detn at a definite pressure, which should be selected either in the zone where small variations in $p$ lead to small errors in $t$, or in the zone of utilization of the paper.

A Papineau-Couture

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Stainless steels used in heavy machining [in paper mills] (Herd) 9. Animal materials for artificial silk (Mendel) 29. Structure of the crystal lattice of cellulose (Astbury, Marwick) 2. Swelling of cellulose in $HClO_4$ (Andress, Reinhardt) 2. Cellobiosan and cellulose (Hess, Garthe) 2. Bleaching machines (Ger pat 515,613) 25. Apparatus for clarifying waste waters of the paper, cellulose, etc., industries (Ger. pat 518,063) 14. Resins from cellulosic material (Russ appl 56,420) 26. Ultramarine [from sulfite liquor] (Russ appl 50,674) 26.

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**Cellulose** I G Farbenind A.-G (Heinrich Dickmann and Christoph Beck, inventors) Ger 518,154, Jan 0, 1929 In the manuf of cellulose by treating wood with $HNO_3$, the concn of the acid is maintained during the treatment by leading $NO_2$, or gases contg $NO_2$ into the reaction mixt

**Cellulose.** Zellstoffpfabrik Waldhof, Valentin Hottenroth and Otto Faust Fr 37,121, June 22, 1929 Addn to 663,684 (*C. A.* 24, 722) Cellulose of all kinds is improved by a treatment with NaOH, the temp of treatment and the concn of the NaOH being adapted to one another, the lower the concn of the soln., the lower being the temp used

**Treatment of grasses for the production of cellulose.** L Ordódy, B Ordódy, Z Hollósy and E Horváth Hung 101,627, May 12, 1930 Pectic substances and lignins are decompd by boiling under pressure with sufficient $Ca(OH)_2$ to neutralize the acid decompn products The silica of the raw material may be extd by hydroxides, carbonates or sulfides of alkali metals Cf *C. A.* 24, 5495

**Yellow pigmented cellulose.** Emile de Stubner U. S 1,705,764, March 10 Various details are described for pptg a yellow pigment from Pb acetate, $K_2Cr_2O_7$ and $H_2SO_4$ solns on "sol fibrous cellulose" such as cellulose ester or ether material in such finely subdivided form that when the material is dissolved, the pigment becomes dispersed in the soln without subjection to grinding or other special dispersing treatments

**Cellulose esters.** British Celanese, Ltd Brit. 338,745, Dec 11, 1928 Cellulosic material such as cotton, cotton linters reconstituted cellulose or wood pulp is subjected to successive pretreatments with $HNO_3$ (for an hr at about 50°) and an aliphatic acid anhydride such as $Ac_2O$ or propionic or butyric anhydrides (for an hr at room temp.) and may then be esterified by addn of a catalyst such as $H_2SO_4$ or $ZnCl_2$ and, if desired, a further quantity of the anhydride Products suitable for making rayon, films, etc., are obtained

**Cellulose esters.** I G Farbenind A.-G Brit 338,708, Feb 25, 1929 See Fr. 687,627 (*C. A.* 25, 813)

**Apparatus for digestion of nitrocellulose or for purification of cellulose.** M G.

Milliken (to Hercules Powder Co.) Brit. 338,941, May 20, 1929. In an app. of the character described in Brit. 301,267 (*C. A.* 23, 4071), the material is forced under pressure together with water through a restricted passage such as a coil (which may be formed of chrome steel of small diam. and a length of 2500–3000 ft.) which leads directly or through a suitable valve to a stand pipe or chamber to effect substantial equalization of pressure in the coil between the inlet and discharge ends. The coil may be heated by steam to 130–160°. Various details of app. and operation are described.

**Apparatus for saponifying cellulose acetate.** Verein für Chemische Industrie A.-G. (Karl Werner, inventor). Ger. 515,779, Aug. 12, 1928.

**Cement for films.** M. Sary. Hung. 100,689, Oct. 3, 1929. Ten g. celluloid is dissolved in 5000 g. acetone and 500 g. amyl acetate, and 10 g. AcOEt is added.

**Bleaching tower for fibers, especially cellulose.** Paper Patents Co. Ger. 515,961, Nov. 30, 1928.

**Bleaching unspun fibers.** Paper Patents Co. Ger. 515,731, Aug. 5, 1928. The bleaching of raw material, especially cellulose, for paper manuf. is described.

**Modifying the luster of rayon at the time of production.** H. Dreyfus. Brit. 338,490, May 17, 1929. In making filaments or other products from various specified cellulose esters or ethers, a reduced or modified luster is obtained by adding to the solns. used for dry or wet spinning a small proportion (suitably 0.5–2%) of finely subdivided insol. materials (preferably white pigments) such as $BaSO_4$, Pb sulfate, ZnO, Ba phosphate, $ZnCO_3$, $CaCO_3$, $MgCO_3$, $CaSO_4$, $Al_2O_3$ or silica, and, to minimize settling, materials of low sp. gr. may be added such as Li and Mg silicates, oils, dispersing agents, etc., also may be used. The use of alkyl and aralkyl ethers of starch also is mentioned, and various details and modifications of procedure are described.

**Artificial silk from viscose.** I. G. Farbenind. A.-G. (*Adolf Kämpf and Arnulf Hager, inventors*). Ger. 518,234, Apr. 27, 1929. Artificial silk of reduced luster is prepd. by spinning viscose solns. to which a small quantity of a stannate or antimonate, particularly a pyroantimonate, has been added. The added salt is decompd. during the spinning process, with the result that colloidal metal oxide is deposited in and on the fibers. An example is given.

**Artificial silk, etc.** Léon Lilienfeld. Fr. 37,344, July 31, 1929. Addn. to 666,178 (*C. A.* 24, 1509). Artificial threads of a high resistance in the dry state, above 2 g. per denier, are made by coagulating a thread of viscose by means of a gaseous mineral acid.

**Artificial silk spinning.** Hans Eggert. Ger. 515,871, July 14, 1926. The adhering pptg. bath is removed from spun artificial silk fibers by suction-washing the fibers after they are wound on spools.

**Artificial filaments, ribbons, etc.** British Celanese, Ltd., R. P. Roberts and L. W. Gregory. Brit. 338,036, July 29, 1929. Opaque products formed from org. esters or ethers of cellulose coagulated with aq. media are given improved transparency and tensile strength by heating them (suitably with dry steam or other hot gases or vapors while under tension, and if desired after preliminary impregnation with solvents, swelling agents or plasticizers). Various details of procedure are described.

**Centrifugal spinning apparatus for artificial silk manufacture.** W. S. Mumford. Brit. 338,958, Aug. 29, 1929. Structural features.

**Piston pump for solutions of viscose, cellulose acetate, etc.** Textiles Artificiels Ing. A. Maurer. Ger. 518,100, June 22, 1929.

**Spinning pumps for artificial silk.** Louis Claude Brun. Fr. 37,287, July 30, 1929. Addn. to 658,463 (*C. A.* 23, 5317).

**Apparatus for dry-spinning of artificial silk filaments.** Nelsons Silk, Ltd., and J. Nelson. Brit. 338,881, July 25, 1929. Structural features.

**Pulp from wood.** Linn Bradley and Edward P. McKeefe (to Bradley-McKeefe Corp.). U. S. 1,795,754, March 10. Wood is digested in a cooking liquor contg. most of its soda in the form of a sulfite of Na; the residual liquor is subjected to a treatment including a reducing furnacing operation to yield a product contg. $Na_2CO_3$ and a relatively large amt. of $Na_2S$; and the $Na_2S$ thus formed is utilized in an alk. cooking liquor to cook an addnl. quantity of wood. Residual liquor from this second cooking operation is subjected to a furnacing to yield a product contg. $Na_2CO_3$ and a lesser proportion of $Na_2S$ than was present in the alk. cooking liquor, and the furnace product is subjected to a sulfiting to produce a cooking liquor contg. a quantity of $Na_2SO_3$ at least equiv. to any $Na_2S_2O_3$ present; and the cycle is repeated, by use of the last mentioned cooking liquor in the first stage of the process. U. S. 1,795,755 relates to a cyclic process, in which one lot of wood is cooked in a liquor contg. $SO_2$ and $NaHSO_3$ and another lot of wood is cooked in a liquor contg. NaOH and a lesser quantity of $Na_2S$, residual liquors from these

2 operations being mixed and suspended matter sepd This is followed by addn of a Na compd such as NaOH capable of redissolving remaining suspended org material, concn., treatment of a portion of the concd liquor by a reducing furnacing operation to form $Na_2CO_3$ and a considerable amt of $Na_2S$, treatment of another portion of the liquor by furnacing to produce mainly $Na_2CO_3$ without much $Na_2S$, forming sep liquors from these 2 furnace products, causticizing the liquor contg the greater proportion of $Na_2S$ to form a cooking liquor contg NaOH and $Na_2S$, and subjecting the other liquor to treatment to form a cooking liquor contg $NaHSO_3$ and $SO_2$ and not contg any objectionable quantity of $Na_2S_2O_3$ U. S. 1,795,756 relates to a generally similar process in which however the wood cooked in alkali is treated with a larger proportion of $Na_2S$ than NaOH when freshly charged into the digester Cf. *C. A.* 25, 816

**Pulp from material such as wood chips.** Erwin H. Hussey (to Bauer Bros. Co.) U. S. 1,795,603 March 10 Material such as wood chips is disintegrated in the presence of sufficient water to thoroughly impregnate the material but without any substantial excess of water, further reduction and disintegration is effected (suitably by rotating disks) in the presence of a large quantity of water, followed by rolling, pressing and squeezing of the material, without appreciable cutting, between rotating, relatively movable disks having teeth inclined in an opposite direction to the direction of rotation App. is described

**Bleaching wood pulp.** Linn Bradley and Edward P. McKeefe (to Bradley-McKeefe Corp.) U. S. 1,795,757, March 10 Fibrous material from an incomplete digestion of wood is treated with liquor comprising a manganate such as $NaMnO_4$ together with an alkali metal hypochlorite U. S. 1,795,758 describes numerous details and modifications of procedure of a process which may comprise digesting raw cellulosic materials in successive batches, one in an alk. cooking liquor and the other in an acid cooking liquor, and forming each liquor with inorg. compds. derived and recovered from the other liquor after the cooking operation therewith Cf. *C. A.* 24, 4634

**Paper pulp.** Mead Pulp & Paper Co. Brit. 339,333, Aug. 28, 1929 In a continuous process of pulp production, stock of high consistency is treated with a gaseous chlorinating agent as it is fed down a tower (which may be fed with gaseous Cl from a liquid Cl supply) Numerous details of arrangement and construction of app. are described Cf. *C. A.* 24, 4392

**Paper pulp.** Mead Pulp & Paper Co. Brit. 339,334, Aug. 28, 1929 For producing a free pulp of high strength, color, and clay-carrying quality suitable for paper making, from wood, straw, fibrous grasses and the like, such as that which has been subjected to an incomplete chem. digestion (e. g., leached chestnut chips), the material is subjected to multi-stage and coördinated chlorinating treatment, the first stage being with an insufficient quantity of chlorinating agent acting at a limited temp. and the second stage involving treatment of a thickened pulp with a stronger chlorinating agent Numerous details of app. and procedure and auxiliary and preliminary treatments of the material are described

**Rotating perforated drum apparatus for separating paper pulp, peat fiber, etc., from liquids** E. F. Sundström and K. E. Steen Brit. 338,547, July 18, 1929 Structural features

**Treating black liquor from the soda-pulp process.** Erik Hägglund Ger. 518,062, June 24, 1926 See Brit. 273,267 (*C. A.* 22, 1854)

**Treating black liquor formed in the soda-pulp process.** Erik Hägglund U. S. 1,795,557, March 10 The liquor is subjected to a heat and pressure treatment to ppt. most of the org. substances present as carbonaceous and pitchy material After sepn. of the liquor from the ppt. thus formed, it is causticized (the acetate content being left substantially unchanged) and concd., and a portion of the NaOAc content is crystd. out Another portion of the causticized liquor is used to increase the alkalinity of the black liquor, and a further portion is used to act upon pulp-forming fibrous material, crystd. NaOAc and volatile products are recovered An arrangement of app. is described Cf. *C. A.* 21, 3128, 24, 4932

**Paper.** Felix Thunert Ger. 518,099, Dec. 24, 1924 A method is described of making packing, etc., paper having a downy upper surface, by securing cellulose wadding to a smooth paper support by means of an adhesive

**Paper, molded sheets, blocks, etc., from fibrous materials.** Respats, Inc. Brit. 339,528, Jan. 11, 1930 See U. S. 1,770,430 (*C. A.* 24, 4634)

**Bituminous paper board.** A. Sommer Hung. 100,522, Aug. 7, 1929 Molten asphalt is emulsified with paper pulp by mixing and heating The emulsion is broken down by drying, and paper board is made from the solid phase by rolling

**Roll for calendering apparatus.** Theodor Greis. U. S. 1,795,556, March 10 A

calendering roll comprises a core around which is wound a band or ribbon of material standing on edge and having its weft threads arranged in staggered relation

Imparting high finish to paper. ALBERT L. CLAPP (to Bennett, Inc.). U. S 1,797,048, March 17 After the drying operation, there is applied to paper an aq dispersion of solid particles of waxes flexible at the calendering temp of the usual hot calendering rolls at the dry end of the paper machine, and the paper is hot calendered App is described

Apparatus (with twin glazing cylinders) for glazing paper. J. W. GRANT. Brit. 339,370, Sept 13, 1929 Structural features.

Waterproof flexible paper. THE SCUTAN CO. Ger 514,922, Nov. 25, 1927. See Brit 281,316 (*C A* 22, 3530)

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E MUNROE AND C G STORM

**Fifty years' experimental research upon the influence of steam on combustion of carbonic oxide.** WM A BONE *J Chem Soc* 1931, 338–61 —An historical account is given of expts and theories on the combustion and explosion of gaseous mixts from the time of H B Dixon's discovery of the activation by water vapor of the combustion of CO (1877) up to now Chem and phys theories of gaseous explosions are considered in sep sections J G MCNALLY

**The laws of combustion of colloidal powders containing vaseline.** H. MURAOUR AND G AUNIS *Compt rend* 192, 418–21(1931) cf *C A* 24, 4396 —The variation in $\int p dt$, in which $p$ is the pressure prevailing during combustion and $t$ is time, was studied in powders contg (1) vaseline and (2) centralite ((C$_6$H$_5$N)$_2$CO) to lower the temp of explosion of the nitrocellulose nitroglycerin mixt The decrease in $\int p dt$ with d of charge is much less with vaseline than with centralite The powders contg vaseline obey the same laws of combustion as other powders at high ds of charge but not at ds corresponding to pressures below 500 kg per sq cm The peculiar behavior of vaseline is attributed to the fact that it is emulsified rather than dissolved in the powder. F L BROWNE

**Dust explosions, with special reference to wood-working industries.** H. R. BROWN *Am. Soc. Mech Eng*, Advance paper, Dec 1–5, 1930, 3 pp —Explosions in flour mills have been common, but now this hazard is recognized in grain elevators, starch factories, sugar refineries, wood-working plants, textile mills and other factories in which materials in form of dust are manufd Precautionary measures are suggested and regulations have been tentatively adopted for prevention of dust explosions in wood flour mfg establishments. E I. S

**The constitution of atmospheres behind stoppings.** T. DAVID JONES *Colliery Guardian* 142, 398–401, 493–4(1931).—Many analyses are reported of mine air contained in sections of coal mines which, for one reason or another, have been sealed off Four different types are distinguished which are characteristic of the action taking place in the district sealed off. (1) The air is almost unchanged with time There is little formation of $CO_2$ (2) The air is more or less rapidly replaced by $CH_4$, the $CO_2$ formed from the original air being pushed out In one case $CH_4$ reached 90% in 12 weeks, the addnl 10% being N (3) The air is replaced by a mixt of $CO_2$ and $N_2$ (black damp). In one unusual case black damp (with 18% $CO_2$) reached 100% in 134 weeks This type is due to fires When the $O_2$ has been reduced below 10% flames cannot exist, although heating may continue until the $O_2$ has been used up (4) This results from a race between the accumulation of fire damp and the diminution of O From a safety point of view explosions do not occur when the $CH_4$ exceeds 15% or the $O_2$ is less than 10% Generally the $CH_4$ wins the race Examples of consecutive analyses and diagrams illustrating the 4 types are given A. L. KIBLER

*Role of gas masks in mines (Eszto) 13. The propagation of flame in electric fields* (GUÉNAULT, WHEELER) 2. Use of HCl to prepare bore holes for blasting (Brit. pat. 338,454) 13.

**Explosive derived from hexamethylenetetramine.** E. L. D'ASTECK. Brit. 339,024, Sept 20, 1929 $(CH_2)_6N_4$ is oxidized with $H_2O_2$, the resulting product is treated with $HNO_3$ and is further oxidized with $H_2O_2$ Various details of procedure are described.

**Blasting cap.** WM. PRITCHARD, JR. (to Hercules Powder Co.). U. S. 1,795,440,

March 10 A weighting material such as Pb is placed in a cap comprising a casing and a charge which may be formed of fulminate-chlorate compn. in order to give the cap as an entirety a sp gr higher than that of coal, so that mech. sepn from the broken coal is facilitated

Diffusion apparatus for indicating the presence of combustible gases in air. BRUNO TREBITSCH Austrian 120 986, Aug 15, 1930

Testing mixtures of coal dust and stone dust in mines. EMIL WITTE Ger. 472,529, Dec. 11, 1925 The mixt. is compared with a graduated color tube contg coal dust at one end and stone dust at the other, with gradual intermediate mixing.

Testing mixtures of coal dust and stone dust in mines, etc. EMIL WITTE. Ger. 514,162, June 15, 1929 Addn to 472,529 (preceding abstr.).

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Biphenyl: A starting point in organic synthesis. GILBERT T. MORGAN AND LESLIE P WALLS. *J Soc Chem Ind* 50, 94T(1931).—Biphenyl, now available industrially at a moderate price, is pointed out as a possible source of *intermediates for synthetic dyes and drugs* Examples are given H. W. LEAHY

The copperas indigo vat. J CLAROU *Tiba* 9, 247–51(1931).—A description of the vat dyeing of cotton with indigo in the presence of $FeSO_4$. A PAPINEAU-COUTURE

Troublesome fibers in the dyeing of garments. VALETTE. *Tiba* 9, 141, 143 (1931).—A brief outline of the chem and tinctorial properties of some fibers which give trouble to dyers and cleaners acetate rayon, acetylated wool, "immunized" cotton, "passive" cotton, "amido" cotton A PAPINEAU COUTURE

Cause of the greenish shade of cotton fabrics jigged in indigosol O by the steaming process. LOUIS A DRIESSEN *Tiba* 9, 139(1931).—One method of application of indigosol O consists in jigging cotton fabric in a bath contg indigosol O, $NH_4CNS$, $NaClO_3$ and $NH_4VO_3$, drying and steaming 1–15 min In some cases a greenish shade is produced It is shown that this is due to the use of too much $NH_4CNS$ which, on heating (especially if prolonged) gives rise to the formation of persulfocyanic acid. The trouble can be eliminated by reducing the proportion of $NH_4CNS$ or by using $NH_4$ oxalate or lactate in place of $NH_4CNS$ A PAPINEAU COUTURE

Even dyeings on wool. ALB BYTEBIER. *Rev chim ind.* 39, 262–5(1930). P. THOMASSET

Partial alkaline hydrolysis of acetyl silk as a pretreatment for dyeing. W. COLTOF, H I WATERMAN AND J G WOLF *Z. angew Chem* 44, 163–8(1931).—Superficial hydrolysis of acetylcellulose fibers in dil NaOH and AcOH, at 60°, attained max. effects, which depended on the alkali concn The wt losses were 4.2, 6.3 and 8.4% in 0.0067, 0.0101 and 0.0133 *N* NaOH. If complete deacetylation of cellulose units took place (as has been claimed), the cellulose formed should be calculable from the wt. losses Extn of the treated fibers with $Me_2CO$ gave greater residues of cellulose than the calcd values It is concluded that intermediary layers of incompletely deacetylated material exist below the completely hydrolyzed surfaces. The treated fibers were dyed under standard conditions (1 hr at 70°) with benzopurpurin 4B. Absorption was detd by colorimetric examn of the bath before and after dyeing Absorption on the untreated fiber was negligible; it increased rapidly, at first, with increasing deacetylation, but reached a max when the wt. losses were 2–3% Greater absorption may be produced only by lengthening the time of dyeing Consideration of this factor is of great importance to the dyer K. H ENGEL

Unit heaters prevent condensation in dye houses. J R. COOPER. *Heating, Piping and Air Conditioning* 2, 767–9(1930).—A discussion of the problem of air transportation in plants where moisture removal is of paramount importance and a description of several specific installations of unit heaters in dye rooms E I. S.

Note on the boiling of cotton preliminary to bleaching. J. DUTREILLIS. *Tiba* 9, 245, 247(1931).—It is considered that the most logical procedure is as follows: treatment with hot 1.5° Bé HCl, treatment with $C_6H_6$ or similar fat solvent and boiling at atm. pressure with $Na_2CO_3$, if necessary a pancreatin treatment can be carried out between the fat extn. and soda boiling A. PAPINEAU COUTURE

The use of liquid chlorine in the industry of bleaching cotton cloth. LA BLANCHISSERIE ET TEINTURERIE DE THAON LES-VOSGES (Sealed communication of 1914) *Bull soc. ind Mulhouse* 97, 60–2(1931).—A process for the prepn. of hypochlorite liquors

and their use in bleaching cotton are described The app consists of a column in which an ascending stream of Cl gas meets a spray of NaOH soln or milk of lime. J H. O.

**The generating and application of x-rays for textile investigations.** HERMAN BOXSPR. *Am. Dyestuff Reptr* 20, 163–6(1931) —Seven references are listed. A K. JOHNSON

**Physical and chemical properties of textiles. II.** A J HALL. *Textile Mercury* 84, 239(1931), cf *C A* 25, 2296 —Some effects of the phys conditions of rayons and the methods of manuf on the resistance of cellulose to snail enzyme degradation are shown A K. JOHNSON

**Identification and analysis of rayons.** H TATU *Russa* 6, 175–87(1931) —A critical review of methods proposed for the identification and analysis of nitrocellulose rayon, the identification and analysis of acetate rayon, the sepn of viscose from cuprammonium rayon, microscopical examn and ultra violet examn Bibliography of 40 references A PAPINEAU COUTURE

**Pieces of artificial crepes containing acetate rayon.** A CRISPE *Russa* 6, 243–7 (1931).—Practical operating directions A PAPINEAU-COUTURE

**Cellulose amyloid and the utilization of the amyloid effect in the textile industry.** JUSTIN-MUELLER *Tiba* 9, 129–33(1931) —The optimum conditions for the production of amyloid consist in dissolving 5 82 parts of cellulose in 100 parts of $H_2SO_4$ (d 1.580) to a thick starch like paste and then pouring the soln slowly into a large vol of cold $H_2O$, which gives a white, curdy ppt To obtain a pulverulent ppt it is necessary to use a large excess of acid, or to allow the latter to act for a longer period, but this results in attack of the amyloid with production of dextrin or glucose On drying the ppt. after washing to neutrality, it becomes grayish, hard, horny and more or less translucent, but softens again on prolonged contact with cold water The wet ppt or its NaOH soln does not reduce Fehling's soln , but if allowed to stand after boiling with Fehling's soln the surface becomes very slightly reddish, showing a very slight reduction by surface action The chief characteristic is that the dried ppt is more resistant to the action of reagents than the undried ppt indicating that there is probably a certain amt. of polymerization on drying The production of cambric effects on cotton by treatment with $H_2SO_4$ and the parchmentizing of paper are both considered to be due to a superficial amyloidation of the fabric or paper Rapidly passing rayon (viscose, acetate, cuprammonium) fabrics through $H_2SO_4$ (50–52° Bé ), followed immediately by thorough washing and final treatment with dil $NH_3$ increases the tensile strength, but gives a rougher touch A PAPINEAU-COUTURE

**The behavior of the aqueous solution of domestic cocoons. I. II.** HIDEO KANEKO *J Agr Chem Soc Japan 6, 623–32, 1015–22(1930)* —*The greater the* surface tension of the aq soln of boiled cocoons is, the better the reeling. The isoelec. pt. of aq solns in which the reeling is easy is 4 25–4 4 The sp elec cond ($k$) of the aq soln. = log $C + B$, in which $C$ is the concn and $B$ is the const. (about 1.1), $k$ increases with the temp The cond of the soln is changed more by acids than by bases. The cond of a soln having good reelability is not changed by the addn of electrolytes Y KIHARA

**Medulla in wool. A new test for detection of hairiness in the fleece.** B L ELPHICK. *New Zealand J Agr* 42, 91–8(1931) —Medullated fibers present a bright chalky appearance when a sample of wool, free of grease and dirt, is immersed in benzene and is viewed against a black background Pure wool fibers have a silky transparent appearance The test can be carried out in about 5 min K. D. JACOB

**Recovery of spinning oil from fulling plants.** A. BEVER *Tiba* 9, 133–7(1931).— A brief outline of the advantages and of the various processes of recovery, and also of the necessity of controlling the compn of the effluent to eliminate portions contg such small amts of oil as to render the recovery uneconomical A PAPINEAU-COUTURE

**Glue and gelatin in the textile industry.** HERMANN STADLINGER. *Kunstdünger u Leim 28, 81–9(1931)* —Numerous uses of these materials in various operations in mfg. textiles are described, with notes on the qualities required and suggestions for new uses Many working formulas are included C J SCHOLLENBERGER

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Proteins of wool (SAITO) 11A. Water requirements in the textile industry (KEHREN, STOMMEL) 14. Aromatic amines [dyes] (Ger pat 515,758) 10. Substitutes for sugars [in printing or dressing textiles] (Ger. pat. 518,196) 18.

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*Deutscher Färberkalender, 1931.* Wittenberg A Ziemsen Verlag M 5 Reviewed in *J. Soc Dyers Colourists* 47, 82, *Tiba* 9, 211(1931).

**Dyes.** Chemische Fabrik vorm Sandoz Brit 338,858, Dec. 20, 1928 An arylaminoanthraquinone contg in the benzene ring to which is attached the arylamino group a halogen atom in β position and in the other benzene residue a sulfonic acid group is treated with sulfite (with or without the presence of phenol or a similarly acting compd.) which effects replacement of the β halogen atom by a sulfo group Examples are given of the production of water sol dyes suitable for wool dyeing and printing giving fast blue to greenish blue shades

**Dyes.** I G Farbenind A G Brit 338,747, Dec 4, 1928 Halogenated dibenzopyrenequinones are made by causing halogen or a halogenating agent to react in an alkali $AlCl_3$ melt with a 3 4 8 9 dibenzopyrene 5,10 quinone or a 4,5,8,9-dibenzopyrene 3 10 quinone, or with a ketone capable of being transformed into such a pyrene quinone by ring closure The products may be after treated with a hypochlorite to improve the shades of the dyeings Several examples are given, including dyes giving orange and scarlet tints

**Dyes** I G Farbenind A.-G Brit 339,489, Dec 6 1928 4,5,8,9-Dibenzopyrene 3 10-quinones contg both Cl and Br are made by chlorination of brominated dibenzopyrenequinones or by bromination of chlorinated dibenzopyrenequinones Several examples are given for the production of dyes producing various red tints

**Dyes.** I G Farbenind A.-G Fr 37,120, June 22, 1929 Addn to 670,562 *N'* Dihydro-1 2,2' 1' anthraquinoneazines contg Me groups in the anthraquinone ring are made resistant to Cl by a treatment with $H_2SO_4$ and $MnO_2$ or other oxidizing agents having a similar action An example is given of the treatment of the 3,3' dimethyl deriv Cf *C A* 24, 2608

**Dyes.** I G Farbenind A.-G Fr 37,442, Sept. 18, 1929 Addn to 667,108 The sulfonic acids of Fr 667,108 (*C A* 24, 1223) are replaced by the corresponding carboxylic acids of aromatic diamino compds Examples are given

**Dyes.** Soc anon pour l'ind chim à Bâle Fr 37,190, July 4 1929 Addn to 677 782 (*C A* 24, 3378) Dyes of the general formula 2,3 $(R^1N{:}N)(HO_3S)C_{10}H_4(NH{:}X{:}NH{:}R^2{:}N{:}NR^3)$ 6, in which X represents a residue such as CO or CS or a triazine quinazoline, pyridazine, pyrimidine or like heterocyclic residue, $R^1$ is the residue of anthranilic acid or a deriv thereof, $R^2$ is an aryl ring and $R^3$ is an aryl ring contg an OH and COOH group *o* to one another, are prepd by coupling the aminonaphthol derivs with a diazo compd corresponding to the group $R^1$ Examples are given

**Azo dyes.** I G Farbenind A.-G Brit 338,672, Oct. 10, 1928 Azo dyes (examples of which dye cotton yellow and red shades) are made by diazotizing the compds produced by subjecting mono- or di nitrobenzoylated diaminoarylsulfonic acids to slight reduction (such as is required to convert an aromatic nitro compd into an azo- or azoxy-compd., as described in Brit. 313,636, *C A* 24, 1227) and coupling with a coupling component. Several examples are given

**Azo dyes.** I G Farbenind A G Fr 37,157, June 28, 1929 Addn to 677,491 (*C A* 24, 3116) Azo dyes are prepd by coupling *o* hydroxydiazo compds with hydroxyquinolone derivs and choosing the reaction components in such a manner that the product contains at least one sulfonic group Thus, 4-chloro-2-aminophenol-6-sulfonic acid is diazotized and coupled with 1 phenyl-4 hydroxy 2-(1)quinolone to give a dye which dyes Cr-mordanted wool a Bordeaux red shade Other examples are given

**Azo dyes.** I G Farbenind A.-G Fr. 37,203, July 10, 1929 Addn to 674,638 (*C A* 24, 2892) Azo dyes are prepd in substance or on the fiber from condensation products of diazo compds with primary amines which contain groups giving soly in water Thus the diazoamino compd of 2 5-dichloro-1 aminobenzene and 4 sulfo-2 aminobenzoic acid is coupled with 2',5'-dimethoxyanilide 2 hydroxynaphthalene-3 carboxylic acid, the dye formed giving a yellowish brown shade Several examples are given

**Azo dyes.** I G Farbenind A.-G Fr 37,383, Aug 31, 1929 Addn to 645,771 (*C A* 23, 2041) Azo dyes are prepd by coupling 2,3 hydroxynaphthoyl 2-amino-3 naphthol ethers with diazo compds. of *p*-aminodiaryl ethers, the 2 and 5 positions of which, with respect to the $NH_2$ group, are substituted but which do not contain COOH, $SO_3H$ or nitric groups, *e g*, 3 methyl 6-chloro-4-aminodiphenyl ether

**Metal compounds of azo dyes.** Soc. anon pour l'ind chim à Bâle Ger 518,016, Sept. 8, 1928 See Brit. 297,478 (*C A* 23, 2836)

**Azo dyes containing chromium.** Fritz Straub and Hermann Schneider (*to* Soc. anon. pour l'ind chim à Bâle) U S 1,796,058, March 10 A chromable dye such as that formed from diazotized 6-nitro-2 amino-1-phenol-4 sulfonic acid and β naphthol is treated with Cr hydroxide in the presence of a water sol salt of hydrosulfuric acid such as $Na_2S$ Various other examples are given Cf *C A* 24, 5164

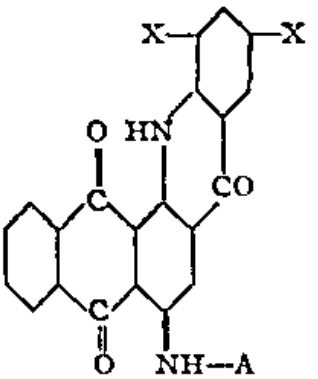
**Chromium compounds of azo dyes.** I G FARBENIND A.-G. Brit. 338,595, Aug. 22, 1929. Compds. dyeing wool greenish yellow shades are formed by boiling a Cr salt with dyes such as those formed from 2-chloroaniline (or 4-chloro-3-toluidine) and the methylpyrazolone from 2-amino-2'-hydroxy-4-sulfo-3'-carboxy-5'-methyldiphenyl sulfone or similar components. Cf. *C. A.* 24, 1746.

**Vat dyes.** I G FARBENIND A.-G. Brit. 339,396, Sept. 28, 1929. An acylating agent is caused to react on a condensation product obtained by treating a 1-(*Bz*-1-benzanthronylamino)-4- or 5- or 8-aminoanthraquinone or a substitution product halogenated in the benzanthrone residue with an alkali condensing agent. Products are obtained dyeing olive shades fast to Cl, and several examples are given. Among the acylating agents which may be used are benzoyl chloride and cinnamic acid chloride.

**Vat dyes.** BRITISH DYESTUFFS CORP., LTD., and ANTHONY J. HAILWOOD. Fr. 37,360, Aug. 22, 1929. Addn. to 638,387 (*C. A.* 23, 286). The dye obtained by the fusion of naphthalimide or acenaphthenequinone with NaOH under conditions other than those indicated in the 1st example of Brit. 26,690/13 is brought into a sol. or colloidal form for use in the vat by treatment with an acid agent such as oleum or $ClHSO_3$ followed by a fresh pptn. by dil'n.

**Vat dyes.** I G FARBENIND A.-G. Fr. 37,173, July 2, 1929. Addn. to 669,740 (*C. A.* 24, 1990). The action of Br on dibenzanthrone or isodibenzanthrone or their derivs. for the production of dyes is carried out in the presence of $ClHSO_3$ at temps. below 50°.

**Vat dyes.** I G FARBENIND A.-G. Fr. 37,184, July 2, 1929. Addn. to 674,639 (*C. A.* 24, 2891). Vat dyes are prepd. by the reaction of a halogenated anthraquinone-acridone contg. 3 or more halogen atoms with a halogenated aromatic amine. The products obtained probably correspond with the formula



in which X represents any halogen atoms and A is an aromatic ring. Examples are given.

**Vat dyes.** I G FARBENIND A.-G. Fr. 37,309, Aug. 6, 1929. Addn. to 679,912 (*C. A.* 24, 3909). Vat dyes are prepd. by condensing an α-hydroxyanthracene with an α-compd. of a 4-methyl-5-halo-7-alkoxyisatin. Thus, α-anthrol heated in PhCl with 4-methyl-5-chloro-7-methoxyisatin gives 2-anthracene-4'-methyl-5'-chloro-7'-methoxy-2'-indole indigo which dyes fiber a greenish blue shade.

**Vat dyes.** I G FARBENIND. A.-G. (Wilhelm Eckert and Otto Braunsdorf, inventors). Ger. 517,195, June 19, 1928. *See Brit. 313,837 (C. A. 24, 1226).*

**Vat dyes.** I G FARBENIND A.-G. (Hugo Wolff and Ernst Honold, inventors). Ger. 517,442, Apr. 30, 1929. *Addn. to 489,957 (C. A. 24, 2305).* Vat dyes are obtained by treating polyanthraquinonylaminobenzanthrone compds. which have an anthraquinonylamino residue in the *Bz*-1-position, with alkali and, optionally, treating the resulting dye with acid condensing agents. Thus, di(1'-anthraquinonyl)-6-*Bz*-1-diaminobenzanthrone (obtained from 6 *Bz*-1-dihalobenzanthrone and 1-aminoanthraquinone) is fused with NaOH and alc. at 180–200°. The resulting mass is heated with water, filtered and washed. The dye so obtained colors vegetable fibers in olive-brown shades from a NaOH and hydrosulfite vat. Further examples are given. Cf. *C. A.* 24, 4941.

**Vat dyes.** I. G FARBENIND A.-G. (Georg Rösch, inventor). Ger. 518,017, Aug. 9, 1929. Yellow to orange vat dyes are prepd. by combining 2 mols. of an α-aminoanthraquinone with 1 mol. of naphthalene-2,6-dicarboxylic acid or its derivs. not contg. OH groups. Suitably, the dichloride of the acid is heated with the α-aminoanthraquinone in $PhNO_2$. Examples are given.

Vat dyes. I G Farbenind A G (Heinrich Nerresheimer and Wilhelm Schneider inventors) Ger 518,230, July 26, 1929 The dyes described in Ger 491,430 (*C A* 24, 2518) are halogenated The products are faster to Cl than the initial dyes and give modified dyeings Examples are given

Violet vat dyes. I G Farbenind A.-G (Maximilian P Schmidt and Wilhelm Neugebauer inventors) Ger 502,352 Apr 30, 1927 Haloperylenetetracarboxylic acids contg not more than 3 halogen atoms are condensed with *o*-diamines. An example is given

Blue-green vat dyes. Soc. anon pour l'ind chim a Bale Brit. 339,516, Dec. 24 1929 2 Methylbenzanthrone or a deriv contg a replaceable substituent in the *Bz* 1 position is sulfurized and converted into products of improved properties by dissolving in $H_2SO_4$ and dilg the soln thus formed continuously with water or with aq $H_2SO_4$ so that the dye is pptd but impurities are retained in soln, or purification may be effected by reducing to the leuco compd sepg and oxidizing the latter if desired

Blue vat indanthrone dye. D A W Fairweather, J Thomas and Scottish Dyes Ltd Brit 338,891 May 25 1929 2 Aminoanthrahydroquinone 9,10-disulfuric ester is oxidized by use of a cupric salt such as the sulfate or chloride (suitably with addn of NaOH or HCl) to avoid danger of over-oxidation and produce a product which is presumably indanthrone

Acid wool dyes. I G Farbenind A.-G (Rudolf Muller and Ernst Honold, inventors) Ger 518,229, Mar 18, 1928 The diazo compds. from 1 aminoanthraquinone-2 sulfonic acids substituted in the 4 position with a readily exchangeable atom or group or the residue of a base are treated with primary or secondary bases. Thus, the diazo compd from 1 amino-4 bromoanthraquinone 2-sulfonic acid may be treated with $PhNH_2$ while cooling in the presence of a little Cu The reaction proceeds with evolution of *N* Other examples are given also Cf *C A* 25, 214

Acid wool dyes. Wilhelm Eckert (to General Aniline Works) U S 1,796,011, March 10 Dyes producing generally yellow or greenish yellow dyeings (according to the several examples described) on animal fibers or cellulose esters and ethers are produced by causing a compd of the group consisting of $NH_3$, alkyl—$NH_2$, aralkyl—$NH_2$, aryl—$NH_2$ and *o* arylene $(NH_2)_2$ (the aryl residues being substituted or not) to act upon a compd of the general formula of a naphthalic anhydride wherein may be substituted the sulfonic or the sulfamic acid group and a univalent substituent in the presence of water at a temp of about 100° The use of the Na deriv of 4-sulfamino-1,8-naphthalic anhydride and *o* $C_6H_4(NH_2)_2$ and similar starting materials is described, and the same or similar dyes are obtained by transforming the reaction products of naphthalic anhydride or a deriv thereof, with $NH_3$, an aliphatic or aromatic amine into the sulfonic acids or sulfamic acids, resp or by subjecting naphthalic anhydride or a deriv. thereof to react with a sulfonic acid of an amine U S 1,796,012 describes the production of generally similar dyes by treating nitronaphthalic acid derivs. (such as nitro-1,8-naphthalimide contg H, alkyl, aralkyl or aryl on the N) in an aq soln with such reducing agents as simultaneously effect the entrance of a sulfonic acid group Such agents are, for instance hyposulfite, bisulfite or the like. It is advantageous to add to the aq soln a water sol. org solvent, *i. e.*, alc. The reaction is generally carried out at boiling temp, but it is also sufficient to heat the soln. to a somewhat lower temp It is also possible to use as parent materials such nitronaphthalic acid derivs. as contain a sulfonic acid group In this case the introduction of a further sulfonic acid group is unnecessary and it is sufficient to reduce the nitro group Examples are given of the use as starting materials of *N* methyl-4-nitronaphthalimide (or the corresponding ethylimide or phenylimide), 4 nitronaphthalimide and *N*-(*p*-sulfophenyl)-4-nitro-1,8 naphthalimide. Cf *C A* 25, 1097

Anthraquinone dyes. I G Farbenind A.-G Brit. 339,266, Sept. 3, 1929 1-Amino-4 bromoanthraquinone 2 sulfonic acid is caused to react with an aromatic amine contg a hydroxyl group, which is etherified by a polyhydric alc., such as *o*- or *p*-aminophenol glycol ether or *p*-aminophenol glycerol ether, suitably in the presence of Cu or a Cu salt and of $Na_2CO_3$ The dyes dye wool clear blue or greenish blue shades

Acylaminoanthraquinone dyes. I G Farbenind A.-G Brit. 339,267, Sept. 3, 1929 Two mol proportions of a-aminoanthraquinone or a substitution product are condensed with 1 mol. proportion of a reactive deriv of a naphthalenedicarboxylic acid, a diphenylmethanedicarboxylic acid, diphenyl *p,p'*-dicarboxylic acid or a halogen substitution product of such compds (with the exception of such dicarboxylic acids as are capable of forming internal anhydrides) Various examples are given for the production of dyes giving yellow, orange and red shades.

Dibenzanthrone dyes. R. S Barnes, R. F Thomson, J Thomas and Scottish

Dyes, Ltd. Brit. 339,321, May 31, 1929. Fuchic esters of dibenzanthrone or halogenated dibenzanthrone are treated with oxidizing agents (such as $Na_2Cr_2O_7$, $K_2S_2O_8$, $KMnO_4$, $V_2O_5$ or $H_2O_2$) in the presence of an inorg. acid of at least 4% strength. Various details and examples are given.

Sulfurized dyes. I. G. Farbenind. A.-G. Fr. 37,481, Oct. 2, 1929. Addn. to 653,785 (*C. A.* 23, 3816). Sulfurized dyes are prepd. by heating halogenated dinaphthylene dioxide with S, with or without diluents of high b. p., or melting these compds. with polysulfides in the known manner. Examples are given of dyes from the tetrachloro, pentachloro, tetrabromo and hexachloro compds. Cf. *C. A.* 25, 1090.

Sulfuretted dyes. I. G. Farbenind. A.-G. Brit. 339,410, Oct. 10, 1928. Acid mordant dyes probably of the thiazine series are obtained by reaction of S in fuming $H_2SO_4$ on a β hydroxynaphthoquinonesulfoarylimide (in which O, OH and the $NRSO_2H$ group are in the 1, 2 and 4 positions, resp.) in which the aryl group (R) may contain further substituents with the exception of alkylamino groups. Examples are given for the production of dyes dyeing wool from an acid bath reddish violet shades which turn green when after-chromed, the dyes are suitable for printing wool or cotton by the chrome printing process. Cf. *C. A.* 25, 2005.

Pastes from insoluble mordant dyes. E. Ya. Vinetskaya. Russ. appl. 22,888, Sept. 13, 1927. Pastes are prepd. from alizarin by mixing the dry dye with 5–10% of a protective colloid, such as gum tragacanth, etc., and grinding the mixt. in a colloid mill together with water.

Pasting sulfur dyes with resin soaps. I. G. Farbenind. A.-G. (Franz Schweitzer-Hennig and Walter Hagge, inventors). Ger. 518,198, June 10, 1928.

Improving the solubility of dyes. Arthur R. Murphy and Joseph B. Orsch (to Newport Chemical Corp.). U. S. 1,706,115, March 19. A dye such as direct fast yellow 5G is dissolved in water in the presence of a sol. pyrophosphate salt such as Na pyrophosphate, which serves as a solubilizing agent.

Fuchsin. C. N. Ignatyev and I. I. Vasin. Russ. appl. 50,998, July 11, 1929. *Fuchsin is prepd. by heating above 100° in the presence of air a mixt. of aniline, o- and p-toluidine and activated carbon without the addn. of any kind of oxidizer.* The fuchsin is extd. from the melt by any of the known methods.

Parafuchsin. S. N. Ignatyev and I. I. Vasin. Russ. appl. 50,307, Nov. 29, 1929. Parafuchsin is prepd. by heating a mixt. of $(p\text{-}H_2NC_6H_4)_3CH$, aniline and its salt, iron chloride and activated wood charcoal in the presence of air. The dye formed is extd. from the melt, which is first freed from the excess of aniline by the usual methods. The extn. can be carried out, *e. g.*, first with acidified water and then with org. solvents.

Bisulfite compound of alizarin blue. A. A. Razumeyev. Russ. appl. 49,462, June 19, 1929. A mixt. of alizarin blue paste or the dry dye with a soln. of alkali is supersatd. with sulfurous gas under agitation and let stand under ordinary or superatmospheric pressure at ordinary or elevated temp. until a sample is completely sol. in water. The product is then isolated by ordinary methods.

Anthanthrone derivatives. I. G. Farbenind. A.-G. (Max A. Kunz, Karl Köberle and Erich Berthold, inventors). Ger. 518,231, Aug. 10, 1928. New compds. useful as *vat dyes or intermediates* are prepd. from di- or poly-aminoanthanthrones by substituting a radicle for H in one or more of the $NH_2$ groups. Examples are given describing the reaction of diaminoanthanthrone with PhCOCl, 1-chloroanthraquinone and 1-aminoanthraquinone-2-carboxylic acid chloride. Cf. *C. A.* 25, 602.

Condensation products from benzoin. Soc. Anon. pour l'Ind. chim. à Bâle. Ger. 517,498, July 20, 1928. Fr. 37,391, Sept. 5, 1929. New compds. are prepd. by treating benzoin with aromatic sulfonic or carboxylic acids in the presence of a condensing agent, *e. g.*, $H_2SO_4$, oleum, or $HSO_3Cl$. Thus, a soln. of Na benzenesulfonate in $H_2SO_4$ may be stirred with benzoin at 80–90° until a sample gives a clear soln. in water. Alternatively, mixts. of benzoin and aromatic compds. may be treated with reagents having both a sulfonating and condensing action. Thus, $C_{10}H_8$ and benzoin may be fused together and the cooled melt introduced into $H_2SO_4$ and $HSO_3Cl$ at 60°. Other examples are given also. The products are useful as assistants in the *manuf. of lakes and dye pastes* and in dyeing with ice colors and vat dyes.

Dye intermediates. I. G. Farbenind. A.-G. Brit. 338,764, Dec. 16, 1929. 2-Aroylbenzanthrones are made by treating benzanthrones contg. the group $—CH(R)CN$ (in which R represents aryl) in the 2 position, described in Brit. 319,593 (*C. A.* 24, 2613), with oxidizing agents such as $KMnO_4$ or $Na_2Cr_2O_7$ in the presence of org. diluents such as glacial HOAc or acetone. Several examples are given.

Dye intermediates. I. G. Farbenind. A.-G. (Walter Mieg, Berthold Stein and

Wally Trautner inventors) Ger 518,213, May 3, 1927 New condensation products are prepd by treating aminoanthraquinones or their derivs or substitution products with alc alkali hydroxide solns at a temp below 100° while leading air into the reaction mixt The products are strongly colored and are sol in $H_2SO_4$ but they are not useful as vat dyes Examples are given

**Gray dyeings on furs, hairs and feathers.** I G Farbenind A.-G Brit 339,444, Nov 7 1928 The material (with or without mordanting) is treated with a soln contg a suitable oxidizing agent such as $H_2O_2$ and a 4 amino-*N* alkyl or *N* aralkyldiphenylamine or a 4' halo- or 4' alkyl deriv Various examples and details of procedure are given

**Color lakes.** Wilhelm Eberlein Ger 515,981, Jan 25, 1928 Color lakes are produced by pptg basic dyes by sulfite-cellulose lye Fixing agents, emulsions, fats and waxes may be added Thus methyl violet is treated with the lye $Al(OH)_3$ may be added to form a printing paste Addn of a colloid (*e. g.*, bentonite) and wax or oil renders the lake suitable for use as a marbled paper-coloring agent.

**Dyeing textile materials.** Pieter Mijer (to Two-Tone Corp.) U. S 1,796,033, March 10 Various details of app and procedure are described for coloring webs of permeable fabric by forming 2 color clouds while sepg the heavy particles or drops from the lighter particles and exposing one face of the fabric to one of the clouds and the other face to the other cloud Cf *C. A.* 24, 3383-4

**Dyeing piece goods and yarns with vat dyes.** I G Farbenind A.-G. (Gerhard Poetzsch and Hermann Jager, inventors) Ger 518,197, Feb 3, 1928 Better penetration is obtained by slop padding the materials with the unvatted dye paste with the addn of an agent promoting running or bleeding, and then treating the materials as usual with an alk hyposulfite soln Suitable agents for promoting running are emulsions of oils and fats or their free acids or water sol derivs., *e. g.*, Turkey red oil or cellulose derivs forming neutral or alk aq colloidal solns., *e. g.*, an alkali salt of carboxymethyl cellulose The method is intended particularly for tightly beaten cotton or linen fabrics or strongly twisted or mercerized yarns Examples are given

**Dyeing fulled goods.** V V Kuvichinskii and N V Voronkov Russ. appl. 41,382, Feb 22, 1929 Fulled goods are steamed, known dye solns are added by the usual methods and the goods are again steamed

**Dyeing acetyl cellulose.** Wolfgang Jaeck and Joseph Lang (to Soc. anon. pour l'ind chim à Bâle) U S 1,796,028, March 10 Acetylcellulose is treated with a colloidal prepn from an intermixture of insol aminoazo dyes having an affinity for acetylcellulose, with waste sulfite liquor, which serves as a dispersing agent U. S 1,796 029 relates to the similar use of aminoanthraquinones with waste sulfite liquor

**Dyeing cellulose esters** British Celanese, Ltd Brit. 339,429, Oct. 26, 1928 In dyeing fabrics, such as those comprising cellulose acetate, formate, propionate or butyrate on machines of the winch type, formation of creases is avoided by partially saponifying the ester before dyeing, and delustering may be simultaneously effected Various details of procedure and reagents used are given

**Dyeing fur, hair and feathers.** I G Farbenind A.-G (Karl Marx and Karl Bittner, inventors) Ger 518 199, Dec 11, 1928. The mordanted or unmordanted materials are treated with an oxidizing agent and a base (or its salt) of the formula $R_1R_2NC_6H_4NR_3CH_2CH_2N(alkyl)_2$, where $R_3$ is H or an alkyl group and $R_1$ and $R_2$ are H or alkyl or aryl groups Nuclear substitution products of such bases may also be used Thus, Cu- or Fe mordanted fur may be treated with an aq bath contg $H_2O_2$ and 4-amino-1 (ω-diethylaminoethylamino)benzene, brown shades being obtained Other examples are given also Cf *C. A.*, 25, 2007

**Printing with vat dyes.** I G Farbenind A.-G Fr 37,188, July 3, 1929 See Brit. 314,904 (*C. A.* 24, 1522)

**Printing with vat dyes.** I G Farbenind A.-G Fr. 37,282, July 4, 1929 Addn to 642,991 (*C. A.* 23, 1514) Merchandise is printed with a vat dye mixed with thickening agents other than cellulose esters or ethers capable of easy pptn., and the merchandise is treated with a reducing agent and an alkali Examples are given of the use of carrageen moss

**Printing fabrics.** I G Farbenind A.-G (Ludwig Lochner, inventor) Ger 516,088, Sept 12, 1928 Addn to Ger 513 526 (*C. A.* 25, 2006) In producing polychromatic effects by ester salts of vat dyes by the method of 513,526, β-naphthol and other coupling compds are used instead of 2 3 hydroxynaphthoic acid arylides Thus, fabric is soaked in a lye contg β naphthol, Turkey red oil and NaOH For red printing, the dried fabric is treated with a paste contg diazotized *p*-nitroaniline, water, starch and AcONa Further examples are given

**Printing wool.** I. G FARBENIND A.-G. Fr. 37,474, Sept 30, 1929 Addn to 662,205 (*C A* 24, 510) Illumination effects are obtained by printing wool, colored with a dye capable of being discharged, with discharge agents contg esterified salts of leuco compds of vat dyes, then treating the merchandise after steaming with a soln of a persulfate contg a free acid Cf *C A* 25, 1102

**Piece-dyeing machine.** SIEMENS SCHUCKERTWERKE A.-G (Georg Schlenk, inventor) Ger 515,926, June 10, 1929 Addn to 459,546

**Apparatus for washing, dyeing or other treatments of articles with liquids.** KENNETH C ANDERSON U S 1,796,312, March 17 Structural features of an app. suitable for treating fabrics or other materials

**Treating textiles.** CAMILLE DREYFUS Fr 37,382, Aug 31, 1929 Addn to 679,429 (*C A* 24, 3911) A limited amt of a sapong agent in other than paste form is applied to textile materials of or contg cellulose esters and rapidly dried

**Cleaning textiles, etc.** LOUIS A H LANTELME Fr 695,131, May 6, 1930 A colloidal product such as starch, paste, bone glue or skin glue is used in the cleaning, washing, bleaching, dyeing or charging of textiles or threads of all kinds

**Waterproofing textile materials.** FRITZ FUCHS Austrian 121,364, Sept 15, 1930. Addn to 109 167 (*C A* 22, 4836) The materials are impregnated with a soln of degradation products of vulcanized rubber in a high boiling solvent, *e g*, pitch, asphalt or bitumen, with or without a drying oil The prepn of the soln may be interrupted before soln is complete the undissolved portion acting as a filler

**Treating textile materials for mercerization** EMIL GRIMDER U S 1,796,598, March 17 Woven material is subjected to the action of a shrinking liquid such as mercerizing soln and is afterward subjected to a series of alternate cooling and transverse stretching treatments

**Bleaching and mercerizing machines.** ALLGEMEINE ELEKTRIZITÄTS GES Ger 515,613, Aug 14, 1928 Details of regulating

**Bleaching bast fibers.** I G FARBENIND A.-G Brit 339,550, March 16, 1929 Bast fibers, either as crude fiber or in yarn or finished goods, are bleached by successive use of baths comprising (1) peroxide, (2) acid Cl soln, (3) $Na_2CO_3$ soln, (4) alk or neutral Cl soln and (5) peroxide Various details are described.

**Bucking process for vegetable fibrous materials.** GUSTAV ULLMANN Austrian 121,528, Oct. 15, 1930 See U. S 1,787,880 (*C. A* 25, 828).

**Bucking linen, etc.** WERNER ERB Ger 515,675, May 10, 1927. Vegetable fibers are bucked in a mechanically stirred bleaching bath at 60–70°

**Preparing vegetable textile fibers for spinning.** JOSEPH VIALLET (to N T. Artificial Wool Co, Ltd) U. S 1,795,414, March 10 Cleaned waste vegetable fibrous material such as waste jute fabric is treated with a soln which promotes fermentation such as a dil soln of $MgSO_4$, $KNO_3$ and K phosphate and heated to 30° with a softening agent such as olein, and after the fermentation has sufficiently proceeded the material is unravelled and boiled with a dil alkali soln

**Textile fiber from materials such as ramie, flax, hemp, sisel and bamboo.** DINSHAW R NANJI (one-half to Duncan M. Stewart) U S 1,796,718, March 17. The material is heated with a 0 1–0 5% $(NH_4)_2SO_4$ soln at a temp corresponding to a vapor pressure of 1–2 atm for 60–20 min and then subjected to pressure to remove slimy matter; subsequently the fiber is washed, dried and obtained from the straw by an ordinary scutching or similar process U S 1,796,719 describes a process for the manuf of textile yarns consisting in resolving natural bast fibers such as those of plants of the genus *Boehmeria* embodying ultimate filaments of a length of at least 2 5 in into such ultimate fibers, blending the latter with synthetically produced fibers such as any variety of rayon and then spinning the blend Cf *C A* 24, 1750

**Fiber and yarn from unretted flax.** HENRY C WATSON and MARTIN WADDELL (to Watson-Waddell Ltd) U S 1,795,528, March 10 After breaking, scutching and twisting the fibers into a rove, the rove is wound onto an open reel in the roving frame, retted while on the reel, washed and spun U S 1,795,529 and U S 1,795,530 also relate to app for treating flax.

**Dressing yarns.** EDOUARD PINEL Ger. 518,195, Nov. 27, 1926 Yarns of cotton, wool, etc, are treated with a soln of carob bean gum, which may contain a softening agent such as glycerol, and then with a soln of starch or other size

**Singeing fabrics.** W. OSTHOFF Brit. 339,281, Aug 28, 1929 A rich excess of O is supplied with the primary air or O to a gas or vapor burner and singeing is effected by the highly heated O thus obtained. App. is described. Cf *C. A.* 24, 511.

**Delustering fibers of fabrics of regenerated cellulose.** I. G. FARBENIND. A.-G. (Walther Schieber, Hugo Pfannenstiel and Herbert Mahn inventors). Ger. 518,194,

Aug 22, 1929 The materials are treated with a soln. of a cellulose ester or ether in conjunction with a non solvent for the ester or ether, with the result that a cloudy film is produced on the materials when they are dried Thus, regenerated cellulose yarn may be treated with a 0 2% soln of benzylethylcellulose in equal parts of MeOH and $C_6H_6$ to which 10% of water has been added Alternatively, the yarn may be impregnated with a simple soln of the cellulose deriv, and the non solvent applied later *e g* by steaming

Carbonizing cellulosic fibers in mixed goods. H Dreyfus. Brit. 339,300, Aug. 2 1929 Mixed fabrics contg cellulosic fibers such as cotton together with other materials such as cellulose derivs, wool and silk are heated in inorg acid or acid salt solns sufficiently dild to have no deleterious effect on the non-cellulosic materials, to render the cellulose fibers removable without drying in the presence of a carbonizing reagent. Ornamental effects may be produced by use of colored or other reserves, and delustering of cellulose acetate may be prevented by avoiding undue heating or by using suitable protective reagents

Filling and weighting fabrics of cellulosic materials. R W R Mackenzie, E H. Robinson D Lumsden and M Fort Brit 338,651, Sept. 23, 1929 Materials such as cotton or linen are loaded and filled "in an invisible way" with mineral loading agents such as clay talc or barite (alone or together with unwoven cotton, wood fiber, paper or paper pulp) by rendering them sticky by treatment with a plasticizing agent such as $H_2SO_4$, caustic alkali $CS_2$, cuprammonium soln. or the like, applying the filling before, during or after the plasticizing treatment, and subsequently subjecting the material to a setting bath The properties of the material are stated to be improved in various respects

Artificial silk, etc. I G Farbenind A.-G Brit 339,089, Nov 14, 1928 Artificial threads, hairs, bands, etc., are made by dissolving natural silk waste in $H_3PO_4$, coagulating the viscous soln thus formed by use of an alkali metal salt soln (suitably a NaCl soln. contg also $NH_4$ formate) and stretching the coagulated material to the desired form Various details of the process are described

Artificial silk, etc. H Dreyfus. Brit. 338,983, May 31, 1929. Filaments, threads, ribbons, films, etc., of cellulose or its derivs such as nitrocellulose are subjected to the action of sulfonic acids contg at least 6C atoms (such as benzenesulfonic acid) of a concn of at least 20% (preferably 30–50%) for the purpose of improving the strength and elasticity and modifying the luster of the material The process is particularly suitable for the treatment of viscose products made from alkali cellulose unripened or ripened for only a short time After treatment, the sulfonic acids are preferably removed by washing with water alone or with water contg an alkali or base As a substitute for or addn to the sulfonic acids, acids such as methylphosphinic acid or nitrophenylphosphinic acid may be used, and benzylsulfonic acid, phenolsulfonic and -disulfonic acids and naphthalene- and naphtholsulfonic acids may be used. Various details and modifications of procedure are described

Dull finish viscose silk. Benno Borzykowski (to Swiss Borvisk Co). U. S 1,796,744, March 17 The viscose silk, while still contg S, is treated directly with a bleaching agent such as a very dil Cl soln which will not remove the S.

Treating raw silk. I G. Farbenind A.-G. (Robert Griessbach and Otto Ambros, inventors) Ger 513,373, Jan 22, 1928 Raw silk is scoured by treatment with a soln contg an activated protease, *e g.*, papain activated with a trace of HCN Examples are given.

Impregnating jute bags or other fabrics. L. D'Antal. Brit. 338,538, Oct. 19, 1928 An impregnating material is prepd by oxidizing a vegetable drying oil (such as linseed oil or sunflower oil) or a mixt of such oils by treating at temps. of 180–200° or higher with acid sludge from oil refining Various details of treatment are described and mention also is made of the use of castor oil and substances contg the $SO_4$ radical

Apparatus for carbonizing woollen fabrics in open width. Ernst Gessner A.-G Ger 518,310, May 6, 1928.

Gas-cell fabric for aircraft lighter than air. Arthur D Cummings (to Goodyear Tire & Rubber Co) U S 1,797,189, March 17 A textile material is impregnated with waterproofing material such as Al acetate, oleate or stearate and provided with a coating of an agglutinant such as glue or gelatin and with a p'y of material, such as goldbeater's skin or "cellophane," which is highly impermeable to inflating gases, over the agglutinant.

Nitrocellulose and linoxyn mixture suitable for coating fabrics, etc. Victor Scholz (one-half to Atlas Ago Chemische Fabrik A G) U. S 1,796,219 March 10 Linseed oil is oxidized and polymerized in the presence of a Pb compd catalyst such as

PbO or Pb linoleate and kneaded, the kneaded oil is dissolved in alc. with use of heat and pressure, and the resulting soln is mixed with nitrocellulose. Cf. *C. A.* 25, 2213.

**Mothproofing fabrics.** The Larvex Corp. Ger. 515,643, Nov. 11, 1928. See Brit. 301,121 (*C. A.* 23, 4085).

**Mothproofing wares.** I. G. Farbenind. A.-G. (Wilhelm Lommel and Heinrich Münzel, inventors). Ger. 515,056, Jan. 1, 1930. The wares are rendered mothproof by treatment with Sr salts, *e. g.*, $Sr(NO_3)_2$.

## 26—PAINTS, VARNISHES AND RESINS

A. H. Rahn

**Aluminum powder for paints.** Brit. Eng. Standards Assoc., *Specification* No. 388, 6 pp. (Aug., 1930). Specifications. R. I. S.

**Measurement of color tone.** W. van Wollen Scholten. *Farben-Ztg.* 35, 1824–6 (1930).—After a brief discussion of the Ostwald and the Baumann-Prase systems of color designation, the author recommends the step photometer. It should be useful in standardizing tinting pigments. G. G. Sward

**Luminescence analysis. II. *Luminescence of white painters' colors and the employment of luminescence analysis for investigations of paintings.*** Ernst Beutel and Artur Kutzelnigg. *Monatsh.* 57, 9–11(1931); cf. *C. A.* 24, 2053. The work was undertaken from the point of investigation of paintings to det. their origin. Most *ZnO whites showed canary yellow, one only showing brown.* This was so strong in even min. quantities that quant. ests. were impossible. $PbCO_3$ showed a *beige* color and could be identified in mixts. with $BaSO_4$. $TiO_2$ showed dark violet and mixts. with ZnO showed gradations up to the ZnO yellow. In com. colors the vehicle had little influence on the luminescence. The presence of ZnO could be established with certainty, but $PbCO_3$ not so surely, partially on account of the variety of reactions possible after exposure to air for long periods. It varies greatly as the paintings yellow with age. Orrok M. Evans

**Difficulties in paint and varnish manufacture.** Robert Hörsterhuisfer. *Farbe u. Lack* 1931, 135.—*Many difficulties attributed to faulty material are often due to* improper formulation or to carelessness. A careful study by producer and user will eliminate misunderstandings and uncover economies. Some specific examples are given. G. G. Sward

**Preparation and investigation of titanium white.** Paul. Askenasy and Kurt Hutsh. *Z. anorg. allgem. Chem.* 196, 257–81(1931).—A completely Fe free metatitanic acid can be obtained from a Ti sulfate soln. contg. Fe by sepn. as Ti K oxalate followed by hydrolysis of the mixed oxalate. This takes place at 135°, the yield depending upon the dil'n. Orthotitanic acid can be sepd. quantitatively in the cold at a *p*H of 4. At this acid concn. $FeSO_4$ remains in soln. *By* resoln. of orthotitanic acid in $H_2SO_4$ and hydrolytic sepn. of metatitanic acid at 95°, a completely Fe free high grade paint pigment is obtained. The brilliancy of this Fe free $TiO_2$ is comparable with that of other white pigments, while its covering power is not approached by any other. The influence of the ratio $TiO_2/BaSO_4$ upon covering power was studied. Pigments which were obtained by pptn. of the metatitanic acid upon a $BaSO_4$ suspension were superior in covering power to the corresponding mech. mixt. of $TiO_2$ and $BaSO_4$. The best covering power was obtained when the $BaSO_4$ and metatitanic acid were simultaneously pptd. In the extn. of Ti from ilmenite with $H_2SO_4$, 6 hrs.' treatment with a 55% acid is sufficient. This produces a basic sulfate metatitanic acid mixt. contg. Fe. Removal of Fe by treatment with acids leads to too great a loss of Ti. H. Storetz

**Standoil.** R. Pfirrmann. *Verfkroniek* 3, No. 10, 12–8(1930); *Chimie & industrie* 25, 418(1931).—Prolonged heating of linseed oil (and others) at 280–300° produces *an increase in the viscosity and the acidity, which occurs more rapidly the higher the* temp. The effect of temp. was studied on 10 kg. samples in Al kettles at 280°, 285°, 290°, 295° and 300°. The viscosity increases as an exponential function of the time of heating. The acidity increases fairly rapidly at first (1st hr.), and then approx. linearly. It is preferable not to heat above 300°, as the increase in acidity is too rapid and becomes too great in the very highly thickened oils. A. Papineau-Couture

**Colophony in varnishes and oil paints.** R. Schwarz. *Farbe u. Lack* 1931, 123–4.—The low price and many uses of colophony make it a very important raw material. The principles of its uses in gloss oils, rubbing varnishes, tung oil spar varnishes and *ester gum are briefly outlined.* G. G. Sward

Kauri gum in nitrocellulose lacquers. I. Solubility of kauri gum in mixed lacquer solvents. J. BOSNARD & S. STACKMAN. *New Zealand J. Sci. Tech.* 12, 65-93(1930).—Kauri is sol. in (1) anisol to which may be added AmOAc or (and) $CCl_4$; (2) petroleum distillate used in mixts. with other solvents, (3) Cellosolve. AmOH is also used with these. All these are compatible with pyroxylin. This long paper is a treatise on using kauri with these in pyroxylin lacquers. D. THURSBY

Printing-ink patents. JOSEPH ROSSMAN. *Am. Ink Maker* 8, No. 8, 21-3; No. 9, 21-5, 41-43; No. 10, 27, 29, 41; No. 11, 27, 29, 41; No. 12, 27, 29 (1930); 9, No. 1, 25, 27 (1931). E. J. C.

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$TiO_2$ (SPURTEL). 18. Separation and size distribution of microscopic particles (ROLLER). 2. Use of vulcanized rubber waste as a fixing agent in bronze printing (RICE). 30. Rubber conversion product [for use in varnishes or lacquers] (U. S. pat. 1,797,158). 36. Drying apparatus for pigments (Ger. pat. 518,370). 1. Purifying pitch, etc. (Brit. pat. 339,470). 22.

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JACOBI WERNER. Die Fabrikation von Wachstuch, amerikanischem Ledertuch, Wachstaffet, Maler- und Zeichenleinwand, Teertuch, unverbrennlichen Geweben, Linoleum, Linoleumersatz und Kunstleder. Leipzig: A. Hartleben's Verlag. 182 pp. M. 5.50, bound M. 6.50.

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**Green paint.** P. N. SMIRNOFF. Russ. appl. 72,760, June 4, 1930. Dehydrated $CuSO_4$ is added, with agitation, to a mass of white lead and litharge ground in linseed oil after heating and recooling. The mass is then passed through a color mill, and water is added. The product is taken up in ground white lead and a soln. of rosin in gasoline.

**Rust-resisting paint.** CARL NITTINGER (to Carnit-Rostschutz & Farbstoff G. m. b. H.). U. S. 1,795,062, March 10. A paint suitable for use on iron, wood or other surfaces is formed of a vehicle such as varnish and a pigment comprising finely ground coal slag about 80 and finely ground "electro-positive Zn" about 20%.

**Anticorrosive and antifouling paints.** N. J. SIMPSON. Brit. 339,128, Dec. 17, 1929. Paints are formed contg. over 2% by wt. of Hg oxide, with vehicles such as MeOH, shellac, turpentine, linseed oil and japan and pigments such as ZnO, Indian red or other Fe oxide pigments or red lead or other Pb compds.

**Masking paste for use in sign painting, etc.** ALBERT E. VAUGHN. U. S. 1,795,453, March 10. A pigment such as yellow ocher is mixed with an emulsion formed of honey 10, evapd. milk 8 and glycerol 6 parts and a small proportion of "sulfurated potassium."

**Oil colors for printing, etc.** FIRMA HERMANN FRENKEL. Ger. 518,322, Sept. 11, 1929. A strongly blown linseed oil having an acetyl no. of at least 100 is used as the vehicle.

**Iron oxide pigments.** I. G. FARBENIND. A. G. (Bernhard Wurzschmitt and Annemarie Beuther, inventors). Ger. 515,503, Dec. 5, 1928. A $Fe(OH)_2$-contg. ppt. is oxidized by O gas in presence of water or aq. salt solns. at temps. above 100° and with raised pressure. Thus, $Fe(OH)_2$ is ppted. from a $FeSO_4$ soln. by NaOH and the ppt. oxidized in an autoclave at 190–200° and 10 atm. to give a bright red pigment. Further examples are given.

**Lead pigments.** SWISS INVENTIONS SYNDICATE, LTD., and A. V. BLOM. Brit. 319,357, Sept. 7, 1929. A pigment consisting of a fine dispersion of Pb in Pb oxide is prepd. by melting an alloy rich in Pb (suitably an alloy contg. Pb 85, Sb 13 and Sn 2%) in a thin layer in an air tight furnace in the presence of Ca resinate (suitably 0.5% the quantity of the alloy), maintaining the temp. just above the m. p. of the alloy, and creating a vacuum in the furnace so that streams of air are drawn into the furnace to oxidize the Pb of the alloy. A temp. of 280–310° is suitable with the specified alloy.

**Ultramarine.** V. F. OSMENSKII and M. P. RASU. Russ. appl. 50,674, Dec. 5, 1929. The black caustic obtained from spent sulfite liquor is evapd. to dryness, disintegrated, mixed with sulfur, kaolin and siderite, calcined in crucibles or muffle furnaces and then worked over by usual methods.

**Composition for colored pencils.** V. M. RODIONOV and I. M. FEDOROV. Russ. appl. 47,402, May 17, 1929. Graphite, talcum, etc., are added to the mass obtained in the prepn. of methyl violet by oxidation of $PhNMe_2$. The mass is then worked up by the usual methods after the addn. of a gum such as gum tragacanth.

**Drying oil products.** J. SCHNIEDER. Brit. 338,932, May 21, 1929. Products having properties generally similar to those of wood oil are obtained by heating oils of the linseed, soy bean and fish oil classes to 200° or somewhat higher with small quantities of catalysts such as $H_2SO_4$, $SbCl_5$, $Al_2O_3$, HgO, I, bromide, Fe, Ni, Zn or Sn. The corre-

sponding fatty acids may be similarly treated and the products thus formed then esterified with glycol or glycerol or a mixt of these

**Driers for paints, varnishes, etc.** I G Farbenind A.-G. (Franz Pohl, inventor) Ger 518,004, Oct 20, 1927. See Brit 311,710 (C. A. 24, 979)

**Coloring nitrocellulose lacquers and plastics.** I G Farbenind A.-G. Ger 518,018, Sept 21 1929 Addn to 515,057 (C. A. 25, 1092) and 516,315 (C. A. 25, 2011) The dyes specified in Ger 515,057 and 516,315 are used in conjunction with dinitroaminophenylamines Green colors fast to light are so obtained

**Protective coating on iron, wood or other materials.** Walter Bauer U. S. 1,705,703, March 19 Protection from the atm is effected by applying at ordinary temp., a mixt of castor oil and 5–10% metal oxides such as those of Pb, Mn, Co or Zn with an addn of solvents consisting of easily drying oils such as turpentine or naphtha followed by heating and "burning in" the coating by a suitable hot air blast App is described

**Protective coatings on metal pipes, etc.** Hirsch A.-G. Brit 338,081, March 9, 1929 The material to be coated is preliminarily heated to the m. p. of a fusible intermediate artificial resin such as one formed from phenol or urea and formaldehyde and such a material is applied (without a solvent) in pulverulent form (either as a dust or in suspension in water or other non solvent liquid or by rubbing on as a solid block) During hardening the coated surface may be treated with a solvent or solvent vapor and fillers also may be added

**Reducing the viscosity of nitrocellulose solutions.** Wm C Wilson (to John S Stokes) U S 1,705,918 March 19 A phenolic condensation product contg an active methylene compd such as $(CH_2)_6N_4$ is added to a nitrocellulose lacquer to lower its viscosity

**Cellulose-covered wire gauze.** Kalle & Co A G (Adolf Dulitz, inventor) Ger 515,511, June 28, 1928 The gauze is dipped alternately into a cellulose ester soln and a weakly acting swelling agent The product may be coated with a thin layer of dil nitrocellulose In the example, a wide meshed wire gauze is dipped into acetylcellulose lacquer and, when dry, into aq ale as swelling agent The operations are repeated until the required thickness is attained $C_6H_6$ or $HOCH$ may be used instead of aq ale The finished product may be rendered weather proof by a coating of 2–3% tricresyl phosphate

**Linoleum.** R Clayton (to Armstrong Cork Co.). Brit. 338,965, Oct. 15, 1928. The oxidizable components of a linoleum cement contg a siccative oil are first substantially completely oxidized (suitably as described in Brit 303,650, C. A. 23, 4817) and a coagulant is added to the cement (about 1% of $H_2O$, being preferred as coagulant), and the material is mixed with suitable fillers. Numerous details of compns. and procedure are described Brit 338,978 specifies the use of a "delayed action" coagulant such as dehydrated boric acid in the form of metaboric or pyroboric acid or boric anhydride, or urea

**Resins from cellulosic material.** Ucherno-Opytnyi Zavod Moskovskogo Tekhnikuma Zhirovoi Promyshlennosti "Dzhirzhikavod" Russ. appl 30,420, Oct. 15, 1929 Sunflower husks are heated under pressure with water or an aq soln of alkali followed by hydrolysis with mineral acids and extn by the usual methods.

**Artificial resin compositions for lacquers, etc.** I G Farbenind A.-G. Brit. 339,271, Sept 3, 1929 Homogeneous products are prepd. by mixing, in soln or otherwise, a polymerization product of a vinyl ester such as polyvinyl chloride with the condensation product of a phenol deriv and aldehyde (such as the product from anisole and $CH_2O$) or the like An example is given for making a lacquer with $C_6H_6$ as solvent

**Molding synthetic resins.** A V Kreier. Brit 338,015, Aug 28, 1929 Decorative articles are made from synthetic resins by placing lace or other fabric (without preliminary impregnation) between a covering sheet and backing of initial condensation product and heating the materials under pressure Cf C. A. 25, 610

**Synthetic resins such as urea-formaldehyde resins.** I. G Farbenind A.-G. Brit 338,037, July 20, 1929 Condensation of reacting materials such as urea or thiourea and $CH_2O$ for obtainment of non inflammable products is effected in the presence of org solvents formed at least mainly of halogaryl substituted aliphatic ales, such as mono- and di bromobenzyl ales, and chlorobenzyl ales, and preferably in the presence of an acid reacting substance such as oxalic acid or HOAc (the reaction being accelerated by heating) Numerous examples with details of procedure are given, for producing products suitable for making lacquers, molded articles, etc

**Synthetic resins.** J. M. Weiss. Brit 338,845, July 10, 1929. Polymerization of coumarone, indene and their homologs is effected by using as the polymerizing agent

a mixt of an adsorbent earth such as fuller's earth and an acid sulfate of a tervalent metal such as acid ferric sulfate Various details of procedure are described

Synthetic resins. Compagnie française pour l'exploitation des procédés Thomson Houston Fr 37,234, July 19, 1929 Addn to 654,175 (*C. A.* 23, 3822) The production of artificial resins of the alkyl kind combined with drying oils is described Thus, a mixt of glycerol and phthalic anhydride is heated progressively to 200°, a mixt of phthalic anhydride and one or more fatty acids derived from drying oils (china wood oil, linseed oil or Perilla oil) is added and the heating is continued until the foam disappears, then the desired amt. of drying oil is added, *e. g.*, 10–50% of the wt. of the resin It is preferable to incorporate the drying oil before complete condensation has taken place Instead of acids from a drying oil, one or more oxidizable unsatd acids such as oleic acid, stearic acid or linoleic acid may be used In another example an unsatd fatty acid, *e. g.*, an acid derived from linseed oil, is heated with glycerol to 200–250°, linseed oil is then added until a clear soln is obtained. The soln. is mixed with phthalic anhydride and heated further, The compns of resin and oil are sol in acetone, AcOBu, BuOH, triacetin, etc., and may be used as a varnish, etc., or incorporated with fillers for making molded objects

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E SCHERUBEL

Little-known Brazilian oil seeds. F. W. Freise *Seifensieder-Ztg* 58, 131–2 (1931), cf *C A* 24, 1238.—F. tabulates the consts of 27 varieties of little-known Brazilian oil seeds, giving the source, popular and botanical names and the time of ripening P Escher

The fatty oil of seeds of Colchicum autumnale L. G Gaal. *Magyar Gyógyszerésztud Társaság Értesitoje* 6, 149–67(1930).—The consts of the oil are $d_{15}$ 0.9104–5, $n_D^{20}$ 1.4723, acid no 14.76, sapon. no 199.0–9.8, acetyl no 12.3, Reichert Meissl no 2.41, Polenske no 0.32, Hehner no 91.6–92.1, I-Br no 92.47, satd fatty acids 12.73%, glycerin 10.8%, mol. wt 269.5 The fatty acids contained 2.1% raw phytosterin. The presence of arachidic acid could not be demonstrated. Daturic acid was found in the oil.

S S de Finály

Experiments with the shipment of some tropical products containing oil in pressed bales. Ir W Spoon. *Ber. Afdeel Handelsmuseum Ver. Koloniaal Inst.* No 56, 28 pp (1930).—With copra the results were satisfactory, there being no loss of oil and only a small increase in free fatty acids. The results with earth nuts and rubber-seed kernels were very unsatisfactory, as both had suffered from the pressing and the percentage of free fatty acids had increased considerably. J. C. Jurrjens

New compounds produced during the hydrogenation of fish oils. II. The formation of the higher alcohols Sei ichi Ueno and Riichiro Yamasaki *J. Soc. Chem Ind., Japan* 34, Suppl binding 35–7(1931), cf. *C A.* 25, 612.—One kg. of unsapon. matter was washed with methanol to sep hydroxy compds from hydrocarbons. After evapn. of the methanol the residue was taken up with ether, treated with $Na_2S_2O_3$ and phenyl hydrazine to remove aldehydes and ketones and then washed, dried and evapd. The higher alcs obtained were fractionated by distn. and the fact was confirmed that the unsapon volatile matter produced during hydrogenation contains iso-aliphatic $C_8$, $C_{10}$ and $C_{12}$ primary alcs of the satd and olefin series together with hydrocarbons of the iso-paraffin and olefin series E. Scherubel

Catalytic fat hardening. I. Progressive hardening decreases the speed of hydrogenation. II. Selective hydrogenation of fish oils. L. Ubbelohde and H Schönfeld *Z angew. Chem* 44, 184–7(1931).—The decreasing speed in progressive hydrogenation of oils is not due to the catalyst, since it can be used over several times, each time it shows a high speed at the start and slows up toward the end Nor is it due to the concn in the oil of the double C bond, since linseed oil and fish oils are hardened less rapidly than cottonseed oil It is due to the increasing concn. of satd. acids and to the manner of hydrogenating By detg. the insol bromides, formed by highly unsatd acids, at the different stages during fish-oil hardening, U. and S confirmed the fact that clupanodonic acid can be reduced completely to less unsatd acid without forming stearin, by means of a gentle hydrogenation, reduction of the amt. of Ni, temp and agitation The fish-oil odor disappeared at I no 95 when rapidly hardened and the clupanodonic acid at I no 80–90, slow hardening (45–50 I nos. per hr.) showed only 0.5% of the highly unsatd clupanodonic acid remained at I no. 120 P. Escher

Solubility of fats in various solvents. Solubility of Tsubaki oil and rape oil in ethyl alcohol. K. Hasiu *J. Soc Chem Ind, Japan* 34, Suppl binding 64–6, 66–7 (1931).—The soly of refined and bleached Tsubaki oil (*Camellia*, family Theaceae) as well as that of rape oil was detd in various concns of ethyl alc by heating known amts. of oil and alc. of different concns in closed tubes and observing the temp at which both layers turned clear The turbidity temp was read during slow cooling The results are tabulated and expressed in graphs P. Escher

An installation for continuous washing with alcohol in refining oils and obtaining a high percentage of fatty acids and their esters. Otto Krebs. *Chem App.* 18, 15–6, 49–51(1931).—A system is described for washing fatty acids from oils with alc. The alc. removes the acids and is recovered in a rectifying column M. C. Rogers

Intramolecular rearrangements when hydrogenating esters of fatty acids with one *double bond.* II. A. Steger and H W Scheffers *Chem Umschau Fette, Öele, Wachse u Harze* 38, 61–6(1931), cf *C A* 25, 2315.—A $\Delta^9$-elaidic, a $\Delta^9$-oleic and a $\Delta^6$-oleic Et ester were partially hydrogenated with Ni at 180° to an I no of 55, at which point a max of solid unsatd acids is formed The products were analyzed for their solid and liquid acids by Twitchell's alc method, sepd into their individual acids by fractional crystn. in different solvents, and the constitution of each acid was detd. by ozonization and analysis of the ozonides for m p, proximate compn and sapon no The double bonds in $\Delta^9$-elaidic and $\Delta^9$-oleic acids are shifted during hydrogenation from $\Delta^9$ toward both sides to $\Delta^{10}$ and $\Delta^8$, a greater amt being formed of the former than of the latter, the elaidic acid forms less of the $\Delta^{10}$ and $\Delta^8$-elaidic acids than oleic acid, and thus it may be assumed that the principal shifting of the double bond occurs in the liquid *oleic acid and that the first-formed* $\Delta^8$- *and* $\Delta^{10}$-*oleic acids are later converted into* $\Delta^8$- and $\Delta^{10}$-solid elaidic acids The $\Delta^6$-oleic Et ester shifts its double $\Delta^9$ bond also to its neighboring C atoms, forming $\Delta^5$- and $\Delta^7$-oleic acids and possibly also the corresponding $\Delta^5$- and $\Delta^7$-elaidic acids No conclusions could be drawn with respect to the manner in which the bonds of solid unsatd acids change during hydrogenation, since hardening was stopped at the point of their max formation P. Escher

The spontaneous ignition of commercial oleic acid. Paul Erasmus. *Allgem Öl- Fettztg.* 27, 309–12, 345–8, 367–8, 408–9(1930).—Oleic acid manufd. from bone fat contained no highly unsatd acids. It was very susceptible to spontaneous ignition in the Mackey app. When the anhydrides present were removed it was no longer susceptible to spontaneous ignition The removal of the anhydrides also prevented the *darkening of the oleic acid on atm oxidation. Addn. of the isolated anhydrides to an* oleic acid which was not spontaneously ignitable caused it to take on this property. The substance causing the spontaneous ignition was identified as γ-stearyl lactone This substance on oxidation yields ketonic acid, which in turn gives up $O_2$ easily to form the lactone again. The addn of 0.05% of γ-stearyl lactone to oleic acid causes it to become spontaneously ignitable. The presence of Fe was found necessary to bring about this result. Removal of Fe from a spontaneously ignitable oleic acid caused it to lose this property Addns. of small quantities of Fe oleate to an oleic acid not spontaneously ignitable did not show any effect. When larger amts. (0.5%) were added it became spontaneously ignitable Conclusion: The lactones are $O_2$ carriers, requiring the presence of Fe as catalyst, and are a cause of the spontaneous ignition of oleic acid *The addn of 1% linolic and linolenic acids (lactone free) to an oleic acid not spontaneously* ignitable caused it to become so W. F. Bollens

Oleiferous Allanblackia. Chemical composition of Allanblackia floribunda Oliv. J. Pieraerts and Serge Vlassov. *Mat grasses* 22, 8975–7(1930).—Addnl analysis has been made supporting previous conclusions that this plant is the cheapest and most satisfactory raw material for the *manuf. of* pure or technical *stearic acid.* P. T.

Thermodynamics in the soap industry. K. Löffl. *Seifensieder-Ztg* 58, 127–8, 152–3(1931).—L. discusses the calcn. of the total calories required for boiling and drying soaps Spray drying shows simplicity of app. and least heat consumption. P. E

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Bleaching earths (Eckart) 18. Germicidal efficiency of soaps and of mixtures of soaps with NaOH or with phenols (Schaffer, Tilley) 11C. The *influence of soaps on* the germicidal properties of certain mercurial compounds (Hampil) 11C. Soaps, creams, etc. (Fr. pat 695,218) 17. Destructive hydrogenation [of fatty oils] (Brit. pat 339,048) 21. Complex organic peroxides [for bleaching soaps, oils, fats, waxes, etc.] (Brit. pat. 339,336) 12. Mixtures of hydroxy fatty acids (Ger pat. 518,390) 10. Substitutes for sugars in [filling transparent soaps] (Ger. pat 518,196) 18.

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Husson, M.: Les huiles d'olives. Algiers: Impr. algérienne 14 pp.

MARTIN, GEOFFREY The Modern Soap and Detergent Industry. Vol. I. Theory and Practice of Soap Making. 2nd ed., revised and enlarged London: Crosby Lockwood 36s., net

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Preparation for splitting fats. G S PETROV Russ appl 62,843, Jan. 23, 1930 Addn to pat 18 855 Fat-splitting agents are prepd by sulfonation of highly hydrogenated fats or fatty acids, excluding hydrogenated castor oil.

Oils and fats. PETER FRIESENHAHN Ger 515,709, May 28, 1925 Addn. to 365,160 The hydrated phenols of 365,160 for prepg emulsions or soins of oils and fats are supplemented or replaced by alcs formed by the hydrogenation of unsatd hydrocarbons obtained from the cracking of acid resins or from the residual pitch of aliphatic raw material distns

The concentration or drying of masses containing fatty oils. L. AUER. Hung 101,164, May 28, 1925 Masses are concd or dried in an atm. contg less O than does air

Preventing oxidation of oils, etc. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON *Fr 695,119, May 6, 1930* *The oxidation of oils*, fats, waxes, etc., is prevented by adding 0.5–1% of phenyl α naphthylamine.

Extracting oil from blubber, meat, bones, tongues and other parts of whales, etc. C O JOHNSON Brit 339,305, Aug 31, 1929 In a wet rendering process, the materials are submerged in water which is kept boiling under pressure during the digestion by introduction of steam App and various details of procedure are described

Apparatus for extracting oil from olives, etc. SOC. JEANJEAN ET CASAS Fr 37,352, Aug 9, 1929 Addn to 654,217 (*C. A.* 23, 3824)

*Reaction products of cashew nut shell oil.* THE HARVEL CORP Ger. 518,424, June 4, 1927 See Brit. 272,510 (*C. A* 22, 1863) and 275,574 (*C. A.* 22, 2285).

Soap JEAN GNAEDINGER. Fr 37,464, Sept 27, 1929 Addn to 665,425 (*C A* 24, 984) The α-abientinic acid is converted to the β form which is more stable before combining it, by the aid of catalysts, with unsatd oils of the fatty series to form a soap

Soaps. I. G FARBENIND A.-G (Otto Ambros and Anne Nies Harteneck, inventors) Ger 518,019 Mar 13, 1928 Products yielding stable foams and emulsions are prepd by adding soft or hard fish roe or prepns. thereof to soaps or saponaceous materials A suitable addnl substance may be prepd by removing fat from soft fish roe *by means of an org. solvent and then drying, or the active material may be extd* from the roe with dil alkali

Dry-cleaning soap. LEO R HUBBARD (to Camille Dreyfus). Can 309,361, Mar 10, 1931. A detergent adapted for the dry cleaning of fabrics comprises a mixt of oleic acid 1, cyclohexanol 1, $CCl_4$ 1, ammonia of (26° Bé.) 1/8 and water 1/2 part.

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## 28—SUGAR, STARCH AND GUMS

J. E. DALE

Quality of the mineral fuel received by sugar factories for the campaign 1929-30 I B MINTZ *Nauk. Zapiski Tzukrovoi Prom.* 10, 225–35(1930).—A report

V. E. BAIKOW

Movement of nitrogenous substances in sugar manufacture during the campaign of 1929-30 at the Usinskii sugar factory. B. A LYASKO *Nauk. Zapiski Tzukrovoi Prom.* 10, 23–38(1930).—From a no. of analyses made during the campaign L. shows the amt. of noxious N represents about 1/3 of the total N of the beet At the diffusion battery about 1/2 of the total N, 4/5 of the albuminous N and 1/10 of the noxious N are eliminated, while ammonia and amide N go almost entirely into the diffusion juice 96.5% of N in sirup is of the noxious type Ninety % of the noxious N passes into the final molasses with 10% eliminated in the diffusion battery Ten tables and 2 diagrams are shown

V. E. BAIKOW

Experiments in the harvesting of burned cane. III. P. O. J. 213 cane. H. H DODDS AND P FOWLIE *Proc. S. African Sugar Tech. Assoc.* 1930, 122–32(1931), cf. *C. A.* 24, 3125.—It is shown in a no. of tables and graphs that the variety P. O. J. 213, like the Uba cane, deteriorates more slowly after being burned than when it is not fired The burned cane keeps better if left standing than after it is cut. The differences between burned and unburned canes are even greater than in the case of Uba, and unburned cane must be taken to the mill without delay, while burned cane may be kept for about a week But in fields which have been burned over, the supply of org. matter must be maintained by fertilizing

F. W. ZERBAN

Determination of small proportions of invert sugar in raw sugars. Lewis Tynon and J Henry Lane *J Soc Chem Ind* 50, 85–6T(1931), cf *C. A.* 17, 1400, 2091; 18, 763.—The original tables were calcd only for products contg not less than 0.3% invert sugar. A new table is presented for a range of 0–0.404% invert sugar. Twenty-five g of the sugar plus 0.1 g invert sugar in the form of the standard soln is dissolved to 100 ml. This soln is titrated against 10 ml Fehling soln by the standard method previously described. It is unnecessary to clarify with $Pb(OAc)_2$ or to remove lime salts with $K_2C_2O_4$, because the same results are obtained without their use.

F W. Zerban

Measurement of color in solutions of white sugars. J A Ambler and S Byall. *Ind Eng Chem., Anal Ed* 3, 135–6(1931).—The measurement of the colors of white sugars was placed on a reproducible, accurate basis by matching the colors of water solns of the sugar against a standard made by dilg 10 g of Balch's No 5 maple sirup color standard soln (*C A* 24, 2630) with water to 100 cc. For the detn of color of hard candies made from the sugars the candies were dissolved in water and the colors of the solns matched against a No 9 maple sirup standard soln, dild in the same way as the No 5. The color of the barley candy is not related to that of the original white sugar.

F W Zerban

Impurities in white sugars. I. Determination of phosphorus. S Byall and J A Ambler *Ind Eng Chem., Anal Ed* 3, 136–7(1931).—The importance of traces of impurities in sugar necessitates analytical methods of greater sensitivity. Total $P_2O_5$ is detd in the $HNO_3$ soln of the residue obtained by ashing in the presence of $Na_2CO_3$, inorg $P_2O_5$ is detd directly in a water soln of the sugar, and org $P_2O_5$ is found by difference. The Briggs modification (*C A* 16, 3193) of the Bell and Doisey ceruleo-molybdate method (*C A* 14, 3685) detects as little as 0.3 p. p. m. of $P_2O_5$ in a 10 g sample. Analytical results on 26 samples of white sugars show up to 1.4 p. p. m. of inorg., and up to 45.6 p. p. m. of org., $P_2O_5$.

F W Zerban

*Recovering of ammonia in beet-sugar manufacture.* A I Vostokov and M P Kotlyarenko *Nauk Zapiski Tzukrovoi Prom* 10, 211–9(1930).—The methods for recovering $NH_3$ from evapd water from beet juice are described. The product is a high-grade *fertilizer.*

V E Baikow

The German report on the Oxford sugar method. Oskari Routala. *Acta Chemica Fennica* 3, 94–5(1930).—If sugar beets were not treated immediately after picking the yield of sugar was low and there was considerable inversion, especially if the beets were stored in a warm place. The yield was also low if the beets were frozen. The Oxford sugar method consists in the rapid picking, cutting and drying of the sugar beets to preserve the sugar content for later use. The beets were cut into very small pieces and dried in a 3 compartment oven at 60–70° for 1 hr. The dry beets had 60–70% sugar, compared to 7–8% in the undried beets. Very little inversion was found. The drying affected the protein and protoplasmic content of the beets in such a way that little of these substances was found in the sugar solns. The sugar from the dried beets was extd very readily by water. The soln turned black when 0.2–0.3% of Ca as oxide, pectate, oxalate or phosphate was added. Addn of activated charcoal and centrifuging gave a colorless sugar soln. The molasses obtained was sweeter than ordinarily, because of a higher invert-sugar content. The German investigation comm. reported that the procedure is as yet not industrially profitable since the change to the new equipment is costly.

S A Karjala

Experiments on raw sugar with Russian activated carbon. M P. Kotlyarenko and N. K. Konibolotzkii *Nauk Zapiski Tzukrovoi Prom* 10, 102–11(1930).—The decolorizing power of the Russian activated C is higher than that of Norit-Standard, Amsterdam, 1926. The adsorption of colloids and ash by Norit is smaller than that by Russian C. The colloids and ash are not retained by the C and are almost entirely washed back into the thick juice. The wash (sweet) water must be given a preliminary treatment to eliminate the ash and colloids before it is mixed with a sirup. The max. regenerating effect of activated C was obtained by thermal and HCl treatment.

V. E. Baikow

The quality of the sweet (wash) water from the bone-black filters. M I. Nakhimanovich and I. P. Zelikman *Nauk Zapiski Tzukrovoi Prom.* 10, 51–74(1930).—From a no of expts the following conclusions can be drawn: With decrease of the density, the proportion of non sugars increases. The sweet water washes out from the chars the coloring matters adsorbed in the early stages of the filtration. Washing should be stopped when the sweet water decreases to 2.5 Brix (1.5–1.6% of sugar).

V. E. Baikow

Nonit installation at the Khutor-Mikhallovskii sugar refinery. G. I. Zhukik. *Nauk Zapiski Tzukrovoi Prom* 10, 86–102(1930).—A description. V. E. Baikow

Regeneration of the bone chars. N. S. Volkov. *Nauk Zapiski Tzukrovoi Prom* 10, 294–307(1930).—Regeneration of bone chars can be divided into 2 parts: (1) boiling for a certain period of time in the same vol. of water, and (2) washing with clean water for a limited time. With poor quality of water, the time of boiling and amt. of water should be increased. While the water dissolves mineral salts and org. matters, the bone black adsorbs coloring matters from the water. If the temp. of the wash water is decreased from 90–95° to 55–60°, the amt. of water must be increased 30–40%. Washing with condensed water has the advantage of decreasing the amt. of steam. The chem. control of the regeneration consists in checking and comparing the mineral residue of the wash waters before and after washings.
V. E. Baikow

Prospects and advantages of rotary filters in sulfitation factories. W. H. Foster. *Proc. S. African Sugar Tech. Assoc.* 1930, 71–6(1931).—The sucrose (2%) lost in filter cake in Natal is higher than in other countries. Higher dilu. of settlings is not economical. Washing in the presses gives indifferent results, and furnishes a sloppy cake. The use of filter aids in sufficient quantity is too expensive. Double filtration through the presses reduces the sucrose loss in filter cake, but also the purity of the filtrate and the boiling house efficiency. Double settling is being practiced, but it requires too much steam for evapn. The Mauss continuous rotary vacuum filter has been tried in various ways. The 2nd operation in double filtration can be carried out more economically with the rotary filter, the machine being particularly suitable to this type of work. The low purity of the 2nd filtrate is an undesirable feature of the process. The solid content of the settlings is rather low for the successful direct operation of the rotary filter. Should a thickened sludge be possible at low cost, the filter offers considerable advantages over the filter press as regards economy in labor and cloth, increased sugar recovery and greater cleanliness. The floor space required is much greater than in the case of filter presses.
F. W. Zerban

Metafiltration in the sugar industry. Anon. *Intern. Sugar J.* 33, 18–20(1931).—It is a well-established fact that the filtration employed in the carbonatation process is responsible for the increased yield, and the better quality of the sugar as compared with the defecation or the sulfitation process. Filtration app., whether of cloth, sand, wire gauze or rings as in the case of the Metafilter, act simply and solely as a support to the solid matter which it retains. The filtering elements of the Metafilter are made up of thin brass rings 1/8" outside and 1/16" internal diam. The rings are piled one upon another to form a tube so that a 1 in. run of filtering elements is composed of some 30 rings. Alternate rings carry a light embossing on each face exactly 0.002 in. high, which provides a gap of this thickness between each pair of rings. The rings are strung on a fluted rod which acts as a support and provides drainage channels, the rings being pressed together by screw pressure from the end. An ingenious aspect is an arrangement to rotate the whole filter body *en bloc*. In operating the Metafilter on filtering juices in a defecation or sulfitation factory it is necessary first to precoat the column of rings with a thin film of kieselguhr. It was found in Java that an addn. of 0.5% on the Brix of the heavy liquor being filtered was all that was necessary to obtain a fairly rapid flow. In 60 min., in one run 1000 l. of 55–60 Brix juice at a temp. of 70° was filtered with a filtering area of 2.2 sq. m., corresponding to a capacity of 7.51 per sq. m., per hr., a very high rate of filtration.
W. L. Owen

Loss in polarization of Natal raw sugars on storage. L. Blacklock. *Proc. S. African Sugar Tech. Assoc.* 1930, 105–7(1931).—Several cases of excessive deterioration of Natal sugars call for remedial measures. The safety factor should be kept low, by drying if necessary. The sugar should be of uniform grain and not acid. The mill must be kept in sanitary condition. Mixing of high grade with low grade sugars should be avoided. Storage and transport conditions should be as perfect as possible, low humidity and low temp. being essential.
F. W. Zerban

Palmyra palm and its uses in gur manufacture. M. R. Gokarn. *Poona Agr. Coll. Mag.* 21, 241–52(1930).—The manuf. of gur (crude sugar) from the juice obtained by tapping the immature nuts of the palmyra palm (*Borassus flabelifer*) is described. The best yields of juice are obtained from the female spathes, the av. yield per tree ranging from 60 to 100 gallons per season. Saccharimeter readings on several samples of palmyra juice ranged from 11° to 13° Brix as compared with 13.5° to 18° Brix for coconut juice. There was no marked difference in the saccharimeter readings on the juice from the male and female palmyra spathes. Two samples of the crude sugar contained 2.10 and 2.61% glucose and 86.68 and 83.51% sucrose, resp.
K. D. Jacob

New sources of inulin. E. VANDERKLEET AND R. M. KINGHORN. *J. Am. Chem. Soc.* 53, 1501–6(1931).—Three new sources of inulin (I) are discussed. Cannaceæ (*Canna glauca* (Parish) Covill., (*Canna indica* (Linn.), of which 200 g. gives 30 g. of I, *Thalia multiflora* Watt, a variety of wild onion, 200 g. of which gives 25 g. I, and *Polymnia edulis* (Parish) Nutt., belonging to the family Compositæ, 100 g. of which gives 32 g. I. The sp. rotation of I from these sources ranged from −24° to −31°, all products were wet in H₂O and did not melt. In the light of this work and that of Chevastelon (*J. pharm. chim.* 8, 241(1928)), it appears that there is no correlation between the sp. rotation and the solv. of I. No claim is made that any of the products described was a definite chem. individual. C. J. West

Measurement of consistency of starch solutions. J. C. BITTENBIN. *Ind. Eng. Chem., Anal. Ed.* 3, 185–91(1931).—The swell of starches is measured by pouring the starch suspension prepd. by a standardized procedure, into water in a cylinder, allowing it to stand and measuring the vol. occupied by the starch granules on the next day. It was found that the product of conen. and swell plotted against the viscosity, furnishes a curve which may be used to evaluate starches without a viscosity detn. The method gives best results with starches showing large swell like potato, sago and arrowroot starch. P. W. Cranan

Potash fertilizers for sugar beets (WAGNER) 15.—The change in x-ray spectrum of inulin on swelling in water (KATZ, DERKSEN) 2.

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Sugar Abstracts (*New Journal*). Published by the Palmer Publishing Corp. of New York, 150 Waverly Place, New York City. Appears as a part of *Facts About Sugar* and also as a separate journal. Vol. 1, No. 1 appeared in Jan., 1931. Price, $5 per year.

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Sugar. INTERNATIONAL PATENTS DEVELOPMENT CO. Brit. 340,015, Sept. 18, 1930. See Fr. 680,075 (C. A. 24, 4154).

Calandria apparatus for evaporating sugar solutions, etc. JAMES HAMILL, JOHN P. TAGGART and GEORGE W. CONNON. U. S. 1,795,001, March 10. Structural features.

## 29 LEATHER AND GLUE

ALLEN ROGERS

Leather, sanitation and colloid chemistry. JOHN A. WILSON. *Ind. Eng. Chem.* 23, 447–52(1931).—An address. H. H. Mehrtens

New Zealand made leather. P. WHITE. *New Zealand J. Sci. Tech.* 1930, 241–7; *J. Intern. Soc. Leather Trades Chem.* 14, 553.—Results of density, water absorption and wear tests are given. H. H. Mehrtens

Gas poisoning in the leather industry. A. GUTBENBERG. *Vestnik Kozhevennoi Prom. i Torgovli (Review of Leather Ind. and Trade)* 1930, No. 7/8, 411–4; *J. Intern. Soc. Leather Trades Chem.* 14, 190–90. A fatal poisoning occurring when workmen entered an empty tan vat is ascribed to HCN, produced from any gelatin of pine bark by enzyme action. Under certain manipulative conditions this gas may form a layer in the bottom of the vat when the liquor is drawn away. This may be displaced by a water jet. Safety rules are given. H. H. Mehrtens

Stretching tests for leather. O. A. REGAN. *Bull. offic. de la soc. sper. pour l'ind. pelle mat. colorantes* 8, 141–41(1930); *J. Intern. Soc. Leather Trades Chem.* 14, 553.—Samples cut from adjacent positions in the same skin show such variations that it is dangerous to draw conclusions except from a large no. of tests. A stretching force below that required for rupture causes permanent elongation. The relation between elongation and contraction in width and thickness is not the same as that obtained with isotropic substances. Simple rupture and tearing rupture (in a direction not at right angles to the strain) are distinguished. H. H. Mehrtens

Estimation of fat in leather. P. KOTELNIKOV. *Vestnik Kozhevennoi Prom. i Torgovli (Review of Leather Ind. and Trade)* 1930, No. 4, 141; *J. Intern. Soc. Leather Trades Chem.* 14, 554.—Extn. with petr. ether for 6 hrs. (Soxhlet-type), without previous drying of the leather, is advised. H. H. Mehrtens

Determination of water in vegetable leather. R. PARADISE INNES AND J. M. CAMPS. *J. Intern. Soc. Leather Trades Chem.* 15, 190–200(1931).—Inaccuracies in the oven drying method are studied. Factors considered are time of heating, pressure and temp. (vacuum at 95° vs. air at 110°), and grease content of the leather. Many of the findings

are contrad etory and it is concluded that the accuracy of the detn of water in vegetable leather by the oven method cannot be guaranteed no matter what the exptl conditions, unless the grease content of the leather is extremely low Regain in wt of oven-dried samples stored over concd $H_2SO_4$ is ascribed to adsorption of air H B Merrill

*Irgitan and its use in dyeing chrome leather.* J G Geigy *Boll ufficiale staz sper ind pelli mat concian's* 8, 154(1930), *J Intern Soc Leather Trades Chem* 14, 435.—Methods of application are described. H B Merrill

Waterproof finishes [lacquer finishes for leather]. D Woodroffe *Leather Trades Review* 1930, *J Intern Soc Leather Trades Chem* 14, 318.—A discussion. H. B. Merrill

Hydration of animal skin by the volume change method. IV. *Effect of various* factors on the hydration of calf skin. Edwin R Theis and P. T Benton *Ind Eng Chem* 23, 307–70(1931) cf *C A* 23, 2319.—The dilatometer method has been improved so as to measure hydrations quantitatively in ml Postmortem changes reduce hydration and hasten the onset of degenerative dehydration. The onset of degenerative dehydration is prevented by salts and antiseptics, which indicates that bacterial action is responsible. Hydration, though in reduced amt., takes place in satd. solns. of salts, indicating that the wt. loss accompanying curing is due to removal of free rather than bound water Hydration in satd. salt and alkali solns follows the order LiCl, ($NaCl + Na_2CO_3$) < $MgSO_4$ < NaCl < 0.05 *N* NaOH < $Ca(OH)_2$ + excess lime < $H_2O$, $Ca(OH)_2$ With dry-cured skin, NaCl in low concn (2–4%) hastens the attainment of max hydration but also hastens the onset of degenerative dehydration in moderate concns (8–10%) it delays the attainment of max hydration without diminishing its extent, and inhibits dehydration, in high concns (15–20%) it decreases the extent of hydration Hydration increases with the ratio of water to the skin in the total exptl. system, and decreases with increasing temp (again contrary to the effect on swelling) Increase in sp gr by the displacement method can be used to measure hydration. H B Merrill

Physicochemical differences of hide powder by sex. T. Tadokoro and K Yoshimura *J Soc Chem Ind, Japan* 34, Suppl binding 37–8(1931).—Hide powder prepd from bull hide showed the following differences from that prepd from cow hide greater "acid producing power" in neutral salt soln., greater tannin absorptive power, less $I_2$ absorptive power, less swelling capacity in salt solns. (no difference if hide powders are purified) H B Merrill

Microscopic study of the effects of cold temperatures upon skins and hides. Fred O Flaherty and Wm T Roddy *J Am Leather Chem Assoc* 26, 172–80(1931).—No damage was observed that could be attributed directly or indirectly to low or subfreezing temp Keeping skins or hides at low temp has a tendency to dehydrate them which also aids in their preservation Frozen skins should never be flexed and should be allowed to thaw before soaking H B Merrill

Columbian hides. V. A. Lathom Sharp *Leather Trades Review* 1930, 889–92, *J. Intern Soc Leather Trades Chem* 14, 587.—Methods of cure and preservation are described. H. B. Merrill

Investigations on animal skin. Georg Grasser and Hiroshi Ohoki. *J. Faculty Agr Hokkaido Imp Univ* 27, Pt. 2, 253–74(1930).—The time of hydrolysis of skins of *different species in solns. of acids, bases and salts is tabulated* H. B Merrill.

Investigations on gelatin and skin. Georg Grasser and Hiroshi Ohoki. *J Faculty Agr Hokkaido Imp Univ* 27, Pt. 2, 275–84(1930).—The peptizing effects of numerous salts are listed H. B Merrill

Cultivation and tannin content of Caesalpina coriaria (divi-divi) in [former] German E. Africa. T. Mark. *Tropen* 33, 100–5(1930), *J. Intern Soc Leather Trades Chem* 14, 587–8.—The tannin content is fair after 9 years' growth and excellent after 15 yrs The percentage of tannin compares favorably with that of Indian divi-divi. H B M

Problem of tannery waste. D Jordan Lloyd *Leather World* 22, 1102–5(1930).—Products are enumerated and current practice for their disposal is discussed. H. B Merrill

Tanning materials and their characterization. II. Organic tanning materials. Georg Grasser and Hiroshi Ohoki *J. Faculty Agr Hokkaido Imp Univ* 27, Pt. 2, 243–61(1930); cf *C A*. 24, 4951.—Contraction temp and time required for complete hydrolysis on boiling are tabulated for hide and gelatin tanned with a large no of tanning materials, including natural tannins, syntans, aldehydes, phenols and their derivs The effect of added salts and of solvent (in case of aldehydes) is studied. No general relationships are found and no conclusions drawn. H. B. Merrill

Analytical control of sulfonated oils used in the tannery. M. Geronazzo. *Boll. ufficiale staz sper. ind pelli mat conciarli* 8, 142–50(1930), *J Intern. Soc. Leather*

*Trades Chem* **14**, 373; cf *C. A* **22**, 2485.—The procedure devised for sulfonated castor oil has been applied to sulfonated animal and fish oils. The results are sufficiently precise for technical purposes. H. B. MERRILL

**Combined working of two tanning materials on gelatin and animal's skin. Chemical investigation of combination tannage.** GEORG GRASSER AND MASATAKE ICHISE *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 319–48(1930).—The contraction temp. of the skin and m. p. of gelatin tanned successively with 2 tanning materials are tabulated. H. B. MERRILL

**Mangrove as a tanning material.** T. A. BUCKLEY *Malayan Forest Records* **1929**, No. 7, *J. Intern. Soc. Leather Trades Chem.* **14**, 277–8.—Analyses show the variations in tannin content in bark from different species, different trees and different parts of the same tree. Great variations exist; the average compares unfavorably with Madagascar and E. Africa mangrove. *Rhizophora mucronata* has very high tannin content (28% of moist bark); the more plentiful *R. conjugata* contains only about 16%. *Carapa obcata* is the species richest in tannin, but its exts. froth badly. Bark should be extd. as soon as stripped; there is a gain in tannin on drying, but this is offset by objectionable darkening of color. The tannin content tends to increase from the bottom to the top of the tree, and is highest in older, bigger trees. H. B. MERRILL

**The Pavlovitsch alkaline tanning method for the preparation of sole leather.** L. KRIGUELOUKIS *Ledertech. Rundschau* **1930**, 81; *J. Intern. Soc. Leather Trades Chem.* **14**, 574.—The leather is tanned first with quebracho at $p_H = 8 - 7.5$ for 6 days, the concn. and temp. being gradually increased, then with oakwood ext. at $p_H = 3.8 - 4.0$. Analyses and wear tests show the leather so made to be normal. H. B. MERRILL

**Tanning small fur skins.** O. DUJARDINE *Leather Manufacturer* **41**, 260–1(1930).—A description. H. B. MERRILL

**Tanning reptile skins.** D. WOODROFFE *Leather Trades Review* **1930**, 840; *J. Intern. Soc. Leather Trades Chem.* **14**, 573. H. B. MERRILL

**The theory of chrome tanning in the light of detanning processes.** C. STIEPEL. *Kunstdünger u. Leim* **28**, 15–21(1931).—Chrome tanning proceeds in 2 stages beginning in the alk. bath, but the max. destruction of swelling properties of hide does not result until the bath has become acid from pptn. of a basic Cr compd. upon the fibers of the hide. In detanning chrome scrap for glue, 2 products are obtained, one $H_2O$ sol. and of normal behavior, the other $H_2O$ insol., so-called "chrome glue" obtained by the magnesite process (cf. Stiepel, *C. A.* **25**, 2018), which represents hide substance tanned under acid conditions, more difficult to detan. C. J. SCHOLLENBERGER

**Tanno-chemical investigation of chrome salts.** GEORG GRASSER AND MASATAKE ICHISE *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 295–318(1930).—*The contraction temp. of the skin, and m. p. of gelatin tanned with different chrome salts, prepd.* under different conditions, are tabulated. H. B. MERRILL

**The gel strength of glue from hide, from chrome leather and from bones and its relation to the viscosity and chromium content.** O. GERNGROSS AND H. MENDEL *Kunstdünger u. Leim* **28**, 109–16(1931).—Ten hide glues, 5 bone glues and 13 glues from chrome leather were investigated. Procedures are described in detail. Gel strength of a 12.5% soln. at various temps. was detd. with the Greiner app. Viscosity of a 17.75% soln. at 40° was measured by the Vogel Ossag app. The $p_H$ of a 1% soln., water and ash contents of samples are also given, but methods are not described. $Cr_2O_3$ in chrome glues varied 0.03–4.20%. Among com. Cr glues, there was no connection between $Cr_2O_3$ and phys. properties, but 3 samples from leather dechromed in the lab. showed *progressive improvement in gel strength and viscosity with Cr removal.* Chrome glues (with one exception) and bone glues showed higher gel strength than hide glues of the same viscosity. The relation of gel strength to viscosity was fairly regular among all samples and most regular among hide glues. The $p_H$ varied 5.0–7.6, and within this range had no important effect upon viscosity. C. J. SCHOLLENBERGER

**Influencing of gelatin-metal salt precipitation by addition of neutral salts.** GEORG GRASSER AND HIROSHI OHOKI. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 285–8(1930).—The effects of a large no. of Na salts on pptn. of gelatin by salts of weak bases and heavy metals are listed. H. B. MERRILL

**Ashing glue and gelatin in the "Effix" muffle furnace.** ERNST GOEBEL. *Kunstdünger u. Leim* **28**, 117–9(1931).—Tests of a new muffle furnace showed that glue and gelatin samples could be ashed to const. weight at a saving of 50% time and 80% gas as compared with ignition over a Bunsen burner. Comparisons of crucibles of different materials showed that least time and gas were required with Pt, slightly more with "Weta" ware and most with silica and porcelain. With the latter, time and gas consumption were approx. 100% greater than with Pt. C. J. SCHOLLENBERGER

**Animal materials for artificial silk, a chemico-technical problem for the glue and gelatin industry.** H MENDEL. *Kunstdünger u Leim* 28, 120-1(1931).—If filaments of gelatin could be tanned or fixed while under tension, the tendency of the mols to orient themselves (cf Katz and Gerngross, *C A* 20, 528) should result in a fiber with superior strength, which might compete with artificial silk. Investigation of this or similar problems might well be undertaken by the industry C J SCHOLLENBERGER

**The collagen fiber.** I HALLA AND R. TANDLER *Z physik Chem*, Abt. B, 12, 89-92(1931).—X ray spectrograms of collagen fibers from *fish skin* were identical with those of gelatin under tension FRANK URBAN

**Changes in the use of adhesives.** HERMANN STADLINGER *Kunstdünger u Leim* 28, 8-11(1931).—A general outline is given of the uses of natural adhesives in the past, recent substitution of synthetics and possible new applications for old materials C. J SCHOLLENBERGER

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Glue and gelatin in the textile industry (STADLINGER) 25. Refractometric study of chromic acid reduction (GRASSER, OHOKI) 6. Study of the warble and its eradication (GANSSER) 15. Uniting rubber and leather (Brit pat 338,789) 30. Substitutes for sugars in [chrome tanning] (Ger pat. 518,196) 18.

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STIASNY, ED. Gerbereichemie. Dresden T. Steinkopff About 600 pp. About M 35, bound, about M 37.

WIENER, FERDINAND, and WEBER, H. Die Lederfärberei und die Fabrikation des Lackleders. Ein Handbuch für Lederfärber und Lackierer 4th ed., revised and enlarged Leipzig A Hartleben's Verlag 220 pp M 5, bound, M 6

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**Rotary-drum tanning apparatus.** E G WILSON Brit. 339,252, Aug 23, 1929. Structural features

**Removing fat from sheepskins.** P. I PAVLOVICH, N G SHCHEKOLDIN, V I DRELING, K. I ZYABLOV and V F DROZDOV Russ appl 68,138, Apr 11, 1930 Skived sheepskins are treated with caustic solns of "Kontakt" (petroleum sulfonic acids) or its soap

**Chrome velvet leather.** V. S AVTONOMOV Russ. appl. 59,844, Dec. 7, 1929 Chrome leather is treated with warm water followed by an alternating treatment with a soda soln and Cr alum, and then by the usual treating methods.

**Leather for driving belts, etc.** A. MCLELLAN Brit. 338,536, Aug 19, 1929 Leather for belt conveyors or driving belts is rendered resistant to moisture and wear by buffing and treating with a soln formed of gutta percha, Sb sulfide or other cold vulcanizing agent, and $CS_2$ or $CCl_4$ or both (which may be applied in successive coats, each of which is allowed to dry before applying the next coat) The material may be subsequently subjected to pressure, and may be preliminarily impregnated with rubber Various details of solns and procedure are described

**Dyeing leather.** N P SHAVROV Russ appl 39,491, Jan 26, 1929 An ext is obtained by boiling the bark of the larch tree or pine tree with caustic remaining after a complete extn of tanning material The leather is dyed with this ext with the usual metal mordants by the customary dyeing methods

**Dyes for chrome leather.** I. G FARBENIND A.-G Brit 338,930, July 22, 1929. *Aromatic N nitroso compds* are warmed with aromatic amino-, hydroxy-, or amino-hydroxy-compds (suitably in the dye bath at the time of dyeing chrome leather) Numerous examples are given for producing dyeings of various colors

**Monoazo dyes for leather.** I G FARBENIND A.-G Brit 339,029, Sept. 24, 1929 Dyes giving brown shades on leather are obtained by coupling a diazotized *p*-nitroaniline negatively substituted in *o* position to the $NH_2$ group, or a homolog, with a compd of the diphenylamine series such as diphenylamine or a sulfo or carboxy deriv Examples are given

**Artificial horn.** I G FARBENIND A.-G (O Schmidt, K Seydel and E Meyer, inventors) Ger 482,930, Aug 28, 1926 Casein is worked up by the customary processes after addn of a small quantity of a liquid or solid hydroaromatic or aliphatic-hydroaromatic base, or an aliphatic base contg an OH group, or a salt or deriv of such a base The use of cyclohexylethanolamine is described in an example

**Glue.** PORA-WERK PAUL SCHROT. Ger 515,868, April 27, 1926 A filling material for animal glue consists of wood dust and such mineral as gypsum or chalk. The filling material is intimately mixed with the glue under pressure

**Glue and gelatin from chrome leather cuttings.** BRITISH GLUES & CHEMICALS,

LTD., and R. B. DREW Brit. 338,584, Aug 17, 1929 Chrome leather cuttings are subjected to percolation with a soln of an alk earth such as magnesia, repeatedly and cyclically in one direction at such a rate that the acid extd from the leather neutralizes sufficient alkali to maintain the desired alkalinity (a $p_H$ of 8–8 5 being suitable) A temp of 105° is suitable for thick cuttings and undesirable sol matter such as salt may be removed by a preliminary extn at room temp. Various details of app and procedure are described

## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

**The chemical technology of rubber.** SIDNEY M HAGMAN *Reprint from Svenska Gummi Ind Memorial Number*, issued on the occasion of Disponent Henry Dunkers' 60th anniversary, September 6, 1930 —A general discussion H C DUUS

**A modern service laboratory—the I. C. C.'s work for the rubber industry.** ANON *Chem Trade J* 52, 100-1(1931) —A description is given of the new service lab for the rubber industry that has been equipped by the Brit Dyestuffs Corp., Ltd., at Hexagon House, Blackley, near Manchester One section deals with the solution of technical problems, the second with the routine testing of rubber industry chemicals and colors and the third with research W H BOYNTON

**The world's rubber supplies.** GEO. RAE *Bull Rubber Growers' Assoc* 13, 59–84 (1921) —Though chiefly economic, the paper is of general interest, as it deals with planted areas, output, exports, imports, consumption and stocks in the producing and mfg localities C C DAVIS

**Metallurgical methods used in producing rubber.** PAUL D. V MANNING *Chem Met. Eng* 38, 131–2(1931) —An illustrated description is given of new machinery for planting, cultivating and prepg guayule. C. C DAVIS

**Patents and custom standards of new machines for the manufacture of rubber articles.** RUDOLF DITMAR. *Kolloid-Z* 54, 237–9(1931).—A review A. FLEISCHER

**The use of pigments in the rubber industry.** FERD. A. RICHTER. *Farbe. u Lack* 1931, 135 —The primary use of pigments in rubber is not for the color but for the phys properties imparted to the rubber The choice of pigment depends upon the method of vulcanization as well as the use to which the product is put. G G SWARD

**Reënforcing action of pigment mixtures on rubber compounds.** D. J. BEAVER AND J W. MACKAY. *Ind Eng. Chem* 23, 294–6(1931) —The exptl data which are presented show that mixts of varying proportions of either channel gas black or a "soft" C black with whiting, lithopone or clay impart additive phys properties to the vulcanizate Mixts. of "soft" C black with ZnO also impart additive properties, whereas mixts of channel black with ZnO result in poorer resistance to abrasion, in a higher modulus and in a higher tensile strength than those corresponding to the additive effects. These facts are explained by a chem reaction between the basic ZnO and the acidic compds in the rubber or on the C black. These results are applied to the formulation of a solid tire rubber mixt., which shows a greater resistance to abrasion and to "blow-out" when it contains a "soft" black than with a channel gas black. C. C D

**American-grown rubber produced from guayule.** GEO. H. CARNAHAN. *Chem. Met Eng* 38, 128–31(1931) —An illustrated description of recent developments (cf Spence, *C. A.* 24, 2914) C. C. DAVIS

**Physical tests of sponge rubber.** F. L. HAUSHALTER. *India Rubber World* 83, No 5, 59–60(1931) —An *app.* to measure the compressibility and the permanent set after compression of sponge rubber is described and illustrated C C DAVIS

**Soft rubber in chemical process equipment.** H. E. FRITZ. *Chem Markets* 28, 273, 275, 277(1931).—An illustrated description is given of the application of rubber to ball mill linings, and machinery bearings, with special reference to the Vulcalock process. C. C. DAVIS

**Chemical constitution of rubber.** MARIO D. PINTO. *Rev. brasil. chim* 2, 267–70 (1930) —P. discusses the work of the early investigators, and shows the evolution of the present formula $(C_5H_8)_n$. JOHN M LADINO

**Isoprene and rubber. XXII. Isorubber-nitrone.** H. STAUDINGER AND H. JOSEPH. *Ber.* 63B, 2888–99(1930); cf. *C. A.* 24, 4954 —Pummerer's view that the unit mol. of rubber is $(C_5H_8)_2$ is supported by mol -wt detns on rubber in menthol and especially on isorubber nitrone (I) in $C_6H_6$ and $PhNO_2$ These results, which have been confirmed as to their order of magnitude, are apparently not in agreement with Staudinger's view, based on model expts with polystyrenes, the conversion of rubber into col-

loid sol rubber phosphonium salts, the prepn of polymer homologous series of polyprenes, the degradation of rubber, the relationship between viscosity and mol wt., etc., all of which lead to the conclusion that the primary colloid particles of rubber, *i. e.*, the particles in dil soln., are macromols contg some 100 isoprene mols. joined in a chain (mol wt around 68 000). A study of the action of PhNO on rubber solns gave results somewhat different from those of Pummerer and Gündel. They believed that the resulting decrease in viscosity is due to the disturbance of the rubber micelles by the addn of reagents. It has been found, however, that the viscosity of solns of macromol (eucolloid) polystyrene is greatly diminished by Cl, Br, strong oxidizing agents (N oxides, $O_3$), etc., as the result of an irreversible cleavage of the long sensitive macromols into shorter fragments having a hemi-colloid character. The viscosity changes (often considerable) produced in highly viscous rubber solns. by the addn of reagents are also irreversible, and therefore cannot be due to adsorption of the reagent on the colloid particles or to changes in their micellar structure. The macromols of rubber, because of their double bonds, are much more sensitive than the satd. macromols of polystyrene, and their cleavage into shorter fragments of hemi-colloidal character is a primary phase of almost all transformations undergone by rubber. To det. the extent of such a cleavage in the reaction with PhNO, varying quantities (0.01–3.0 mols.) of PhNO were added to a 0.2 *M* soln. of rubber (purified according to Pummerer) in $C_6H_6$, and after 24 hrs. at 20° the time of flow from an Ostwald viscometer was noted. Parallel expts. were made with $NO_2$ and $Br_2O_3$. Below are, resp., the no. of mols. of reagent used and the viscosity of the resulting soln. as compared with pure $C_6H_6$ taken as 1: PhNO 0.01, 0.5, 2.9; PhNO 0.1, 3.7, 1.; 3.7. Rubber soln. alone 3.6. *If* I, then, is not a deriv. of rubber itself but of oxidative degradation products, it should contain somewhat more O than that calcd. for pure isorubber nitrone, and such is the case. In P. and G.'s published analyses only 2 show C values equal to the theoretical, the other 5 being 1–1.5% too low. S. and J. in about 20 analyses obtained values 1.5–2% too low although they completely excluded air in the prepn. of the I and carried out the filtration and washing in a N atm. As to the mol. wt. of the product, a series of detns. in 1% $C_6H_6$ soln. gave values about twice as large as in $PhNO_2$, but the latter, which on the av. were only slightly higher than P. and G.'s, varied considerably. I is not a homogeneous substance but a mixt. of polymer homologous products which can be sepd. by means of cold $C_6H_6$ into more easily and less easily sol. portions of approx. the same compn. but with different mol. wts. in $PhNO_2$, and forming $CHCl_3$ solns. of different viscosities. Furthermore, it was shown by isothermal distn. in Signer's app. (*C. A.* 24, 4433) that in equally concd. solns. of the 2 portions there are fewer mols. in the soln. of the less sol. portion. The reaction with PhNO does not permit of detg. whether the mol. of rubber is made up of 100 or 1000 isoprene residues. XXIII. Cryoscopic measurements on rubber solutions. H. Staudinger and H. F. Bondy. *Ibid* 2900–5.—Reply to Pummerer, Andriessen and Gündel (*C. A.* 24, 1102). Mol.-wt. detns. on rubber in camphor cannot serve to clear up the structure of rubber, for, as already shown, the rubber undergoes extensive degradation to hemi-colloidal cleavage products when heated in molten camphor (170–80°). The ratio of the time of flow of a $C_6H_6$ soln. of rubber which has been dissolved in molten camphor to the time of flow of a soln. prepd. from the same quantities of rubber and camphor without heating is about 1.15, the rubber recovered from the former soln. has the properties of a deeply degraded hemi-colloidal rubber, is smeary, has almost completely lost its viscosity, dissolves without swelling and forms solns. of low viscosity. The relative viscosities of a 0.2 *M* soln. of pure rubber in tetralin are 14.89 and 2.60, resp., before and after the rubber has been heated with camphor. The sepn. of mixed phases observed by P. and Andriessen in attempts to det. the mol. wt. of rubber in freezing $C_6H_6$ is easily explained by the fact that concd. rubber solns. in $C_6H_6$ (1%) are not sol. but gel solns., for rubber purified according to P. the limiting concn., *i. e.*, the transition from sol to gel soln., is about 0.5%, and it is only in the dil. sol. solns. that mol.-wt. detns. can be made successfully. With the hemi-colloidal degradation products, mol.-wt. detns. can be made by the f. p. method. The limiting concn. of a degraded rubber of polymerization degree 100 is reached in an approx. 5% soln. P. and Gündel express the opinion that S.'s rubber was not completely N free, but S. and B. were unable to detect any N by heating with K, although a control showed that 0.01% N can be detected in this way. C. A. R.

Swelling pressure of rubber. Paul Stamberger. *Nature* 127, 274(1931); cf. *C. A.* 24, 4659.—The formula $P = K/V^3$ gives satisfactory results with the data of the previous paper, where $P$ is the swelling pressure, $V$ is the vol. of solvent bound to a unit wt. of jelly, and $K$ is a const. whose meaning is expressed by substituting the above

equation in the max work term $dA = PdV$ The swelling pressure results from the attraction of solvent mols by the mols of the gel ARTHUR FLEISCHER

**The action of lead selenide in rubber mixtures.** R DITMAR AND K. H. PREUSSE *Caoutchouc & gutta percha* 28, 15449-50(1931).—Recent interest in Se in the rubber industry led to a study of its derivs as possible valuable compounding ingredients The present paper continues the previous work on Se red (cf *C A* 24, 4663, D and Preusse *C A* 24, 4659) Zn selenosulfide (5% Se) and $K_2SeSO_3$ had no notable effect in rubber mixts either on the rate of vulcanization or otherwise, so PbSe was next examd A finely ground natural product (hardness 2.5-3 d 8.2-8.8) was used In rubber-S mixts, PbSe has no influence on the rate of vulcanization nor any reënforcing effect On the mixing mill PbSe has a strong plasticizing action which becomes marked with 4% PbSe and accordingly this property may be utilized in prepg adhesive cements from rubber In the mixt crepe 100, S 3 PbSe 2, accelerator 2 whiting 30, the PbSe acts as a very powerful activator with the majority of com accelerators (the results with 16 are tabulated), so that no other activator is needed, and it also reënforces the vulcanizates particularly in increasing their resistance to abrasion Its action, therefore, resembles that of Se On increasing the PbSe in an accelerated mixt to 100 parts on the rubber, the reënforcement increased continuously In cures with $S_2Cl_2$ in $CS_2$ or with $S_2Cl_2$ vapor, PbSe had no action at all, except that because of its softening action (*loc cit*) the cure had to be prolonged C C DAVIS

**Liquid rubber and carpets.** WEBSTER NORRIS *India Rubber World* 83, No 6, 56(1931).—An illustrated description is given of the application of rubber dispersions in a new type of carpet C C DAVIS

**The curing of sheet rubber.** T E H O'BRIEN *Trop Agr* (Ceylon) 75, 280-92 (1930).—Smoking of sheet rubber prevents undesirable surface stickiness Unsmoked sheet contg *p*-nitrophenol is inferior in aging properties to a like sample without *p* nitrophenol Smoked sheet after vulcanization is superior in aging properties to unsmoked sheet when both contain *p*-nitrophenol A sheet weighing 1.5 lb and measuring 23 × 18 in is of correct thickness for efficient drying, combined with good appearance, and is also the most suitable size for packing in a standard rubber chest J O H

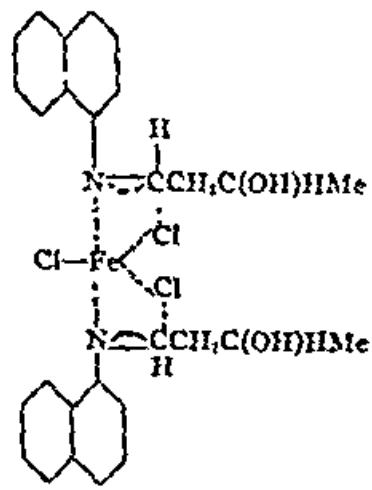
**The consistency of the particles in balata latex.** E A HAUSER. *Kautschuk* 7, 2-3(1931), *Gummi Ztg* 45, 1030(1931).—The expts deal with balata latex from Peru, which was preserved with AcOH For this reason the acid character of the latex may have brought about certain changes in the consistency of the particles, so that the conclusions drawn from the expts do not necessarily hold good for the particles of fresh latex The micromanipulator examn was carried out with the aid of a new kind of dark field condenser, with the finest microneedle which was equipped with a new device for its control (cf *C A* 25, 1409) The examn shows that there are 2 kinds of particles in such latex: (1) a uniformly tacky kind, which probably represents the resinous components of the latex, and (2) a smaller kind of particle which does not have a homogeneous structure This 2nd type consists of a viscous inner part and a plastic outer part, which even has a certain degree of elasticity By evapn of the latex or by addn of coagulating agents the consistency of the 1st type changes only slightly or not at all, whereas the 2nd kind of particle contracts to a homogeneous mass The 2nd kind of particle probably therefore represents the actual balata hydrocarbon Further expts proved that during the evapn only the particles of the 1st type fuse together, whereas the particles of the 2nd type remain distinctly sepd from each other This latter fact probably depends upon each hydrocarbon particle having an adsorbed skin of the non balata components dissolved in the serum This observation is of particular interest, since it offers the possibility of obtaining pure balata by some convenient method, such as fractional pptn or fractional sepn from the latex, without having to resort to extn C C DAVIS

**Gathering, treatment and properties of guttapercha.** H. R. BRAAK *Chem Weekblad* 27, 567-71(1930).—A review. A L. HENNE

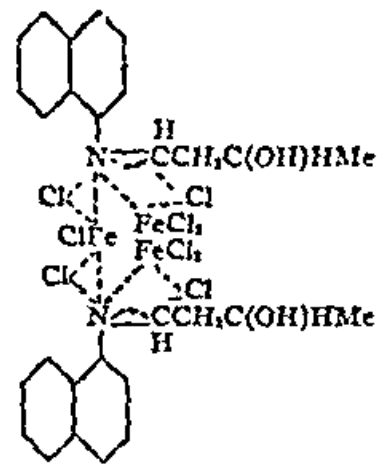
**Age-resistant rubber. A survey of United States and foreign patents for chemical prevention of the deterioration of rubber.** JOSEPH ROSSMAN *India Rubber World* 83, No 5, 65-8(1931) C. C. DAVIS

**The protective action of some antioxidants. II. The metal halide compounds of some protective agents against aging, with special reference to aldol-α-naphthylamine.** F. KIRCHHOF *Kautschuk* 7, 7-12(1931); cf *C. A* 23, 3371.—It has already been shown that alc solns of heavy metal chlorides change the color of alc solns of certain antioxidants like aldol-α-naphthylamine (I), "Stabilite Alba" (II) and "Agerite powder" (III), both when viewed in visible and in ultra-violet light The present paper, in which the behavior of I in particular was studied, attempts to explain this

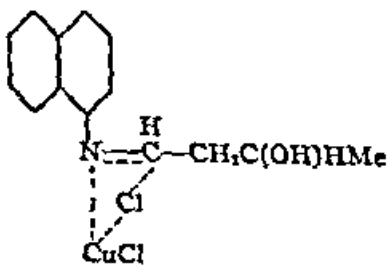
*phenomenon, which is of importance not only from the antioxidant point of view, but because of the discoloration of vulcanizates contg such antioxidants* With $AuCl_3$, $CuCl_2$, $FeCl_3$ and $PtCl_4$, I gives cherry red colors at low concns and intense blue colors at higher concns of the metal chlorides The blue colors are, however, unstable and change to violet, then to cherry-red With $AlCl_3$, $AsCl_3$, $CoCl_2$, $FeCl_2$, $HgCl_2$, $MnCl_2$, $NiCl_2$ $SbCl_3$ $SnCl_2$, $SnCl_4$, $TiCl_4$, $UO_2Cl_2$ and $ZnCl_2$ no colors are obtained. While $AuCl_3$ $CuCl_2$ $FeCl_3$ and $PtCl_4$ cause the disappearance of the fluorescence of I in ultraviolet light $SbCl_3$ is the only other chloride of those above which affects the fluorescence, and this gives a yellow white ppt. From the cherry red I solns with $CuCl_2$ and $FeCl_3$ chocolate and coffee brown *ppts* with high Cu and Fe contents sep on long standing, and these remain dark even after long washing with *EtOH* Their $C_6H_6$ *solns* are intense yellow brown Analysis of the ppts showed that the Cu ppts, which vary from coffee brown to ocher yellow, are adsorption compds of the cherry red sol Cu I compds with solid I, and that the Fe ppts, which are chocolate brown, are adsorption compds of the *sol cherry red* Fe I *compds. with solid* I. *These reactions are not the same as* that of aq I with aq $FeCl_3$ $ZnCl_2$, $AgNO_3$ and $CrO_3$ (cf "Meyer-Jacobson," II, 370), because water and dil alkalies cause cleavage of the alc Cu and Fe compds, with *formation* of blue violet flocculant ppts which contain no metal and which become yellow-brown in air Since these color reactions are confined to chlorides of a higher state of *oxidation the more loosely combined halogen plays the essential part. The fact that* the reaction with $CuCl_2$ is in every case more rapid than with $FeCl_3$ may be utilized to distinguish analytically small quantities of these compds A similar color reaction occurs with free halogen, *e g*, Br in $CCl_4$, where a deep indigo appears immediately, changes to violet, then to cherry-red and finally to yellow-brown. These Br addn *compds give no color reaction with* $FeCl_3$ *or* $CuCl_2$, *so that in the color reaction* the metal halide combines at the double bond between the N and CH. Since the cherry-red I $FeCl_3$ and I $CuCl_2$ compds are decompd by small quantities of HCl to yellow-brown products, only unstable compds are formed, and since the quantity of addn compd depends upon the concn of halide, the N does not always have the same valence, and the *following formulas are assigned*



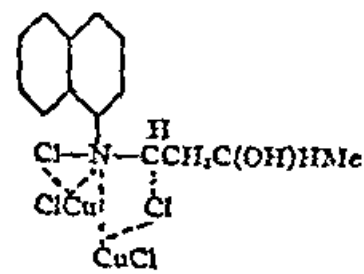

Cherry red soln (3 valence N) from low $FeCl_3$ concn. Stable




Blue violet soln (4-valence N) from high $FeCl_3$ soln Unstable




Cherry red soln (3-valence N) Stable




Blue soln. (4-valence N) Unstable

These resemble the hemin (IV) formula of Willstatter and Kuster The I-metal halide solns absorb all visible light up to a bright band in the red and orange between 560 and 680$\mu\mu$, and since HCl solns. of IV show a similar band, the absorption limits may be characteristic of the $FeCl_3$ and $CuCl_2$ groups The ultra-violet fluorescence of all the I metal halide compds is very feeble compared with that of the original substance, and the colors vary greatly The following fluorescent colors appeared in EtOH in ultra violet light I, intense sky-blue, I + $FeCl_2$, very pale violet, I + $CuCl_2$, pale yellow green, I + $CuCl_2$ + HCl, pale green brown, I + Br, pale violet II intense violet, II + $CuCl_2$, pale yellow green, II + $CuCl_2$, pale yellow green, II + $CuCl_2$ + HCl, pale green brown, II + Br, pale brown, IV + alc HCl, pale red brown The source of the strong fluorescence is probably in the N—CH double bond, and it is lost by addn of the halide The O transporting power of Fe in hemin occurs also in the I metal halide and II-metal halide compds, for I soln made pale rose by $FeCl_3$ becomes deep blood red when O is passed through it, whereas I soln alone is pale yellow The O transporting power of the $CuCl_2$ compds is many times greater than that of the corresponding Fe compds and this agrees with the similar behavior of Fe and Cu compds in rubber With 1% $CuCl_2$, O caused a turbidity with I and intense carmine with II, by the formation of oxidation products, and after prolonged passage of O, about 50% of the dissolved substances sepd as a chocolate brown *ppt* contg only a small percentage of combined Cu Treatment of I soln contg $FeCl_3$ for many hrs gave an intense carmine color, with no insol oxidation products Not only is the auto oxidation of antioxidants greatly accelerated by their $FeCl_3$ complexes and especially by their $CuCl_2$ complexes, but it is inhibited by catalytic poisons Thus with II $CuCl_2$ soln, a little HCN greatly retards the time of appearance and the intensity of the carmine which is formed upon treatment with O III gives no immediate color with alc $FeCl_3$ or $CuCl_2$, but on long standing in air a brown color appeared, because of oxidation III is probably more stable than I and II toward oxidizing agents and oxidation catalysts In titrating III in ultra violet light, the quantity of $FeCl_3$ required to destroy the violet fluorescence is approx 2 mols of $FeCl_3$ per mol of III. II gives no immediate color with $FeCl_3$, but on long standing a carmine color appears, especially in light II and $CuCl_2$ give an immediate yellow or yellow brown which changes soon to deep carmine The carmine solns with II and $FeCl_3$ and $CuCl_2$ show similar spectral properties, and are not changed by HCl, in contrast to the colors with I complexes *In titrating in ultra violet light, only 0.5 mol of $FeCl_3$ or $CuCl_2$ is required to destroy* the fluorescence of the II-$FeCl_3$ and II $CuCl_2$ complexes Based on the similar absorption spectra of these metal halide complexes with the previous ones, they probably contain similar $FeCl_3$ and $CuCl_2$ complexes which cause the colors The Fe complex would be PhN $CH_2$ $CH_2$ NPh | $FeCl$, where the stability toward HCl results from the formation of high valences Since antioxidants are oxidized in time by autoöxidation they protect an antioxidizable substance like rubber only as long as they remain active Since traces of sol heavy metal compds, especially of Fe, are invariably present in rubber compounding ingredients, rubber mixts which contain protective agents are discolored by the formation of dark colored metal complexes and their oxidation products. C. C. Davis

**New light on vulcanization. The process as revealed by electrical tests.** W. H Nuttall and J. Kirkwood *India Rubber J.* 80, 657–60(1930).—A review and discussion, with particular reference to the work of Curtis, McPherson and Scott (*C. A.* 22, 330), Kitchen (*C. A.* 23, 2375) and Boggs and Blake (*C. A.* 24, 4125). C. C D

**Tensile tests of vulcanized rubber at high speed.** A. van Rossem and H. B. Beverdam *Rev gén caoutchouc* 7, No. 57, 27–34(1930).—Most of the testing machines used for detg the elongation of rubber have a slow speed, and 60 cm. per min is somewhere near the speed usual in practice, regardless of the state of cure This is in spite of the fact that undervulcanized rubber, which has a high elongation when stretched at slow speed, is brittle when stretched very rapidly, and has an extremely low elongation. For this reason, it was of interest to make elongation tests at high speeds No app was available for recording the stress-strain curve, and resort was had to the pendulum app of Charpy. The technic employed in adapting this app to the present expts is described and illustrated. Different accelerated rubber mixts at various states of cure were tested in this way. The energy at rupture was calcd. and the results were compared with tests on the Schopper dynamometer The results show that (1) the max energy at rupture as a function of the time of vulcanization is much more sharply defined at the high speeds of the pendulum app than in the tests with the Schopper machine, and (2) the max. strength with the pendulum app is at a

lower state of cure than with the Schopper machine With vulcanizates contg a low percentage of S e g, the mixt rubber 100, S 3, diphenylguanidine 1, ZnO 5, the pendulum app gives a less sharply defined max, but nevertheless here too this max is at a *lower state of cure than* that with the Schopper machine The influence of loading with pigments and fillers was also studied The magnitude of the max. depends upon the substance *added, but the sharpness of this max and its relation* to the time of vulcanization are independent of the nature of the filler Accelerated aging tests were made in the Geer oven at 70° and the aged vulcanizates were then tested in the same way After aging the time of cure/energy at rupture curve obtained from the Schopper machine was similar to that obtained from the pendulum app before heating The energy at rupture curve detd by the pendulum app is therefore of great importance in relation to the state of cure, because the time of vulcanization which corresponds to the max energy at rupture by the pendulum app is, contrary to the time of vulcanization corresponding to the max tensile strength by the Schopper dynamometer, the time of vulcanization which corresponds to the best aging The importance of tests at the high speeds and the shortcomings of the pendulum app for this purpose make it *desirable that an app be developed* which at a *very rapid* speed of stretching will: (1) det the resistance to stress, the ultimate elongation and the energy at rupture (2) record graphically the relation between the stress and the elongation and (3) perform at different speeds Also in *Kautschuk* 6, 224–9(1930) C. C Davis

Hard spots in vulcanized rubber compounds. J. H Howey. *Ind Eng Chem* 23, 287–90(1931).—Expts are described, the object of which was to ascertain the cause of local variations in the hardness of exptl slabs of rubber mixts of the C black tread type It was found that areas of excessive hardness correspond to regions where the max flow or displacement occurs when the rubber mixt. is pressed into the mold at the time of curing A knowledge of this fact is of importance in testing the hardness of a vulcanizate by the Am Soc of Testing Materials standard of hardness, and for increasing the precision and reliability of this convenient test. It was also found by chem analysis that these variations in hardness cannot be attributed to heterogeneous regions (non uniform compn) in the rubber S-accelerator pigment mixt., and it is concluded that the variations must depend either upon altered conditions of dispersion in the regions of max displacement or else upon a local grain effect set up by the flow C. C. Davis

Use of vulcanized rubber waste as a fixing agent in bronze printing. Geo Rice *Rubber Age* (N Y) 28, 611–2(1931).—An illustrated description. C. C. Davis

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Monoxanthogens [vulcanization accelerators] (U. S pat. 1,796,972) 10 Substitutes for sugars in coagulating latex. (Ger. pat. 518,196) 18. Dispersion of carbon black in water (Can. pat. 309,276) 18.

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Purifying latex. K. D P., Ltd Brit. 338,766, Dec. 20, 1928. Latex is subjected to heat treatment with simultaneous evapn and then subjected to a usual purifying *treatment, as by centrifuging to sep serum, which is facilitated by the pretreatment.*

Device for spraying rubber latex by an air jet. Charles E Maynard (to Fisk Rubber Co). U S 1,795,875, March 10 Structural features.

Rubber. K. D P, Ltd (Rudolf Pummerer and Hans Kroepelin, inventors) Ger 515 603, May 26, 1926 Addn. to 460 950 Pure rubber hydrocarbons are prepd. from rubber latex by treating with alkali in an electrodialyzer

Rubber compositions. Dunlop Rubber Co, Ltd, E A. Murphy, A Niven and D F. Twiss. Brit. 328 975 Aug 20, 1929 Crumb-like rubber compns are prepd. by coagulating an aq dispersion of rubber or the like, by pptn. *in situ* (in relatively large *amounts on the* dry rubber content) of compounding ingredients formed by the interaction of one or more water-sol. reagents normally having no coagulating effect, with other added water sol. reagents, such as reagents which together form products such as $MgCO_3$, $CaCO_3$, $ZnCO_3$, Ca, Ba or Zn silicates, silicic acid or Zn, Cd or Pb sulfides. Soap, glue, gum acacia, etc., may be added to modify the properties of the product.

Use of amines as rubber coagulants. Albert J. Gracia (to Goodyear Tire & Rubber Co) U. S 1,797,192, March 17 Latex is coagulated by use of amines such as ethylamine, diethylamine, propylamine, dipropylamine, tripropylamine, butyl amine, amylamine, iso-amylamine, di isoamylamine or allyl amine.

Preserving rubber. Lorin B Sebrell (to Goodyear Tire & Rubber Co.). U. S.

1,797,179, March 17. Anilinohexylideneaniline (suitably in the proportion of about 0 5%) is added to rubber compns before vulcanization

**Rubber "antioxidant."** Wm S Calcott and Wm. A Douglass (to E. I. du Pont de Nemours & Co) U S 1,796,980, March 17. Deterioration of rubber is retarded by the addn of a small proportion (suitably about 0 5–2 5%) of a transparent brittle solid obtained by the reaction of glucose on *m* tolylenediamine

**Trinaphthylamine.** Albert M Clifford (to Goodyear Tire & Rubber Co) U S 1,797,196, March 17 This compd is obtained by extn with $C_6H_6$ from crude dinaphthylamines and is an antioxidant for rubber

**"Micro-porous" rubber.** H. Beckmann Brit. 338,698, Oct 26, 1928 The process described in Brit 240,430 (*C A* 20, 2262) is modified by adding to the latex a substance capable of being coagulated to form a hydrophilic gel, such as 2% of blood albumin, and then adding a coagulating agent, such as HOAc, which will cause coagulation of both the latex and the added substance Among the substances which may be added are silicic acid, stannic acid, $Al(OH)_3$, colloidal $Fe_2O_3$, colloidal chromic oxide, colloidal tungstic and molybdic acids, manganic hydroxide, V pentoxide albuminoids polypeptides and hemoglobin, and substances such as silicic acid may be formed in the latex by reaction Cf *C A* 24, 752

**Apparatus for molding rubber articles such as tennis balls.** Harry Willshaw and Sydney N Goodhall (to Dunlop Tire & Rubber Corp) U S 1 795,917, March 10 Various structural features are described

**Uniting rubber and leather.** K Eimer Brit 338,789, Jan 8, 1930 Materials such as shoe parts of rubber are roughened on a grinding wheel, coated with rubber soln, sprayed with particles of crepe rubber and further coated with rubber soln and then united by hammering with leather coated with rubber soln

**Attaching rubber to metals.** C. M Carson (to Goodyear Tire & Rubber Co) Brit. 339,421, Feb 23, 1929 A cement is used consisting of latex, hemoglobin a tanning agent such as formaldehyde, $K_2Cr_2O_7$ $K_4FeC_6N_6$ or $Al_2(SO_4)_3$, and vulcanizing ingredients and this cement is vulcanized after application

**Compositions containing rubber and cement.** N Swindin and Nordac, Ltd Brit 339,002, Sept 5, 1929 In making a material suitable for floors, road surfaces or acid resisting coating, raw rubber (heated or swelled with a solvent) is dispersed with water (preferably in the presence of a hard porous inert powder such as fine coke dust which acts as a triturating agent), suitably with addn of emulsifying agents such as soap, saponin, borax, $NH_3$ and soda, and the material is then mixed with a cement (such as portland or oxychloride cement materials) which reacts with the water and causes setting of the mass Various details and use of different fillers, etc, are described

**Films, threads, disks, etc.** I. G Farbenind A -G Fr 37,485, Oct. 3, 1929 Addn to 676,658 (*C. A* 24, 3135) Mixts of natural rubber with the polymerization products of butadiene hydrocarbons are treated with sulfuring agents until the high elasticity characteristic of rubber disappears

**Isomerizing rubber.** Imperial Chemical Industries, Ltd, and E B Robinson Brit 339,398, Sept 30, 1929 Rubber is liquefied by heat and then treated with isomerizing substances such as $H_2SO_4$, sulfonic acids, sulfonyl chlorides, sulfuric esters or metallic halides, with or without phenolic compds, to produce a thermoplastic product Various details of procedure are given

**Apparatus for curing tire flaps.** Robert W Snyder (to Goodyear Tire & Rubber Co.). U. S 1,797,180, March 17. Structural features.

**Rubber conversion product.** Herman A Bruson (to Goodyear Tire & Rubber Co). U S. 1,797,188, March 17 See Can 299,963 (*C. A* 24, 3135).

**Synthetic rubber.** I. G. Farbenind A -G Brit 338,534, Aug 17, 1929 Polymerization of diolefins such as butadiene is effected in the presence of alkali or alk earth metals or their alloys in particles of uniform size, such as with Na balls of 1 1 mm diam in a rotating Fe autoclave at 40°.

**Synthetic rubber.** I. G. Farbenind A -G. Brit. 339,135, Dec 20, 1929 Polymerization of diolefins such as butadiene with an alkali metal such as Na is effected in the presence of at least 25% of a low b -p aliphatic ether such as dimethyl, diethyl or methylethyl ether (these ethers serving both as diluents and as catalysts). Various details and examples are given

**Synthetic rubber.** I. G Farbenind A -G. Brit 339,243, Aug 30, 1929. Polymerization of diolefins such as butadiene is effected in the presence of alkali or alk earth metals or their alloys such as Na amalgam or of alkali or alk. earth metal compds with org radicals which are not capable of ionization (such as Na ethyl, K ethyl, K diphenylmethylmethane, Na triphenyl methane and Li alkyls) and the polymer-

ization agent is added gradually or in at least 3 successive portions during the polymerization. The polymerizing agent may be mixed with other substances such as polymers of diolefins, rubber, paraffin, salt or waxes. Several examples are given.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 339,255, Aug. 30, 1929. Rubber like products suitable for various purposes similar to those for which rubber is usually employed are obtained by polymerizing a mixt. of a diolefin such as erythrene, isoprene, butadiene, methyl or dimethyl butadiene, with styrene (suitably after emulsification of the initial materials together with Na stearate or other suitable emulsifying agent). The polymerization may be carried out at 40–60° for several days, and products of different properties may be produced by varying the proportions of the starting materials.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 37,374, Aug. 29, 1929. Addn. to 655,217 (*C. A.* 23, 4103). Synthetic rubber, etc., is intimately mixed with finely divided soot such as lampblack or C black before vulcanization.

Thiuram disulfides. GEORGE C. BAILEY (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,077, March 17. Compds. suitable for use as rubber vulcanization accelerators and having the general formula $R_1$-CS-S-S-CS-$R_1$ are made by treating a compd. of the type $R_1$-CS-S-M with NaOCl, $R_1$ comprising an org. radical and M a metal radical. Tetramethylthiuram disulfide is made by treating Na dimethyldithiocarbamate with NaOCl in aq. soln.

Rubber vulcanization accelerators. RUBBER SERVICE LABORATORIES, INC. Brit. 339,332, Sept. 7, 1929. Accelerators are prepd. by reaction of an aldehyde amine such as butylidene isoamylamine with a substituted unsatd. aldehyde such as α-ethyl β-propylacrolein. Various details of procedure for manuf. and use of the accelerator are described. Cf. *C. A.* 24, 266,752.

Apparatus for vulcanizing automobile tires. MATTHEW REID. U. S. 1,795,680, March 10. Structural features.

Vulcanizing rubber. INDUSTRIAL PROCESS CORP. Brit. 339,303, Nov. 26, 1928. See Fr. 681,061 (*C. A.* 24, 4426).

Vulcanizing rubber. HAROLD GRAY (to B. F. Goodrich Co.). U. S. 1,796,018, March 10. A product formed by reaction of an org. amine such as aniline or $NH_3$ I, and an aliphatic aldehyde such as butyric aldehyde 3 or more mol. proportions is used as an accelerator.

Rubber vulcanization. ADRIEN CAMBRON (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,240, March 10. An accelerator is used comprising the product obtained by causing aniline and acetaldehyde, under essentially anhyd. conditions, to react in the presence of a small quantity of $ZnCl_2$. Cf. *C. A.* 24, 2640.

Vulcanized colored rubber. RUDOLPH KEECH (to I. G. Farbenind. A.-G.). U. S. 1,796,656, March 17. Before vulcanization, there is incorporated with rubber an insol. metal salt such as the Ba salt of an acid anthraquinone dye contg. at least one amino group, such as 1 amino–4 phenylaminoanthraquinone-2 sulfonic acid, and the material is then vulcanized.

# CHEMICAL ABSTRACTS

Vol. 25. JUNE 10, 1931 No. 11

## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Automatic laboratory siphon. CHARLES BUJNIEVICZ *Chemist-Analyst* 20, No. 3, 16(1931).—Glass caps, sealed to the outer sides of the ends of an equal-armed siphon tube, are recommended W. T. H.

Simple technic in using a pycnometer. F. L. KISKADDEN *Chemist-Analyst* 20, No. 3, 16–7(1931).—*Directions are given for using a narrow-neck, sp.-gr. bottle with viscous oils, tars and pitches.* W. T. H.

A pipet bulb. R. W. KEHR. *Chemist-Analyst* 20, No. 3, 21(1931).—Rubber tubing, with wire to prevent collapse at the bend, can be used for making a suitable bulb W. T. H.

A method for filling burets by vacuum. C. W. EDDY *J. Chem. Education* 8, 964–5(1931) E. H.

New insulator for the hot-water bottle. C. W. EDDY *Chemist-Analyst* 20, No. 3, 20–1(1931).—Cut a strip of crude rubber of suitable size. Soak the edges in $CCl_4$ until they soften. Place around the neck of the bottle and work the edges together *till the seam disappears* W. T. H.

Handy wash bottle. E. H. HERMAN *Chemist-Analyst* 20, No. 3, 21(1931).—The continuous flow wash bottle with Bunsen valve is described. A pressure bulb is used for blowing, and a glass bead is placed in the rubber tubing which leads to the extra opening in the stopper. *By pressing the rubber away from the bead, air enters and the flow stops* W. T. H.

A thermometer for precision calorimetry. T. CARLTON SUTTON *J. Sci. Instruments* 8, 98–103(1931).—A Hg-in-glass thermometer for sensitive calorimetric work has been developed by (1) reducing to 60 mm. the pressure of N in the space above the Hg column, and (2) eliminating parallax by means of a novel and simple type of reading lens. E. H.

Process for the investigation of air filters. W. SELL *Z. Ver. deut. Ing.* 75, 295–6(1931).—Previous methods for detg. the efficiency of air filters have been gravimetric. A new colorimetric method for detg. residual dust content is described in which a finely pulverized, water-sol. aniline dye is used as "colored dust." An accuracy of 0.5% is easily obtained M. McMAHON

Accurate air separator for fine powders. PAUL S. ROLLER *Ind. Eng. Chem., Anal. Ed.* 3, 212–6(1931).—An app. is described for sepg. quantitatively a 1-kg. charge of fine powder into a series of fractions beginning with 0–2.5 microns. Except for the finest fractions (below 5 microns), where attrition by the air current takes place in the case of soft powders, particle sizes sepd. are homogeneous within the limits given by Stokes' law. The most important cause affecting the rate of sepn. is that of rate of air flow. Under similar conditions rate of sepn. is proportional to air flow. Initial rates of sepn. of particle-size fractions have been made up to 135 g. per hr. at a flow of 140 l. per min. Continuous sepn. can be effected by the use of an offset separator tube with sep. collection of oversize. A figure of the air separator and details of its *operation are given. At a 30-micron particle size of a portland cement powder* with an air flow of 500 l. per min., the equiv. rate of feed was 5.4 kg. per hr., while the rate of recovery was 0.92 kg. per hr. The efficiency of recovery, based on the max. possible recovery in a run, was not in excess of 23%. ALICE W. EPPERSON

A simple procedure for fractional distillation of small quantities in a high vacuum. S. KOBER *Biochem. Z.* 232, 274–7(1931).—A special app. is described. S. MORGULIS

An apparatus for the evaporation of various materials in high vacuums. C. HAWLEY CARTWRIGHT AND JOHN STRONG *Rev. Sci. Instruments* 2, 189–93(1931).—An app. for the deposition in high vacuum of metals and non-metals on various surfaces is described, in which material to be evapd. is placed in a coiled filament and brought in contact with a heating coil in the evacuated app. The filament consisted of W or Pt wound

around a cylindrical dr A crucible could be used if material to be evapd. reacted with W or Pt Al, Sb, Be, Pt, Ca, Cr, Co, Cu, Au, Fe, Pb, Mg, Mn, Ni, Se, Ag, Te, Sn and Zn were deposited, also some alloys, quartz, fluorite, alkali halides and AgCl, on any surface not affected by high vacuum. M. McMahon

Glass extraction apparatus. B. L. Hawthorn *Half-Yearly J. Mysore Univ* 4, 243–4 (1930). George Calingaert

Extraction apparatus for solutions lighter than the solvent. Ernst Manelli *Ann. chim. applicata* 21, 34–41 (1931).—A tube *A* with a siphon reaching almost to the bottom is placed in an ordinary Soxhlet extractor, and the soln. to be extd. is placed in this tube, except for enough solvent just to cover the mouth of the siphon. The solvent evapg. is condensed, and drops through *A*, which holds the soln. to be extd. When the liquid reaches a certain level, it siphons out as in the ordinary app. When the vapor of the solvent is to be used then a tube *B* brings the vapor up, discharging below the level of the soln. being extd. Here also the condensed solvent siphons out automatically. A. W. Contieri

A new absorption apparatus. St. Peyer. *Chem. Ztg.* 55, 202 (1931).—The app. described was designed for studying the adsorbing and absorbing powers of activated C, etc., for solvent vapors. J. H. Moore

The construction of Dewar flasks. T. E. Peters, M. J. Copley and E. J. Shaw. *J. Am. Chem. Soc.* 53, 1235–6 (1931).—Details are given for using a 5-l. round bottom pyrex flask for the outer jacket and a 2-l. flask inside. These containers are recommended for the storage of liquid air. B. A. Soule

The expansion hydrometer. E. Hiedemann. *Physik. Z.* 32, 223–5 (1931).—A new practical app. is described for the detn. of abs. values of the expansion coeff. of liquids. C. E. P. Jeffreys

An automatic sampler and doser. H. Geiger. *Chem. Fabrik* 1931, 159–60.—A detailed description is given of an app. for sampling or mixing liquids. It is driven by clock-work, will take as many as 24 samples, and the speed is adjustable to run for a day or a week. J. H. Moore

Set of weights for the microchemical balance. Wilhelm Feigenbauer. *Z. anal. Chem.* 83, 422–6 (1931).—The difficulties involved in getting satisfactory wts. which will be accurate to 0.001 mg. are pointed out. A description is given of a satisfactory set of weights for the microbalance and a method of calibrating the same to 0.001 mg. is described. W. T. H.

*An apparatus for potentiometric volumetric analysis.* Peter Dickens. *Chem. Fabrik* 1931, 145–7; cf. *C. A.* 24, 1054.—Details are given of a simple and practical app. designed for the detn. of the elements usually found in steel alloys. J. H. St.

*Apparent-specific-gravity apparatus.* Arthur F. Seifert. *Eng. News-Record* 106, 522 (1931).—A brief illustrated description of a simple, inexpensive device for detg. the apparent sp. gr. of stone, slag, gravel, etc. R. E. Thompson

The efficiency of some common return condensers. F. Mach and R. Herrmann. *Chem. Fabrik* 1931, 157–9, 170–3.—Results are tabulated for expts. with 9 types of cooler when condensing $Et_2O$. The best 3 coolers in order of efficiency were Liebig coolers with 4 internal tubes, those with bulbs blown in the internal tube, and those with small jacket diam. Countercurrent cooling did not increase the efficiency. J. H. M.

*Magnetic pusher in combustion tubes.* P. A. Thiessen. *Z. angew. Chem.* 44, 278 (1931).—In Berzo's recent paper (*C. A.* 25, 1458) a method for introducing the substance into a combustion tube is described, which is similar to that invented by T. (*Mikrochemie* 1, 6 (1924)) which is once more depicted. W. T. H.

Colloid mills. II. Arthur Chwala. *Kolloid-Z.* 54, 358–64 (1931); cf. *C. A.* 25, 2722.—German patent review. A. Fleischer

Acid pumps. O. Voigt. *Metallbörse* 21, 1555–6, 1604–5 (1931).—Four types (centrifugal, plunger, diaphragm and those employing an auxiliary liquid) are described and compared as to construction, action, efficiency and use. Cast Fe contg. 15–18% Si is commonly the fabricating material, although bronze and hard Pb are not attacked by a no. of acids. The stuffing box is an important part of any pump. B. A. Soule

Automatic vacuum pressure regulator. Howard L. Cole. *Philippine J. Sci.* 44, 411–3 (1931).—A modified Miller and McKinney app. (*C. A.* 22, 2294) to be used on a 110-v. d. c. or on a battery is described. The Hg of the manometer touches a Pt-wire contact, thus closing a circuit and bending down the movable arm of an electromagnet. This arm holds a rubber stopper with a hypodermic needle No. 22 inserted in it. As air enters the system through the needle, the circuit is interrupted by the falling of the Hg in the manometer. This device maintains a vacuum within ±0.5 mm. at 20 mm. pressure. Alfred Burger

Design, construction and operation of a constant-humidity room. P. H PRIOR *Proc. Tech. Sect Paper Makers' Assoc. Gt Brit & Ireland* 9, 152–74(1929).—The points to be considered in the design of such a room are discussed, and details are given for the construction of a room 12 ft. by 15 ft. by 7 ft. 10 in. Provision is made for complete change of air 4 times per hr. or for recirculation of the air over the controls when the room is only used for conditioning samples. Humidity and temp. control are effected by diverting part of the air over the correcting devices (humidifier, refrigerator and heater) by means of elec. fans controlled by a hair hygrometer and a bimetal strip. The controls normally operate at about 5-min. intervals and to within 1% relative humidity and 1° F. B. C. A.

Low-temperature test rooms an aid to research. HUGH J. KRAMPE *Refrigerating Eng.* 21, 331–3(1931).—Recommendations are given as to methods and materials for use in the construction of low temp. test rooms. The uses of such low temp. test rooms in the automotive, oil and food industries, as well as in academic research institutions, are described. A. H. JOHNSON

Oblique-light illuminator for photography by reflected ultra-violet and by the light of fluorescence. G. KÖGEL. *Phot. Korr.* 66, 282–3(1930).—In the adaptation of the Busch oblique-light illuminator to ultra violet photography, K. suggests the use of Cr-plated metal mirrors (described and illustrated) instead of the usual, but relatively expensive, optical system of quartz. The special suitability of reflected ultra-violet radiation for photographing black lead pencil marks is mentioned. E. R. BULLOCK

The calculation of the thermal characteristics of regenerators. K. RUMMEL. *J. Inst. Fuel* 4, 160–73(1931).—The process of heat transfer in an exptl. regenerator was studied. Measurements of temp. and resistance to flow were taken on different types of checkers and under varying conditions of operation. Practical simplified methods of calcn. are derived and applied to the exptl. data. D. A. REYNOLDS

Glass blow-torch for blow-pipe analysis. C. H. ALMFELT AND C. C. BEEBE. *J. Chem. Education* 8, 968(1931). E. H.

*Monochromatic sodium light in polarimetry and refractometry.* VL. STANĚK AND K. SANDERA. *Listy Cukrovar.* 49, 311–5(1931).—The elec. Na lamp of the firm Osram is described in its simplest form, and its use in polarimetry is discussed. The light may be purified with filters or by prisms. The simple monochromator (Schmidt and Haensch) is attached to the polarimeter and works well with the above Na lamp. For prism polarimeters the filtration of light is not necessary. FRANK MARESH

Note on Julius suspensions. M. J. BREVOORT. Bur. Mines, *Rept. of Investigations* 3086, 2 pp. (1931).—An improved galvanometer suspension is described. ALDEN H. EMERY

What is the basis for retiring equipment? R. L. COPSON. *Chem. Met. Eng.* 38, 202–3(1931).—The economics of replacement of equipment is discussed. E. H.

Machinery to make solid carbon dioxide. TERRY MITCHELL. *Ind. Eng. Chem.* 23, 523–5(1931).—The app. used in the manuf. of solid $CO_2$ is briefly reviewed. Illustrations and a flow sheet are included. R. D. BUMBACHER

A bath thermostat. THOS. C. HERNDON. *J. Chem. Education* 8, 969–70(1931). E. H.

*A thermostat regulator.* ELLIOT Q. ADAMS. *Rev. Sci. Instruments* 2, 187–8 (1931).—A W-Hg contact in H permanently enclosed in glass was used as a thermostat regulator. A Hg tight W plunger in 2 mm. capillary served as adjuster, one complete turn of the micrometer head advancing the plunger approx. 1 mm., equiv. to 0.08°. The regulator was used for keeping a 50-l. $H_2O$ thermostat const. to ±0.002° for 1 hr. With an auxiliary heater in a heating-coil circuit, variation in temp. did not exceed ±0.001° for 3 hrs. M. MCMAHON

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Permanent marking of glass and porcelain vessels (ISBELL) 19. A microscopic method [hypermicroscope] (SYNGE) 2. Theory of optical pyrometers and a description of several new improvements (HELD) 2.

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TRINKS, W.: Industrieöfen. Band II. Bau und Betrieb. Berlin: V. D. I. Buchhandlung. 398 pp. Linen, M. 20. Cf. *C. A.* 23, 2854.

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Laboratory extraction apparatus (Soxhlet type). ARNOLD FLIEDNER. Ger. 519,371, May 26, 1929.

Thermometer. ILMENAUER GLAS-INSTRUMENTEN-FABRIK ALBERT ZUCKSCHWERDT. Ger. 521,228, Jan. 17, 1929. The scale-tube and the mercury (or other liquid) reservoir are connected by a flexible metal capillary tube.

Dropping bottle. C F Boehringer & Söhne G m b H Ger 519,476, June 15, 1929

Filters. August Paul. Ger 469,227, May 21, 1925 See U. S 1,786, 361 (*C. A.* 25, 440)

Filters. Auguste G Lemaire Fr 636 406, Nov 7, 1929 Arrangement for closing the filter pockets is described

Filters. Motor Improvements Inc Fr 697,061, June 3, 1930 A metallic filter made from a spiral ribbon of metal is described

Air or gas filters. Henri Haegler Fr 696 791, Sept 17, 1929

Cylindrical filter for air or gases Hans Wittemeier Fr 695,427, May 10, 1930

Metallic filters for air or gases Samuel A Niestlé Fr 695,445, May 12, 1930

Gas filter. Julius A Wilisch Ger 400,245 April 16 1921

Gas filter. R Lahaussois Brit 339 913 March 30, 1929 A glass plate or the like is coated with an adhesive and hairs are taken from a support and caused to adhere by one end to the prepd surface to form a filter plate for gases Cf *C A* 25, 1414

Apparatus for separating suspended matter from gases Horace Waring (to Associated Lead Manufacturers, Ltd ) U S 1,797,812, March 24 Structural features

Device for separating liquids from gases. Harlan W How (to Struthers Wells-Titusville Corp ) U S 1,797,232, March 24 Structural features of a device suitable for sepg entrained liquid from vapors from evap app

Apparatus for filtering liquids. Ernest Lagger Swiss 143,378, Jan. 20, 1930 The filter beds comprise layers of wood charcoal and gravel

Sand filters. Soc H Chabal et Cie Fr 696,366, May 31, 1930 A method is described of cleaning by air blown through

Drum filters. I G Farbenind A -G Fr 695,848, May 19, 1930 An endless band with tensioning means is wound in a helix round the filtering and heating or drying drum to remove solid substances retained on the filtering surface

Continuously operating pressure-cell drum filter. Florenz Flemming Ger 521,-030, Dec. 15, 1928

Pressure filter and extrusion apparatus. A R. Jahn Brit 339,669, Sept. 4, 1929 Structural features

Water-film apparatus for removing dust from gases. Ludwig Delp Ger. 519,017, April 27, 1928

Centrifugal separators for mixtures of three liquids. Aktiebolaget Separator-Nobel. Fr 695,725, May 16, 1930

Means for distributing blown air under filtering layers. Soc. H. Chabal & Cie Fr 696 614, June 3, 1930

Roller driers. Kali-Chemie A.-G and Wilhelm Sasse Ger 516,757, July 14, 1928

Band driers for crystals obtained from solutions. Adler & Hentzen, Maschinenfabrik. Ger 516,658, Jan 4, 1929

Tube system for pneumatic drier. Paul Rosin Ger 520,056, Jan. 25, 1929

Drum and plate drier. Mitteldeutsche Stahlwerke A -G Ger 517,718, Oct. 22, 1929

Drying drum. Maschinenfabrik Imperial G m b H Ger 521,100, Sept 24, 1929

Drying drum with internal mixers. Deutsche Babcock- & Wilcox-Dampfkessel-Werke A -G Ger 517,716, Jan 10, 1930

Vacuum drying apparatus. Julius Pintsch A -G (Walter Neuhold, inventor) Ger 517,719, Oct 24, 1929 Details are given of a stationary surface condenser.

Vacuum drying apparatus. Julius Pintsch A -G (Walter Neuhold and Hans Groth, inventors) Ger 520,286, Oct. 24, 1929

Drying kiln. Rudolf Wiedemann Ger 517,908, Dec 6, 1927.

Rotary kiln or drying apparatus. F A Johnson Brit 339 595, Sept 4, 1929 Structural features

Centrifuge for drying vapors. Wm. Alexander. Ger 516,553, April 30, 1927.

Apparatus for drying air and other gases. Alec E Sherman and Isidore Maynard Ger. 520,055, Aug. 14, 1929 Brit. 314,592 (*C. A* 24, 1254)

Drying plant comprising chambers and hot air currents. U Fornitz & Co. A.-G Ger 517,715, Nov. 1, 1927.

Automatic regulating means for evaporators. František Turek. Fr. 697,238, June 11, 1930

517 745 June 12, 1928 The hot gases are led partly under the base of the muffle and partly around its sides

Coal-dust furnace CARL HUPSCHMIDT Ger 511,008, Aug 11, 1926

Gas furnace KURT RUMMEL and ALFRED SCHACK. Ger 517,818, Nov. 8, 1928 Details of a metal recuperator for preheating the fuel to a high temp are given

Furnace for the activation of carbonaceous materials by gases. SOC. DE RECHERCHES ET D EXPLOITATIONS PÉTROLIFÈRES. Fr 696,253, Sept. 9, 1929

Heating regenerative furnaces. VEREINIGTE STAHLWERKE A.-G Ger. 519,124, Sept 18, 1927 Coal dust is blown by means of a combustible gas into the hot gases passing to the furnace, the arrangement being such that the coal is partly or wholly gasified before it reaches the hearth

Air heater for furnaces, etc. MAX and ERNST HARTMANN. Ger. 519,471, Aug 24, 1929

Supplementary air-draft regulator for industrial furnaces. SCHMIDT-AEOSOLO G M B H FÜR FEUERREGELUNG Ger. 520,314, Mar 27, 1929

Traveling-grate apparatus for drying, destructive distillation, etc. FRANZ SCHENK. Ger 520,075, Oct 31, 1928

Device for preventing escape of hot gases through faulty brickwork of furnaces by suction. ERICH ROUCKA Ger 517,746, Feb 15, 1925.

Hollow water- or air-cooled beams for the fire chamber of furnaces. GUSTAV KARRENBERG and HERMANN RÖMER Ger 517,903, Sept. 30, 1928

Burners for powdered fuel. GEORGE E. K. BLYTHE. Fr. 696,713, June 6, 1930

Coal-dust burner. ADOLF BÜHLMANN Ger 519,426, Feb 11, 1927

Burner for pulverulent or gaseous fuel. ALLGEMEINE ELEKTRIZITÄTS-GES. (Friedrich Munzinger, inventor) Ger 519,022, Jan 14, 1928

Gas burner. OSKAR HOPPE Ger 519,425, Aug. 26, 1927. Means are described for regulating the admixt. of the gas with compressed air

Heavy-oil burner. DECIO PIZZI. Ger. 516,567, Nov. 6, 1929 Details of construction are given

Heat exchanger. HANS SIMMON Ger 519,054, Aug 19, 1925 See Austrian 113,190 (*C. A* 23, 4109)

Heat exchanger, especially for steam generator. SCHMIDT'SCHE HEISSDAMPF-GES M. B H. Ger 519,056, Sept. 28, 1928.

Tubular heat-exchange apparatus. R. MORTON & CO., LTD., and P. ROBINSON. Brit. 339,869-70, Feb 7, 1930 Structural features

Apparatus for heating by means of gaseous or liquid fuel with recirculation of the active gases and elimination of the inert gases. PAUL G LINKE. Fr 696,346, May 31, 1930

Heat-transmission tubes for chemical apparatus. ROYAL BAKING POWDER CO. Ger 519,047, May 16, 1928. Brit. 311,092 (*C. A* 24, 534)

Control system for regulating the supply of fuel such as gas to boiler furnaces in accord with pressure variations. THOMAS A PEEBLES (to John M. Hopwood). U. S. 1,797,586, March 24. Structural features.

Prewarming and cooling apparatus for annealing pots. AKT.-GES. BROWN, BOVERI & CIE Ger 519,330, May 20, 1930.

Electric heater for liquids. EGERTON R. CASE. U. S 1,797,520, March 24 Structural features.

Electric water heater. A LOW & SONS, LTD., and D. W LOW. Brit. 339,734, Oct. 24, 1929 Structural features

Electric water heater. THOMAS B. ALLARDICE U. S 1,797,749, March 24.

Acid proofing. PAUL ASKENASY Ger. 516,745, Dec. 6, 1929 The rotating parts of centrifuges, etc., are rendered acid proof by coating with hard Pb contg Hg

Apparatus for evaporating brine, etc. PAUL H. MÜLLER. Ger 519,123, Aug 13, 1925

Apparatus for making foam. GEORGE M. THOMSON Ger 521,183, Feb. 8, 1928 See Brit. 299,242 (*C. A* 23, 3132).

Moisture-condensing device. CHARLES W. ARMBRUST (to International Life Saving Water Making Cup Corp.) U. S 1,797,894, March 24 Various details are described of a device "for condensing the moisture from exhaled breath," having for its stated object "the provision of a life-saving cup which will collect the moisture from the breath and condense it as pure water for and during emergency, as in shipwreck, or on the sea, or in desert places, without fresh water"

Cooling-tower. K. W BRANCZIK. Brit. 340,127, Dec 16, 1929

Precision casting machine. FRIEDRICH J. HAAS. Ger 521,387, Feb 13, 1926

Die-casting machine for artificial material. INTERNATIONAL METALL A.-G. Ger. 517,510, Mar. 25, 1928.

Device for removing the cores of castings. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 517,781, Dec. 15, 1928.

Apparatus for electroösmotic purification of liquids such as water. SIEMENS-ELEKTRO OSMOSE GES. Brit. 339,673, Sept. 7, 1929. Structural features and various details of operation are described.

Apparatus for evaporating corrosive solutions such as caustic soda. R. M. WINTER and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 339,657, June 14, 1929. The liquid to be evapd. is passed as a film over a surface heated directly or indirectly by radiation from one or more incandescent plates arranged parallel to the surface. The plates may be formed as described in Brit. 25,808 of 1909 or consist of a metal plate supporting an alundum plate carrying granules of magnesia or the like. Various details of construction are described.

Lubricated rotary plug valve for fluids destructive to the lubricant. S. J. NORDSTROM (to Merco Nordstrom Valve Co.). Brit. 339,889, Feb. 26, 1929. Structural features.

Apparatus for grading tea or other materials by the action of air currents. W. G. FIRMAN. Brit. 339,758, Nov. 14, 1929. Various structural details are described.

Heated vacuum container with stirring device for mixing materials such as graphite and bearing metals. ERNST MEIER (to Braunschweiger Huttenwerk G. m. b. H.). U. S. 1,797,992, March 24. Structural features.

Mixing and emulsifying apparatus of the cylinder and plunger type. W. J. DAVY. Brit. 339,751, Nov. 8, 1929. Structural features.

Apparatus for testing the tensile strength of flexible materials. ALFRED SCHOPPER (to the firm of Louis Schopper). U. S. 1,797,734, March 24. Structural details of a gas inflation testing app. are described.

Apparatus and mode of operation for classifying sand or other powdered materials by aqueous suspension and centrifugal and gravity separation. L. ANDREWS. Brit. 340,027, Sept. 19, 1929.

Surface condenser. INGERSOLL-RAND CO. Ger. 520,462, Nov. 17, 1928. See Brit. 302,347 (*C. A.* 23, 4109).

Containers for storing gases or liquids under pressure. ALEXANDER BELDIMANO. Ger. 517,917, June 27, 1928.

Carbide agitator for acetylene generators. HERBERT G. IRWIN. U. S. 1,797,264, March 24. Structural features.

Acetylene generator. CARL KEEL. Fr. 695,278, May 7, 1930.

Acetylene generator. I. G. FARBENIND. A.-G. Fr. 696,359, May 31, 1930.

Thermoelectro-responsive device suitable for control of switches, etc. HERBERT E. RUPP (to Ohio Brass Co.). U. S. 1,797,369, March 24. Structural and elec. features. U. S. 1,797,370 describes a thermostatic elec. circuit control device.

Bimetallic thermostatic electric switch or cut-out. FELTEN & GUILLEAUME A.-G. Brit. 339,705, Sept. 6, 1929. Structural details.

Thermostatic device for control of electric circuits. ADOLPH A. THOMAS. U. S. 1,797,886, March 24. Structural features.

Thermostatic control device for gas fed to burners. OTTO FOX and WILLET E. STARK (to Bryant Heater and Mfg. Co.). U. S. 1,797,571, March 24. Structural features.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Harley James Morrison. A. S. RICHARDSON. *Ind. Eng. Chem.* 23, 594(1931).—Biography with portrait. G. G.

Karl Seubert's eightieth birthday, April 6, 1931. WILHELM BILTZ. *Z. angew. Chem.* 44, 269(1931).—Biographical note with portrait. E. H.

The investigations of Frant. Wald. ANTONÍN KŘÍŽ. *Chem. Listy* 25, 5–10(1931); cf. *C. A.* 25, 1714.—A review. FRANK MARESH

In the services of chemistry. ZD. RAUŠAR. *Chem. Listy* 24, 437–43(1930).—An article filled with reminiscences covering the advances made in chemistry during the years 1880–1930. FRANK MARESH

The progress of physicochemical research in India. S. S. BHATNAGAR. *Proc. 15th Indian Sci. Congr.* 1928, 95–114.—An address. E. J. C.

A Chinese forerunner of the Bunsen burner. EMERICH CZAKÓ *Z angew Chem* 44, [illegible] —A device used by the Chinese for burning natural gas, reported by the missionary Imbert in 1828, is described. E. H.

The new chemical laboratories of Picatinny Arsenal. J B ROSE. *Ind. Eng Chem News Ed* 9, No 8, 123(1931) E. J. C.

The "Deutsche Museum" and its sections of chemistry and pharmacy. CARLOS DA SILVA ARAUJO *Bol assoc brasil pharm* 11, 25–33(1930) —Descriptive. C. A. ABELEDO

Romance of science in bygone London. H. G WAYLING. *Science Progress* 25, 479–80 (659–69)(1931) —A paper of considerable interest to students of the history of chemistry and the other phys. sciences. JOSEPH S. HEPBURN

Chemistry in the intermediate schools. JOSEF KOS. *Chem. Listy* 24, 448–50 (1930) —The defects of education are discussed and reforms are proposed. FRANK MARESH

An industrial chemistry text of 1830. CHARLES W. STILLWELL. *J. Chem. Education* 8, 896–901(1931) —A review. E. H.

*Some aspects of the unit method of teaching chemistry.* RUSSELL S. HOWARD *J Chem. Education* 8, 910–8(1931) E. H

Inspection trips. W T. READ *J Chem Education* 8, 919–28(1931) E H

Some instructional devices in elementary chemistry. HORACE G. DEMING *J Chem. Education* 8, 902–9(1931) E. H.

A study of the type and number of balances essential for high-school use. RALPH E DUNBAR AND EMORY D FISHER *J Chem Education* 8, 936–8(1931) E H

Equation testing in high schools. LEONARD J FRIEDNER. *J. Chem. Education* 8, 939(1931) E. H

A student experiment on the olefin hydrocarbons: The interconversion of ethyldimethylcarbinol and amylene; the polymerization of amylene. W M LEE AND E. C. WAGNER. *J. Chem Education* 8, 941–5(1931) E. H.

Hydrocyanic acid from methylamine as a lecture experiment. HERMANN EMDE AND THOR HORNEMANN *Z. angew Chem.* 44, 278(1931) E. H.

A reaction-velocity experiment. JACK P. MONTGOMERY *J Chem. Education* 8, 940(1931) —For class-room demonstration, the course of the acid hydrolysis of sucrose is followed by the change in sp gr of the soln., measured by a Westphal balance. E. H.

The specific gravity and the vapor pressure of concentrated sea water from 0° to 175°. K. HIGASHI, K. NAKAMURA AND R. HARA *J. Soc. Chem. Ind Japan* 34, Suppl binding 72(1931) —The sp gr and the vapor pressure of sea water at concns. from normal to satd NaCl and at temps. from 0° to 175° were detd V. F. H.

Nomography. OTTO LIESCHE. *Chem Fabrik* 1931, 122.—The chart shows change in % with changing wt. during evapn. and drying J H. MOORE

Addendum to the Utrecht radiation and temperature measurements on the measurement of a black body by means of the gold point. L. S. ORNSTEIN, D VERMEULEN AND J. WOUDA *Proc Acad Sci Amsterdam* 33, 985–9(1930) —Temps. of W lamp filament were measured with a calibrated thermopile and an optical pyrometer, and the space distribution and emission coeff calcd. To connect these measurements with the international scale a black body of Ni was inserted in a tube furnace. Just in front of this was placed a Pt-PtRh thermoelement clamped together with a small piece of very pure Au The temp was measured simultaneously with the thermoelement and a pyrometer, the interruption of the thermal current giving the m. p of the Au. GREGG M. EVANS

Theory of optical pyrometers and a description of several new improvements. S. HELD *Chaleur et ind* 11, 473–80(1930). cf *C. A.* 25, 1414 —Standardization, the action of selective filters, the transmission factor with a selective filter, an interpolation formula for selective filters, conditions for the use of optical pyrometers, calcn. of the temp of a black body as compared with a non-black body, a practical formula for measuring black body temp., measurement of the temp of a non-black body with selective screens and the possibilities of error, are treated mathematically and graphically S. L. B ETHERTON

Radiation pyrometry. E. L. FIDGE. *Chem. Eng Mining Rev* 23, 189–94(1931).—The application and use of radiation pyrometers in industry and lab. research are discussed. F. D. ROSSINI

Methods of measurement with the thermionic tube. ERNESTO DENINA *Atti III congresso naz chim pura applicata* 1930, 402–13 —The application of the thermionic vacuum tube to problems of phys. chemistry and electrochemistry is described

to the free energy change A correlation is claimed between the order of increasing free energy change and the order of increasing abundance of the element formed
J B AUSTIN

The new element rhenium. WILHELM FEIT. *Ind Eng Chem, News Ed.* 9, No 8, 122(1931) —Descriptive. E J. C.

Atomic weight of dvi-manganese (rhenium). J G F DRUCE *Science Progress* 25, 499–500(1931), cf *C A* 25, 2031 —A review of detns of this at. wt by various investigators The value 186 31 ± 0 02 is accepted as the most accurate J S H

Investigations for the concentration and isolation of the element having atomic number 61. L ROLLA *Atti accad Lincei* 12, 270–2(1930) —A review of work done to date in attempting to isolate element 61 from a large sample of com didymium, contg considerable Ce A W. CONTIERI

Statistic evaluation of the energy of interaction of a coulomb and a molecule. L. GOLDSTEIN *Compt rend* 191, 606–8(1930) —Math. GREGG M EVANS

Some aspects of the problem of molecular structure. JAMES KENNER *Rept Australian Assoc Advancement Sci* 18, 132 55(1926)(published in *Sydney Univ Reprints Ser* III, 1, Nos 45–61) —A presidential address before the Australian Assoc. Adv Sci 18, Sect B(1926) A general review C E P JEFFREYS

The physical identity of enantiomers. ALAN N CAMPBELL AND FREDERICK C. GARROW *Trans Faraday Soc* 26, 500–4(1930), cf *C. A* 24, 1000 —Extremely pure *d*- and *l*-mandelic acids are shown to differ slightly but distinctly in m p, rotatory power, rotatory dispersion and soly The hypothesis is proposed that enantiomers are not physically identical A P SACHS

Symmetric spherical oscillator and the rotational motion of homeopolar molecules in crystals. T E STERN *Proc Roy Soc* (London) A130, 551–7(1931) —A treatment of a homeopolar mol of type $X_4$ free to rotate in a field of force of axial symmetry is developed The method is more rigorous than that of Pauling (*C A* 24, 5558) and more extensive It is concluded that rotation occurs if $T$ is greater than $2V_0/k$ and that oscillation occurs if $T$ is less than $2V_0/k$, wherein $T$ is the temp, $k$ Boltzmann's const and $V_0$ the potential function defined by $P$ Thus two cases are distinguished, one of rotation and one of oscillation WILLIAM E VAUGHAN

Studies on coördination. III. The energy of coördination. F. J. GARRICK *Phil Mag* 11, 741–4(1931), cf *C A* 24, 2924, 5578 —The energy of coordination is the min potential energy ($\phi$) or the max energy evolved on formation of complex ion Values of $\phi$ calcd for Zn, Fe, and Mn as $MCl_2 6NH_3$ by the Born theory of lattice energy agree with those calcd by the previous method Data for calcns on hydrates are lacking ARTHUR FLEISCHER

The deformability of ions. R BRDIČKA *Chem Listy* 24, 374–9, 398–403(1930) — The Fajan's theory is used to explain many phys phenomena and chem properties, the theory remains on a qual basis but embodies a phys concept of atoms and ions The theory cannot be used to explain the color of salts as an absorption of visible radiations due to deformed anions, for the electronic system of cations also absorb in this range Adsorption may be associated with the deformability of ions the adsorption depends upon the potential at the interface of two phases The potential originates in the Helmholtz double layer and depends upon the distance between the opposite charges in the layer The more deformable ions permit a close approach of the electrons in a shell and force the pos layer to approach the neg layer This increases the adsorption potential and consequently the adsorption FRANK MARSH

Surface tension in a magnetic field. HERMANN AUER *Z Physik* 66, 224–8 (1930) —No effect of a magnetic field of 20,000 gausses could be detected within the accuracy of the expts ($10^{-4}$–$10^{-5}$) GREGG M EVANS

Concentrated space charge (polarization) in calcite. A JOFFE, D ROYANSKII AND K SINELNIKOV *Z Physik* 66, 143–71(1930) —The variation of space charge in the thin cathode layer was measured and expressed as the capacity of an equiv condenser The field at the cathode is so strong that a drop of Hg is flattened when used as an electrode Measurements were made of (1) current with const p d, (2) potential with const current and (3) residual current always reached as a min (in reality a leakage current of the condenser) The capacity was, in general, higher parallel to the $Z$-axis than at right angles to it, but was unchanged with time The cond increased logarithmically with temp The behavior of the different crystals and electrodes was individual The space charge leaked away, even when no imposed current was passing, but took months for complete leakage at room temp The concn of space charge in calcite crystals in these cathode layers is attributed to impurities in the crystal
GREGG M EVANS

**Electrical conductivity and high voltage polarization of saltpeter crystals.** Boris Hochberg and Valentine Joffe. *Z Physik* 66, 172–91(1930), cf preceding abstr — The $NaNO_3$ crystal was made from a melt The ratio of polarization e. m. f. to that imposed decreased with increase in temp and imposed e m f The space charge is coned in thin layers at *both* electrodes and is attributed to impurities, since the polarization decreases with increased purity of the crystal Grego M Evans

***Thermomagnetic study of some anhydrous compounds of cobalt and nickel.*** B Cabrera and A Duperier *Anales soc espaü fis quím* 29, 5–14(1931) —The thermic variation of magnetic susceptibility of some Co and Ni compds was detd by the Faraday method of electrodynamic compensation $CoSO_4$ and $CoF_2$ obey the Curie-Weiss law $NiF_2$ and $NiBr_2$ obey this law, but $NiSO_4$ show such wide deviations from the linear function that a transformation of the cation at 280° is possible, raising the magnetic moment 2 units However, the deviations for $NiCl_2$ do not permit such a conclusion Perhaps here the equation $(\chi + K)(T + \Delta) = C$ is applicable, where $\chi$ = sp susceptibility of the salt and $K$ the app const F M Symmes

**Molar refraction of methanol. I. Influence of concentration of solution in a non-polar substance.** M Velasco *Anales soc espaü fis quím* 29, 15–20(1931), cf preceding abstr —The molar refractions of many solns of MeOH in $C_6H_6$ were detd, showing that there is no effect of conen on molar refraction The bond between the *dipoles of MeOH due to assocn does not modify the forces that act on the peripheral* electrons of atoms constituting the mol E M Symmes

**Dependence of the magnetic properties of the cobalt-chromium mixed crystals upon the temperature.** Franz Wever and Heinrich Lange *Mitt Kaiser-Wilhelm Inst Eisenforsch Düsseldorf* 12, 353–63(1930) —A series of Co-Cr alloys, in which the Cr content varied from 0 to 20%, was prepd from exceptionally pure materials The magnetic properties of these alloys were studied over a wide range of temps with special attention to the region of the Co-rich mixed crystals A description is given of the *astatic magnetometer* which was developed for this investigation and which proved to be very well adapted to tracing magnetization curves under unfavorable circumstances. The results are presented in a series of curves from which a no of conclusions are drawn The polymorphic transformation of the Co-Cr mixed crystals shows an exceedingly large temp hysteresis In addn. to the retarding action of the Cr this seems to be due to the small energy difference between the types of crystal lattice when both are in equil at the temp of transformation For both the modifications of the Co-Cr mixed crystals there is always a sp temp conen line for the loss of magnetic properties These lines are very nearly parallel to each other. This confirms Heisenberg's deductions according to which the sepn of the atoms and the coördination no det. the magnetic behavior. The absence of sharp breaks in the equil curves for the polymorphic transformation again confirms the idea that the magnetic transformation is not to be considered as a phase transformation in the sense of the phase rule, W. W Stifler

**Change of the magnetic moment of nitric oxide with temperature.** E. C. Wiersma, W. J. de Haas and W H. Capel *Proc Acad Sci Amsterdam* 33, 1119–24(1930) — The susceptibility of NO was measured in terms of the forces exerted on a small, evacuated glass bulb, placed in a non uniform magnetic field, when surrounded by NO and by $N_2$, resp The diamagnetism of $N_2$ was assumed to be independent of the temp The results range from $\chi \times 10^6 = 49.07$ at 292.1°K to 87.32 at 112.8°K, and the agreement with the predictions of van Vleck's theory is excellent. W. W. Stifler

***The magnetization-temperature curves of iron, cobalt and nickel.*** F. Tyler *Phil. Mag* [7], 11, 596–602(1931), cf *C A*. 24, 4218 —The curves for $\sigma/\sigma_0$ against $T/\theta$ are almost identical for Fe, Co and Ni They are definitely incompatible with the classical curve and with quantum curves for $j$ greater than, or equal to, 1. There is close agreement when $j = 1/2$ The electron spin is to be regarded as the fundamental magnetic element operative for Ni, Fe and Co The value of $j = 1/2$ means that electron spins are independent and that there is a tan $h$ distribution The electrons are not free but assocd with ions as in Heisenberg's theory Arthur Fleischer

**Anomalous diamagnetism and crystal structure.** V. I. Vaidyanathan. *Indian J. Physics* 5, 659–72(1930).—The anomalous diamagnetism of graphite, Bi, and Sb was found to be diminished on mech. colloidalization The decrease for graphite was *greater than for the other two Single natural crystals of graphite* were found to be magnetically anisotropic, in the ratio of 1.6.7 for the crystal axis, resp, perpendicular and parallel to the field In compds of Bi and Sb the ionic values were found to be much smaller than for the crystals state, *e. g.*, for $Sb^{III}$ $\chi = -26 \times 10^{-6}$, for $Sb^{V}$, $\chi = -66 \times 10^{-6}$, for $Bi^{III}$, $\chi = -40 \times 10^{-6}$, for $Bi^{V}$, $\chi = -69 \times 10^{-6}$, and for

C in compds $\chi = -6 \times 10^{-6}$ The effects produced by colloidalization are ascribed to the existence of large electron orbits comprising groups of mols Magnetically, amorphous C is considered to be microcryst. graphite and it is said that this view is supported by the x ray results of Debye and Scherrer The magnetic anisotropy of graphite, Bi and Sb is ascribed to the unequal valency groups for these elements
W. W. Stifler

Diamagnetism, field strength and crystal structure. W J de Haas. *Nature* 127, 335–6(1931), cf *C A* 25, 855.—Some years ago de H called attention to the probability of a correlation between crystal structure, change in elec. resistance in a magnetic field, diamagnetic susceptibility and possibly the Hall effect Graphs are now given showing the susceptibility of Bi at 14.2°K as a function of the field strength, both for fields parallel and perpendicular to the binary axis Another set of curves shows the magnetization and change in resistance under the same conditions. In fields where the resistance increases, the magnetization remains nearly const and vice versa This is attributed to the behavior of the outer electrons and the explanation is offered that the diamagnetism of the outer electrons is superposed upon a paramagnetism due to the remainder of the atoms
W. W Stifler

The diamagnetism of polyhalides. Francis W. Gray and John Dakers *Phil Mag* [7], 11, 81–95(1931), cf *C A*. 24, 1613.—The mol diamagnetic susceptibilities of alkyl and tri alkyl phenyl substituted $NH_4$ and Rb halides and polyhalides were detd The structures are discussed by the method of Gray and Farquharson A. F.

Magneto-optical anisotropy in a plane normal to the optical axis of a hexagonal crystal. Paramagnetic rotatory powers and magnetic moments in directions close to the binary axes at very low temperatures. Jean Becquerel and W. J. de Haas *Proc Acad Sci Amsterdam* 33, 937–48(1930).—The magnetic rotations along the two varieties of binary axes differ and represent the first example of optical anisotropic phenomena in a plane normal to the optical axis of a uniaxial crystal By the definition of a uniaxial crystal this cannot be true of a purely optical phenomenon, and it is actually due to the paramagnetic nature of the phenomenon and to the magnetic anisotropy At the temps close to 1.7°K. the ratio of the Verdet consts., 0.579 at 77.5°K., falls to 0.21
A P. Sachs

Paramagnetic rotatory power of a crystal of tysonite in a direction normal to the optical axis at liquid-hydrogen temperatures. Jean Becquerel and W. J de Haas *Proc. Acad Sci Amsterdam* 33, 926–36(1930), cf *C A* 25, 873.—The ratio of the magnetic rotatory powers along a direction making a small angle with the optical axis and along the optical axis, found equal to 0.579 at 77.5°K. (see preceding abstr.) decreases as the temp falls
A. P. Sachs

Magnetic rotatory power of a uniaxial crystal in directions oblique to the axis; determination of the rotation of tysonite in a direction close to a binary axis at the temperature of liquid nitrogen Jean Becquerel *Proc Acad Sci. Amsterdam* 33, 913–25 (1930).—Expts at ordinary temps have already shown that tysonite has a smaller magnetic rotatory power oblique to the axis than along the optical axis (cf *C A* 23, 1792) At liquid N temp the law of variation of magnetic rotation with the inclination of the wave and the direction of the magnetic field with respect to the crystallographic axes is confirmed The observed magnetic rotation of tysonite in directions oblique to the axis is a paramagnetic rotation in the direction of a magnetization of the crystal resulting from the action of the magnetic field The ratio of rotatory power normal to the axis to the rotatory power along the axis is 0.579 at 77.5°K., instead of 0.83 at 293°K
A P. Sachs

Determination of the susceptibility of cupric sulfate pentahydrate at low temperatures; the magneton numbers of the iron group. W J. de Haas and C J. Gorter *Proc Acad Sci Amsterdam* 33, 1101–5(1930).—The susceptibility, $\chi$, of $CuSO_4 + 5H_2O$ was measured at a no of temps from 290°K. down to 14.3°K. The results range from $6.95 \times 10^{-6}$ at room temp to $121.6 \times 10^{-6}$ at the temp. of liquid $H_2$ When corrected for the diamagnetism of the anion and of the $H_2O$ of crystn., the values are $\chi' = 6.35 \times 10^{-6}$ and $1.22 \times 10^{-3}$, resp The results follow the Curie-Weiss law with $\theta = -70°$ and $\chi' T = 18.3$. The corresponding magneton no is 9.51 Weiss magnetons In the light of these results, the theory of Bose and Stoner is extended to cover deviations in the second part of the Fe group and an explanation is offered for the variable magneton nos found there.
W. W. Stifler

*Contribution to the theory of dielectrics.* G Guébey *Phil. Mag* [7], 11, 405–10 (1931).—Math A formula is derived on the assumption based on exptl facts that the current in a dielec is due both to the contribution of dipoles and to the presence of ions
Arthur Fleischer

The dielectric constant of water as determined by a resonance method. E. P. Linton and O. Maass. *J. Am Chem Soc.* 53, 957–64(1931).—The resonance method of Cuthbertson and Maass (*C. A.* 24, 1775) was reinvestigated and a method for calibrating condensers, which vary linearly according to their setting, is described. The effect of power of oscillating circuit and precautions required in work with media of high dielectric const are given The effect of cond. of medium on resonance point is negligible provided the cond is below $4 \times 10^{-4}$ (in the case of water) The dielec. const. of water is 79.2 at 25° based on 1.00 for air B. E. Tiffany

Dielectric characteristics of Seignette's salts. P. P Kobeko and I. V. Kurchatov. *J Russ Phys.-Chem. Soc.*, Phys Pt., 62, 251–65, *Z Physik* 66, 192–205(1930).—Experimentation indicates that high values of dielec. consts cannot be explained by high polarization The increase in the induction is believed due to (*1*) transmutation of electrons into atoms, (*2*) vibration of ions within the lattice and (*3*) orientation of mols. possessing a dipolar moment V Vesselovsky

*New results on dielectric constants of electrolyte solutions* (from measurements by A. Slama and O. Milicka). R Fürth *Physik Z* 32, 184–7(1931), cf. *C A* 18, 1606; 19, 1080, and Pechold, *C A* 22, 907.—It is shown that dielec const., *D*, detd by the ellipsoidal method of I is independent of the frequency, *f*, between 50 and 2200 cycles/sec The method is improved to give a precision of 0.6% up to a cond of $10^{-4}$ ohm$^{-1}$ cm$^{-1}$ The curves obtained by plotting *D* against *c* (molar concn.) are all of the same type with increasing *c*, *D* decreases to a min (at $c = 0.005$–$0.01$), then increases abruptly and finally approaches a limiting value which is frequently above the *D* of $H_2O$ With electrolytes of the 1–2 or higher valence types, the *c*, *D* curve may show two min or an inflection and a min The min *D* shifts toward higher *c* with increasing *f* The lowering of *D* observed here is much greater than at higher *f* (*e. g.*, $10^6$ cycles/sec) In the *c* range near the min *D* (where the electrolytes are largely dissocd.), it is assumed that most of the $H_2O$ mols are held oriented in the $H_2O$ sheaths about the ions Then as *c* increases, the ions tend to unite forming complexes and liberating $H_2O$ mols which are now free to rotate in accordance with an external field and *D* therefore increases The various min or inflection points probably indicate the formation of one or another complex Upon the assumption that, at the *c* of min *D*, all $H_2O$ is bound by the ions, *m* (the no mols $H_2O$ per mol of electrolyte) and *n* (the no mols $H_2O$ per unit ionic charge) were calcd for HCl, LiCl, NaCl, KCl, $FeCl_2$, $CuCl_2$, $BaCl_2$, $PbCl_2$, $AlCl_3$, $FeCl_3$, NaBr, NaI, $HNO_3$, $NaNO_3$, $Ba(NO_3)_2$, NaOH, KOH, $Ca(OH)_2$, $H_2SO_4$, $H_3BO_3$ and $H_3PO_4$ The values of *m* varied from 125 to 385 and those of *n* from $2 \times 10^3$ to $2 \times 10^4$. In general, *n* increased with the wt. of the anion (resp., cation) in a series of electrolytes having a common cation (resp., anion) This is in accord with the idea that the larger the ionic wt. the more points of attachment the ion would have for $H_2O$ mols The $H_2O$ sheath is pictured as being formed of more or less oriented $H_2O$ dipoles, the attractive force being "passed on" from link to link of the chain as in the case of iron filings picked up by a magnet. At low *f* the time required for the formation of such a "chain-model," $H_2O$ sheath is assumed to be small with respect to the duration of an oscillation but very large with respect to the relaxation time of the $H_2O$ dipole It is assumed further that at $f = 10^6$ this chain formation is too slow to take place and thus at high *f* more $H_2O$ dipoles are free for orientation in an external field; the *D* lowering is therefore smaller Oscar T. Quimby

Molar refraction of methanol. M Velasco *Anales soc. españ fís quím* 28, 1228–38(1930).—The sp. inductive power of solns of MeOH in $C_6H_6$ was detd., and the results were used to calc. the molar polarization of the solns *Variation of molar* polarization of MeOH as a function of the molar fraction contained in the soln was examd by the Debye theory to deduce the molar polarization at infinite dilu By the aid of this limit value the dielec moment of the MeOH mol. is calcd. as $\mu = 1.6 \times 10^{-18}$. E M. Symmes

*Dipole moments of some organic sulfur compounds and related substances. III.* Meaning of dipole measurements in the stereochemistry of carbon compounds. Ernst Bergmann, Leo Engel and Stefan Sandor *Z physik Chem.*, Abt B, 10, 397–413(1930); cf. *C A.* 24, 4274; 25, 212.—The following moments are given diphenyl sulfide 1.47, *p*-chlorodiphenyl sulfide 1.38, thioanisole 1.27, diphenyl selenide 1.38, diphenyl telluride 1.14, phenyl thiocyanate 3.59, *p*-chlorophenyl thiocyanate 2.93 benzyl cyanide 3.91, *p*-bromobenzyl cyanide 2.64, *o*-chlorobenzyl cyanide 4.76, phenyl mustard oil 2.76, diphenyl sulfoxide 3.88, nitrobenzene 4.08, fluoronitrobenzene 2.63 and benzyl chloride 1.85 From these values are established the characteristic valence angles for the following groups $SC_6H_5$ 71°, S 142°, SCN 127° and CN 154°. *p*-Substitution has little effect upon such angles, but they are affected by the susceptibility to polariza-

tion of the mol. as a whole The mustard oil group is built at an angle. The earlier mentioned "semi polar double bonds" cannot be confirmed. A model for the last 2 compds. is described from which the moments can be calcd with satisfactory accuracy
GREGG M EVANS

Comments on the paper by Shilling and Larton on "The effect of temperature on the viscosity of air." A O RANKINE. *Phil Mag* [7], 11, 225–7(1931); cf. *C. A.* 25, 10.—Polemical.
ARTHUR FLEISCHER

Flame temperatures of hydrocarbon gases. G W. JONES, BERNARD LEWIS, J B FRIAUF AND G St. J PERROTT. *J Am Chem Soc.* 53, 869–83(1931).—Measurements of flame temps. for air mixts. are reported for the following gases. Pittsburgh Natural Gas ($CH_4$), $C_2H_4$, $C_2H_2$, butane, isobutane $C_4H_{10}$, $C_3H_6$ and $C_4H_8$. A spectral line reversal method with Na and Li salt sprays was employed The temps. are a max. when the mixt. has a slight excess of combustible gas over the amt necessary to consume all the $O_2$ present. These max temps. range from 1880° for $CH_4$ to 1975° for $C_2H_4$ and agree with calcd values. Max flame temp is attained with a mixt. contg less combustible gas than the mixt. that gives max. speed of uniform flame movement.
J B AUSTIN

The velocity of sound in carbon dioxide. H. O KNESER. *Physik Z* 32, 179 (1931).—The velocity of sound in $CO_2$ increases with the frequency in the range 0.5–3.0 × $10^5$ cycles/sec. Above the frequency 3 × $10^5$ the velocity is again const. at 268.2 m./sec. (3.7% higher than the normal value) This leads to a value of 1.40 for $c_p/c_v$.
OSCAR T QUIMBY

A relation between orthobaric volumes and temperature. JURO HORIUCHI HARITTI *Sci Papers Inst Phys Chem Research* 15, 89–104(1931); cf *C A* 21, 860, 3871.—The applicability of H.'s equation of orthobaric vol to $CH_4$, $C_2H_6$, $C_3H_8$, $C_4H_{10}$, MeCl, EtCl, $Me_2O$, CO, $Me_2S$, $Et_2S$, $PH_3$, $Cl_2$, HCl, He, Ne and Xe is demonstrated. The various parameters are tabulated for the 58 substances studied in this and the previous papers The rules and approximations derived from the H equation were used to calc. the orthobaric d of Kr as follows 210°, 0.82 and 0.82, 200°, 1.34 and 0.40, 190°, 1.58 and 0.25, 180°, 1.75 and 0.17, 170°, 1.89 and 0.11; 160°, 2.00 and 0.07, 150°, 2.10 and 0.04
OSCAR T. QUIMBY

Properties of saturated vapors, including steam. A. PRESS. *Phil Mag* 11, 111–8(1931).—Math. The first law of thermodynamics is solved to give 2 functional equations. The first was used by Callendar for the construction of steam tables, while the second leads to a theoretical justification of the third law. For satd vapors, the equation of state takes the form $p = (\Gamma - 1)\, a_m\, t^{\Gamma/\Gamma-1}$, where $\Gamma$ is a const. characterizing a fluid and is the ratio of the gross latent heat to the net latent heat of evapn. For steam from 0° to 220°, $\Gamma$ = 1.11.
ARTHUR FLEISCHER

The pressure-volume-temperature values for ammonia to one thousand atmospheres from 30° to 200°. FREDERICK G KEYES. *J. Am Chem Soc.* 53, 965–7(1931), cf *C. A* 12, 550.—The *P-V* values for $NH_3$ (with vols. of 1.50–5 cc./g) were detd from 30° to 200° with a max. error of 0.25%.
W. C. FERNELIUS

The equation of state of propellant gases. A. D CROW AND W. E. GRIMSHAW *Trans Roy Soc.* (London) A230, 39–73(1931).—The app and exptl. procedure are described for measuring the pressures developed by exploding nitrocellulose, cordite and ballistite in a vessel of given capacity Observations were made over a range of loading densities and for 2 vessel capacities, the observed pressures being corrected for the cooling of the hot gases caused by the wall surface of the vessel and the work absorbed in the wall stress. The equation of state of the hot gaseous mixt. resulting from the explosions is the expression for the pressure exerted by the uncooled gases and is found to be $p_s = \lambda/[(1/\Delta) - \eta]$, where $\lambda$ is the ballistic force of the propellant, $\Delta$ is the density of loading, and $\eta$ is defined as the co-volume, its numerical value being about 4 times that of the mols. contained in 1 g of the gas complex The expression for the ballistic force is $\lambda = 84.80\ \{(\Sigma\ g\ mols.)/g\}\ T_s$, where $T_s$ is the temp of the explosion and depends on the constituents of the explosion, their heats of formation, the mean mol heats at const. vol. of the gases over the temp range involved (2700°K. to 4200°K.), and the control equation of the water-gas reaction. The co-vol. $\eta$ is evaluated from the constituents of the gas complex by using the hard kernel values of the mol radii increased by 2.5%.
C. C. KNESS

The constants of the Beattie-Bridgeman equation of state with Bartlett's *P-V-T* data on hydrogen. W EDWARDS DEMING AND LOLA E. SHUPE *J Am. Chem Soc.* 53, 843–9(1931), cf *C A* 24, 2925.—Applying Bartlett's *P-V-T* data (*C A* 22, 2302) to the Beattie and Bridgeman equation of state, $PV^2 = RT\,(V + B_0(1 - b/V))(1 - c/VT^3) - A_0(1 - a/V)$, gives the consts for $H_2$ Below the crit. d., $A_0$ = 124.040, $B_0$ = 20.22, $a$ =

56.18, $b = -7.22$, $c = 20 \times 10^6$, above the crit. d., $A_0 = 124\,040$, $B_0 = 17.50$, $a = 56.18$, $b = -19.68$, $c = 20 \times 10^6$. A break in the graph of $B$ vs. d. occurs near the crit. d. The Beattie-Bridgeman equation of state and Bartlett's $P$-$V$-$T$ data on a 3:1 hydrogen-nitrogen mixture. *Ibid* 860–9.—For a 3:1 mixt. of $H_2$ and $N_2$, the consts. are: Below the crit. d., $A_0 = 3000 \times 10^3$, $B_0 = 25.03$, $a = 21.36$, $b = -15.16$, $c = 16 \times 10^6$, above the crit. d., $A_0 = 3489 \times 10^3$, $B_0 = 21.42$, $a = 28.56$, $b = -30.58$, $c = 16 \times 10^6$. A break in the graph of $B$ vs. d. again occurs near the crit. d. DON BROWNE

State equation of easily liquefiable hydrocarbons. IV. Weight of the liter and compressibility coefficient of normal butane. MARCEL BECKERS. *Bull. soc. chim. Belg.* 39, 470–95(1930), cf. *C. A.* 24, 761.—This is a very careful exptl. detn. All the precautions needed to obtain the high degree of accuracy claimed are extensively described. It was found that for $C_4H_{10}$, $f_{(v,\theta)} = 0.997013$. The wt. of the normal l. is 2.70324. A. L. HENNE

Dimensional analysis applied to the thermal conductivity of liquids. J. F. DOWNIE SMITH. *Ind. Eng. Chem.* 23, 416–9(1931).—Thermal cond. of liquids is assumed to be a function of mol. wt., d., sp. heat, viscosity, gas const., thermal expansion and compressibility. By dimensional analysis, a formula is obtained connecting all these variables. It may be simplified and 2 functions plotted against each other, the graph showing a max. error of 4.5% in the thermal cond. G. M. MURPHY

Prediction of critical temperatures and heats of vaporization. K. M. WATSON. *Ind. Eng. Chem.* 23, 360–4(1931).—The crit. temp. of a non-polar liquid may be calcd. from its b. p., mol. wt. and liquid d. with an error of less than 2%. The latent heat of vaporization at any temp. or pressure may be calcd. by 2 methods when the crit. temp. and normal b. p. are known. The error is generally less than 5%. For either polar or non-polar liquids, the latent heat of vaporization may be calcd. at any temp. if the crit. temp. and 1 exptl. value of the latent heat are known. G. M. MURPHY

Allotropy in liquids. J. A. SMITS. *Z. physik. Chem.*, Abt. A, 153, 287–98(1931), cf. *Verslag Akad. Amsterdam* 1912, 418.—The allotropic theory is extended for the cases of monotropic and enantiotropic liquid transitions. ARTHUR FLEISCHER

The influence of intensive drying on inner equilibria. J. A. SMITS, E. L. SWART, P. BRUIN AND W. M. MAZEE. *Z. physik. Chem.*, Abt. A, 153, 255–61; *Proc. Acad. Sci. Amsterdam* 34, No. 1, 160–4(1931); cf. *C. A.* 21, 1049, 22, 1523, 23, 1327.—Eight mos.' intensive drying over $P_2O_5$ in a modified app. (cf. Terwen, *C. A.* 11, 553) insuring a gas-free liquid showed no effect in accord with those recorded by Baker. Baker's effects on intensively dried liquids were due to superheating which occurs readily in dust free liquids. ARTHUR FLEISCHER

Superheating and intensive drying of liquids. ERNST COHEN AND W. A. T. COHEN-DE MEESTER. *Proc. Acad. Sci. Amsterdam* 33, 1003–14(1930); *Z. physik. Chem.*, Abt. A, 153, 241–53(1931).—The authors confirmed the work of Lenher (cf. *C. A.* 23, 4388) and concluded that the abnormal rise in the temp. of the boiling liquid observed by Baker (cf. *C. A.* 16, 2441) was not due to the drying. GREGG M. EVANS

Apparatus and methods for precise fractional distillation analysis. New method of gas analysis. WALTER J. PODBIELNIAK. *Ind. Eng. Chem., Anal. Ed.* 3, 177–88 (1931); cf. *C. A.* 24, 5092.—The construction and operation of the latest development in fractional distn. of complex hydrocarbon mixts. are described. The operation is based on distn. at low temps. and at pressures of 1 atm. abs. or below. Distn. curves are given for natural gas, manufd. gas, refinery tail gases, natural gasoline and other hydrocarbon mixts. having compds. boiling below $C_4H_{10}$. The accuracy of analyses is discussed. M. C. ROGERS

Measurement of viscosity and its applications in chemistry. A. BOUTARIC. *Industrie chimique* 17, 762–5, 841–3(1930), 18, 6–7(1931).—A review. P. T.

Viscosity of liquids. Methods of measurement and applications. A. BOUTARIC. *Rev. chim. ind.* 39, 194–9(1930).—A review. P. THOMASSET

Hydrodynamics of systems of varying viscosity. IV. MARCUS REINER. *Kolloid-Z.* 54, 175–81(1931), cf. *C. A.* 24, 2052.—The fundamental law $\varphi = \varphi_\infty - (\varphi_\infty - \varphi_0)e^{-\tau/c}$ is derived for non-Newtonian liquids, i. e., liquids with structural viscosity. In the equation $\varphi_0$ is the fluidity at rest, $\varphi_\infty$ at the largest fluidity, $C$ the stability coeff. of the liquid structure, $\varphi$ the fluidity at the tangential tension $\tau$. An equation for the capillary viscometer is also derived. ARTHUR FLEISCHER

Necessity of using the absolute kinematic viscosity coefficient in the practical determination of viscosity. PAUL WOOG. *Bull. inst. phys.* 1931, 23–4, 41–7.—After showing the function and importance of viscosity and discussing the effects of temp. thereon, the chief viscometers now in use and the various methods available for actually measuring

the true viscosity coeff are described A plea is made for the adoption of such methods and of the poise and stokes as practical units of measurement A P-C.

Experimental contribution to study of uniform laminary flow. G B Ugolini *Ann lavori publici* 68, 496–510(1930).—The generally assumed parabolic distribution of velocity along the tube diam is not substantiated by expts with water in cylindrical glass tubes 4 5 mm in diam Velocity distribution seems to be more like that of a turbulent stream E I S

The mechanism of plastic flow. G F Cunningham *J Phys. Chem* 35, 796–814 (1931).—The mobility of clay pastes was found to vary markedly with the pressure L Onsager

The surface tension of crystals. D Balarew *Kolloidchem Beihefte* 32, 205–11 (1931).—No equil can exist between a single crystal and its mother liquor for a homogeneous surface according to the Ostwald-Freundlich equation Such an equil is possible provided the surface tensions at edges and corners are greater than the surface tension at a face The faces are believed to grow in a mosaic pattern thus giving an inhomogeneity to account for a greater surface tension R. H Lambert

Strength of salt crystals partially immersed in water. A. Smekal. *Physik Z.* 32, 187–92(1931). cf *C. A* 23, 3836.—The tensile strength of NaCl crystals, whose midportions were bathed in water, was much greater than that of a normal dry crystal, but the increase was less than a tenth that reported by Joffé (*C. A.* 22, 518). Oscar T Quimby

Progress and problems of chemical crystallography. H Steinmetz *Fortschr Min Krist Petr* 12, 193–219(1927). E H

Some examples of cyclic twin formations. R. Brauns. *Centr Mineral., Geol., Paläont.*, Abt A, 1929, 357–66, *Chem Zentr* 1930, I, 957.—Cyclic twin formations, which give the impression that the crystals have a higher symmetry than they possess in reality, are described with $K_2SO_4$ and alexandrite as examples. With the former the twin planes are (110) and (1$\bar{1}$0) and with the latter they are (130) Serial twins were not observed on either one G Schwochi

*The possible orientation of cubic crystals deposited on a sheet of mica.* L Royer *Compt rend* 191, 1346–8(1930).—Crystals of alk fluometaphosphates are oriented on mica similarly to those of alk. halides, suggesting an analogy between the structures of the two series of compds Orientation takes place only if the structure is octahedral and of the face-centered cubic class like NaCl Values for the unit length of the (111) face of $KPF_6$, $RbPF_6$, $NH_4PF_6$ and $CsPF_6$ are calcd and it appears that the difference between these values and that for mica (5 12 A U) in a case of mutual orientation of crystals of different species must not exceed 0 69 A U H. W Walker

The dehydration of heulandite studied by means of x-rays. J Wyart *Compt rend* 191, 1343–6(1930).—Up to about 210° the axis of symmetry of heulandite contracts 0.35 A U or 2% with loss of water No modification in the at arrangement takes place and the change is reversible Above 210° with a 10% loss in wt a large contraction occurs, the crystal form is altered, and the structure becomes heterogeneous like that of dehydrated mica and kaolinite. Cryst. platelets of diverse orientation result Such a change is irreversible H. W. Walker

Crystallographic researches on some racemic compounds and the respective optical antipodes of the asparagine group. Guido Carobbi *Rend accad sci Napoli* 36, 49–55(1930).—The following properties were detd *l-* and *d Chloroacetylasparagine* m. 150°, monoclinic, sphenoidal, $a\ b\ c = 0.7876\ 1\ 0.4281$, $\beta = 96°22'$; simple forms $a(100)$ $b(010)$ $b'(0\bar{1}0)$ $m(110)$ $m'(1\bar{1}0)$ $\gamma(101)$ $\gamma'(10\bar{1})$ $y(121)$ $x(12\bar{1})$; elongated along the *y*-axis, the bisectrix emerges from (100), inclined to the normal of that plane, and at a large angle relative to the optic axes, plane of the optic axes is normal to (010), sp gr 1 538, mol vol 135 59 *dl-Chloroacetylasparagine* m 105°, triclinic, pinacoidal; $a\ b\ c = 0.9068\ 1\ 0.8617$, $\alpha = 63°29'$, $\beta = 113°20'$, $\gamma = 117°15'$; simple forms, $a(100)$ $b(010)$ $c(001)$ $n(110)$ $m'(1\bar{1}0)$ $\gamma(101)$ $\gamma'(10\bar{1})$, elongated along the *y*-axis and somewhat tabular relative to (100); in convergent light one axis emerges from (100) at the edge of the field, on (100) the direction of max extinction makes an angle of 5° with the *y*-axis in the obtuse angle formed by [1$\bar{1}$0.100] and [00$\bar{1}$·100]; on (001) the extinction angle is 22° with the *y*-axis in the obtuse angle formed by [00$\bar{1}$·-·100] and [00$\bar{1}$ 110], sp gr 1 560, mol vol 145.23. *l-* and *d-Benzenesulfonylasparagine* m 163°, monoclinic, sphenoidal, $a\ b\ c = 0.7557\ 1\ 0.7105$, $\beta = 104°42'$; simple forms, $a(100)$ $b(010)$ $b'(0\bar{1}0)$ $c(001)$ $m(110)$ $m'(1\bar{1}0)$ $q(011)$ $q'(01\bar{1})$, often tabular with respect to (100), in convergent light, crossed nicols, an optic axis emerges from (100) at the edge of the field plane of the optic axes parallel to (010), sp gr 1 434, mol vol 189 80 *dl Benzenesulfonylasparagine* m 172°, minute crystals, mono-

clinic prismatic, elongated relative to the *z*-axis, and tabular relative to a pair of parallel faces, probably (100) In convergent light, with the crystal lying on (100), there appears one bisectrix slightly inclined, and both optic axes at the edge of the field, plane of the optic axes is normal to (010), sp gr 1.550, mol vol 171.50 *dl-Benzoylasparagine* monoclinic, prismatic, $a\ b\ c = 0.8865\ 1.0\ 0.5020$, $\beta = 92°12'$; simple forms, $a(100)$ $b(010)$ $o(111)$ $\omega(111)$, elongated along *z* and tabular relative to (100), on (010) a direction of max extinction makes an angle of 7° with the *z*-axis in the angle formed by [010 100] and [100 111] the acute bisectrix emerges slightly inclined from (100) at a small angle with the optic axes, the plane of the axes is normal to (010), angles of the optic axes are $2E_{Li} = 21°0'$, $2E_{Na} = 28°50'$ $2E_{Tl} = 30°10'$, sp gr. 1.433, mol vol 164.76 Values of the interfacial angles are given for the above crystals.

R H Lombard

**Regularity in crystal structure in hydrides, borides, carbides and nitrides of transition elements.** Gunnar Hägg *Z. physik Chem.*, Abt B, 12, 33–56(1931); cf *C. A.* 24, 1591.—The structure of crystals of binary compds contg a so-called "transition element" and either H, B, C, or N is critically examd with respect to the ratio of at radii If this ratio $r_m : r_x > 1.7$ the structure is simple, while if the ratio is smaller the structure becomes more complex the smaller the radius of metal ion Only these combinations show a typical metallic character in crystal structure which is termed an infiltration structure The latter shows a combination $M_4X$, $M_3X$, $MX$ and $MX_2$, each of which is described The face centered cubic or close packing hexagonal lattice, both of coordination no 12 are most often observed One case each of body-centered cubic and simple hexagonal, both of coordination no 8 was found A careful discussion follows of the packing arrangement of atoms and the relation to coordination nos

R H Lambert

**Röntgenographic investigations of potassium fluoborate.** B Prscr *Gazz. chim. ital.* 60, 936–9(1930).—Basche and Mark found that $SrSO_4$, $PbSO_4$, $KMnO_4$ and $KClO_4$ are of the same structural type, and contain 4 mols in the elementary cell (cf. *C. A.* 20, 3597) $KBF_4$ should belong to this same series, for it is isomorphic with $KClO_4$ and $KMnO_4$ (cf Zambonini, *C. A.* 17, 2080) It was therefore of interest to study $KBF_4$ by x rays (Cu radiation) The exptl $d_{18}$ was 2.554–559 (cf $d_{18}$ 2.198 of Stolba, *Jahresber. Chem.* 1872, 231). The x-ray examn showed $a_0 = 7.84$, $b_0 = 5.68$, $c_0 = 7.38$ (rhombic lattice), with $a\ b\ c = 1.382\ 1\ 1.297$. Montemartini reported the prepn. of a cubic form of $KBF_4$ (cf *Rend. accad. Lincei* 3, 359(1894); *Gazz. chim. ital.* 24, I, 478(1894)), but by following the procedure of M., a product was obtained that gave röntgenographs identical with those of the rhombic form, whether the gelatinous compd was dried in air without heating or dried at 100° After drying at 100°, its d was 2.555 The so-called cubic form and the cryst. rhombic form are therefore identical

C. C. Davis

**An x-ray study of mannitol.** Geo. W. McCrea. *Nature* 127, 162–3(1931).—Results for *d*-mannitol are space group $D_2^4$, $a = 8.60$ A. U., $b = 10.58$ A. U.; $c = 5.50$ A. U., calcd d 1.522, 4 mol. per cube

Malcolm Dole

**Conductivity of zirconia.** Hans Schweitzer *Z. anorg. Chem.* 44, 151–2(1931).—The cond was detd. between 200° and 800° (450–1100° abs.) One sample of $ZrO_2$ contained 2% of MgO and the other 1% $Cr_2O_3$, a trace of $TiO_2$ and 0.3% $H_2O$. Graphs are given showing the log cond against the reciprocal of the abs temp The curves for both the specimens show breaks, approx at 450–550°, when the values obtained with increasing temp are plotted Values obtained with decreasing temp give a straight line considerably below the other values, it is suggested that this is due to a loss of $H_2O$ which occurs in the pure material at approx 510–50°. The purer sample (contg no Mg) showed a much higher cond and it is reasoned from this that the cond. of fused, pure $ZrO_2$ is probably appreciably smaller than that of quartz. The relationship between cond and field strength for the Mg-free $ZrO_2$, which had been heat-treated at 800°, was found to be linear up to 1500 v./cm

Edward B. Sanigar

**The properties of chlorides of sulfur. V. Metastable states.** Thomas M. Lowry and Gilbert Jessop. *J. Chem. Soc.* 1931, 323–9; cf. *C. A.* 24, 4111.—The period of induction in the combination of $SCl_2$ with $Cl_2$ can be eliminated or reduced by catalysts such as I and $SbCl_5$ or by autocatalysts The combination of $SCl_2$ and $Cl_2$ to form $SCl_4$ is instantaneous even at —80°, no lag can be detected in restoration of equil when $SCl_4$ is melted below —20°. The freezing and melting of $SCl_4$ is characterized by a marked lag A displacement with temp of the equil concns. in samples of $SCl_2$ was established by observations of d., the dissocn increases from about 15% at 0° to about 25% at 100°.

P. H Emmett

**Langmuir's adsorption isotherm.** R. S Bradley *Phil. Mag.* 11, 690–6(1931).—

Polanyi's theory is criticized on the basis that the heat of adsorption and the adsorption potential cannot be identified The capillary condensation method is inconclusive By the application of the theory of *imperfect gases in a two-dimensional* phase, the equation, $\log c_1c_2 = \text{const}/T + \text{const}$, is derived The consts. $c_1$ and $c_2$ are those of Langmuir s equation The equation was found to apply except at low temp ARTHUR FLEISCHER

Adsorption intensity and its importance in technical processes. *Isidor Traube Z angew Chem* 44, 73-5(1931).—Several means of measuring adsorption intensity have been, or are being developed Where no reaction occurs the intensity of adsorption is proportional to the amt of heat generated, the phys. conditions of the adsorbant and the substance undergoing adsorption being always a const Methods based upon displacement principles and vapor pressure were also found satisfactory for estg adsorption The adoption of such a standard method would be of great value in the *flotation and lubricating-oil industries* and be an aid to botanical studies. W. H TIFFANY

Some relationships between phase-boundary potential, adsorption, surface tension and particle size. FREDERICK K. V. KOCH *Phil Mag* 11, 585-92(1931).—Math The equation for the difference in potential between a spherical particle and a plane surface is derived. ARTHUR FLEISCHER

Discontinuous nature of the process of sorption of gases and vapors by porous solids. A. J. ALLMAND AND L. J. BURRAGE *Proc Roy Soc. (London) A130, 610-32(1931).*—Work pointing to the discontinuous nature of the sorption of vapors by charcoal is reviewed Eight isothermols of the sorption of $CS_2$, $CCl_4$, $C_6H_6$, $H_2O$, $C_5H_{11}OH$ and $CO_2$ on different charcoals showing the great no of observations made are given Isothermals of $C_6H_6$, $CCl_4$ and $H_2O$ on silica gel showing the discontinuous sorption are presented The theory of the sorption of vapors over a wide range of concn on charcoal is discussed S LENHER

Heats of wetting and of adsorption on zinc oxide. WARREN W EWING *Ind Eng Chem.* 23, 427-9(1931).—Heats of adsorption and of wetting of $CO_2$, $NH_3$, $SO_2$, Nujol, $C_6H_6$, $C_6H_5Me_3$, $C_5H_5N$, linseed oil, 1 5% Zn oleate in $C_6H_6$, 5% Zn oleate in $C_5H_5N$ and $H_2O$ on ZnO have been measured at 25° with a simple calorimeter S L.

Specific adsorption properties of activated carbon. L M M DUBININ *J. Russ Phys.-Chem Soc* 62, 1627-33(1930); cf *C. A* 25, 13.—A preliminary theoretical discussion of possible properties of activated carbon to be followed by exptl investigations. The quantity of adsorbed gas is expressed by $a = Cr \times S$ ($Cr$ is the quantity of gas adsorbed by one unit of adsorbent surface and the surface $S$ depends upon the diam of the pores $D$ $S = f(D)$) In case of adsorbed liquids the activity is characterized *by the sum of volumes of the pores and their radius* $v = \varphi(S)$ In case of solns. the equation for the adsorption of gas $a = Cr \times S$ may be used. $Cr$ depends upon the nature of the solvent, nature of the surface of the carbon (amorphous, cryst , interacted with O of the air, contg impurities, formation of an elec. charge greatly affects adsorption of strong electrolytes) The value of $S$ (adsorbing surface) depends upon the nature of the adsorbed mols. of the solute J. G TOLPIN

The adsorption of ethylene on wood charcoal, silica gel and alumina. A. MAGNUS AND H WINDECK *Z physik Chem*, Abt A, 153, 113-26(1931); cf *C. A.* 23, 2340, 24, 4683.—Adsorption curves were detd from low pressures to about 550 mm at 0°, 20°, 40° and 60° Comparison at 0° and 50 mm. pressure shows that 1 g of the beechwood charcoal, 3 6 g $SiO_2$ gel, and 5 33 g of $Al_2O_3$ adsorb equal quantities of $C_2H_4$ The adsorption curves for charcoal show a sharp rise against the flat curves shown by $SiO_2$ gel and $Al_2O_3$ The value of $\beta/0$ for charcoal decreases with temp although the theory requires it to be const. For $SiO_2$ gel and $Al_2O_3$ fictitious values of $\beta/0$, a term in the Magnus equation of state for adsorbed gases, are obtained A. F

Adsorption within the crystal of a salt. I N STRANSKI. *Kolloidchem Beihefte* 32, 197-204(1931).—S does not believe that the Gibbs-Ostwald Freundlich equation relating soly and surface tension of particles is sufficient to explain the effect of grain size He objects to Balarew's freely interchanging the terms surface tension and soly. Various extracts from B 's paper are given and criticized The assumption that water of hydration for crystals like those of $BaSO_4$ is " free" seems untenable The theoretical results given by B therefore can lead to erroneous conclusions. R H L.

The kinetics of surface processes on crystal lattices. I. The adsorption system barium sulfate-electrolyte solutions. LUDWIG IMRE *Z physik Chem*, Abt. A, 153, 262-86(1931), cf *Z physik Chem*, Abt. A, 153, 127(1931).—The adsorption of radioactive Th B, isotope of Pb and of Act, isotope of La, was detd on pptd $BaSO_4$ at 18° in the presence of various ions The velocity of adsorption of Act is decreased by the addn of Ba ions and increased by the addn of $SO_4$ ions Foreign electrolytes such as

HCl diminish the speed of adsorption. Qualitatively the curves for Th B are similar. Quant inspection reveals the differences that Th B is adsorbed to a much smaller extent and that the initial slope of the Act curves is much greater than that of the ThB curves The differences illustrate the previous results The Act curves are characteristic of those of easily sol electrolytes in which valence is the important factor. The Th B curves are characteristic of those of difficultly sol electrolytes in which the velocity is controlled by the recrystn of the adsorbent in accommodating the exchange reaction. ARTHUR FLEISCHER

Adsorption. JOHANNES TERWELLEN *Z physik Chem*, Abt. A, 153, 52–67 (1931).—The adsorption of methyl violet and methylene blue on Ag and Ni wires was detd. by measuring the change in concn. of the solns spectrophotometrically To avoid aging effects in the dye solns, pure dyes were used, the solns were kept in the dark except for the photometer measurements, and $O_2$ and $CO_2$ were excluded from the solns The curves for amount adsorbed against dye concn rise rapidly to a satn. value, which remains const. up to a high concn., after which the adsorption again increases rapidly Methyl violet on Ag shows a bimol. layer if a cubic mol is assumed, and a monomol layer if the mol has a cross section of $3.283 \times 10^{-15}$ cm.$^2$ and a length of $17.49 \times 10^{-8}$ cm. Methylene blue on Ag is adsorbed as a monomol layer if the cubic form of the mol is assumed. Heating the Ag wires to 400° for 2 hrs reduced the adsorption considerably Methylene blue is adsorbed more readily by Ni than by Ag, while methyl violet is adsorbed to a smaller extent. Electrolytic Ni (marked II) adsorbed more than the regular Ni wire The satn values in $g \times 10^4$ for 1000 cm.$^2$ of wire surface are given in the table

| | Ag | Heated Ag | Ni I | Ni II |
|---|---|---|---|---|
| Methyl violet | 2.002 | 0.604 | 1.263 | 3.633 |
| Methylene blue | 1.078 | | 1.877 | 1.927 |

The satn. value depends on the nature of the adsorbent and on the dyestuff so that detn. of surface by detn. of the adsorption is an empirical method. Langmuir's theory of monomol adsorption is not confirmed in the above results ARTHUR FLEISCHER

Adsorption. HERMANN SCHLÖTER. *Z physik Chem*, *Abt. A, 153, 68–82(1931).*—The adsorption of $CS_2$ from 0.05 to 0.9 $p/p_0$ was detd. on glass powder at 43.5° and on Ag powder at 25° and 43.5° The adsorption of pentane on the two powders was detd. at 34°. The curves are all similar and may be expressed by the equation $N = a\,b^P$, where $N$ is the no of layers of mols. in the adsorbed film, $P$ is the pressure and $a$ and $b$ are const. In all cases the adsorbed layer is polymolecular. The results can not be explained by capillary adsorption or by a soln. effect like that of water on a glass surface. ARTHUR FLEISCHER

The activity coefficients and the adsorption of organic solutes. I. Normal butyl alcohol in aqueous solution by the freezing point method. WM. D. HARKINS AND ROY W. WAMPLER. *J. Am Chem Soc* 53, 850–9(1931).—The activity values for the aq solns. of BuOH were detd. by the use of a specially designed app for the detn. of f.-p. lowering sensitive to 0.00001°. The activity coeffs of the carefully purified BuOH in 1, 0.5 and 0.1 *M* solns. are 0.8227, 0.8681 and 0.9433, resp Calcns. based upon the usual "adsorption equation" show that the film of BuOH on aq solns. is monomolecular; the area per mol is 23.7 sq A. U P. H EMMETT

The effect of the hydrogen-ion concentration in the adsorption of ions of barium, aluminum and thorium by clays. N. A. HELD AND M. N. SOKOLOVA. *J. Russ. Phys.-Chem Soc* 62, 1571–5(1930).—Glukhov kaolin adsorbs Ba-ion from solns of $Ba(OH)_2$ to a much larger extent than OH-ion, Ca-ion enters the soln. instead of Ba; therefore this is a case of substitution adsorption. This satisfies Freundlich's equation $x/m = aC^b$. Comparison of adsorption of Ba from solns of $Ba(OH)_2$, $BaCl_2$ and $BaCl_2$ + HCl showed a decrease of adsorbed Ba with increase of H-ion concn In agreement with this, Th ion is adsorbed less than Al ion and less than Ba ion, from solns. of equal concn as its hydrolysis results in a higher concn of H ions J. G TOLPIN

Adsorption of chlorides of aluminum and thorium by clays and kaolins. N. A. HELD. *J. Russ. Phys.-Chem Soc.* 62, 1553–70(1930).—H studied the character of adsorption of these salts by 5 kinds of Russian clays and made a no of electrometric titrations of the ions of $AlCl_3$ and $ThCl_4$. A no of tables and curves show that $Cl^-$ is adsorbed in negligible quantities; while Al and Th are adsorbed in different proportions by different clays (from 1 to 10 times) The general character of adsorption shows that with increased concn. of the cation the quantity adsorbed approaches a limit and seemingly satisfies the isothermal adsorption equation of Freundlich. The cations $Ca^{++}$ and $Mg^{++}$ substitute $Al^{+++}$ and $Th^{++++}$ in the soln., i. e., substitution

adsorption takes place It is suggested that the clays can be characterized by the amts. of adsorbed aluminosilicates. Displacement of hydrolytic equil. results in acidity of the soln. The hydrolysis is expressed by: $AlCl_3 + 2H_2O \rightleftharpoons Al(OH)_2Cl + 2HCl$ $ThCl_4 + 3H_2O \rightleftharpoons Th(OH)_3Cl + 3HCl$ Detd. consts. for the hydrolysis of $AlCl_3$ at 20° range from $1.1 \times 10^{-3}$ to $1.95 \times 10^{-3}$ at 25° from $2.5 \times 10^{-3}$ to $3.6 \times 10^{-3}$, for $ThCl_4$ at 20° $5.5 \times 10^{-11}$ to $5.9 \times 10^{-11}$ J. G. Tolpin

**Adsorption of easily soluble and difficultly soluble electrolytes on precipitates with large surface.** L. Imre. *Z. angew. Chem.* 43, 875-7(1930).—In adsorption phenomena on ppts. with large surface generally 2 processes are involved. The process first ("momentary" adsorption) is an ion adsorption that depends on the charge on the surface and the valence of the adsorbed ion. The second process consists of a building up of mols. and re-soln. of the resulting mols. at the surface layer. In this process the velocity of the decrease of surface and the insoly. of the adsorption compd. are important factors. Curves are given showing the adsorption of Pb (Th B) and actinium on AgCl, AgBr and AgI as a function of time. If the systems are brought together immediately on prepn. adsorption increases with time, otherwise it steadily decreases. With AgCl and AgBr the adsorption increases quickly to a max. and then gradually decreases. R. I. Rich

**Problems of the boundary state.** Wm. Hardy. *Trans. Fey. Soc.* (London) A230, 1-37(1931).—More than 100 substances, chiefly long-chain compds. including normal paraffins, acids and alcs., and carbinols, were used as lubricants in expts. to det.: (1) the static friction between solid surfaces, either clean or separately coated with solid lubricant, (2) the static friction of clean surfaces joined by fluid lubricant, (3) the tangential force needed to produce slip in a solid joint between a cylinder and a plate, (4) the normal force to break a fluid joint between a cylinder and a plate, (5) the normal force needed to break the same joint when solid. The thin films of lubricant between the solid surfaces may be regarded as a fourth state of matter since the energy of these films is shared so overwhelmingly with the enveloping phases. For each load there is a value $h$, sepg. cylinder and plate, at which the capillary pressure is equal to the loading. This value is const. for all fluids including clean air and for different solids when the surfaces are clean. This capillary pressure is called the Leslie pressure, it may be accounted for: (1) by direct attraction of relatively long range as contemplated in the Laplacian theory of short range forces; or (2) by the spreading from mol. to mol. of a state of strain. Mols. that are oriented and strained and in turn can orient and strain mols. beyond them are in a polarized state and the spreading of polarization from mol. to mol. is termed diachysis. The Laplacian theory seems to account most satisfactorily for the Leslie pressure in clean air, but in liquids the most promising view of the boundary state is that it is due to the formation of chains of polarized mols. stretching through the lubricant from one boundary surface to the other. Each chain has little strength in shear and great strength in tension, but both shear and tensile strength decrease as the length of the chain increases. C. C. Kiess

**Anomalous velocity distribution in thin lubricant films.** H. Umstätter. *Kolloid-Z.* 54, 220-6(1931).—The Hagen Poiseuille equation assumes optically thin layers and 0 velocity at the wall layer. These assumptions are not true in lubrication, where processes at the wall may not be neglected. An attempt is made to derive a law by math. summation of the forces acting between the wall and the various layers. Dynamic viscosity, the true measure of the value of an oil for lubrication, is the sum of the true viscosity and the adhesiveness, the specific combination between oil and metal. At present it is only possible to get an indication of the adhesiveness from the temp.-fluidity curves of the lubricant. The fluidity of oils with symmetrical molecules varies as the square of the temp.; for those with unsymmetrical molecules it varies as the temp. A flat temp.-fluidity curve signifies orientation and "adhesiveness" (anomalous velocity distribution). The viscosities of a Baku spindle oil, a Pennsylvania oil, a *Rhenania fraction 310-350°*, *Shell Valtol*, *castor oil and rapeseed oil* were detd. with a microviscometer from 30° to 200°. The results may be expressed by a semi-empirical rule $\eta = (CM^3)/(t - t')^n$ where $C$ is a characteristic const. for a homologous series, $M$ is the mol. wt., $t'$ is a reference temp. and $n$ a value from 1 to 2 depending on the elec. symmetry of the mol. Arthur Fleischer

**Adhesive forces on surface films.** T. M. Lowry. *Nature* 127, 165(1931).—L. explains Adam's contention (*C. A.* 25, 1422) that the mols. of a fatty acid on the surface of water may be held together by mutual attraction of the heads on the basis of the conception of the coördination of H. Malcolm Dole

**The film state of matter.** A. V. Blom. *Kolloid Z.* 54, 210-20(1931), cf. *C. A.* 23, 1290, 2048, 4087, 5336.—Films stand between dispersoids with large unconnected sur-

faces and solid bodies with small but connected surfaces The types of film are the unimolecular (Langmuir, etc.), Hardy films which are thicker than the active range of molecular forces, and zone films. Films may be formed by physical and by chemical processes. The kinetics of film formation by evaporation are reviewed. A. F.

Elliptical polarization by reflection at the surface of liquids: application to the study of monomolecular surface films. Ch Bouhet *Ann phys* [10], 15, 5–130(1931).—A study of elliptical polarization by reflection at Brewsterian incidence from the surface of water, salt solns., pure org liquids and solns. of fatty acids. The ellipticity ($K$) is shown to be pos in all these cases. $K$ for salt solns. is identical with that for pure $H_2O$ (0.00040), confirming the presence of a Gibbs' layer of adsorbed $H_2O$ at the boundary surface Surface films of fatty acid solns. have a thickness calcd from $K$ and Drude's theory of the order of mol dimensions and particularly of approx the same magnitude as $d$, the mean distance between the mols. as detd. from x ray studies, indicating their monomol nature In the case of monomol fatty acid films $K$ consists of 2 terms, $K_2$ pos. and relating to the $H_2O$ or other liquid supporting the film and $K_1$ neg., due to the film and relating to the length of the mols. composing the film. In the case of pure liquids $K$ is given as a first approximation by a relationship of the form, $K = d \times F(\lambda, T, \ldots)$ A P Sachs

Certain mechanical properties of surface tension. V Ducceschi *Boll soc. ital biol sper* 5, 1069–76(1930), cf *C A* 25, 1136.—The formation of adsorption films in the interface liquid ($H_2O$)-gas ($H_2O$ vapor) is accompanied, for certain substances, by the production of a marked quantity of mech energy, capable among other things of producing a regular and continuous movement of a small rotor with rotating blades on the water This mech factor, along with the great velocity with which mol dispersion of almost bidimensional form takes place, should be considered in physiol. processes in which surface-tension energies predominate, *e. g.*, muscle contraction Diagrams and description of the app are given Peter Masucci

A microscopic method. E. H Synge. *Phil Mag* 11, 65–80(1931), cf *C. A.* 22, 4048.—The use of a colloidal Au particle at the focus of a slightly elliptical mirror is proposed as the source of a spot of intense light, very small in comparison with the wave length A particle $10^{-4}$ cm in diam. will scatter sufficient light to operate a photoelec. cell This method would increase the resolution 10 to 20 times beyond that of the ordinary microscope. An instrument using this principle is named an *hyperultramicroscope*. Arthur Fleischer

Measurements of suspensions and deposits. Pierre Mercier. *J. phys radium* [7], 1, 292–305(1930).—A float is attached by means of a hair to a lever It is immersed in homogeneous or heterogeneous suspensions. While the suspensions settle, the movement of the lever is optically recorded The results are presented in curves upward pressure on the bob vs. time, and pptn. velocity vs. concn A. L. H.

Further progress in ultrafiltration. Erwin Kratz. *Chem.-Ztg* 55, 257–9(1931). E. H.

Form and structure of colloidal particles. A. Boutaric. *Rev gén. sci.* 42, 11–9 (1931).—A descriptive paper summarizing the modern conception of colloidal particles. A. Lloyd Taylor

The explanation of Stokes' rule. Franz Urbach *Sitzb. Akad. Wiss. Wien*, Abt. IIa, 139, 473–81(1930).—Theoretical The relationship between Stokes' rule and the sec. law of thermodynamics is discussed, with the use of an idealized cyclical process It is shown that deviations are possible through the effect of the heat energy. It is necessary to assume that the emission mechanism is independent of the heat energy. E. J. R

Temperature and the stability of colloidal solutions. S. I. D'yachkovskii *Kolloid-Z.* 54, 278–84(1931).—The absorption spectra of well-dialyzed hemoglobin and albumin sols were detd. from 20° to 100° at 10° intervals. All solns. after coagulation showed a Tyndall cone. Surface tensions were detd. for a no. of sols from 10° to 70°. The curve of $\Delta\sigma/\Delta t$ against the temp shows a max., which is very decided for $Fe_2O_3$ sols at 30–40°. A large no. of sols were subjected to freezing at temps. from —20° to —182° and the coagulation was noted The surface tension and cond of the thawed sols were detd. The behavior of the sol upon freezing is a good indication of its stability. Uranium and tungstic acid sols were fractionated by use of successive lower temps. of freezing. Arthur Fleischer

Contributions to colloidal syntheses with well-crystallized organic compounds. Nadine von Veimarn. *Kolloid-Z.* 54, 296–306(1931); cf. *C. A.* 24, 2357, 2657, 3415, 3506.—Colloidal solns. of papaverine, camphor, salol, benzophenone, anthracene, an-

[illegible] and phenanthrene in aq. sugar solns. are described. Freshly prepd. salol and anthracene sols have spherical liquid particles. In the coarse particles the [illegible] can be detected. ARTHUR FLEISCHER

Photometric measurements of concentration and dispersion in colloidal solutions. III. [illegible] *Kolloid Z.* 54, 150–6 (1930); cf. *C. A.* 25, 870.—The use of the Zeiss [illegible] was studied by means of mastix sols. If the incident radiation is [illegible] and again the [illegible] weakening const. a max. appears. The curves at different wave lengths are nearly the same; slight deviations are due to errors in the prism factor and to the Tyndall effect. Kirchmann's rule with const. dispersion holds up to the value of the weakening const. of [illegible]. The usefulness of nephelometry ceases where light-weakening measurements begin. The red part of the spectrum is most useful for white sols. Nephelometry is very sensitive to changes in the dispersity. ARTHUR FLEISCHER

Investigations of colloids, prepared by the method of condensation of molecular rays. I. Organosols of the alkali metals. ADOLPH I. RABINOVICH, V. A. KARGIN AND [illegible] *Kolloid Z.* 54, 288–95 (1931).—A *new app.* is described for the prepn. of more stable sols of the alkali metals in org. solvents. K sols in ether can be prepd. which are stable for 2 to 3 mos. Cataphoretic measurements indicate that the particles are neg. charged. KI increases the stability and also the cataphoretic velocity. Light causes the ppt'n. of metal from the pure sol, and a blue gel from the protected sol. K sols in benzene, xylene and tripropylamine are very unstable. K sols in ethylamine are stable for 3–9 hrs. and are characterized by the presence of K in true soln. A. F.

Dielectric constant and structure of thixotropic sols. S. S. KISTLER. *J. Phys. Chem.* 35, 815–23 (1931).—The dielec. consts. of thixotropic $Al_2O_3$, $Fe_2O_3$ and gelatin sols were measured with 32.7-cm. waves by the second Drude method. In all cases the dielec. consts. decreased with increasing concn. of electrolyte ($K_2SO_4$). The absorption of the elec. waves was practically the same for the sols as for pure water. Pure $K_2SO_4$ solns., which were measured for comparison, showed a negligible decrease of dielec. const. and a definite increase of absorption. The reversible sol-gel transition of a colloid is not accompanied by discontinuous changes in its dielec. properties. L. ONSAGER

Specific inductive capacity and molecular weights of colloids. NINA MARINESCO. *Compt. rend.* 192, 625–8 (1931).—An equation is derived from the Debye relation which permits detg. the mol. wt. of dissolved proteins from the dielec. dispersion of the system and the wave length. The mol. wt. obtained by this method corresponds to the smallest particle of dissolved substance even if it is in the presence of more complex micelles that possess a high degree of assocn. The *mol. wt. of gelatin* is 11,300 by this method. J. R. ADAMS

Dispersoidological study of silver salts in aqueous ethyl alcohol, acetone and propione solutions. I. SHINJIRO ISHII. *Bull. Chem. Soc. Japan* 6, 53–60 (1931).—The complex solv. (solv. in the form of complex ions) of pptd. AgI in aq. EtOH solns. of KI and in aq. $(CH_3)_2CO$ solns. of KI was detd. The dispergation of the AgI in these solns. was also studied. The solv. is greater the higher the proportion of EtOH or $(CH_3)_2CO$ in the solvent. The greatest amt. of dispergation and the widest range of KI concn. through which there is dispergation is found at intermediate proportions of EtOH or $(CH_3)_2CO$. P. L. BROWNE

Investigations on the aging of aqueous ferric chloride solutions. A. LOTTERMOSER AND ERICH LESCHE. *Kolloidchem. Beihefte* 32, 157–68 (1931).—The changes in cond. of dil. solns. (0.00250 to 0.00000321 *M*) of $FeCl_3$ in cond. water were studied. The cond. does not attain a const. value at the end of 2000 hrs. The cond. of the more concd. solns. at that time is increasing slowly, while that of the more dil. has passed through a max. and is slowly decreasing. A rise in temp. increases the rate at which these changes go on, but a temp.-reversible equil. was not observed. The same is true for an aging $Fe_2O_3$ sol. Colorimetric detns. show that light is more strongly absorbed by $FeCl_3$ solns. as the wave length becomes shorter and the time of aging increases. J. W. P.

Studies in electroendosmosis. IV. The electroendosmosis of some organic liquids against a glass surface. FRED FAIRBROTHER AND MARK BALKIN. *J. Chem. Soc.* 1931, 389–403.—Measurements were made of the electroendosmosis of fourteen pure org. liquids and water through a diaphragm of sintered Jena-glass powder. $C_6H_6$ and $CCl_4$ show no measurable effect, $Et_2O$ is charged neg. toward the glass and all the other liquids are pos. charged. Surface cond. was found in the glass diaphragm in the case of each liquid that showed endosmosis. Up to 150 volts the relation between the voltage and the velocity of electroendosmosis was linear, but at higher voltages the velocity increased more rapidly than the voltage, which may be caused by the increased atom polarization experienced by the surface layer of the liquid in the diaphragm. In the cases where the dipole moment of the liquid, $\mu$, was known, the function $(D/\Delta f)^{1/2}\mu$

), where $D$ is the d , $M$ mol wt and $\eta$ viscosity, gave a straight line when plotted ıst the velocity of electroendosmosis per volt. J. G McNALLY

Studies on electrokinetic potentials. VIII. Ion antagonism. HENRY B. BULL, ROSS AIKEN GORTNER *J Phys Chem* 35, 700–21(1931), cf *C. A* 25, 1721 — electrokinetic potential for mixts of KCl and NaCl is merely a component of the ıdual potentials, no ion antagonism is evident. Similarly the results clearly ate the absence of ion antagonism between $MgCl_2$ and $CaCl_2$ as influencing the rokinetic potential MALCOLM DOLE

The influence of surface active compounds and electrolytes, with consideration of types of ions, on the electrophoretic velocity of lyophobic sols. SIAU HONG WHANG *ıdchem Beihefte* 32, 169–96(1931) —The electrophoretic velocity (cataphoresis) of ous lyophobic sols ($As_2S_3$, quartz suspension and $Fe_2O_3$), to which various amts of rent electrolytes or surface active compds (alcs , amines and fatty acids) had been d, was detd by the moving boundary method No well-defined relation was vered between surface activity and electrophoretic velocity The addn to quartz ension of an alc up to butyl or a fatty acid caused a decrease in electrophoretic ity, while amyl and hexyl alcs as well as various org bases, both surface active and ive, had the opposite effect The expts with electrolytes show that the electrophoretic velocity of charged particles decreases with increasing mobility of the oppositely ged ions but increases with increasing mobility of the ions of like charge J W PERRY

Effect of alkali salts on the cataphoresis and precipitation of colloidal gold. A contribution to the study of the Hofmeister series. ANNA LAGEMANN *Kolloidchem Beihefte* 32, 212–48(1931) —The effect of various alkali halides on the cataphoresis of ıdal Au was detd by a carefully worked out ultramicroscopical method The ts show that the charge on the Au particle was decreased in the order $Li < Na < K <$ The neg ions hindered this discharging action in the order $Br < Cl < F$ The ge on the particles did not completely vanish but approached an asymptote as the concn was increased from $2 \times 10^{-4}$ to $50 \times 10^{-4}$ $N$ This asymptotic charge eased as the alkali metal ion increased in at wt The change in charge with varying n can be represented by an adsorption curve The coagulating effect of the various was detd by observing color changes Those ions most effective in discharging Au sol were also most efficient in causing coagulation No quant. relation was d, however, between the 2 effects The varying effects observed with different ions be explained by differences in their at radius, mobility and degree of hydration mparison with similar effects observed with lyophilic colloids shows that the same meister series holds for both types of colloids. J W. PERRY

Contribution to the study of the action of electrolytes added to a colloidal solution oportions below those necessary to cause coagulation. G ROSSI AND A. MARESI *Gazz chim ital* 60, 903–6(1930) —Earlier expts showed (cf *C A* 21, 2411) electrolytes that normally are stabilizers (*e g*, $H_2SO_4$ and $Na_2SO_4$ for colloidal S ) function as stabilizers only within certain limits of concn , and at higher concns rue coagulants of the same solns. With a given colloidal soln , a given electrolyte e quantity necessary to cause coagulation, and another electrolyte for coagulant, is for the 1st electrolyte, with respect to the 2nd, an optimum concn that brings t the max stabilization Above this, but with quantities below those necessary for ulation, the electrolyte either does not bring about any change or brings about a ibilization This was demonstrated by expts on colloidal $As_2S_3$ solns , and for the of simplicity with HCl both as the electrolyte, added in quantity below that necessary for coagulation, and also as coagulant It was found that when added to a col- l $As_2S_3$ soln in quantity below that necessary for coagulation, HCl can either *lize or destabilize the soln toward the coagulating action of the HCl itself, according* e concn of the HCl At the concn of HCl which stabilizes the soln , there is an ase in the degree of dispersion, whereas the dispersion is diminished by the addn of antity of HCl which, though not reaching the min necessary for visible coagulation, ibilizes the colloidal soln toward the coagulating action of the HCl itself The ıdal $As_2S_3$ soln was prepd by passing $H_2S$ for a long time into an aq suspension of s, dilg and removing excess $H_2S$ with a current of inert gas, and dialyzing. The e of dispersion and the coagulation phenomena after the various treatments were ed by the ultramicroscope. C C. DAVIS

Coagulation kinetics of suspensoids. I. K. JABLCZYNSKI *Kolloid-Z.* 54, 164–9 l) —Modification of Smoluchowski's assumption by assuming that in coagulation [illegible] is established at which all particles are charged leads to the equation

time $t$ and $z$ the no. of charged particles. When $z$ = zero the equation is the same as S s. The equation holds well for the data of Westgren and Reitstötter on the coagulation with $z$ = 1. Spectrophotometric measurements of the rate of coagulation of $Fe_2O_3$, $As_2S_3$, $Sb_2S_3$ and AgCl sols by KCl at 18° agreed well with the formula.

ARTHUR FLEISCHER

Viscometric investigations of hemoglobin coagulation. S. L. Pepko. *Kolloid-Z.* 54, 170–5(1931). cf. *C. A.* 24, 637.—The effect of $CH_3OH$ and $C_2H_5OH$ on coagulation by KCl, $CaCl_2$ and FeCl was studied by the detn. of viscosity at 17°. In the presence of $CH_3OH$ the viscosity remains const. or decreases; in the presence of $C_2H_5OH$ the viscosity remains const. or increases. The valence effect of the cation in the presence of alc. is only slightly noticeable. At high concns. of $CaCl_2$ with $C_2H_5OH$ stabilization of the system was observed. Stabilization occurs with $FeCl_3$ and $C_2H_5OH$ from concns. of 0.1 *N* to 2 *N*, above which coagulation makes viscosity measurements impossible. Also in *J. Russ. Phys. Chem. Soc.* 62, 2273–82(1930).

ARTHUR FLEISCHER

Pectography—the study of the progressive drying of solutions. Paul Bary. *J. chim. phys.* 28, 1–13(1931). cf. *C. A.* 25, 1076.—The structure of deposits left on a glass slide placed vertically in a beaker contg. an evapg. colloidal soln. was studied. In general hydrophobic sols deposit a series of ridges resembling Liesegang rings while the residues from hydrophilic sols show no structure. Most colloids belong strictly to neither class but represent intermediate systems and may approach either autopeptization or coagulation on aging. $Fe_2O_3$ residues consist of two phases, one composed of doubly refracting filaments arranged parallel to each other and imbedded in an amorphous phase.

J. G. McNALLY

Periodicity and its fundamental principles. Maurice Copisarow. *Kolloid-Z.* 54, 257–65(1931).—Periodic formations are obtained when a $CO_2$ stream is solidified by cooling, in the sublimation of $(NH_4)_2CO_3$ and in burning Mg in oxygen. Yellow P did not show a rythmic structure either on oxidation or on sublimation in a $CO_2$ stream. Periodic structures are the outer result of a periodicity and are developed only in a system where there is harmony between wave frequency and amplitude and the natural frequency of the system.

ARTHUR FLEISCHER

The formation of Liesegang rings. (Miss) S. Roy. *Kolloid-Z.* 54, 190–3(1931).—The following new rings were formed: $HgI_2$ in $V_2O_5$ gel, $HgI_2$ and $AgCrO_4$ in $CeO_2$, TlI and $HgI_2$ in $ZnAsO_4$, TlI in $MnAsO_4$, $BaCrO_4$, $TlCrO_4$, AgI in $SrO_2$, TlI and AgI in starch, and TlI and CuI in agar. Liesegang rings are more marked when formed in the presence of light than in the dark, because of the accelerating effect on coagulation by light.

ARTHUR FLEISCHER

Microscopic and cinephotographic study of Liesegang rings. Suzanne Veil and L. Bull. *Compt. rend.* 192, 282–4(1931).—The rings formed by the action of a drop of $AgNO_3$ on dichromate-impregnated gelatin formed concentrically with pointed protuberances interrupting their continuity. As successive rings were formed the protuberances receded but the rings were left incomplete at these points. The velocity of formation of the rings decreases and the intercepting protuberances disappear as the contact line between the solns. recedes toward the center.

A. Lloyd Taylor

Practical method for determining vapor-tension diagrams. G. Calingaert. *Chimie & industrie* 25, 307–8(1931).—A brief description and explanation are given of a method recently introduced in America; cf. Davis, *C. A.* 24, 4967.

A. P.-C.

Calcium acetate gels. II. C. G. Smith. *Kolloid Z.* 54, 181–90(1931); cf. *C. A.* 23, 4393.—Further expts. were carried out on the formation of the gels with the use of pyridine, Me Et ketone, etc. The addn. of org. liquids immiscible with water shows no visible action in the formation of gels. $Mg(ClO_4)_2$ produces a cryst. ppt.; because of alcoholate formation $CaCl_2$ has no visible effect. Na and Mg acetates form gels quickly. Photomicrographs show that most of the gels have a honeycomb structure with $Ca(AcO)_2$ as the disperse phase. The gels formed by acetone in the presence of $C_6H_6$, $CS_2$ show a phase reversal. The $Ca(AcO)_2$ disperse phase on aging increases size and is accompanied by opalescence. The crystals finally formed may be the anhyd. or monohydrated $Ca(AcO)_2$. III. *Ibid.* 284–8(1931).—The viscosities of $C_2H_5OH$-$H_2O$ and $C_2H_5OH$-$H_2O$-$Ca(AcO)_2$ solns. were detd. from 15° to 40° in an Ostwald viscometer. For the alc.-water solns. the data agree with the literature, a max. occurring in each of the viscosity-temp. curves. The viscosity of the Ca acetate solns. increases with the Ca concn. The change from soln. to gel is very sudden, there is no gradual transition in viscosity. The general decrease in viscosity upon addition of alc. shows that the effect is mainly a dehydration of the Ca acetate. Other factors in gel formation are the lowering of the surface tension and the decreased dissocn. of Ca acetate in the presence of alc.

ARTHUR FLEISCHER

Investigations on gum arabic with the aid of colloidal silver and gold. J. Voigt. *Kolloid-Z* 54, 307–10(1931); cf *C. A.* 23, 3152.—Very pure gum arabic soln. does not reduce $Ag_2O$ or $AuCl_3$ solns. Preliminary illumination of the gum arabic soln decreases its protective action on Ag and Au sols. Arabic acid behaves similarly. Ag sols cannot be prepd by radiation when gum arabic or arabic acid is used as the protective colloid. The nature of the changes in the gum arabic is unknown. A. F.

The effect of salts on the ionization of gelatin. Kenneth V. Thimann. *J. Gen. Physiol.* 14, 215–22(1930).—The addn. of NaCl, $CuCl_2$ and $CaCl_2$ to gelatin solns. is shown from the Donnan membrane equil. to increase the ionization of gelatin. The effect is due to the formation of complex ions. The evidence supports the amphoteric ion structure of protein mols. rather than the classical theory of structure. C. H. R.

Diffusion in gelatin gels. Walter Stiles and Gilbert S. Adair. *J. Am. Chem. Soc.* 53, 619–20(1931).—The results of S. and A. (*C. A.* 16, 860) on the decrease in the rate of diffusion of electrolytes in gelatin gels as the concn. of the latter is increased agree essentially with the recent results of Friedman and Kramer (*C. A.* 24, 2934). J. G. McNally.

The index of refraction of gelatin solutions and the supposed hydration of the dispersed particles. G. Rossi and A. Marescotti. *Gazz. chim. ital.* 61, 14–26(1931).—A review of the literature on colloidal solns. of gelatin (to which numerous references are given) suggested that the expts. of Walpole (cf. *C. A.* 8, 859) on the relation between the *n* value and the concn. of gelatin be carried out with the greatest precision possible. Accordingly sterile aq. solns. of pure gelatin of various concns. at 18° were measured with an immersion refractometer, the technic of which is described. The results are tabulated and discussed in detail and lead to certain general conclusions. (1) Gelatin dissolved in water increases the *n* value of the latter, but this increase is not a linear function of the concn. of the gelatin. (2) This divergence from the linear relation is a confirmation of the hypothesis of R. (cf. *C. A.* 18, 3510) and of Kruyt (cf. *C. A.* 23, 3388), Kruyt and Tendeloo (cf. *C. A.* 19, 919, 3192) on the solvation of the particles of lyophilic colloids. (3) The differences in the *n* value of water as a result of the dissolved gelatin found at different temps. probably depend upon variations in the degree of hydration with change of temp. which are in conformity with the general behavior of lyophilic colloids. (4) Variations in the *n* value of gelatin solns. by addn. of salts ($Na_2SO_4$, NaI, NaBr and Na citrate were tested) are not strictly additive. The salts behave differently, in that both increases and diminutions in the viscosity of the gelatin solns. were found, and the variations caused by these salts are such that no explanation can be offered at present. C. C. Davis.

Structure of celluloid and nitrocellulose and the gelatinizing medium of nitrocellulose as a swelling medium. II. X-ray spectrograms of camphor celluloid with varying camphor content. J. R. Katz, J. C. Derksen, C. A. Kramers, Kurt Hess and Carl Trogus. *Z. physik. Chem.*, Abt. A, 151, 145–62(1930); cf. *C. A.* 24, 5201.—Camphor in celluloid acts as a lubricating agent between the micelles of nitrocellulose. In addn. to this, it forms with the latter, compds. sufficiently definite to show breaking up of the diffraction rings into segments, if the celluloid film is stretched. Typical spectrograms are reproduced and discussed. III. Celluloids with other cyclic ketones as jelling media. J. R. Katz, J. C. Derksen, Kurt Hess and Carl Trogus. *Ibid.* 163–71(1930).—Fenchone, menthone, carvone, cyclopentanone, cyclohexanone and cyclohexanol also form these addn. compds. with nitrocellulose. A tabular correlation is given of the ring diams. and the interplanar distance *d*, for various percentage mixts. of these compds. with nitrocellulose. IV. Acid amides and esters as jelling media. *Ibid.* 172–89(1930).—These compds. likewise form addn. compds. with nitrocellulose. Since ketones, amides and esters have only the carbonyl group in common, it is concluded that it is by means of the latent valences of this group that the addn. takes place. Gregg M. Evans.

Thermoelastic effect in cellulose ester films. J. G. McNally and S. E. Sheppard. *J. Phys. Chem.* 35, 100–14(1931).—At room temp. films of cellulose nitrate or acetate cool when stretched to small elongations but give off heat when elongated beyond their yield point. With strongly biaxial films the secondary heating effect is absent. Under proper stress and temp. conditions cellulose nitrate films contract when heated and the coeff. of thermal expansion depends on the previous mech. treatment of the material, the temp. range, the rate of heating and the stress on the film. A value of $6 \times 10^{-4}$ is given for the coeff. of linear expansion at low stresses between 15° and 45°. The results are related to micellar structure. J. G. McNally.

Solubility of nitrogen in water at high pressures and temperatures. John B. Goodman and Norman W. Krase. *Ind. Eng. Chem.* 23, 401–4(1931).—A high-pressure

**Changes of the osmotic water attraction of a system of phases. I.** F. A. H. SCHREINEMAKERS *Proc Acad Sci Amsterdam* 33, 691–701(1930). cf following abstr. —The problem of the general osmotic system $E E'$ is discussed, where both $E$ and $E'$ may represent any no of phases in equil Expressions are set up for the thermodynamic potential of the whole system and the following results are deduced (I) When the pressures or vols remain const, on both sides of the membrane, the $H_2O$ diffuses toward that side on which the osmotic water attraction (O W A) is the greater and no water diffuses when the O W A is equal on both sides (II) An increase in the pressure of an equil (i e, $I$ or $I'$) for which the vol increases with absorption of water results in a decrease in its O W A, and a decrease in vol produces a decrease in the O W A (III) *When an equil takes in water at const pressure or at const vol, its* O W A *will* decrease unless all phases keep the same composition, and in general for a given quantity of water the effect at const pressure is greater than that at const vol. From these it follows that (IV) increase in pressure or decrease in vol of a liquid or vapor decreases its O W A and (V) when a liquid or a vapor takes in water at const pressure or at const vol, the O W A is decreased and for a given quantity of water the effect at const vol is greater than at const pressure The paper is highly mathematical W W S

**Equilibria in osmotic systems, in which forces act. II Osmotic systems with an active membrane, permeable for several substances** I A H SCHREINEMAKERS *Proc Acad Sci Amsterdam* 33, 1133–9(1930) cf preceding abstr and *C A* 24, 4417 —The general problem of osmosis deals with an active membrane permeable to more than one substance *An abstract mathematical treatment of the thermodynamics of this* case is presented and a no of conclusions are deduced, for which the original paper should be consulted W W STIEFLER

**New micro method for the ebullioscopic determination of molecular weights.** JAMES H C SMITH AND HAROLD W MILNER *Mikrochemie* 3, 117–22(1931) —(In English) An app and its use are described which is based upon the larger app of Menzies and Wright (*C A* 16, 2 3804) Satisfactory results can be obtained by using as little as 3 cc of solvent and 5–25 mg of solute It does not require a supply of Pt tetrahedra, as does the Beckmann micro method, substitutes a differential thermometer for the much more expensive and more difficultly obtainable Beckmann thermometer and the readings are easily obtained because the observed change is greater The app consists of a boiling tube, the *differential thermometer and a Cottrell pump Directions* are given for carrying out a detn and the results obtained shown for urethan, *p*-toluidine, vanillin, diphenylamine, naphthalene and triphenylmethane W T H.

**The surface tensions of aqueous solutions of *p*-toluidine.** R C BROWN *Phil Mag* 11, 686–90(1931) —The surface tension of *p*-toluidine solns with 0–0.6 g per 100 cc of soln was detd at 16.6° by the ring Ferguson, capillary rise and pull-on sphere methods with an accuracy of 0.5% The results are in fairly close agreement with Gans and Harkins The results by the Ferguson method (*C A* 16, 2136) do not agree with those obtained by the same method by Edwards (*C A* 19, 3185) A I

**The viscosity and density of rubidium nitrate solutions.** HAROLD G SMITH, JOHN H. WOLFENDEN AND HAROLD HARTLEY *J Chem Soc* 1931, 403–9 —The relative viscosities (*by the method of Merton, C A* 5, 1221) *and the relative ds* (by *the method* of Hartley and Barrett, *C A* 5, 2096) of 0.092–1.786 *N* aq $RbNO_3$ solns were measured at 18° and 25.01°. The viscosity concn curves for $RbNO_3$ solns at both temps are similar to those of Grüeisen for $KNO_3$ and of Merton for $CsNO_3$ For concns of $RbNO_3$ solns below 0.2 *N*, the relation between relative viscosity and concn is represented by the Jones-Dole equation (*C A* 23, 5375) The graph of $(\phi - 1)/\sqrt{c}$ against $\sqrt{c}$ for $RbNO_3$ *solns* at 18° and 25° shows that both the intercept $A$ and the temp coeff are neg *The "mol soln vol" is* calcd for $RbNO_3$ at various concns of solns from the d measurements and is shown to fall in the normal periodic order of the alkali nitrates J. BALOZIAN

**The behavior of electrolytes in mixed solvents II. Effect of lithium chloride on the activities of water and alcohol in mixed solutions.** R SHAW AND J A V. BUTLER *Proc Roy. Soc* (London) A129, 519–36(1930) —An air-bubbling method, in which the vol of air required is less than 2 l., was devised for the detn of the partial pressures of $H_2O$ and alc. in mixed solns Measurements were made at 25° of the partial vapor pressures of $H_2O$-alc solns contg from 0 to 100% alc and 0.5, 1.0, or 4.0 mol % While increasing concns of LiCl cause a decrease in the partial pressure of $H_2O$ in all solns, its effect on the alc. varies with the composition of the solvent In solns contg a large proportion of alc, its partial pressure falls steadily as the salt concn increases, and in solns contg 6.4 mols % of alc, it rises steadily, while in intermediate solns it first falls and then rises The fractional lowering of the vapor pressure of water is

always greater than that of alc An approx linear relationship is established between the relative activities of both water and alc., and the mol fraction of alc. in the solvent, at const LiCl concn It is possible to distinguish approx the effects of the soln. of ions by alc mols and the salting out of alc. by the interaction of the ions and water

A L Hevne

The fictive volumes of sodium sulfate in aqueous solutions of sulfuric acid and of iodine in an aqueous solution of potassium iodide. R E Gibson *J. Phys Chem.* 35, 690 9(1931) —The sp vols of 2 series of solns. of $Na_2SO_4$ were detd, in the first series approx 5% aq $H_2SO_4$ and in the second approx 10% $H_2SO_4$ being the solvent The fictive vols of $Na_2SO_4$ in these solns were calcd Peculiarities of the vol.-concn. curves indicate the formation of $NaHSO_4$ in soln Measurements of the sp vols of I in a 49% soln of KI showed that in solns contg 10 to 50% of I, the fictive vol of I is independent of the concn of I, and close to the most probable estimate of the sp vol of liquid I at 25°

L Onsager

The variation of the color of solutions of cobalt chloride. Er Toporescu *Compt rend* 192, 280–2(1931) —Solns of $CoCl_2$ 7 17 g /l change from blue to rose or rose violet at the temp indicated for each solvent MeOH, 3°, EtOH, —18°, PrOH, —32°, BuOH, —45°, AmOH, —65° For the same solvents the dielec. consts are 34 5, 32 5, 28 5, (37 5), 25 0 A relation probably exists between the decreasing dielec. consts and a variation in degree of polymerization which accounts for the color change

A Lloyd Taylor

The hydrolysis of zinc sulfate solutions, solubility product of hydrous zinc oxide and the composition of the latter precipitated from zinc sulfate solutions I M Kolthoff and Tohru Kameda *J Am Chem Soc* 53, 832–42(1931) —By using very pure materials it was found that the 2nd ionization const of $Zn(OH)_2$ at 25° is $4\,4\ (\pm 0\,4) \times 10^{-4}$ The soly of hydrous ZnO ppted from the sulfate is $1 \times 10^{-4}$ at 25° On pptn of the hydrous oxide from sulfate soln with NaOH the basic salt $3ZnO\ ZnSO_4$ is formed After heating to 80° for 10 days the ppt becomes more basic and the supernatant liquid more acid

Chansing Wilson

The transport numbers of hydrogen chloride in ethyl alcohol. J W Woolcock, Harold Hartley and O L Hughes *Phil Mag* 11, 222–5(1931), cf *C A* 22, 3084 —The e m f of the cell Ag, AgCl | HCl $m_1$ HCl $m_2$ | AgCl, Ag was measured at 25° The most probable value for the transport no of H ion at infinite dilu is 0 71 ± 0 01

Arthur Fleischer

The status of the investigation of superconductivity. W Meissner *Metallwirtschaft* 10, 289–94, 310–5(1931), cf *C A* 24, 5565 E H

Conductivity measurements in methyl ethyl ketone and acetone. P. Walden and E J Birr *Z physik Chem*, Abt A, 153, 1–51(1931), cf *C A* 21, 1396, 24, 542 —The cond of mono-, di-, tri- and tetra-alkylammonium picrates, iodides, bromides, chlorides, nitrates and perchlorates, of the picrates of Li, Na, K, Ag and Cd, of iodides of Na, K, Cd, and Hg, and of $HgCl_2$ were detd at 25° in Me Et ketone The alkyl groups include the Me, Et, *n* Pr, *n* Bu, isobutyl isoamyl and *n*-cetyl The ketone had a cond at 25° of $5\,0 \times 10^{-8}$, d from 0° to 50° expressed by the equation $d = 0\,82737\ (1 - 0\,0012635\,t)$ and viscosity of 0 005220 at 0°, 0 003929 at 25° and 0 003115 at 50° The cond of $NEt_4$ picrate was also detd at 0° and 50° The conductivities of tetra *n*-propyl, tetra *n* butyl and tetraisoamylammonium picrates and Li picrate were detd at 25° in acetone The limiting equiv condu tivities were calcd by the square root law ($\Lambda_\infty = \Lambda_v + a\sqrt{c}$) Me Et ketone and acetone are differentiating solvents, as shown by the calcns. of the dissoc. consts of the various salts In the various solvents the order of decreasing dissocn for the substituted $NH_4$ salts is the following tetra, tri, di- and mono- Kohlrausch's law of the independent migration of ions is substantiated Stokes' law or the Walden rule of the correspondence of the temp coeff of mobility and of fluidity is confirmed by the measurements on $NEt_4$ picrate Mobilities and solvation nos were calcd from the data Substituted alkylammonium salts with 4 $CH_3$ groups give the following order of ion mobilities $(CH_3)_4N > (C_2H_5)_2NH_2 > iso\text{-}C_5H_{11}NH_3$, which is the order observed in alc. and in water For the halogen and alkali ions, the mobility is inversely proportional to the size of the ion

Arthur Fleischer

Acidity in non-aqueous solvents Conductimetric and electrometric titrations of acids and bases in benzene. Victor K La Mer and Harold C Downes *J Am Chem Soc* 53, 888–96(1931) —Cond titrations of acids and bases in $C_6H_6$ exhibit the anomalous behavior of salts (*C A* 23, 5088) Electrometric titrations of $CCl_3COOH$ and $(C_2H_5)_2NH$ in $C_6H_6$, with quinhydrone electrodes, resemble the titrations of aq solns of strong acids and bases

Curtis L Wilson

New method for measuring the limiting potential of two phases B Lengyel.

*Magyar Chem Folyóirat* 36, 89–94, 105–11(1930).—The mutual charge of 2 outwardly isolated phases formed because of the change of potential in the double zone is used for quant measurement. The e m f of concn chains: normal electrode | soln | solid phase | soln | normal electrode, may be measured by this method. The method $c_1$ | dielectric | $c_2$ may be used directly for measuring the phase limit potential of quartz | aq soln, even solid cryst substances can be measured with slight modifications. The sensitivity of the method is ±1.5 mv. A metal electrode was used instead of dielectric in control expts., results of which agreed with the data of the former method. Preliminary report of phase limit potential of quartz | electrolyte soln. Quartz glasses are examd on their H electrode function by measuring the e m f of an acid alkali-chain and an alkali acid chain. The reproducible difference totaled about 300 mv. Preliminary concn-e m f curves show maxima at $p_H$ 12. S. S. DE FINÁLY

Electrometric determinations of the dissociation of glycocoll and simple peptides. PHILIP H. MITCHELL AND JESSE P. GREENSTEIN. *J. Gen. Physiol.* 14, 255–75(1930).—The apparent acid and basic dissocn. consts. were detd. potentiometrically by the methods of hydrolysis and titration for glycocoll, glycylglycocoll, alanylglycocoll, valylglycocoll, leucylglycocoll, methylleucylglycocoll, phenylalanylglycocoll and glycylglycylglycocoll. The dissocn. consts. were also detd. in the presence of KCl and $K_2SO_4$ at equal ionic strength. The relative order of magnitude of the dissocn. consts. decreases with the increase in no. of C atoms between the $NH_2$ and COOH groups. This is explained as follows on the basis of electronic structure with AcOH and glycocoll as examples. The highly electroneg. $NH_2$ group effects a deformation in the electronic nucleus causing a shift in position of the electron pairs toward the $NH_2$ group about the C and O atoms of the COOH group. In the O—H linkage of the COOH group, the electron pair is drawn closer to the O and farther from the H, decreasing the strength of the bond and increasing the degree of dissocn. of the acid. The proton set free combines at once with the 2 unshared electrons of the N, forming the dipolar mol. or amphoteric ion. Therefore the farther away the $NH_2$ group is from the COOH group, the smaller the deformation of the electronic nucleus and the slighter the dissocn. In general the dissocn. consts. were found to be functions of the H ion activity and of the ionic strength of the solns. Apparent contradictions to the Debye-Hückel theory are indicated and partially explained on the basis of specific ion effects. C. H. RICHARDSON

The electrode potential and the solvent: the solvation activity coefficient. FREDERICK K. V. KOCH. *Phil. Mag.* 11, 579–85(1931). cf. *C. A.* 24, 5574.—The solvation activity coeff. may be defined by the equation $A_s = RT \ln a_s$, where $A_s$ is the free energy involved in the transfer of an ion from pure solvent to a soln. of specified concn. It is related to the usual activity coeff. by the expression $a = a_c a_s$, where $a_c$ is the activity based on the transfer of the ion from vacuum to pure solvent. By considering the transfer of an ion from vacuum to soln. through an electrode the equation for the electrode potential becomes $E = E_s - E_E + (RT/nF) \ln a_c$, where $E_s$ is the solvation potential and $E_E$ is the element potential. The abs. normal potential is thus the difference between two potentials, one dependent on the solvent and the ion, the other on the element electrode and the ion. The Nernst soln. tension is the distribution coeff. between pure solvent and the element electrode. Solvation potentials were calcd. for H, Li, Na, K, Rb, Cs, Tl, Ca, Cl, Br and I ions from the estd. free energy of hydration. The solvation activity coeffs. were calcd. for ions in $C_2H_5OH$. The Born formula for the free energy of solvation holds only for the case where no sp. interaction of ions occurs. The Walden formula for solvation activities was not confirmed. ARTHUR FLEISCHER

Temperature coefficients of certain reference electrodes. PAUL PUTEYS. *Bull. soc. chim. Belg.* 39, 454–7(1930).—Exptl. detns. are reported. For a 0.1 *N* HCl electrode, $E_t - E_{18} = 0.334\,(t-25) + 0.00279\,(t-25)^2$. For a 0.01 *N* HCl, 0.09 *N* KCl electrode, $E_t - E_{18} = 0.391\,(t-25) + 0.00335\,(t-25)^2$. A. L. HENNE

Experimental researches of potential differences between mercury, amalgam and dielectric. B. BIESTERDY. *Magyar Chem. Folyóirat* 37, 23–32(1931).—Production of a zero electrode was tried by using different metal amalgams. Na, Zn, Cd, Sn, Pb and Ag were examd. without any result. S. S. DE FINÁLY

Glass-electrode measurements by means of a galvanometer with condenser attachment. MALCOLM DOLE. *J. Am. Chem. Soc.* 53, 620–2(1931).—With a ballistic galvanometer as a null-point instrument measurements of glass electrode potentials were made to 0.1 millivolt and were shown to agree with those of a H electrode. M. D.

Quinhydrone electrode for mass experiments. G. HATOS. *Magyar Chem. Folyóirat* 35, 168–70(1929).—A practical electrode for mass detns. of $p_H$ is illustrated and described. S. S. DE FINÁLY

Determination of hydrogen-ion concentration by Haber-Klemensiewicz' glass chain,

especially in soil examinations. G HATOS AND GY GOLL. *Magyar Chem. Folyóirat* 36, 33–40(1930).—On examn of 15 soils the method gave almost the same values for $p_H$ as the detn by the quinhydrone electrode. Agreement within about 0.1 $p_H$ resulted from the use of a dil. aq. suspension. Thicker suspension gave agreement within 0.2–0.3 $p_H$. The quinhydrone electrode seemed to be reliable for $p_H$ detns. S. S. DE FINÁLY

*The measurement of the hydrogen-ion concentration in unbuffered solutions.* II. Application of the hydrogen electrode. I. M. KOLTHOFF AND TOSHIRO KAMEDA. *J. Am. Chem. Soc.* 53, 821–4(1931).—It was found that an electrode made by coating a Pt wire with a thin bright layer of Pt yields satisfactory results in the measurement of $p_H$ in unbuffered or slightly buffered solns. The $p_H$ values of $(NH_4)_2SO_4$, $ZnSO_4$ and KCl solns. were measured. III. The colorimetric method. *Ibid.* 825–32.—The measurement of the $p_H$ of pure water, of neutral salts in pure water, and of very dil. NaOH solns. by the colorimetric method is described. The accuracy of the *sulfonphthalein* indicator method is 0.05 $p_H$ in pure water and 0.1 $p_H$ in the NaOH solns. CHANNING WILSON

Determination of hydrogen-ion concentration with a photoelectric colorimeter. RALPH H. MÜLLER AND HERMAN M. PARTRIDGE. *Ind. Eng. Chem., Anal. Ed.* 3, 169–71(1931).—The operation of the colorimeter depends upon the variation in photoelec. current with the transmittancy of the indicator soln. with changing $p_H$ value. The feeble photoelec. current is supplied to a 3-electrode vacuum tube of suitable mutual conductance and $p_H$ values are read in terms of the plate current of the triode. A filter is used between the light source and the soln., being such that it transmits light of a wave length corresponding to one absorption max. of the soln. The plate currents obtained with solns. contg. the same amt. of indicator but buffered to various $p_H$ values are plotted against $p_H$, giving the calibration curve for the indicator. If all factors are const. the plate current of the unknown soln. (contg. the same amt. of indicator) gives the $p_H$. An alternative method is to adjust the intensity of the lamp, vacuum tube filament, etc., to the same value for each expt. and to multiply the observed plate current by the factor representing the ratio between $p_H$ and the current for the indicator. Const. results were obtained over long periods of operation. Diagrams of the app. and calibration curves for various indicators are given, and the characteristics required in suitable vacuum tubes discussed in detail. EDWARD B. SANIGAR

The chemical reactivity of the fused bases. I. The action of the alkali amides upon electropositive metals. W. CONARD FERNELIUS AND P. W. BERGSTROM. *J. Phys. Chem.* 35, 740–55(1931), cf. *C. A.* 22, 1519.—An app. is described for the study of reactions of pure fused alkali amides which avoids contamination of the melt and permits viewing the reaction, controlling the temp., altering the fusion atms., quant. collection of gases and extn. of the melt with liquid $NH_3$. Mg reacts with $NaNH_2$ or $KNH_2$ in an $NH_3$ atm. to liberate the alkali metal. $Mg + 2KNH_2 \rightleftharpoons Mg(NH_2)_2 + 2K$, the equil. point being far to the right. Subsequent reactions are $Mg(NH_2)_2 + 2KNH_2 \longrightarrow Mg(NHK)_2 2NH_3$; $2NH_3 + 2K \longrightarrow 2KNH_2 + H_2$. Ca and Al also liberate K. Ca forms $CaNK_2 2NH_3$ and Zn forms $Zn(NHK)_2 2NH_3$, while Al forms $AlN \cdot NH_3$ + adsorbed $KNH_2$. Be forms $BeNNa_2 2NH_3$ with $NaNH_2$. Ce, Th and Mn are slightly attacked by fused $KNH_2$ while Hg, Cu, Cd, Tl, Ti, Zr, Ta, Cr, Ni, Pt and Ir are not noticeably attacked. Na gives with fused NaOH a blue color, Mg gives a similar color suggesting the reactions $Mg + 2NaOH \rightleftharpoons Mg(OH)_2 + 2Na$, $Mg(OH)_2 + 2NaOH \longrightarrow Mg(OH)_2 + 2H_2O$, $2Na + 2H_2O \longrightarrow 2NaOH + H_2$ (cf. *C. A.* 4, 871, 7, 2167). Ca and Na appear to give some hydride upon reaction with NaOH. W. C. FERNELIUS

Iron oxides and their reducibility with hydrogen and carbon. P. YA. RODE. *J. Russ. Phys.-Chem. Soc.* 62, 1453–66(1930).—The heating curve of $Fe_2O_3$ has a conversion point at 745°, quite likely corresponding to a definite modification of $Fe_2O_3$. Beginning with 1280° some irregularities are observed that probably have a connection with the beginning of loss of $O_2$. The temp. curve of reduction of $Fe_2O_3$ with $H_2$ has 2 kinks probably corresponding to 2 steps in reduction, first to $Fe_3O_4$ and then to a lower oxide. There is no definite proof of formation of FeO as an intermediate product. $Fe_3O_4$ is more easily reduced with $H_2$ than $Fe_2O_3$. In reducing hydrated iron oxides with $H_2$ the point where reduction begins could not be ascertained, because it lies in the region of decompn. of corresponding hydrates. If the products of reduction are cooled in $H_2$ they become pyrophoric when the heating temp. does not exceed 600–650°. A higher heating temp. makes them non pyrophoric. Reduction of $Fe_2O_3$ and hematite ore with C gives on the temp. curve 3 halts, probably corresponding to 3 consecutive stages of reduction to the metal. Here again $Fe_2O_3$ is more easily reduced than $Fe_3O_4$. S. L. MADORSKY

The reaction mechanism of carbon combustion at low pressures. V. SHIVONEN

*Z Elektrochem* 36, 806–7(1930) —The combustion of metallized C filaments was carried out in pure O as well as in additional gases The reaction velocity curves for the formation of the combustion products in pure O are expressed in micromol. per mm O pressure cm$^{-1}$ surface and second The results may be summarized as follows: Kinetic measurements on the C combustion at low O pressures, in general indicate a reaction of the first order The combustion in streaming O between 800° and 1400° forms a gas mixt of const compn ($CO_2$ + 2CO) Between 1400° and 1500° the C surface suffers a change whereby, according to the observation of Langmuir, CO is vaporized Here the velocity curves of both combustion products of C indicate a break Between 800° and 1200° CO formation is promoted through autocatalysis The presence of $CO_2$ retards the combustion of CO and C The velocity equation of $CO_2$ in the presence of CO for the temp between 1500° and 1800° gives an energy value of approx —17 kg-cal At 1600° a minute addn of water vapor accelerates the formation of both combustion products catalytically It appears that the adsorption heat of O on the C of approx. 90 kg cal observed by Marshall and Bramston-Cook corresponds to the formation of an atomic adsorption layer of O already proposed by Langmuir. W VANSELOW

Problems and results of the newer investigations of free radicals. KARL ZIEGLER *Z angew Chem* 43, 915–9(1930) —This is a concise discussion of the causes that det. whether or not a particular substance will be strongly or weakly dissocd The principal points considered are the energy of activation of $C_2H_6$ and the radical and steric factors. A L HENNE

Kordes' law K M STAKHORSKII *J Russ Phys-Chem Soc* 62, 1493–7(1930) —Aside from normal cases where both component compds of a system are unassocd Kordes' law can be used to det approx, from a study of the m-p diagram the mol condition of pairs of which one or both compds are assocd In such cases the assocn const $X_a$ is detd by placing $X_aM_a$ for $M_a$ in Kordes' equation, when $A$ is the assocd compd The equation then becomes $X_a = [M_b\,a(T_a - T_e)\,T_b/M_a\,b(T_b - T_e)\,T_a]$, where $a$ and $b$ are concns of the 2 components $A$ and $B$, $M_a$ and $M_b$ are their mol wts, and $T_a$, $T_b$ and $T_e$ are the m ps of $A$ $B$ and the eutectic mixt The fact that $H_2O$, alcs. and org acids are typical assocd compds is thus once more confirmed by the application of Kordes law S L MADORSKY

Relation between energy of activation and constant $S$ of Arrhenius' equation. E N GAPON *Ukrainskii Khem Zhur* 5, Sci Pt., 169–80(1930) —By the example of 4 reaction groups, it is shown that in a given group the reactions are characterized by the so-called inversion temp $T_i$, at which the reactions proceed at the same rate From this fact results the relationship between the energy of activation $E$ and the const $S$ of Arrhenius' equation $\log S = \log K_i + (E/RT_i)$, where $K_i$ is the rate of reaction const at $T_i$ Thus $K_i$ and $T_i$ are connected by the equation $\log K_i = \log \psi + (\varphi/RT_i)$, where $\psi$ and $\varphi$ are consts., characteristic of all reactions An equation is given describing the kinetics of 2S monomol reactions S L MADORSKY

The problem of dependence of yield on temperature. E N GAPON *Ukrainskii Khem Zhur* 5, Sci Pt, 165–7(in German 168)(1930) —Starting from equations of uni- and bimol reactions and the equation of Arrhenius, 2 equations are obtained showing the relation between temp and reaction yield $\log[\log A/(A - x)] = a_1 - (b_1/T)$ for monomol reactions, and $\log[X/(A - x)] = a_2 - (b_2/T)$ for bimol reactions, where $x$ = reaction yield at a given time, $A$ = initial concn, $T$ = abs temp and $a_1$, $b_1$, $a_2$, $b_2$ are consts These equations make it possible to det the order of reaction and activation energy from yield data at various temps S L MADORSKY

Equilibrium constants for the decomposition of ammonium bicarbonate. WM K. HUTCHISON *J Chem Soc* 1931, 410–2 —The equil consts for the decompn of $NH_4HCO_3$ are calcd from detns. of the partial pressures of $NH_3$, $CO_2$ and $H_2O$ in equil with satd $NH_4HCO_3$ solns. The mean values of $K$ and $K_1$ (detd by assuming the partial pressure of $H_2O$ vapor to be const. at const. temp) at 10° and 20° are:

| | $K = p_{CO_2} \times p_{NH_3} \times p_{H_2O}$ | $K_1 = p_{CO_2} \times p_{NH_3}$ |
|---|---|---|
| At 10° | 253 | 29.5 |
| At 20° | 3000 | 180 |

The general equation for $K$ is $\log_{10} K = 33.88 - 40{,}600/2.303RT$. J. BALOZIAN

*Equilibrium in the iron-oxygen-hydrogen system at temperatures above 1000°.* WALTER E JOMINY AND DONALD W MURPHY. *Ind Eng Chem* 23, 384–7(1931) —A method was developed to det. the equil point by regulating the ratio of $H_2$ to water vapor in gas passing over the Fe sample at a given temp The equil was detd from 1097° to 1427° From these data the m p of FeO is given as 1357° and the heat of fusion as +29,000 ± 5000 cal per g mol B E TIFFANY

Dissociation of sulfuryl chloride. KIMIO ARII. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 10, 256–65(1931). (Abstracts 32–3 [in English] published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 15, Nos. 289–91).—$K_p$ was measured for satd. and unsatd. vapors of carefully purified $SO_2Cl_2$ at 30°, 40°, 50°. The mean values agree with the calcd. ones. ALFRED BURGER

Dissociation of silver carbonate. MOTOKI WATANABE. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 10, 244–50(1931). (Abstracts 29–30 [in English] published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 15, Nos. 289–91).—The pressure of dissocn. of $Ag_2CO_3$ was measured by a static method between 120° and 201°. The values obtained agree with the calcd. ones. The following thermodynamic quantities were calcd.: $\Delta H_{298}$ for the formation of $Ag_2CO_3$ −119 362 cal., $\Delta F°_{298}$ −103 614 cal., $S_{Ag_2CO_3}$ at 25° 42.5 cal./degree. ALFRED BURGER

Investigation of equilibrium between vapor and solution in the system: acetic acid–acetic anhydride. S. I. CHERNOV. *J. Russ. Phys.-Chem. Soc.* 62, 1509–21 (1930). cf. *C. A.* 24, 4451.—The degree of assocn. of HOAc in soln. depends on the nature of the other component and on temp. A study was made of the vapor pressure of HOAc in the system HOAc – $Ac_2O$ at 60° and 80°, by M. Vrevskii's exptl. method. From these data the degree of assocn. of HOAc in the soln. was calcd. by means of Vrevskii's and Gibbs' equations. S. L. MADORSKY

The study of the complex silver hyposulfites of sodium. E. CARRIÈRE AND RAULET. *Compt. rend.* 192, 423–5(1931).—The reaction of AgCl with $Na_2S_2O_3$ solns. was studied by applying the mass law. The $Na_2S_2O_3$ is added from a buret to a known quantity of AgCl until completely dissolved. The ionic reaction is $AgCl + S_2O_3^{--} = AgS_2O_3^- + Cl^-$. Since the concns. of these ions are known, $K$ can be calcd. An excess of NaCl has little effect on $K$, but $AgNO_3$ in excess forms other complex compds. and could not be studied in this way. From the increase in $K$ with temp., the *heat of formation* of the complex ion was detd. as 7.7 large cals. The cond. of the mixt. after the soln. of the AgCl is the same as that of the original soln. since the number of ionic charges does not change. AMY LEVESCONTE

The equilibrium between chlorine, bromine and bromine chloride (BrCl). W. Jost. *Z. physik. Chem.*, Abt. A 153, 143–52(1931).—In the extinction curve for BrCl absorption is 0 at 575 mμ so that measurements beyond this range are not affected by BrCl absorption. Measurements were made of the correction necessary because of absorption of Br by foreign gases. The expts. at 18°, 88° and 230° yield the equation $\log K = (1320/4.57T) - 0.18$. The heat of formation of BrCl calcd. is 0.75 ± 0.5 kg.-cal. ARTHUR FLEISCHER

Thermal dissociation of nitrogen peroxide. O. KLAUSVIC. *Chem. Listy* 24, 473–4 (1930).—A glass tube 12–15 cm. long and 1 cm. in diam. is closed at one end and partly filled with powd. $Pb(NO_3)_2$ dried at 100°. The tube is sealed at the other end, and heated carefully and in intervals until the reaction $2Pb(NO_3)_2 \rightleftharpoons 2PbO + 4NO_2 + O_2$ is completed. The tube is filled with brown $NO_2$ and carefully cooled. By plunging the tube into cold $H_2O$, the contents become almost colorless as a result of the formation of $N_2O_4$. Warming the tube yields $NO_2$ again. The equation for the dissocn. is

$$\underset{\text{colorless}}{N_2O_4} \underset{-5°}{\overset{+150°}{\rightleftharpoons}} \underset{\text{brown}}{2NO_2}$$

FRANK MARESH

The interpretation of the thermal decomposition of nitrous oxide. H. C. RAMSPERGER AND G. WADDINGTON. *Proc. Natl. Acad. Sci.* 17, 103–5(1931).—The thermal decompn. of $N_2O$ has recently been found unimol. (cf. *C. A.* 24, 4980, 25, 868). According to the theories of Kassel and Rice and Ramsperger, only 1 classical oscillator is required to fit the data at 665°. The mol. diam. is $3.05 \times 10^{-8}$ cm., the crit. energy, 53,000 cal. per mole and $k_\infty = 1.78 \times 10^{-4}$. The const. $A$ in the equation for the rate const. is $4.0 \times 10^{9}$. A table is given for the 11 known unimol. reactions giving the pressure and temp. ranges that have been studied, the consts. $A$ and $Q$ in the rate const. equation and the no. of classical squared terms required by the theory. G. M. M.

The thermal decomposition of nitroxyl chloride. A homogeneous gas reaction of the first order. HANS-JOACHIM SCHUMACHER AND GERHARD SPRENGER. *Z. physik. Chem.*, Abt. B, 12, 115–31(1931).—A description and sketch of the app. for measuring thermal decompn. of $NO_2Cl$ is given together with the procedure for collecting the accompanying data. It is shown that the reaction is monomol. and is still independent of pressure at 10 atms. Its heat of activation is calcd. to be 20.5 kg.-cal. All contaminating gases increase the rate of decompn. about equally while $NO_2$ does so about 20% faster. Stoichiometric amts. of $NO_2$ and $Cl_2$ act like unchanged $NO_2Cl$. The exptl. data are discussed. R. H. LAMBERT

*The thermal decomposition of chlorine monoxide.* J J Beaver and G Stieger. *Z physik Chem*, Abt B, 12, 93–108(1931).—The thermal decompn of $Cl_2O$ follows a complicated chain reaction similar to that of $ClO_2$ rather than the simple bimol reaction believed to occur. Between 100° and 130° the rate is proportional to monoxide concn and at 140° to the exponent 0.75 of concn. A consistent explosion was observed at the end of the reaction. A mechanism of the reaction agreeing with the exptl results concludes the article. R H Lambert

The influence of foreign gases in gas decomposition reactions. N Nagasako *Z physik Chem*, Abt B, 11, 420–4(1931).—The theory of monomol reactions is extended to include the presence of foreign gases. New observations on the decompn of $N_2O$ in the presence of He are reported. J B Austin

*Kinetics of the combination of hydrogen and oxygen: Influence of iodine.* W L Garstang and C N Hinshelwood. *Proc Roy Soc* (London) A130, 640–54(1931).—The upper limit of the low pressure explosion region in the $H_2 + O_2$ reaction is lowered slightly by pretreatment with $H_2$, it is lowered also by water vapor in amts up to 22.7% of total pressure and above this percentage explosion is entirely inhibited. The surface reaction in $SiO_2$ vessels is accelerated by I. The gas reaction at high temps and pressures is retarded by I, and the explosion in the crit. low pressure region does not take place with I in concn greater than a minute amt. Amts. of I less than required to stop explosion entirely lower the explosion pressure. S Lenher

The kinetics of the reduction of cuprous oxide. I. The reduction at low pressures—with an appendix giving the results of further experiments on the oxidation of copper at low pressures. Frederick J Wilkins. *J Chem Soc* 1931, 330–5.—The reduction of $Cu_2O$ by $H_2$ is studied at pressures lower than 0.2 mm under such conditions that the Cu-$Cu_2O$ interface is effectively const. and the $H_2O$ formed is instantly removed from the reaction vessel. The rate of reduction is proportional to the pressure of $H_2$. The heat of activation in the reduction process is 18,000 cals. as judged by measurements between 144° and 250°, it is to be identified as the heat of evapn of the adsorbed $H_2$ into $Cu_2O$. Earlier expts. on the rate of oxidation of Cu are extended to low pressures, the oxidation rate is proportional to the pressure of $O_2$ and involves an energy of activation of 9600 cals. P H Emmett.

Chemical kinetics of ion reactions. I. Principles of the theory of Brønsted. Á Kiss. *Magyar Chem Folyóirat* 35, 139–44(1929).—Short summary of Brønsted's theory and its applications. II. Mechanism of reaction between ferric and iodide ions. *Ibid* 36, 49–59(1930).—The reaction proved to be bimol. for I ions and monomol. for $Fe^{+++}$ ions. Hydrolyzed ferric ions do not react with I ions. The primary kinetic salt effect agrees with Brønsted's neutral salt law in dild. solns. Alkali metals show a striking specific ion effect. Slowing influence of ferrous and sulfate ions must be considered as a secondary kinetic salt effect. III. Neutral salt effect and catalysis in case of ion reactions. *Ibid* 37, 17–23(1931).—Connections between the theory of Brønsted and catalysis, kinetic salt effect and medium effect are discussed. S S de Finály

Kinetics of chlorine bleaching. Joseph J Weiss. *Z angew Chem* 44, 102–4 (1931); cf. *C. A.* 25, 2044.—Polemical with H Kauffmann (*C A* 19, 561; 24, 5589). H Kauffmann. *Ibid* 104–5(1931), cf. *C A* 24, 5589, 25, 597.—A reply. L M Symmes

Reaction velocity in the system $Ag_2CO_3 \rightleftharpoons Ag_2O + CO_2$. Wilfred D Spencer and Bryan Topley. *Trans Faraday Soc* 27, 94–102(1931); cf. *C A.* 24, 2366.—Previous work was extended to include the recombination of $Ag_2O$ and $CO_2$, and the decompn of the $Ag_2CO_3$ at various pressures. When the pressure of the $CO_2$ is several times as great as the equil. pressure, recombination takes place rapidly at first and then the rate decreases suddenly. This initial rapid reaction becomes slower as the pressure is decreased. The decompn of the synthetic $Ag_2CO_3$ in a vacuum is more sensitive to temp. than that of the cryst. $H_2O$ vapor promotes recombination by facilitating the penetration of $CO_2$ through the $Ag_2CO_3$ first formed. Curtis L Wilson

Salt and medium effects on the temperature coefficient of the velocity of decomposition of diacetone alcohol. Geo M Murphy. *J Am Chem Soc* 53, 977–81(1931).—The velocity of decompn. of diacetone alc. was measured by a dilatometric method similar to that of Åkerlof (*C A* 21, 688). Different concns of aq. NaOH solns were used, also aq. NaOH-NaCl solns and aq. MeOH mixts. contg. NaOH. The temp. coeff. of reaction velocity is independent of the concn. of NaOH and NaCl in the NaOH-NaCl solns. In the MeOH-NaOH solns the temp. coeff. increases with increasing MeOH content. The energy of activation was computed as 18,000 cal. E. J. R.

Chemical kinetics in mixtures of solvents. VIII. G E Mukhin and R B Ginzburg. *Ukrainskii Khem Zhur* 5, No 2, Sci Pt 147–58(1930), cf. *C A.* 24, 2942.—

The velocities of reactions were studied between $C_5H_5N$ (I) and allyl bromide (II) and between $PhNMe_2$ and II in mixts of $Me_2CO$ and $CHCl_3$ at various temps The observed consts of reaction velocities of the mixts are smaller than the values calcd. according to the additive rules An increase in temp enlarges the percentage deviation of the observed consts from the additivity Under the same conditions this deviation is greater between $PhNMe_2$ and II than between I and II. IX. G L. Mukhin and R. I. Baranova *Ibid* 159–62.—The velocity of reaction between I and II was studied in equimol concns of 0.5 g mol per l in AcOEt, $MeCH_2CO_2Et$, $MeCH_2CH_2CO_2Et$ at 35° and 45°, in BzOMe, BzOEt and BzOPr, and $C_6H_4(OH)CO_2Me$ and $(CO_2Et)_2$ The most suitable solvents for this reaction are the esters of BzOH The greater the mol wt of the esters of fatty acids and BzOH, the smaller is the velocity const of the reaction The introduction of OH(BzOH to $C_6H_4(OH)CO_2H$) increases the velocity const.

Chas Blanc

The rate of solution of metals in acids. Contribution to the theory of local voltaic elements W Guertler and B Blumenthal. *Z physik Chem*, Abt A, 152, 197–234(1930).—The general course of the soln curves of Fe, Ni and Cu in 0.1 *N* HCl and the detailed rate of soln curves of 2 different samples of Zn were detd Exptl conditions were found under which reproducible values could be obtained. The rate of soln of Zn in 0.2 *N* HCl compared to 0.1 *N* HCl is not even approx proportional to the conductivities of the 2 acids contrary to the results of Frieson Auren and Palmaer (*Z physik Chem* 39, 1(1902) 45, 182(1903), 56, 689(1906)) In general, the rate of soln of metals in acids is proportional to the product of the cond of the acid soln and the difference between the anode and cathode potentials of the local voltaic element, Zn is the anode in the present case, whereas various impurities present in the metal constitute the cathode of the so-called local element The observed acceleration of the rate of soln with time in a particular acid is interpreted as being due to a decrease in the $H_2$ overvoltage of the cathode. When this observed variation of $H_2$ overvoltage is taken into account, the theory of local elements satisfactorily explains the rate of soln of Zn in HCl.

P H Emmett

The inhibition of chemical reactions. IV. The site of antioxygenic action. The oxidation of sodium sulfite and benzaldehyde. Kenneth C Bailey and Violet H French *J Chem Soc* 1931, 420–8, cf. *C A* 24, 2947.—The inhibition of the oxidation of aq $Na_2SO_3$ solns by isopropyl and *sec* butyl alcs. in aq soln is studied, the method of McBain and co-workers (*C A* 21, 3510, 24, 1560) being used For concns of the alc. in the aq soln greater than 2 g /l, Γ (increased concn of the alc. in the surface layer in g /sq cm) has a mean value of about $8.6 \times 10^{-8}$ g /sq cm for isopropyl and $10.3 \times 10^{-8}$ g /sq cm for *sec* butyl alc and varies only slightly with change in concn The results indicate an abrupt change in Γ between 2 and 1 g /l, the unimol layer being formed at a concn. of about 1.5 g /l It is shown that the inhibitor is preferentially adsorbed at the interface in aq solns of those alcs that inhibit the oxidation of the $Na_2SO_3$ solns. The graph of the oxidation velocity of aq $Na_2SO_3$ soln against the inhibitor (alc.) concn. does not show a discontinuity at this concn of alc. That the autoxidation of BzH is not identical with that of aq $Na_2SO_3$ solns is suggested by the velocity inhibitor curves

J Balozian

The molecular constitution of the α solid solutions of tin in copper and of the corresponding liquid solutions examined thermodynamically. Γ H Jeffery *Trans Faraday Soc* 27, 136–7(1931), cf *C A* 24, 2660, 25, 632.—From the equation used in previous work, it is concluded that the α solid soln, like the liquid soln, consists of $Cu_3Sn$ dissolved in monat Cu

Curtis L Wilson

The molecular constitution of the β solid solutions of tin in copper examined thermodynamically Γ H Jeffery *Trans Faraday Soc* 27, 137–9(1931), cf preceding abstract.—Evidence based upon the previous thermodynamic equations indicates that the β solid solns are monat Sn dissolved in monat Cu

Curtis L Wilson

A quantitative relation between the slope $dP/dT$ of the curves representing equilibrium at an invariant point. (Mlle) A E Korvezee (Mlle) N H J M Voogd and F Γ C Schepper *Rec trav chim* 50, 252–5(1931).—Equations are derived for calcg $dP/dT$ or the compn of the unknown phase at an invariant point (cf following abstr)

G M Murphy

The composition of the hydrate of hydrogen sulfide (Mlle) A E Korvezee and F Γ C Schepper *Rec trav chim* 50, 256–60(1931), cf *C A* 13, 3049 and preceding abstr.—Detn of the slope of 3 *P-T* curves and the compn of the phases at the quadruple point for the system $H_2S$–$H_2O$ gives $H_2S\ 6H_2O$ as the compn of the hydrate.

G M Murphy

Thermodynamic relations in multi-component systems. Roy W Goranson

*Carnegie Inst Washington Pub* 408, 310 pp (1930).—A complete outline of the subject with accompanying tables. JOSEPH S HEPBURN

The equilibrium diagram of the chromium-carbon system. KAZUE HATSUTA *Kinzoku No Kenkyu* (J. for Study of Metals) 8, 81–8(1931).—The Cr C system was studied by means of thermal, microscopic and x ray analyses and the equil diagram is presented. There are 4 carbide phases, $\epsilon$, $\eta$, $\zeta$ and $\kappa$ corresponding to compds $Cr_4C$, $Cr_7C_3$, $Cr_3C_2$ and CrC (?), resp. The crystal form of $Cr_4C$ is cubic, that of $Cr_7C_3$ trigonal and $Cr_3C_2$ orthorhombic, but that of CrC was not detd. $\alpha$- and $\epsilon$-phases form a eutectic at 1485°, 3.7% C. The $\epsilon$- and $\eta$ phases are peritectically formed according to the following scheme, resp. $\eta$ + melt $\longrightarrow$ $\epsilon$, $\zeta$ + melt $\longrightarrow$ $\eta$. The peritectic temp of the former is 1530°, and that of the latter is above 1600°. The $\zeta$-phase probably has the max m p on the liquidus curve and forms a eutectic with $\kappa$-phase, a transformation takes place at 1505° in this phase. M KURODA

Fractional crystallization in the Blanc process with hydrochloric and nitric acids. GIOVANNI MALQUORI *Atti III congresso naz chim pura applicata* 1930, 420–31; cf *C A* 23, 2876.—Discussion of various ternary systems of the 5-component systems $AlCl_3$-$FeCl_3$ KCl HCl $H_2O$ and $Al(NO_3)_3$–$Fe(NO_3)_3$ $KNO_3$ $HNO_3$ $H_2O$ which are of interest in connection with the extn of K and Al salts from leucite by the Blanc process. Consideration of the phase diagrams shows how large yields and extreme purity of the products may be obtained. G M MURPHY

Melting point diagram in the system zirconium dioxide beryllium oxide. O RUFF, F. EBERT AND H v WARTENBERG *Z anorg allgem Chem* 196, 335–6(1931); cf *C A* 24, 3336.—Earlier expts are repeated and the conclusion is reached that no compd is formed in the system $ZrO_2$ BeO, but that there is a eutectic line at about 2200°. In the system $ZrO_2$ CaO, the compd $ZrCaO_3$ is demonstrated, with m p 2350°. H S

Autocatalysis in oxidation. III. The mechanism of the action of positive catalysts in the autoxidation of abietic acid. G DUPONT, J LEVY AND J ALLARD *Bull soc chim* 47, 942–52(1930); *Bull inst chim* 1931, 20–30; cf *C A* 24, 855, 2915, 25, 1148.—The autoxidation of abietic acid is a normal autocatalysis, normally, it is greatly accelerated by Co abietate, acting as a pos catalyst. However, an extremely small quantity of catalyst (*about 0.001 of Co salt*) *has a marked antioxygen effect. O is* absorbed rapidly, at an increasing rate, until one atom has been absorbed by the abietic acid, the oxidation continues then much more slowly, until a second atom of O has been taken up. From there on, the absorption of O becomes an extremely slow process. The results are explained by the Moureu-Dufraisse theory. It is claimed that the effective catalyst is probably a complex oxidized acid Co abietate, the supporting evidence is furnished by a comparison of the absorption spectra of slightly acid Co abietate, *Co abietate in abietic acid and oxidized abietic acid contg Co abietate*. A L HENNE

Cysteine and glutathione as anticatalysts in oxidations with molecular oxygen. A SCHÖNBERG. *Ber* 64B, 540–61(1931).—The rate of oxidation of leuco methylene blue by mol $O_2$ in the presence of $Cu(OAc)_2$ was found to be due to 2 reactions a primary involving the transfer of $O_2$ by the $Cu(OAc)_2$, and a secondary in which the leuco dye is oxidized by the $H_2O_2$ in the soln. The amt of $O_2$ taken up by the leuco dye depends *upon the ratio of the velocities of these 2 reactions*. The addn of cysteine (I), cysteine hydrochloride (II) or glutathione (III) retards the oxidation. Curves are given showing the effects of the addn of various concns of I, II or III on the velocity of the reaction. In the presence of I, II or III the reaction velocity increases with time, while in their absence it decreases. This increase is thought to be due to the oxidation of *I, II or III by $H_2O_2$ to the disulfides*, which are considered inactive, for cystine has only a very weak anticatalytic action. Increasing the concn of I, II or III retards the oxidation, which is probably due to the formation of complex Cu compds. In high concns of I, II or III the Cu complex is only slightly dissocd., while in low concns there is greater dissocn and hence a higher concn of the catalytically active Cu ions. HCN, which also forms Cu complexes, retards the oxidation of leuco methylene blue with mol $O_2$ in the presence of $Cu(OAc)_2$, *but has no effect on the autoxidation of the leuco dye. Since the addn of* cystine causes little retardation, its Cu complex may be more highly dissocd. It is also possible that the SH group may have a sp effect. RUTH BERGGREN

A simple method of measuring the specific heat of a solid body at ordinary temperature. Application to beryllium. P. VERNOTTE AND A JEUPROY. *Compt rend* 192, 612–4(1931).—A method is very briefly described for detg sp heat of solids without the temp uncertainties encountered in the usual procedure. The solid is allowed to come to a const *temp* in a thick, tightly closed metal box and is then dropped into cold water in the calorimeter and the reading is recorded. This method can be used for higher

temps in which case an oven is used to regulate the temp Be was found to have a sp ht of 0.397 at 13°
J. R. ADAMS

Vapor pressure and heat of dilution. VIII. Heat of dilution of cane sugar in aqueous solution and of urea and calcium chloride in alcoholic solution. R. B. VALLEE AND E. P. PERMAN *Trans. Faraday Soc.* 27, 124–35(1931); cf. *C. A.* 25, 2350.—The heats of dilu. of cane sugar were measured at 0°, 20°, 40°, 60° and 80°, over a range of concn. from near satn. down to about 25%. Small values, never greater than 3 cal. per g. of $H_2O$, were obtained for all heats. They were all neg. Urea in alc. gave very small heats of dilu., all pos. $CaCl_2$ in alc. had neg. heats of dilu. The heats of dilu. calcd. from the vapor pressures agreed with the exptl. values for urea and $CaCl_2$, but not for cane sugar. The osmotic pressures were calcd. from the heats of dilu. of cane sugar, and agreed with the exptl. values.
CURTIS L. WILSON

The heat of formation of gaseous mercury, cadmium and zinc halides. H. SPONER *Z. physik. Chem.*, Abt. B, 11, 425–32(1931).—It is assumed that the bands of the diatomic Hg, Cd and Zn halides reported by Wieland (cf. *C. A.* 23, 4888) represent transitions from the basic level to an excited state. The vibration quanta were extrapolated on this basis and give the following heats of dissocn. (in kg.-cals.): HgCl 32, HgBr 25, CdBr 60, CdI 32 and ZnI 46. By combining these results with existing thermochem. data the following are obtained: $HgCl + Cl = HgCl_2 + 72$ kg.-cals.; $HgBr + Br = HgBr_2 + 62$ kg.-cals., $CdI + I = CdI_2 + 48$ kg.-cals.
J. B. AUSTIN

The heat of formation of the nitrides. I. Manganese nitride and chromium nitride. B. NEUMANN, C. KRÖGER AND H. HAEBLER. *Z. anorg. allgem. Chem.* 196, 65–78(1931).—A new method is described for detg. the heat of formation of nitrides directly by heating the metal in a small elec. furnace, contained in a bomb calorimeter, in $N_2$ under pressure. One min., 45 sec. sufficed to heat the metal to 900° and nitride it. The Mn nitride formed at 500° to 1000°, under 10 to 25 atm. $N_2$, is closely $Mn_4N_3$; and the heat of formation is, $5Mn + N_2 = Mn_4N_2 + 57,180$ (±400) cal. By use of the less accurate method of burning nitrided Mn in $O_2$ in a bomb calorimeter the value, 62 400 cal., was detd. When Cr was nitrided at 600°, 25 atm. $N_2$, for 1 min., 15 sec., only 0.65% N was absorbed, but at 900°, in 1 min., 45 sec., 15 to 24 g. N per 100 g. Cr reacted. The product was largely CrN. The heat of reaction of 1 at. of N with Cr was found to be 29 500 ± 500 cal. The exptly. detd. heats of formation agree poorly with values calcd. from dissocn. pressure data, indicating that the dissocn. pressures in these systems, metal $N_2$, are not sufficiently accurate to permit the estn. of the influence of mixed-crystal formation on the quant. calcn. of the equil. by use of thermodynamic equations. The *electrolytic prepn. of pyrophoric, metallic Mn and Cr*, with a Hg cathode, is described.
R. H. LOMBARD

The reversible oxidizability of organic substances: thermochemistry of the oxidation of rubrene. CHARLES DUFRAISSE AND LEON ENDERLIN. *Compt. rend.* 191, 1321–3 (1930).—The reversible oxidation of rubrene ($C_{42}H_{28}$) appears similar to that of hemoglobin. The photochem. oxidation of rubrene is exothermic, indicating that light acts as a catalyst and that other catalytic agents must exist. The heats of formation of rubrene and its oxides in Cals. are: Rubrene (R) —131, (oxyrubrene (dissociable), ($RO_2$)) —108.4, isooxyrubrene ($RO_2$) —50.4, metrubrene (RO) —92.4. The liberation of 23 Cals. in forming the dissociable oxide is much less than the heat (about 50 Cals.) evolved by introducing O into ethylene and the heat of formation of the other rubrene oxides.
H. W. WALKER

van't Hoff's stability rule. B. BRCZS. *Rec. trav. chim.* 50, 230–7(1931).—Available exptl. data support the rule that from 2 modifications of a system, the one with higher sp. heat becomes stable at higher temp. Ordinarily low temps. suffice for application of this rule but in case of intersecting (gas-solid) sp.-heat curves lower temps. must be considered. The rule also fails for cases like ortho-$H_2$, where the modification appears only due to the lowering of the thermodynamic potential of the other form.
G. M. MURPHY

The transformation of heat into work and "chemical" energy into heat as viewed in the light of the modern "volume energetics." RICHARD V. DALLWITZ-WAGNER *Wärme* 52, 549–50, *Chem. Zentr.* 1929, II, 1385.—If the abs. temp. is replaced by $(1/\delta)$, $\delta$ representing the cubic coeff. of expansion at the resp. temp., then the thermodynamics become vol. energetics and the efficiency of processes in which no temp. drop is involved can be calcd. $A = \frac{1.97}{[(c_p/c_v)-1]}\left(\frac{1}{\delta_1}-\frac{1}{\delta_2}\right)$ or $\frac{1}{[(c_p/c_v)-1]}(KV_1 - KV_2)$; $\delta_1$ and $\delta_2$ represent the coeffs. of expansion and $K$ represents the cohesion pressure. Thus 8750 cal./g. is obtained for the combustion of gas coal (mol. wt. 36, $c_p - c_v = 1.97$), 72

kg -cal for the combustion of $H_2$ and 2 v for the e m f of the H-O element. v. D gives a vol -energetic formulation of the 2nd fundamental law of thermodynamics G Schwoch

New methods of establishing thermodynamic diagrams. J H Conlyn *Chaleur et ind* 10, 251–8(1929) —Mathematical *Ibid* 313-17 —(1) The construction of the entropic curve for liquids, (2) the Mollier diagram and (3) variation of two parameters *of the isochore as a function of the vol (for $CO_2$) are considered* S L B E

Thermodynamics of mixtures. V Fischer *Z Physik* 66, 269-79(1930) —The relations between osmotic pressure, absorption coeff and concn of $C_2H_2$ in $Me_2CO$, $Me_2CO$-$H_2O$, $Me_2CO$-EtOH and $Me_2CO$-MeOH are derived math and compared with the exptl results of Siller (Versuch über gelöster acetylene, Technische Studien Heft 5, Berlin Oldenburg, 1914) Gregg M Evans

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Electric moments of organic molecules (Hassel, Naeshagen) 10. Electric moments of some organic molecules in $C_6H_6$ solution (Eide, Hassel) 10.

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## 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR

Recent advances in science: physics. L F Bates *Science Progress* 25, 570–6 (1931); cf. *C. A.* 25, 2357. Joseph S Hepburn

Some simpler aspects of the corpuscular theory of light and the wave theory of matter. Gilbert D West *Science Progress* 25, 622–6(1931) —An attempt to harmonize the 2 theories Joseph S Hepburn

secondary phenomena, particularly the *reflection of electrons* For I a max. for the formation of ions occurred at 2–4 v., with a probability of $10^{-4}$ Neg ion formation in Hg vapor and A was shown only when electron speeds approached the ionization potential In these cases neg ions are formed probably from excited atoms The probability curve for I reached a min at 0 5 v. L. P Hall

Some new aspects of radioactivity. C D Ellis *Science Progress* 25, 607–21 (1931).—A review Joseph S Hepburn

A spintharıscope for measuring radioactivity. H A Mangan and Herman Schlundt *Trans Electrochem Soc* 59 (preprint) 7 pp (1931).—*The spintharıscope is* serviceable in rapidly establishing the fact of radioactivity in living persons, but in its present form it is quite inferior to the electroscope for accurate estn of small quantities of radioactive emanations C G F

The column ionization of single α-particles. K Diebner *Physik Z* 32, 181–2 (1931), cf *C* 1 22, 4365.—The degree of satn of ionization of single α particles in air and $CO_2$ was investigated with varying angles between the direction of the incident beam and the elec field A strong Po prepn was used giving an av of 26 α particles per hr At 18° and 1 atm., the const $K_0$ in the Geiger formula is found to be for air, 6 26 × $10^4$, for $CO_2$, 8 31 × $10^4$ cm $^{-4/3}$ The const $Z$ (atoms decompd by 1 g Ra per sec.) is 3 71 × $10^{12}$ G M Murphy

*The ionization of individual α- and H-rays at the end of their range* Ewald A W Schmidt and Georg Stetter *Sitz Akad Wiss Wien*, Abt IIa, 139, 123–38(1930), *cf C A* 24, 1279.—*The tube electrometer was used to measure the ionization of many* individual rays at various absorptions α-Rays from Po prepn and H rays (at fragments), obtained by α rays from Po prepn impinging on paraffin sheets, were studied A special valuation method succeeded in approx fixing the sp ionization of a single α and a single H-ray at the end of their ranges as 20,000 and 5400 elementary quanta per cm., resp., or a ratio of 4 to 1 By use of the tube electrometer this makes possible definite recognition of *α rays of small range from H rays* This definite sepn should prove of value in investigations of at disintegrations Oden E Sheppard

Recent progress in the study of the magnetic spectrum of α-rays Salomon Rosenblum *J phys radium* [7], 1, 438–44(1930), *cf C A* 24, 4457.—Resolution of α-rays from Th C was effected in a powerful magnetic field. Plates are shown for a direct method and a focal method Relative velocities of 4 groups of rays from Th C referred to the strongest ray were measured as 1 0034, 0 975, 0 902 and 0 964, resp., and several other groups were detected, showing that particles are not all of the same velocity The energies of these groups differed from the energies of the main Th C group by 40 6, 287, 442 and 441 kv. electrons. Certain groups of γ-rays possessed energies of 40 8 and 279 kv. electrons L P Hall

*Investigations with the tube electrometer on the α-reflection and the shattering* effect on light elements. Ewald A W Schmidt and Georg Stetter *Sitzb Akad Wiss Wien*, Abt. IIa, 139, 139–50(1930).—The secondary radiations produced by α-particles from Po impinging on the light elements *B, Be, C and N were investigated by* the use of the tube electrometer in an attempt to det. whether at. disintegrations took place. The measurements were made in an angle range of 135° and by comparison with analogous expts using a thin Au foil it was detd whether a surplus of reflected α particles was present. The values for Be and N are in good agreement with the theoretical but for B and C the expts., with α particles of 3 5-cm residual range, show 4 to 4 5 times the theoretical no of secondary α-rays With α-particles of 2 3-cm residual range C does not show this surplus of α rays With a special arrangement of the app attempts were made to det. whether this excess of α-particles was due to anomalous scattering or to at. decompn but a definite decision is not yet possible. In the 90° angle range C showed the same particle no as in the 135° angle range, which tends to disprove anomalous scattering *With α-particles of 2 3 cm range B still shows clearly at* decompn Oden E Sheppard

Application of Chamie's photographic method to the determination of the chemical behavior of polonium. Marietta Blau and Elisabeth Rona *Sitzb Akad Wiss Wien*, Abt IIa, 139, 275–9(1930), cf *C A* 24, 1279.—Highly purified solns of Po were mixed with the reagents considered and the mixt. was then placed in a small closed cell in contact with the photographic plate and the plate developed If there is uniform darkening of the plate the Po is considered to be in soln equally distributed but if there are dark spots on a lighter background it is considered that slightly sol Po compds are formed which collect in groups The expts indicate that *N* chromic acid and *N* $HNO_3$ do not repress all hydrolysis of Po salts but that *N* HCl does; KOH partly dissolves the hydrolysis products; *glycerol tends to suppress hydrolysis*, $H_2S$ ppts a Po compd

which dissolves in 4 *N* HCl but not in $K_2SO_4$. $SO_2$ reduces Po compds in $H_2SO_4$ soln but not in HCl. In hydra the reduces Po compds in HCl soln., tartaric acid added to $HNO_3$ soln produces more insol compds. During electrolysis of Po compds in $H_2SO_4$ soln + Ni more dark spots appear in the photographs produced by anode soln than by cathode soln but if Ni is absent the dark spots are seen in either. Further investigation of these electrolysis effects is planned in the hope of throwing light on the catalytic migration of material during electrolysis. ODEN L. SHEPPARD

Emanation apparatus. WINFIELD LATSHAW. *J. Chem. Education* 8, 966–7 (1931).—An app. for the collection of emanation from a radioactive substance is described. The device is particularly useful in connection with lecture demonstrations and was designed to be used as a storage vessel as well as a working app. J. H.

The distribution of radon between liquid and solid phases of water and of benzene. FRANZISKA WITT. *Sitzb. Akad. Wiss. Wien, Abt. IIa* 139, 195–202(1930).—Expts. showed that the quantity of Rn in the solid phase depends on the rate of freezing of $H_2O$ or $C_6H_6$ solns. of Rn. Exhaustive expts. failed to show any simple relationship between rate of freezing and Rn content but did show that when $C_6H_6$ solns. are frozen very slowly Rn is not present in the solid phase. The phenomenon seems to be one of occlusion rather than solv. The fact that even very slow freezing did not reduce the Rn content of ice below $-4°$ is probably due to the air bubbles enclosed in the ice. O. J. S.

Discoloration of glass and some minerals by β- and γ-rays. JOSEF HOFFMANN. *Sitzb. Akad. Wiss. Wien, Abt. IIa* 139, 203–30(1930).—Many different glasses and mineral specimens were irradiated with β- and γ-rays from 610 mg. $RaCl_2$ until no further color change took place. Many samples were also irradiated with *ultra violet rays* from a quartz Hg vapor lamp. When heated most of the samples lost the color caused by irradiation but in some cases heating caused a change in color. For Mn free glasses the irradiation colors are yellow, reddish yellow, brown, reddish brown, gray and blackish. Alkali metal atoms are most commonly the cause of color, then Pb, Ba and Zn and certain heavy metal atoms follow. Only Pb glasses produce a reddish shade as a ground color. Pb glasses are recognizable because they show fluorescence under ultra violet light. Glasses relatively unstable because of high basicity, heavy metal oxide components, several different acid components, etc., frequently show first a gray color, then a brown and finally a blackish color. The Mn glasses present a unique problem which will be considered in a later paper. Violet is a common final color with Mn glasses. ODEN E. SHEPPARD

Radium-bearing minerals from Great Bear Lake, Northwest Territories. HUGH S. SPENCE. Can. Dept. Mines, Mines Branch, *Memorandum Series* No. 48, 4 pp. (1931).—Analyses of 2 pitchblende samples showed $U_3O_8$ 56.91, 63.04, Th nil, $V_2O_5$ trace, nil, Cu 0.70, 0.66, Ni trace, Co 0.13, 0.10, PbO 12.00, 12.13, Bi 0.18, trace, As 0.15, 0.14, Fe 1.01, 0.77, S 2.08, 0.90%, Ag 1.41, 1.72, Au 0.19 oz. per ton, trace. $U_3O_8$ content of 8 samples was 27.88–83.90%, equivalent to 70.79–213 mg. per ton. Quartz was the principal impurity. Pb was present up to 11.25%. Flotation tests showed only little improvement in grade with a loss of 7.51% of the $U_3O_8$. ALDEN H. EMERY

The distribution of spate-potential in high-frequency glow discharge. D. BANERJI AND R. GANGULI. *Phil. Mag.* 11, 410–22(1931); cf. *C. A.* 24, 5612. A. F.

The regularities of x-ray spark spectra. SAKAE IDEI. *Science Repts. Tôhoku Imp. Univ.* 1st series 19, 551–8(1930).—The values of $\Delta\nu/\sqrt{\nu/R}$ and $\Delta\nu/R$ between the so-called spark lines in the x ray spectra and their main line have been studied as functions of the at. no., and it is found that $\Delta\nu/\sqrt{\nu/R}$ is nearly const. and $\Delta\nu/R$ varies linearly with the at. no. By these regularities it was possible to correlate certain spark lines found by several investigators. C. J. HUMPHREYS

The fine structure of the Moseley curves for the *M*-absorption edges in the heavier elements. SAKAE IDEI. *Science Repts. Tôhoku Imp. Univ.*, 1st series, 19, 651–2(1930), cf. following abstr.—Discontinuities in the Moseley curves for the *L*-absorption edges and for some emission lines in the *L*- and *M* series at Pt(78) and near Th(90) were reported in a previous paper. Similar discontinuities have been confirmed for the *M* absorption edges by the method of the modified Moseley curves. C. J. HUMPHREYS

The precise measurements of the *L*-group of the x-rays in the heavy elements. SAKAE IDEI. *Science Repts. Tôhoku Imp. Univ.*, 1st series, 19, 559–639(1930).—Complete results are presented of the measurements of the wave lengths of the x ray lines in the *L*-group for the elements, Ta(73) to U(92). The wave lengths of the stronger lines detd. by Firman and Wennerlöf were used as standards. Siegbahn's tube spectrometer was used throughout the expts. The differences in the values of $\nu/R$ for the energy levels, $[L_I L_{II}]$, $[L_I L_{III}]$ and $[L_{II} L_{III}]$ have been calcd. from the data given by the emission lines

and are compared with the values obtained from the measurements of the absorption edges The correlation of the exptl data with the process of atom building has been attempted by the method of the modified Moseley curves, which have been constructed for the elements studied Regularities in the orders of the intensities as a function of the at. no are discussed C J HUMPHREYS

**The fine structure of the Moseley curves for the energy levels in the lower elements.** SAKAE IDEI *Science Repts Tôhoku Imp Univ*, 1st series, 19, 641–9(1930), cf preceding abstr —The fine structure of the Moseley curves for the energy levels in elements of low at no has been studied by a simple method proposed by I, according to which the curve is assumed to be a straight line, $\sqrt{\nu/R} = a + bZ$, after which the differences between the actual values of $\sqrt{\nu/R}$ and corresponding points on this line are plotted against $Z$. Such a difference curve is called a modified Moseley curve Many discontinuities in the curves studied corresponding to the stepwise process of atom building are brought out in a striking manner Some considerations are put forward on the screening effect of other electrons C J HUMPHREYS

**The fine structure of the *K*-absorption spectrum of selenium.** SAKAE IDEI *Science Repts Tôhoku Imp Univ*, 1st series, 19, 653–8(1930) —Measurements of the fine structure of the *K*-absorption edge of Se are reported The effect of chem combination on the principal *K*-absorption limit has been found to be negligibly small Suggestions which have been made as to the possible origin of such structures will require data from a larger no of elements for confirmation C J HUMPHREYS

**Theory and practice of x-ray analysis.** WILLIAM H BARNES *Can Chem Met* 15, 67–70(1931) —A short review with brief mention of some of the fundamental conceptions on which the subject is based and an outline of a few of the fields of application The production, nature of x-radiation and phys chem and biol effects thereof are discussed Applications to spectroscopy and crystallography are noted W H B

**Construction and operation of a simple x-ray spectrograph.** I VIAN J WOOD *J Chem Education* 8, 952–63(1931) E H

**Quantitative chemical analysis by means of the absorption of x-rays.** N H MOSNES *Z physik Chem*, Abt *A* 152, 380–408(1931), cf *C A* 24, 548 —An analytical method based on the absorption of x-ray line spectra was developed A photographic-photometric method for measuring the intensity of x rays was described When it was applied to the *analysis of Zn* in ZnO and *Ni* in NiO, the max errors were 10 and 39%, resp. FRANK URBAN

**Protective lead thickness in the German protective recommendations.** J H VAN DER TUUK AND W. H. BOLDINGH *Fortschr Gebiete Röntgenstrahlen* 41, 965(1930) — The conclusion is drawn that the international recommendations regarding Pb thickness for x-ray protection are preferable to those of the German Rontgen Society Dosage measurements were made to obtain the necessary data H E SEEMANN

**Protective lead thickness in the international and in the German protective recommendations.** R. GLOCKER *Fortschr Gebiete Röntgenstrahlen* 41, 967(1930) —G. refers to the work of van der Tuuk and Boldingh (preceding abstr.), and points out the difference in principle used in deciding upon the international and the German recommendations A decrease in thickness from 5 mm to 4 5 mm for 200–220 kv appears desirable H E SEEMANN

**The electronic energy levels of the elements, with special reference to their connection with the sizes and electronic states of atoms in metallic crystals.** WILLIAM HUME-ROTHERY *Phil Mag* 11, 649–78(1931), cf *C A*. 24, 5559 —The size of the atom in a crystal is detd principally by the outermost complete shell of electrons of the at core or ion and not by the valency electrons When the interat distances vary as $1/Z^2$ at the beginning of a period, the electronic energy levels vary linearly with $Z^{2/3}$ for the $N_1$ electrons of the outermost group of electrons of the at core This rule was tested for the various groups by plots of $\nu/R$ against $Z^{2/3}$ or for the higher powers log $(\nu/R)$ against log $Z$. The slope of the line when the interat. distance is plotted against $Z$ is $^1/_3$ that of the slope of the energy level line and with the opposite sign From this the no of electrons in the outer shell may be deduced The rule is applied to various elements ARTHUR FLEISCHER

**Excitation of the visible spectrum of helium.** J S TOWNSEND AND F LLEWELLYN JONES. *Phil. Mag.* 11, 679–85(1931).—The intensity of red light for a given current increased 2 7 to 1 when the pressure was decreased from 10 4 to 2 3, for violet light the intensity increased 4 3 times. The calcd. mean energy of the electrons is 3–4 v. This is not in agreement with the properties of the Bohr model of He, which requires 20 v. for radiation emission ARTHUR FLEISCHER

The magneto-optical dispersion of organic liquids in the ultra-violet region of the spectrum. II. The magneto-optical dispersion of methyl propionate, ethyl propionate and ethyl formate. IRIVAL JENKINS AND T. J. EVANS. *Phil. Mag.* 11, 377–96(1931); cf. *C. A.* 24, 441. The consts. $b_1$ and $b_2 \times 10^{-4}$, resp., for the equation given in *C. A.* 24, 441 satisfying the exptl. data at 19° are for methyl propionate 0.1066, 4.771; ethyl propionate 0.1061, 5.068; ethyl formate 0.1061, 4.72. The values of $e/m$ for the light used, calcd. were 0.96, 0.99 and 0.996, resp. The ordinary dispersion may be expressed by the equation $n^2 - 1 = b_0 + [b_2/(\lambda^2 - \lambda_1^2)]$ with the const. $b_0$ 0.8716, 0.8761 and 0.8761 and const. $b_2 \times 10^{-4}$ 8.68, 8.99 and 8.30, resp., for the 3 compds.

ARTHUR FLEISCHER

The optical excitation function of helium. WALTER C. MICHELS. *Phys. Rev.* 36, 1[illegible]. BERNARD LEWIS

Vacuum spark spectra to 40 A. U. the spectra of Be III, Be IV, B IV, B V and C V. BENGT EDLÉN. *Nature* 127, 405–6(1931). cf. *C. A.* 24, 2048.—The series of H and He like spectra which was previously traced to Be IV, has now been completed with B IV, B V and C V, and the limit of optical spectra brought down to 40.28 A. U. The vacuum spark was produced by a capacity of 0.3 μf charged to 60,000 v. Half an hr. with about 30 sparks a min. was sufficient for an exposure. The plates were taken with the same metal grating as was used before, but now set up in a new spectrograph at a glancing angle of 5.4°. Tabulated results for the 2 series of isoelectronic spectra are reproduced below.

| | Be IV | | B V | |
|---|---|---|---|---|
| | ν | λ | ν | λ |
| $1^1S - 2^1P$ | 1,317,084 | 75.925 | 2,058,247 | 48.585 |
| $1^1S - 3^1P$ | 1,560,962 | 64.063 | | |

| | Be III | | B IV | | C V | |
|---|---|---|---|---|---|---|
| | λ | ν | λ | ν | λ | ν |
| $1^1S - 2^1P$ | 100.25 | 997,500 | 60.31 | 1,658,100 | 40.28 | 2,482,600 |
| $3^1P$ | 88.30 | 1,132,500 | 52.68 | 1,898,300 | | |
| $4^1P$ | 84.75 | 1,179,900 | | | | |
| $5^1P$ | 83.19 | 1,202,100 | | | | |
| $6^1P$ | 82.37 | 1,214,000 | | | | |

The ionizing potentials, computed on the assumption that the quantum defect, $n - n^* = 0.013 \pm 0.001$, calcd. from the series of Be III, is const., are in good agreement with the quantum theoretical values given by Hylleraas. C. J. HUMPHREYS

Note on wave lengths in the vacuum copper arc. A. G. SHENSTONE. *Phys. Rev.* 36, 602–3(1930).—For the measurement of Cu II low level spark lines, spark spectra lines are satisfactory standards. However, for high level lines an error of about 2.7 wave nos. is introduced by the same procedure. BERNARD LEWIS

Fluorescence of mercury vapor under atomic and molecular absorption. HENRYK NIEWODNICZANSKI. *Nature* 127, 406(1931). cf. Rayleigh, *C. A.* 25, 2051.—Lord Rayleigh has recently pointed out that the fluorescence of Hg vapor is due to both at. and mol. absorption. This conclusion is supported by expts. on the influence of the magnetic field on this phenomenon. The fluorescence was excited by radiation of λ2537 A. U. The tube with the Hg vapor was placed between the poles of an electromagnet and the intensity of the fluorescent radiation observed at different field strengths. The variation of the intensity of the green fluorescence was found to be similar to that of the resonance radiation investigated by M. Schein. It is concluded, therefore, that, in the excitation of the fluorescence by λ2537, the at. absorption forms the first necessary step. C. J. HUMPHREYS

Intensity, broadening, extinction and secondary continua of the mercury resonance line on addition of rare gases. PAUL KUNZE. *Ann. Physik* 8, 500–20(1931).—The effects of He, Ne and A on the emission and absorption of Hg 2537 have been further investigated. Monochromatic light is passed into a cell, connected directly with this resonance cell is an absorption cell contg. the same mixt. of gases. The photoelec. cell used to measure the resonance is on a line with the resonance and absorption cells. All measurements were made at 21.5°. The pressures of the rare gases varied from 0 to 1 atm. Absorption is greatly decreased by even small quantities of the gases, with increasing pressure the 3 curves (absorption *vs.* pressure) become almost coincident and are almost parallel to the pressure axis, although still decreasing. The sp. broadening according to the Lorenz theory should be 1.1.1 for He, Ne and A, exptly. it is 18, 12 and 19 milli A. U., resp. The extinction of the resonance intensity decreases in the order He,

Ne and A; for He it is almost 0, for Ne small and for A marked. A discussion is given. WILLIAM F. VAUGHAN

**The presence of neutral oxygen in the gaseous nebulae.** I. S. BOWEN. *Phys. Rev.* 36, 600(1930). BERNARD LEWIS

**The two forms of hydrogen.** T. FERKO GRUZ. *Magyar Chem. Folyóirat* 36, 1-10 (1930).—A theoretical discussion of para- and ortho H. S. S. DI LINAY

**The ortho-para-hydrogen conversion at surfaces.** HUGH S. TAYLOR AND A. SHERMAN. *J. Am. Chem. Soc.* 53, 1614-5(1931).—Neither with an active ZnO nor with the more active hydrogenation agent Zn-Cr oxide is there any para H formed at liquid air temps. even after 14 hrs.' contact, in the temp. region where, on these surfaces activated adsorption of H sets in ($T > 0°$) there is an immediate activity in the reconversion of the 50% para H to the normal 1-3 mixt. The relative activities in this respect are exactly parallel with the influence of compn. on the velocity of activated adsorption. C. J. WEST

**The Stark effect in band spectra.** W. G. PENNEY. *Phil. Mag.* 11, 602-9(1931).—Math. Appreciable Stark effect may be expected when an elec. field is applied to a radiating mol. system when for that mol. $\Omega \neq 0$ and there is a non-vanishing permanent moment. The splitting will be quadratic at first, then linear when the energy shifts become large compared with natural Δ doubling intervals. A similar result is obtained for polyat. mols. with 2 nearly equal moments of inertia. For polyat. mols. with 3 appreciably different moments of inertia only the lowest quadratic states will give a measurable splitting. ARTHUR LEIFSCHITZ

**The Raman effect in acetylene.** P. SECRÉ. *Atti accad. Lincei* 12, 226-8(1930).—The Raman effect in gases has not been studied very extensively as in many cases the ultra-violet rays usually used (from Hg) have a chem. action on the gases. S., therefore, utilizes some of the *visible* rays from the Hg spectrum in studying the action on $C_2H_2$. Five sharp lines and one faint line were obtained in the spectrograph. The 5 sharp lines were at $\nu = 25\,117$, 25,377, 25,318, 22,725 and 20,950 cm.$^{-1}$, excited by the 3650, 4046 and 4358 A. U. lines of Hg. The difference in displacement in various spectrographs was $\Delta\nu = 1979 \pm 6$ cm.$^{-1}$. The 6th line is of about 21930 cm.$^{-1}$. The frequency 1979 cm.$^{-1}$ has also been observed in the infra-red absorption and is one of the fundamental frequencies of $C_2H_2$. A. W. CONTIERI

**Raman spectrum of hydrogen peroxide.** S. VENKATESWARAN. *Nature* 127, 406 (1931).—The Raman spectrum of $H_2O_2$ (Merck's perhydrol 30% soln. in water) has been photographed. The prominent feature is the presence of a sharp Raman frequency of 875 accompanied by a weak component at 903 cm.$^{-1}$. The low values of the frequencies suggests that they arise from O atoms, and as such may be compared with the $O_2$ oscillation frequency 1552 obtained by McLennan (*C. A.* 24, 1294). The large difference between the 2 values is indicative of the fact that the O atoms in $H_2O_2$ and $O_2$ mols., resp. are bound differently. Besides the above 2 frequencies there appear other bands which are less intense and sharp, the origin of which is under investigation. C. J. W.

**The electrolytic dissociation of nitric acid as revealed by its infra-red absorption spectrum.** I. I. KISSEY AND J. W. ELLIS. *Phys. Rev.* [II], 36, 603-4(1930).—In solns. of $HNO_3$ of various concns. and of the fuming acid only the water bands in absorption were found. They were sharp and shifted slightly toward shorter wave lengths. In the fuming acid new strong maxima appear which are attributed to the undissocd. $HNO_3$ mol. In the vapor a group is found which is believed to be the same as that for the liquid. Each band, however, is shifted to shorter wave lengths. B. I.

**Photosensitized decomposition of nitrogen trichloride.** I. JOHN G. A. GRIFFITHS AND RONALD G. W. NORRISH. *Proc. Roy. Soc.* (London) A130, 591-609(1931).—The decompn. of $NCl_3$ in Cl alone is sensitized by Cl and the net reaction is $2NCl_3 \longrightarrow N_2 + 3Cl_2$. The reaction is strictly of 0 mol. order with respect to $NCl_3$ until the decompn. is practically complete; a semi-explosive reaction then occurs. The velocity is directly proportional to the light absorbed by the $Cl_2$. Quantum efficiencies were measured in 4360 A. U. light and 3650 A. U. light; pressures of $NCl_3$ ranged from 0.116 to 2.48 mm.; $Cl_2$ pressures varied from 22.3 to 700.0 mm. The quantum efficiencies are high (between 17 and 5) at low concns. of $Cl_2$ (between 22 and 100 mm.) and approach a limiting value in the neighborhood of 3 at the highest pressures of $Cl_2$. The results are reproduced by the equation $\gamma = (1/0.0038)(1/p_{Cl_2}) + 2.5$. No decompn. occurs in green or yellow light. The app. is described. A short discussion is given. O. and N. postulate an initiation of the reaction by Cl atoms; it then proceeds by way of reaction chains of short length. WILLIAM E. VAUGHAN

**The oxidation of sulfur dioxide in ultra-violet light.** O. KORNFELD AND E. WIEGMANN. *Z. Elektrochem.* 36, 789-91(1930).—The $SO_2$ and O mixt. was exposed in small

quartz vessels The $SO_3$ content was detd iodometrically The illumination was conducted with light of the following wave lengths 3130, 3020 to 2970, 2800, 2537, 2300 to 2190 A U with the use of a monochromator At 2537 A U the conversion was less than 0.01 mol per quantum For the same wave length the quantum efficiency, $\phi$, for conversion is dependent upon the concn of $SO_3$, decreasing as the concn. of $SO_3$ increases At 1849 A U the decrease is greater than at 2070 A. U The reaction velocities are independent of the concn of $SO_3$ and $O_2$ Any temp influence on the velocity between room temp and 65° was not ascertained Corresponding quantum efficiencies are for (1849 A U = 1.00), (2070 A U = 0.71), and (2300 A U. = 0.53) A partial discussion of the reaction mechanism was based on the dissocn of O since the reaction limit is concordant with the range of the O dissocn The absorption spectrum of $SO_3$ has 2 feasible regions between which the one reaction lies Conclusion The mechanism of the decompn reaction in the long wave length region must be entirely different from that in the short wave length region in view of energy considerations.

W. Vanselow

Experiments on the luminescence of zinc sulfide and diamond under the influence of radioactive radiation Berta Karlik *Sitzb Akad Wiss Wien, Abt IIa*, 139, 509–19(1930).—The decrease in luminescence of a ZnS screen under the effect of pure $\alpha$ radiation from Po was measured The results are compared with those of Marsden (*C A* 5, 242) A filter was found which seps. the 2 bands in the emitted light the individual variations of these bands was studied Another sample of ZnS of smaller scintillating ability showed a smaller decrease in luminescence. The Rutherford formula was found not to fit the data when applied to the individual bands A satn value for $\gamma$ radiation was found This was shown not to be caused by regeneration in the dark Expts were made on the effect of $\alpha$- and $\gamma$ radiations on a sample of diamond The results were similar to those obtained with ZnS A description is given of the method by which the ratio of luminescence intensity to particle density was controlled

C J Rosenbaum

Band width and temperature dependence of the emission bands of phosphorescent alkali halides. Franz Urbach *Sitzb Akad Wiss Wien, Abt IIa*, 139, 349–52 (1930). cf *C A* 24, 1289.—*U* has derived a theoretical equation which requires that (1) for bands of the same width, the displacement with temp is the greater for those bands which show the larger deviation from a linear relationship between the band width and $\sqrt{T}$ (2) for bands of equal deviation from the $\sqrt{T}$ law, the broader bands show the greater displacement These predictions have been checked against the data of W Meyeren (*C A* 24, 4223) Within the limits of error the predictions are fulfilled

E J Rosenbaum

Luminescence of the alkali halides I. Introduction and orientating observations. II. Methods of measurement—first results—theory of thermoluminescence Franz Urbach *Sitzb Akad Wiss Wien, Abt IIa*, 139, 353–62, 363–72(1930).—For a series of alkali halides, NaCl, KBr, RbBr, RbCl, CsCl and natural rock salt and sylvine, U made preliminary visual observations of the bands emitted around 5000–5200 A. U, during and after exposure to Ra emanations The phosphorescence on heating and illumination and the triboluminescence were observed Rock salt showed a blue phosphorescence, while the artificial NaCl showed a yellow, which could be changed to blue on melting or applying pressure. The blue of rock salt could not be changed to yellow KCl gave a sec. intensity max. of fluorescence when illuminated again after a pause of a few sec For sylvine it was found that the total amt of fluorescence was greater under illumination than from heating An estimate of the proportion of active centers leads to the order of magnitude $10^{-4}$ Expti. details are given for quant measurements, made by means of photoelec. cells. The existence of the recuperation effect was confirmed Curves are presented showing the variation of thermoluminescence with time A theory of thermoluminescence is developed, based on the assumption that an activated center must pass a threshold energy level before it can return to an unactivated state III. Measurements of thermoluminescence, luminescent-center hypothesis. Franz Urbach and Georg Schwarz. *Ibid* 483–95.—Errors in the measurement of the thermoluminescence of the alkali halides are discussed critically Curves are presented for data obtained by varying the time of irradiation with Ra, the color of the illumination, the state of subdivision, and pressure applied before and after irradiation Reproducible results could be obtained only by tempering the crystals at 200° for 24 hrs The results are interpreted with the aid of the luminescent-center hypothesis, modified by ascribing a finite life to the luminescent centers which is dependent on the temp E J R.

Luminescence analysis. III. The alkaline earth group and quantitative knowledge of luminescence. Ernst Beutel and Artur Kutzelnigg *Monatsh* 57,

15–9(1931), cf *C A* 25, 2579.—CaO, $Ca(OH)_2$, $CaCO_3$, $CaSO_4$ and the corresponding compds of Ba and Sr were investigated with a photometer through red, green and blue filters. The results are given tabularly. GREGG M. EVANS

**Experiments on radiothermoluminescence.** FRANCES G. WICK. *Sitzb. Akad. Wiss. Wien*, Abt. IIa, 139, 497–508(1930). *J. Optical Soc. Am.* 21, 223–31(1931).—Quant. observations were made of the thermoluminescence, after irradiation with Ra, of synthetic $CaSO_4$ with added Mn and of samples of fluorite. The photoelec. method of Urbach was used, exptl. details are given. The $CaSO_4$ used showed a single intensity max. which was lowered by pressure applied either before or after Ra irradiation. Fluorite showed a series of max. which are ascribed to the rare earths on the basis of a spectroscopic examn. These max. also were lowered or destroyed by pressure, while a blue band was relatively intensified by pressure applied before irradiation. The natural thermoluminescence of the fluorite samples was examd. The effect of Ra irradiation on the substances investigated is similar to that obtained with Rontgen rays. E. J. R.

**Determination of ultra-violet-ray content of sunlight.** TORATARO HANZAWA. *J. Agr. Chem. Soc. Japan* 6, 1093–102(1930).—A chem. actinometer using $NH_4$ molybdate in dil. HCl with small quantities of EtOH is suggested. Y. KIHARA

**Photochemical action of intermittent and complex light.** M. PADOA AND N. VITA. *Z. wiss. Phot.* 28, 153–67(1930).—It was found experimentally that under certain conditions the photochem. reaction of HI oxidation with filtered light gives a higher effect than with white light. It was shown that Berthoud's law holds for HI oxidation in white light and that, for monochromatic light, for each wave length there is a different ratio between intensity and effect. A. P. H. TRIVELLI

**Photovoltaic studies on metal and oxide electrodes in distilled water and in dilute solutions.** B. LÁNYI AND E. THEISZ. *Magyar. Chem. Folyóirat* 35, 129–39, 145–51(1929).—Ag, Cu, $Ag_2O$ and CuO electrodes were studied in distd. water and in dil. solns. *Expts. were carried out both in the absence of foreign gases and with various gases* bubbled through the solns. and over the electrodes. Pure metals showed effects up to 1 mv., while metals with oxidized surfaces showed effects up to 200 mv. The effects were the same in distd. water as in dilute solns. of electrolytes. H, N and O were without effect. An explanation is offered based on a photochem. reaction between the electrode and the soln. This reaction is probably reversible in the dark, since the photovoltaic potential gradually becomes zero after illumination ceases. S. S. DE FINÁLY

**Photophoresis and the influence upon it of electric and magnetic fields.** FELIX EHRENHAFT. *Phil. Mag.* 11, 140–6(1931); cf. *C A* 22, 1723.—With transverse magnetophotophoresis, the movement of the particles is reversed on reversing the magnetic field. This reversal does not occur in longitudinal magnetophotophoresis. With a transverse elec. field, particles on illumination may move in either direction. Te, Sb, and I particles move at low fields strengths, while Ni, Fe, Sc and Bi require high strengths. No effect is observed in an alternating elec. field. The effect is capable of quant. measurements. ARTHUR FLEISCHER.

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Azo-chromophore (spectra of about 20 dyes of the *o*- and *p*-amino- and -hydroxyazobenzene types) (BLUMBERGER) 25. The magneton numbers of the Fe group (DE HAAS, GORTER) 2. The kinetics of surface processes on crystal lattices (IMRE) 2.

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# 4—ELECTROCHEMISTRY

COLIN G FINK

Advantages of electric melting furnaces. F W. FRIESE. *Metallurgia* 2, No 10, 128-30(1930) —Performance and comparative cost data are discussed, with particular reference to Cu alloy foundry work in Brazil F I S

Factors affecting the economics of industrial electric heating. N. R STANSFL *Trans 2nd World Power Conference* (Berlin) 1, 429-40(1930) —Of metallurgical interest ALDEN H EMERY

Electrically heated annealing furnaces for the steel and other industries. J C WOODSON *Iron Steel Eng* 8, 122-8(1931) —Annealing covers full annealing, process annealing, normalizing, patenting, spherizing, malleabilizing, graphitizing, etc. Brass annealing, Cu, Al, steel, castings and forgings, special and fabricated shaped, wire strip and sheet annealing, bright annealing in artificial atm., and future trends are all discussed W. H BOYNTON

Electric heating insures quality production H J FISCHBECK. *Elec World* 97, 680-1(1931) —Elec heat is employed by the Pratt & Whitney Aircraft Corp as a result of the following advantages (1) high efficiency with attendant quality of work, (2) simplicity of application, (3) close automatic temp control, (4) cleanliness and improvement of working conditions, (5) impossibility of overheating any part of the charge and (6) elimination of the combustion method with its attendant uncertainty of results and general fuel problems, plus reduced fire hazards Carburizing, hardening and miscellaneous heat treating are handled W H. BOYNTON

Difficult production problem solved by electric heat. L J BRICSON *Elec World* 97, 723(1931) —*Asphalt-coated pipe* requires careful control of coating temps during the period of immersion and solidification Roughly speaking, the temp at which the compd. is applied depends inversely upon the thickness of coating desired Coking of the coating must be carefully avoided A steel tank with concentric resistance heater frame warms the pipe compd A large order of asphalt-coated pipe was handled in a vertical, electrically heated tank. The coating material melts at 102° and is applied at 204° W H BOYNTON

Economy of electric resistance furnaces from the standpoint of power industry and consumer. V PASCHKIS *Elektrizitätswirtschaft* 29, 474-9(1930). E I S

Electric resistance furnace. KNOOPS *Elektrizitätswirtschaft* 29, 465-73(1930) —The advantages of elec. furnaces for the power industry and the consumer are discussed, and the principle types are described Their field of application is outlined and consumption data are given E I S

Electrodes of the third order. J. VELÍŠEK *Chem Listy* 24, 443-7(1930) —An electrode of the 3rd order consists of a metal surrounded by 2 insol (depolarizer) salts which also sat the soln The first depolarizer has a cation corresponding to the metal of the electrode, the potential depends only upon the concn of the cation in the electrolyte The electrodes of the third order are used practically to det concns of such metals (Ca, Tl) which decompose with $H_2O$ and cannot be constructed as electrodes of the first order The system Pb | $PbSO_4$, $CaSO_4$, $Ca^{++}$ is discussed The system Hg | $Hg_2(IO_3)_2$, $Zn(IO_3)_2$, $Zn^{++}$ showed stable potentials only after 3 days With freshly silvered electrodes, the system Ag | $Ag_2C_2O_4$, $CaC_2O_4$, $Ca^{++}$ became stable in a few min The system Zn | $ZnC_2O_4$, $CaC_2O_4$, $Ca^{++}$ became const after 30 min and remained dependable, the Zn was amalgamated The system Hg | $Hg_2I_2$, TlI, $Tl^{++}$ is discussed Computations of potentials of the various systems are given F M

A Luther calcium electrode of the third order. J VELÍŠEK AND K SVENCON *Chem Listy* 24, 467-71(1930) —The electrode Pb | $PbSO_4$, $CaSO_4$, $Ca^{++}$ was constructed, it fulfils the conditions postulated by Luther for electrodes of the third order The second depolarizer is $CaSO_4$, its soly is too great to det. Ca ions accurately and yields as many Ca ions as a pure 0.01 *N* $CaCl_2$ soln. The potentials of individual electrodes (when compared to a standard Hg electrode) varied among themselves and fluctuated in the same series of measurements, although systematic changes in the potentials were not observed and indicate that all secondary reactions that Luther described progress so slowly that the potential becomes practically independent of the time For more accurate measurements of Ca ions another electrode must be devised, in which the second depolarizer is less sol FRANK MARESH

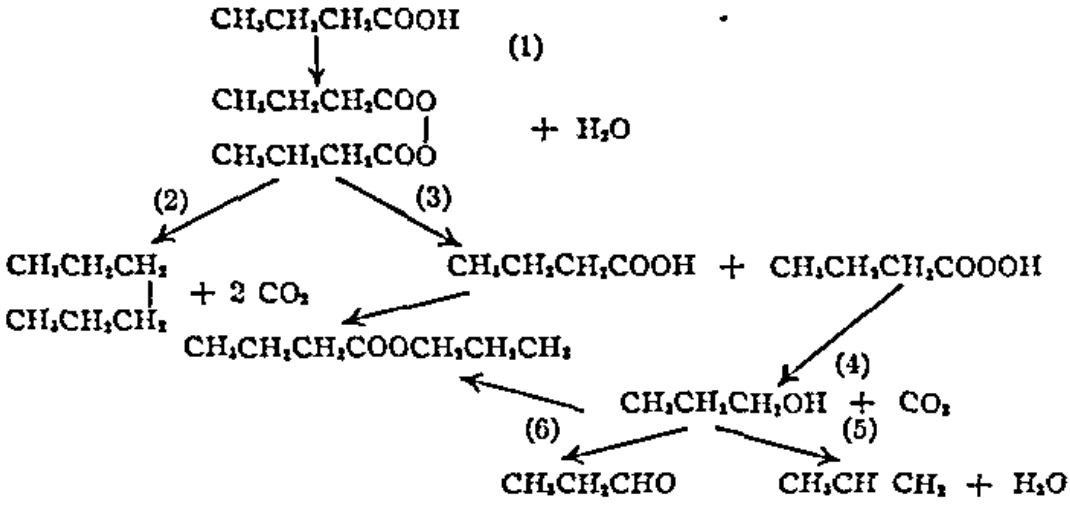
Electrolytic refining of aluminum and aluminates in an aluminum chloride-sodium chloride melt. V A PLOTNIKOV, N S FORTUNATOV AND V. P. MASHOVITZ *Z Elektrochem* 37, 83-8(1931) —A general review of patents and a discussion of all the

processes for refining Al. The authors carried out expts using a NaCl 1 5AlCl$_3$ electrolyte with a c d 1–1 5 amp /sq dm without any other aluminate addn The temp was 160°. The thickness of the Al deposited on the Fe and Cu plates was 0 01–0 05 mm Al thus produced contained 0 043–0 06% Fe, 0 023 Si and 6 015 Na. G. T. M.

Alkali chlorite oxidation and reduction cells. II. G R Levi and D Ghiron *Atti accad Lincei* 12, 158–61(1930)—*In a previous paper (C A. 25, 654)* several cells in which chlorite was reduced to chloride in neutral soln were studied The following addnl reactions have now been studied $Pt^- | KClO_2$ (0 1 *N*) or Ca $(ClO_2)_2$ || $KMnO_4$ (0.1 *N*) | $Pt^+$, in which $ClO_2^-$ is oxidized to $ClO_3^-$ while $KMnO_4$ is reduced to $MnO_2$, at a voltage of 0 175 at 20° On account of liberated alkali the voltage gradually increases to 0 4 and does not remain const , but when $Ca(ClO_2)_2$ is used, a const value of 0 175 v is maintained, as the $Ca(OH)_2$ combines with $MnO_2$ and is pptd The cell $Pt^- | KClO_3$ (0 1 *N*) || NaClO (0 1 *N*) | $Pt^+$ has an initial value of 0 084 v which increases to 0 10 and then decreases with time In this case the reaction $NaClO_3$ + NaClO ⟶ NaCl + $NaClO_3$ takes place Alkali bromites react in the same way, the voltage being only 0 06 at the start The cell $Pt^+ | KClO_3$ (0 1 *N*) || $H_3O_3$ (0 1 *M*) | $Pt^-$ has an initial value of 0.20 v and increases to about 0 25 v without becoming const The cell $Pt^+ | KClO_3$ (0 1 *N*) || $FeSO_4$ (0 1 *M*) | $Pt^-$ rapidly comes to equil. with a value of 0.253 v Finally, the cell $Pt^+ | HClO_3$ (0 01–0 1 *N*) || KCl, $Hg_2Cl_2$ (0 1 *N*) | $Pt^-$ attains a value of 0 58 v which changes less than 0 01 v per hr A W Contieri

Electrochemical production of sodium and lead arsenates. V A Plotnikov and M Ivanenko *Z Elektrochem* 37, 88–91(1931)—$Na_3AsO_4$ was obtained by electrolysis of a soln contg 150 g $As_2O_3$ as Na arsenite per l in the anolyte and 150 g NaOH in the catholyte Fe or Ni electrodes were used The c d was 3 amp /sq dm To produce Pb arsenate, solns were used contg in 1 l 20 g $Na_3AsO_4$ and 70 g $NaNO_3$ plus enough AcOH to neutralize the alkali in the anolyte and a 30% $NaNO_3$ soln in the catholyte The anode was of Pb and the cathode of Fe The c. d was 5 5–6 amp /sq dm Diaphragm (parchment) cells were used in both cases Current efficiencies were approx 100% Also in *Zhur Prikladnoĭ Khim* 3, 999–1005(1930) G T Motok

The electrolysis of salts of *n*-butyric acid and the questions connected therewith. F Fichter and Adolf Bürgin *Helv Chim Acta* 14, 90–101(1931), cf *C A* 24, 4205—Disagreement about products of electrolysis of the salts of butyric acid under different conditions made it necessary to repeat some of these expts to det definitely (*a*) whether differences in conditions cause variation in products, (*b*) whether isopropyl (I) or *n* propyl alc. (II) is a product and, if so, how it is formed, and (*c*) whether certain steps in the peroxide-per acid hypothesis are in accord with the facts The steps are:




In all expts the following were obtained in approx the indicated theoretical quantities on a basis of current used propylene (III), 2 7 to 11 4%, isopropyl butyrate, trace to 2 8%; I, 3 64 to 8 4%; *n* propyl butyrate, trace, propionaldehyde, trace, isopropyl butyrate, trace. Varying acidity, alky , c. d , diaphragm, type or material of electrodes, concn. of electrolyte, etc , apparently changes the products only quantitatively. To explain the formation of I it was first shown that 1 vol of butyric acid (IV) dissolves 4 197 vols of III at 0° and 2.28 vols at 20°. Fifty-cc portions of IV which had dissolved 209 85 cc. of III at 0° were sealed in glass tubes and heated 50

hrs at 1 *(illegible)* and 0 2531 (44 9% theoretical) 0.2531 (44 9%), 0.3164 (56.2%), and 0 2768 g (49 2%) of I obtained by hydrolysis was detd. by oxidizing to AcMe and colorimetrically estg with *o*-nitrobenzaldehyde This shows that III adds on to IV and hydrolysis of the ester formed yields I, the reaction indicating a possible origin of this alc during electrolysis. In order to det the possibility of step 2 the thermal and photochem decompn of butyryl peroxide (V) was studied. 0.3430 g of 99.2% V heated in a bronze bomb in an oil bath at 270° gave 99 18% of the theoretical quantity of $CO_2$ The yield of hexane in another detn was 62 6% of the theoretical 0 1910 g of 99 1% V in a quartz tube was exposed to a Hg vapor lamp for 22 hrs and yielded 98 6% of the theoretical amt. of $CO_2$ but only traces of hexane were obtained, and a colored residue remained in the tube In order to det. the possibility of step 3, weighed samples of V were dissolved in 10 cc. AcMe, 10 cc. of IV and 100 cc. water were added, the mixt was shaken at const. temp and samples were periodically analyzed to det. the extent of hydrolysis The samples were cooled to 0°, dild. with AcMe and KI in AcOH, and titrated cold with $Na_2S_2O_3$ to det per acid formed and then heated to 30–40° and again titrated to det. V. In one case 0 1804 g V at 31–32° showed 4 6% hydrolysis after 60 min., 7 14% after 180 min 8 44% after 200 min and 9 33% after 300 min. At 17–8 7 34% hydrolysis occurred in 300 min. In order to det. the possibility of reaction 4 the thermal and photochem decompn. of butyric per acid (VI) was studied. 0 5450 g of 87 2% VI in a bronze bomb was heated to 270° and 0 1775 g $CO_2$ (88 4% theory) and 0 1768 g III as propylene dibromide (VII) (92 1% theory) obtained. Four g of VI after 15-hrs. exposure to a Hg vapor lamp yielded only 0 150 g VII and a little $CO_2$ and indications were that more of VI decompd. to form $O_2$, satd hydrocarbons and resins

OREN E SHEPPARD

Principles of the hydrometallurgy and electrodeposition of the metals. T. P CAMPBELL. *Colo School of Mines Mag* 20, No 3, 13–15, 45, No. 4, 15–19, No 5, 26–8 1930 —A detailed review E I S

The cuprous-cupric equilibrium in copper sulfate and perchlorate solutions and the anodic behavior of copper E HEINERTH. *Z Elektrochem* 37, 61–76 (1931) —A detailed and practical description of the previous studies made on the equil. $2Cu^+ \rightleftarrows Cu^{++} + Cu$ The expts carried out in this study consisted in the analytical part of *a)* titration with $KMnO_4$, *b)* titration with $Ce(SO_4)_2$ Very pure Cu salts required in the expt. were prepd The equil was studied at 20° to 60° In a molar $CuSO_4$ soln there are 0 71 millimols of $Cu^+$ in equil at 20° and 3 15 at 50° In sulfate solns the ratio $\sqrt{Cu^{++}}$ molarity $Cu^+$ molarity is independent of the salt concn within wide limits From the values obtained with sulfate soln the reaction $Cu^{++} + Cu = 2Cu^+$ at temps of 20–60° gives a value of 18 850 cal and a calcd normal potential of 0 525 v for the reaction $Cu \longrightarrow Cu^+$ at 25°

G T MOTOR

A study of silver-plating solutions. B EDERER AND N PROMISEL. *Trans Electrochem Soc* 59 (preprint) 19 pp (1931) —A discussion is given of the effects of temp., c. d and concns of Ag, cyanide, carbonate and $CS_2$ on the resistivity, throwing power, and cathodic and anodic polarization in argentocyanide plating solns. Curves are shown. A comparison is made between solns. contg Na salts and those containing K salts, and the advantages of the latter pointed out. Optimum plating conditions and compns. for the above solns are suggested. The subject is treated mainly from the industrial standpoint, although theory is also briefly considered. C. G F.

Electrodeposition of silver from sulfate, nitrate, fluoborate and fluoride solutions. EDWARD B SANIGAR. *Trans Electrochem Soc* 59 (preprint) 21 pp (1931) —The possibility of electrodepositing Ag in a form suitable for electroplating purposes from silver sulfate, nitrate, fluoborate and fluoride solns. has been studied. Owing to the simple-immersion deposition of Ag from these solns upon Cu, Hg, brass and Ni, adherent deposits were obtained only upon Ag Relatively compact deposits of Ag were obtained upon Ag deposited from an argento-cyanide soln., from $Ag_2SO_4$ solns. contg boric acid or $Fe_2(SO_4)_3$, $AgNO_3$ solns. contg boric acid, silver fluoborate solns. and silver fluoride solns. However, these solns. showed a great tendency to yield treed deposits, and the conditions under which deposits free from trees could be obtained were limited. All the compact deposits were decidedly cryst., and while they might be of use in the electro-refining of Ag, as a means of obtaining dense Ag deposits instead of the loose crystals given by the nitrate soln., they offer no serious competition to the usual argentocyanide soln. for the electroplating of Ag, unless considerable improvement can be made, for example, by the use of "addition agents" A further difficulty in the use of these baths for Ag deposition is the unsatisfactory corrosion of the anodes. C. G F.

Electroplating on aluminum. H. K WORK. *Metal Cleaning and Finishing* 2, 777–80 (1930) —See *C. A* 22, 3844, 25, 2370 E. I S.

**Plating glass and clay.** I Werner *Sprechsaal* 63, 223-4(1930) To render clay or porcelain conductive, cover with graphite compn and heat to 200° or 400° E I S

**Improvement in electroplating quality needed to meet competition.** I B Nim *Automotive Ind* 63, 560-4(1930) The quality of plating and future protective progress are discussed Ni plating at low $p_H$, heat treatment of Cr plate, durability tests, control methods, Cr plating for resistance to abrasion and electrodeposition of Fe are also discussed I I S

**The influence of foreign metals during nickel plating.** B Šulik *Chem Listy* 25, 123-4(1931).—A Ni bath ($H_3BO_3$ 3.0%, $Ni(NH_4)_2(SO_4)_2$ 70%) contg 1% $CuSO_4$ (0.253% Cu) gave a dark and stained deposit or showed dark spots with 5% $CuSO_4$ (1.266% Cu) Ni plating was not possible, with 10% $CuSO_4$ (2.53% Cu), the Cu was pptd as a powder All of the Cu was easily removed upon a metallic cathode with a strong current The addn of 0.5% $ZnSO_4$ (0.113% Zn) to the Ni bath retards the rate of Ni deposition, with 0.266% Zn stains form over the deposit with 0.45% Zn the bath becomes useless The addns of 0.5% $FeSO_4$ (0.10% Fe), 0.20% Fe, and 0.403% Fe to the Ni plating bath showed no effect, with 0.601% Fe the bath plates well but gives a dark deposit, the addn of 2.02% Fe leaves unplated areas especially at the point of support and the deposits are dark and irregular Analysis of 4 brands of Ni showed Ni 96.7 99.2 Fe 0.54 2.01 and Cu 0.11-0.10% Analysis of 2 brands of Ni $SO_4 \cdot 6H_2O$ showed traces of Cu and 0.23-0.15% Fe Frank Marsh

**Further developments in low-$p_H$ nickel deposition.** W M Phillips *Trans Electrochem Soc* 59 (preprint) 4 pp (1931) cf *C A* 24, 4990.—Further commercial work indicates that (1) deposits from baths of low $p_H$ furnish better protection than those from baths of high $p_H$ (2) the hardness of deposits is not directly influenced by the $p_H$ Ni is softer from baths operated at elevated temps and (3) pitting is no worse at low $p_H$ than it is at high $p_H$ C G F

**A note on the tarnishing of chromium-plated brass** W M Phillips *Trans Electrochem Soc* 59 (preprint) 2 pp (1931).—In the St Louis district Cr plated articles appear to have 'tarnished' Investigation shows that where no Ni or insufficient Ni is first plated over brass or Cu articles, this type of failure can occur C G F

**Electrolytic production of hydrogen and oxygen.** F I Evandieu *Elec Times* 78, 389-92(1930).—The advantages and disadvantages of the filter-press-type and bell-type electrolytic cells are discussed and the Knowles plant at Bussi, Italy, is described in detail E I. S

**Leclanché-type primary cells.** Brit Eng Standards Assoc., *Specification* No 397, 26 pp (Sept., 1930).—Dry cell specifications E I S

**Asphalt composition vs. hard rubber in battery jars.** M Shank *Elec Mfg* 5, No 6, 37, 76(1930).—The relative merits of these 2 materials are discussed E I S

**The effect of electrical discharges upon thiocyanic acid.** W Glund and Clara Dieckmann *Ber ges Kohlentechnik* 3, 420-8(1931), cf *C A* 24, 5011.—The effect of elec discharges upon the reaction $HCNS(aq) \longrightarrow HCN(aq) + S(rhombic)$ was studied both silent and glow discharges being used With the silent discharge, the yields were too low and the energy consumption extremely high With the glow discharge, however, and with addn of H gas, about 80% of the HCNS was decompd., 95-100% of which was recovered as HCN Varying quantities of $SO_2$, $H_2S$ or S are also obtained, depending upon the exptl conditions Elec. efficiency is very low, the energy consumption being about 675 watt hrs per mol. of HCN as compared with a theoretical requirement of only 6.87 watt hrs H Stoertz

**Electrical gas purification and filtration.** R Seliger *et al* *Trans 2nd World Power Conference* (Berlin) 1, 492-508(1930).—A review Alden H Emery

**Mercury-arc power rectifier auxiliaries and accessories.** E S Waterman *Gen Elec Rev.* 34, 228-31(1931).—The rectifier depends on the successful functioning of its auxiliary app The exhaust system is important, as a high degree of vacuum must be maintained It consists of a vacuum valve, Hg condensation pump, receiver tank, *motor-driven rotary vacuum pump and the vacuum measuring and regulating devices* The contact making gage is made of three parts (1) thermal vacuum detector, (2) vacuum regulator and (3) source of excitation The vacuum regulator is composed of the following parts all mounted in one case (1) indicating motor, (2) regulator contacts and contact hammer, (3) small a c motor The regulator and its auxiliary relays perform the following functions (1) start and stop the rotary pump at desired *pressures, (2) remove the rectifier from service if the pressure becomes excessive, when* the unit is equipped with automatic control and (3) sound bell alarm if pressure be-

body such as Cu having a coating of a compd such as $Cu_2O$ placed in a suitable container with Hg under pressure. A layer of Pb foil also is used.

Electrodeposition of gold and silver. Asociación de Productores de Yodo de Chile. Ger. 519,208, Dec. 12, 1928. The electrolyte is AuI or AgI dissolved in a salt soln., e. g., in an alkali or alk. earth iodide soln. The method may be applied in refining the metals or in electroplating. Suitable electrolytes are AuI 21 and KI 140 g., or AgI 40 and KI 370 g., in 1 l. of water, and suitable conditions are a voltage of 0.1-0.3 and a c. d. of 100 amps. per sq. m.

Chromium plating. John J. K. McCullough and Benjamin W. Gilchrist (to Lemstedt Mfg. Co.). U. S. 1,797,357, March 24. A Cr plating bath is prepd. contg. Na chlorochromate, Cr chromate, HCl and water. Cf. C. A. 24, 302.

Electroplating iron and steel with other metals such as nickel and chromium. Metals Protection Corp. Fr. 695,068, May 9, 1930. See U. S. 1,774,209 (C. A. 24, 4003).

Producing coherent metal layers on crystals. Hanovia Chemical and Manufacturing Co. Ger. 519,110, Dec. 18, 1927. The crystals are subjected simultaneously to superficial reduction and electrodeposition, with the result that an alloy layer is formed on the crystal surface. Thus, a layer of cryst. $Cu_2O$, for use in a dry rectifier, may be treated with an acidified soln. of $NiSO_4$, $(NH_4)_2SO_4$, undergoing electrolysis.

Covering metals. Institut Français des Matériaux de Frottement. Fr. 696,588, June 5, 1930. In coating metals with compds. or mixts. known under the designation of W bronzes and Mo bronzes, the bronzes are obtained by electrolysis of solns. of salts of meta- or poly-tungstic acids, or salts of meta- or poly-molybdic acids, on the metal dipped into the soln. and used as cathode. The use of $BaW_4O_{13}.9H_2O$ and $SrW_4O_{13}.9H_2O$ is described.

**e. g.**, **an analytic apparatus.** André P. H. Peltier. Ger. 517,931, April 10, 1926.

*Depolarizer of an app. especially applicable for the decompn. of NaCl.*

519,148, Apparatus cell of the tank type suitable for electrolysis of water. James N. Activ (to Westinghouse Elec. & Mfg. Co.). U. S. 1,797,076, March 24. Structural electrode.

Electrolytic cell suitable for electrolysis of water. James N. Smith (to Westinghouse Elec. & Mfg. Co.). U. S. 1,797,077, March 24. Structural features.

Method and apparatus for sterilizing water in thin layers by electrolysis. Pierre M. R. Salles. Ger. 519,418, July 17, 1930.

Metallized asbestos diaphragm for electrolytic cells. Karl Wolinski. Ger. 468,432, Mar. 17, 1927.

Metals from ores. Dowsett Research Co. Fr. 696,418, April 2, 1930. A process for the elec. heating and fusing of conducting materials such as metals reduced from their ores is described. The material is introduced from below into a column which opens on to the hearth of a furnace, the top of the column being used as electrode to establish an arc between it and the electrode of the furnace. The temp. is regulated by varying the speed of feeding.

Aluminum. Pierre Hacquard. Fr. 695,097, May 15, 1930. Al is obtained by reducing Al compds. such as bauxite in an elec. furnace in the presence of W, whereby an alloy of Al and W is obtained, from which the W is removed by a sweating or liquation operation or an electrolytic refining below the m. p. of Al.

Magnesium. Alexis C. Jessup. Fr. 696,218, May 28, 1930. Mg is obtained by making an incompletely dehydrated mixt. of KCl and $MgCl_2$ in the proportion of 2 or 3 mols. KCl to 1 mol. $MgCl_2$, electrolyzing the mixt. until the mixt. contains at least 3 mols. of KCl for one of $MgCl_2$ and submitting the mixt. thus practically dehydrated to a second electrolysis. The no. of vats for the 2nd electrolysis is preferably greater than for the first.

Ammonium compounds. Emil Barkhard and Henryk Goldmann. Ger. 521,338, Feb. 17, 1927. In the manuf. of $NH_4$ compds. by subjecting a mixt. of N, H and other gases to elec. discharge, the tension is alternately raised and lowered during the process. Thus, a mixt. of N, H and HCl may be subjected to an electrostatic field, the tension of which is varied every few secs. between 100,000 and 120,000 v.

Dioxides of titanium, zirconium, hafnium and thorium. Imperial Chemical Industries, Ltd. and I. L. Clark. Brit. 300,608, Sept. 7, 1929. An alk. soln. or suspension of raw material contg. a compd. of the metal, such as a suspension of ilmenite, is electrolyzed to deposit impurities such as Fe in the metallic state (satisfy under 20 atm. pressure of H or air at 90–120° with an insol. anode of C, Ni or Cr steel). Various details and examples are given.

Oxidized layers on aluminum. Richard F Müller Fr 607,073, May 24, 1930 In the formation of oxidized layers on Al, oxides of other metals such as Fe are incorporated during the operation The result may be obtained by electrolysis, the electrolyte contg salts of Fe in the colloidal state, or the Al may be alloyed with metals to form the oxides such as Fe, Si and Cu

Enamelled designs on metal surfaces. Hugo Depach Ger 510,607, Aug 27, 1927 The metal surface is prepd chemically or electrochemically with layers which give the enamel the coloring of metal compds These layers are then covered with a transparent enamel or glaze The whole is then heated until the latter layer fuses Several examples are given In one a Cu surface is galvanically silvered and then galvanically coppered thickly for red parts and thinly for green parts. Electrolysis in a bath of 2% $NaNO_3$ and 1% $Na_2CO_3$ leaves the plate with a deposit of Cu, which is shaded off into the desired light, shade and color effects by a rotating or scraping tool. The coloring effect may be enhanced by under glaze pigments. The plate is then covered with glaze powder and heated in a muffle furnace.

Hydrogen peroxide. I G Farbenind A.-G Fr 606,150, May 27, 1930 An app is described for the production of $H_2O_2$ by electrolysis under pressure Hg electrodes comprising several trays filled with Hg or amalgam and placed one above the other in a common pressure vessel are used.

Hydrogen peroxide. I G Farbenind A.-G Fr 606,273, June 2, 1930 $H_2O_2$ is produced by the cathodic reduction of O, the O being controlled continuously or periodically or the H present being eliminated continuously or from time to time, preferably by catalytic combustion, or both methods are combined An automatic analysis app mounted in the current of O is used.

Hydrogen peroxide I G Farbenind A.-G Fr 606,585 June 3, 1930 See Ger 514,172 (*C A* 25, 1167

Hydrogen peroxide Kali-Chemie A.-G Fr 606,871 June [illegible] 1930 [illegible] $H_2O_2$ are submitted to an electroosmotic treatment for purification and c[illegible]g Mech. or distn.

Bleaching shellac. Olga Mylo née Rosenhagen Ger [illegible],272, Apr[illegible]30, June Addn. to 517,096 (*C A* 25, 2760) A soln. of crude shellac is mixed with a [illegible] of a fluoride, e. g., NaF or $NH_4F$, and the mixt. is electrolyzed.

Electric furnace. Jesse I Brown Ger [illegible] Mar 20, 1925 Addn. to 507,074 (*C A* 25, 463

Electric furnace W C Heraeus G m b H Ernst Haagn and Eduard Killius, inventors) Ger 517,401 Mar 31 1929 Devices of regulation are described.

Electric furnaces. Siemens-Planiawerke A.-G für Kohlefabrikate. Fr 606,116, May 2[illegible] 1930 Electrodes for electric furnaces are made by packing powd. or granular mineral coal, which has not been or has only been partly carbonized, into a vessel and heating it in the vessel until completely carbonized. Pressure may be applied to the coal if much gas is evolved during the heating A flux such as asphalt, bitumen or resin may be added to the coal. The electrodes may be made in the furnace during its use Cf *C A* 25, 1744.

Electric resistance furnace. Akt.-Ges. Brown, Boveri & Cie Swiss 143,509, Nov 2[illegible], 1[illegible]

Induction furnace. Peter Kamps and Hermann Zipernick Ger 516,539, Mar 10 1929

Electrode smelting furnace. Akt.-Ges. Brown, Boveri & Cie Ger 521,268, July 12, 1927

Rotary electric furnace suitable for reducing iron ore. B M. S. Kalling and C. von Dellwig Brit 340,117, Dec. 10, 1928. Structural and elec. features.

Electrolytic furnace. Dow Chemical Co Brit 339,823, Jan. 11, 1930

Electric annealing furnace with protective gas filling. Allgemeine Elektrizitäts-Ges. Ger 519,231, Feb 16, 1927

Electrically heated apparatus for concentrated sugar juices, cracking oils or other purposes. R. A. Carleton Brit 339,649, Sept. 10, 1929 Various structural features are described of an app comprising a plurality of closely spaced tubes connected at their ends by bends to form a continuous conduit through which the fluid to be heated is circulated and which is electrically heated.

Electrically heated apparatus for determining the limiting creep stress of materials at selected temperatures. D Colville & Sons, Ltd., W Barr and W. E. Bardgett Brit 339,840, Feb 26, 1930 Structural features.

Electric heating unit suitable for immersion in water. Clarence M. Brodnax and Joseph Lonzo. U. S 1,797,712, March 24. Structural feature

Electric air heater. WALTER W BROWN and LLOYD B STONE U S 1,797,519 March 24

Signal device for electric smelting furnaces. ALLGEMEINE ELEKTRIZITÄTS GES. Ger 521,290, July 20, 1929 *Molten metal leaking from a faulty melting pot or the like* operates an alarm

Carbon electrodes for electric furnaces. ROBERT SUCHY, KARL STAIB and WILHELM MOSCHEL (to I G Farbenind A G) U S 1,797,805, March 24 See Fr 665,620 (*C A* 24, 794

Electrode of very wide section for electric furnaces. SOC ELECTRO-METALLURGIQUE DE SAINT BÉRON Fr 696,319, May 30, 1930

Electrode for electrolytic apparatus such as cells for decomposing water JAMES N SMITH (to Westinghouse Elec. & Mfg Co) U S. 1,797,375, March 24 Structural features.

Electrodes for electrolyzers. GEORGE F JALBERT Fr 696,788, Sept 16, 1929 The electrodes are coated with a mineral or org colloidal substance, conductive or not, which prevents direct contact of the electrolyte with the metal of the electrode, whereby the polarization is diminished.

Soluble anodes for use in electrolysis. SIEMENS & HALSKE A G (Victor Engelhardt, inventor) Ger 521,509, May 17, 1928 The anodes are made in the form of very thin long or endless bands which are kept in const motion in the electrolyte

Electrodes for electric purification of gases. SIEMENS-SCHUCKERTWERKE A G Fr 695,777, May 17, 1930

Electrodes for secondary elements. I G FARBENIND A G (Karl Ackermann, inventor) Ger 519,456, Dec. 19, 1929 Addn to 491,498 (*C A* 24, 2066). The porous metallic material used in the method of Ger 491,498 is made of Cu-Ni alloy, *e. g.*, an alloy contg Cu 50 and Ni 50%. Cf *C A* 24, 4409

Depolarization electrodes. JOHANNES M SCHMIERER and DIAMCO A G Ger 519,148, Apr. 5, 1930 In the manuf of compressed depolarization electrodes, the active mass is mixed with org fibers, *e. g.*, ramie, in order to prevent swelling of the electrodes when in use

Device for joining carbon furnace electrodes. SIEMENS PLANIAWERKE A -G FÜR KOHLEFABRIKATE (Josef Soppa, inventor) Ger 520,394, Nov 21, 1928.

Spark-discharge apparatus for generating a bleaching gas for flour, etc. FRITZ STUFF. Ger. 521,300, Dec. 25, 1929. Addn to 510,419 (*C A* 25, 1008).

Electric apparatus for testing gases. EDUARD SENFTER Ger 516,719, June 6, 1928. The app. is suitable for testing air samples of crucible gas etc., from tubes of various pressures.

Apparatus for purifying gases. SIEMENS-SCHUCKERTWERKE A -G Fr. 696,117, May 26, 1930. The pipes for the sweeping gases for the insulators in elec. gas purification app. are disposed in the hot gaseous current passing through the app whereby the sweeping gases are heated.

Gas purification. METALLGES. A G Fr 696,286, May 30, 1930 Preliminary or premature ionization of gases to be purified by elec. means is suppressed by means of a screen disposed transversely in the current of the crude gases, the face of the screen being disposed above the source of the gas in the immediate neighborhood of the flame The screen may be provided with cooling means.

Removing chemically active gases from oil containers, in electric apparatus, etc. SIEMENS-SCHUCKERTWERKE A -G. Ger. 517,842, Aug. 7, 1928. The app. contains chambers with gas-absorbing solvents.

*Electric switches and fuses.* J LAWN. Brit. 339,748, Nov. 7, 1929 A tube filled with Ne, He or other rare gas, and constituting a glow-discharge tube is arranged across the terminals of a switch or fuse so that the tube glows when the switch is open or when the fuse blows, indicating the location of the switch or fuse in the dark.

Loading submarine signalling cables. STANDARD TELEPHONES & CABLES, LTD., and J. R. VEZEY. Brit. 339,989, Sept. 18, 1929. Mech features.

High-power incandescent lamps, tungsten arc lamps, x-ray tubes, rectifiers, etc. PATENT-TREUHAND-GES. FÜR ELEKTRISCHE GLÜHLAMPEN (to General Elec. Co., Ltd). Brit. 339,927, May 18, 1929. Structural features.

"Getter" for tungsten incandescent lamps. EGYESÜLT IZZÓLÁMPA ÉS VILLAMOSSÁGI RÉSZVÉNYTÁRSASÁG. Brit. 339,798, Dec. 18, 1928. As a "getter" there is used an inorg. water-absorbing substance gaseous at ordinary room temp. such as $SiF_4$, $AsF_3$ or a fluoride of P. The getter may be introduced as such or may be formed in the bulb, as by decompn of K silicofluoride

1930 Bleach out layers, sensitized with thiourea derivs, are fixed by destroying the sensitizer with $SO_2$ and, if necessary, removing the decompn product from the layer

Photographic bleach-out process. I G. Farbenind A G Fr 695,420, May 10, 1930 The binding agent for the colors in the bleach-out process is composed of a mixt of substances which dissolve the colors with substances which do not dissolve the colors and which swell in the fixer to be used in each case Cellulose ethers or ester-ethers may be used as the substances capable of swelling in the fixers ($C_6H_6$ other aromatic hydrocarbons benzine or ethers) and ales of high b p or cellulose esters such as nitrocellulose as the solvents for the colors

Photographic reproductions. Rudolf Fischer Fr 695,821, May 10, 1930 In the photographic reproduction of pamphlets, notes, etc, the actinic rays are prevented from traversing the emulsioned support by coloring the latter itself or a special layer applied thereto with substances which optically are as clear as possible but absorb the actinic rays

Photographic images. I G Farbenind A-G Fr 696,641, June 4, 1930 Bi chrome or polychrome photographic images are produced by one of the methods used in color photography, using esters or salts of esters of leuco compds of dyes as substances sensitive to light The sensitiveness to light may be increased by the addn of substances such as collodion having an oxidizing action in light.

Photographic films. Kalle & Co A G Fr 696,100, May 26, 1930 Photographic films, etc., particularly cellulose films sensitized by diazo compds, are protected against damp by coating them before use with a layer of varnish such as nitro- or acetyl cellulose varnish

Photographic films. Wladimir Reyos Fr 695,449, May 12, 1930 Sensitized layers on films are protected by a coating composed of a soln, in an appropriate solvent, of the substance composing the support or of a like substance capable of uniting intimately with the support, or such a substance in a liquid state Thus a soln of celluloid in AcOAm may be used on celluloid films

Metal cinematograph film Leopold Radó Ger 517,517, Nov 15 1927 The film consists of rolled metal, e g, Al, with a coating of cellulose, viscose, etc., which is given the sensitized coating in the usual way

Two-color cinematographic films. J E Thornton Brit 339,977, Aug 10, 1929 In a modification of the process of film manuf described in Brit. 316,338 (*C. A* 24, 1588), feed perforations are made in the blank film before it is fed to the printing machine Various details of manuf are described

Coloring films. Multicolor Films Inc Brit 339,971, Sept. 17, 1929 See Fr 684,354 (*C A* 24, 5246)

Sound films I G Farbenind A G Fr 695,831, May 19, 1930 In making sound films in colors, the sound band is first produced in known manner by printing, developing and fixing, and afterward the colored image is produced in known manner The sound band is protected against modifications by an impermeable layer

Patterns for printing paper, etc. Conrad Lang and Arthur Lang Swiss 138,900, May 4, 1929 The pattern template is placed on a light sensitive layer which is protected from the action of the printed colors, prior to the copying and developed

Photographic prints in colors Agfa Trust Brit 340,044, Oct 1, 1928 In producing prints in natural colors with use of 3 sensitive emulsions each dyed with a transparent dye, which are printed from color record negatives, developed, hardened and the unhardened gelatin and silver image removed, auxiliary dyes which are easily removed after exposure are added to the quicker printing emulsion layers to equalize the times of exposure of the layers

Apparatus for developing blue prints. Bruno Stange G m b H Ger 517,668, May 2, 1929

## 6—INORGANIC CHEMISTRY

A R MIDDLETON

Surface chemistry of hydrates. I V R Damerell. *J Phys Chem* 35, 1061–7 (1931).—Hydrous Al oxide forms the trihydrate on standing in $H_2O$ contg small quantities of $NH_4$ Over drying agents the hydrate particles lose chemically bound $H_2O$ in proportion to the surface The difference in $H_2O$ content of ground and unground hydrargillite is due to increase in surface S Lenher

Hydrates of the alkaline earth oxides C Nogareda *Anales soc españ fis*

*quím* 29, 33–64(1931).—Systematic dehydration of 2 lime hydrates of different origins, contg a large excess of free moisture, was carried out. From the dehydration diagram obtained there was no evidence of the presence of hydrates of $Ca(OH)_2$, but the mol vol values of the free $H_2O$ pointed to the existence of a labile $Ca(OH)_2 H_2O$. By the *usual methods* $Ca(OH)_2$ *was obtained in macrocrystals, but without any hydrates*. $Sr(OH)_2 H_2O$ and $Ba(OH)_2 H_2O$ were obtained by allowing their hot, satd solns to stand. Dehydration diagrams and detn of mol vol of $H_2O$ of crystn showed clearly the presence of a little stable $Sr(OH)_2 8H_2O$ and $Ba(OH)_2 8H_2O$ and a very stable $Sr(OH)_2 H_2O$ and $Ba(OH)_2 H_2O$, showing again the great similarity of Sr and Ba compds.

E M Symmes

*Hydrates of the alkaline earth peroxides. II.* Their constitution. C Nogareda. *Anales soc espan fis quím* 29, 131–45(1931).—The d and mol vol of highly purified $CaO_2$, $SrO_2$ and $BaO_2$ octahydrates were detd. From previous work (*C. A.* 24, 3721) on d and mol vol of hydroxides of these metals the av mol vol for $8H_2O$ could be calcd., and by deducting this value from the values for the above peroxide hydrates the mol vol of the peroxides was obtained approx. The values found were $CaO_2 8H_2O$ d 1.700, *M.* 127, $CaO_2$ *M.* 21.2, $SrO_2 8H_2O$ d 1.951, *M.* 135.1, $SrO_2$ *M.* 28.3, $BaO_2 \cdot 8H_2O$ d 2.291, *M.* 136.8, $BaO_2$ *M.* 30.0. Comparison with the corresponding mol vol of the monoxides gives for the second O atom a vol about 0.25 normal, *i. e.*, 2.9 to 3.0 (Biltz, *C. A.* 25, 628). All peroxide compds show clearly the Rosenfeld reaction. Extn tests with $Et_2O$ by the Willstatter method to detect $H_2O_2$ were neg. The isotherm of breakdown of the hydrate can be followed up to a loss of 7.5 $H_2O$, and then decompn starts. From the course of the dehydration curve no conclusions can be drawn as to the existence of other hydrates. All properties of the hydrates tested point to the structure $X\begin{matrix}O\\|\\O\end{matrix} 8H_2O$. In the breakdown of the hydrates the 0.5 $H_2O$ remaining is *driven off only above 200° this can be explained by the assumption of a partial hydrolysis* of the peroxide hydrate with formation of a hydroxide. The ratio $XO_2$ $X(OH)_2$ in the dehydrated product was about 5:1. These hydroxides may act to stabilize the peroxides and explain the existence of $CaO_2$ obtained otherwise only under high pressure.

E M Symmes

Iodates of titanium. Privada R Ray and Haridola Saha. *Proc 15th Indian Sci. Congr* 1928, 169–70.—*By the action of $HIO_3$ dissolved in $HNO_3$ (1:3 by vol.)* upon freshly prepd titanic acid dissolved in the same solvent, a basic iodate of Ti has been obtained. The individuality of the substance in question has been established by the fact that the same product was obtained from the liquid phase of varying concn. It is preferable to regard the compd as a complex tetrahydroxydiiodatotitanic acid for several reasons. It is converted by heating to 100° to the proper basic Ti iodate. Salts of complex hydroxyiodatotitanic acid have also been prepared.

E J C

A contribution to the study of the formation of salts with glycine. J V Dubský and A Rabas. *Spisy vydávané přírodovědeckou Fakultou Masarykovy Univ.* No 123, 3–18(1930), cf. *C. A.* 24, 4722.—Glycine (I) 7.5 g in 100 cc $H_2O$ was treated with 4.07 g ZnO at 20–40°, filtered and crystd., it yielded 2.8 g $(NH_2CH_2CO_2)_2Zn + H_2O$ (II). II is a white, cryst nonhygroscopic substance, sol in $H_2O$ 1.10, turns yellow at 240–260°, decomposes at 310°, hydrolyzes at 65–70° in $H_2O$ with the formation of $Zn(OH)_2$. II was also prepd by treating I with $ZnCO_3$ or $Zn(OH)_2$; II could not be prepd by treating $NH_2CH_2CO_2Ag$ with $ZnCl_2$. The mother liquor from II was further evapd at 50°, yielding 2.9 g of a white cryst mass $(NH_2CH_2COO)_2Zn$ 3 glycine + $H_2O$ (III). III melts with decompn at 245°, is sol in $H_2O$ 1.6 and nonhygroscopic, the solns are neutral. Aq solns of III crystallize, forming first I and then III in the last fractions. III was also prepd by treating 4.07 g ZnO in 100 cc $H_2O$ with glycine (15 g.) and evapg until crystals began to appear. $ZnCl_2$ 3 glycine (IV) was prepd by dissolving 3 g glycine in 20 cc $H_2O$, adding 2.73 g anhyd $ZnCl_2$ in 5 cc. $H_2O$ and permitting free crystn to occur for 10 days. The yield was 1.9 g., m. (with decompn.) 228°, hygroscopic, acid to litmus and having a bitter taste. $ZnCl_2$ 2 glycine + $2H_2O$ was prepd by treating 6.81 g anhyd $ZnCl_2$ in 3 cc. $H_2O$ with 7.5 g glycine in 18 cc hot $H_2O$. The filtered soln immediately gave glassy crystals m. 100° and decompg at 230°. $ZnBr_2$ 2 glycine + $2H_2O$ was prepd by mixing 2.25 g $ZnBr_2$ and 2.25 g glycine in 7 cc. $H_2O$. After standing, crystals (transparent) appeared, they m. 98°. $ZnSO_4$ glycine + $5H_2O$ (11.6 g.) was prepd from 11.5 g. $ZnSO_4 7H_2O$ and 3 g glycine in 10 cc. $H_2O$ by allowing crystn to proceed for 14 days. The white transparent crystals lose 4 $H_2O$ at 50–60° and leave $ZnSO_4$ glycine after drying at 80–125°. The crystals are stable in air, nonhygroscopic (m. 82°) and decompose at 320°. $(NH_2$-

The formation of green manganous sulfide. II. Influence of $NH_4Cl$, $NH_4OH$ and $NH_4HS$ on the transition of the red sulfide to the green. Georg Lansen. *Z. anorg. Allgem. Chem.* 193, 277–96 (1930). cf. *C. A.* 18, 598.—The effect of $NH_4HS$, $NH_4OH$ and $(NH_4)_2S$ on the transformation of the red to the green MnS was detd. by observations over 6 years. The presence of a slight excess of $NH_4OH$, up to 1 mol. per atom of Mn, greatly decreases the time required for the initial appearance of the green form. A larger ratio of $NH_4OH$ has the opposite effect. Changing the ratio of $NH_4HS$ or of $(NH_4)_2S$ used for pptn. does not affect the initial appearance of the green. An excess of $NH_4OH$ also does not increase the total rate of transformation. Independently of the green transition and simultaneously with it, but somewhat faster, occurs a transition to the orange sulfide. This modification, like the red, is amorphous while the green is cryst. The presence of $NH_4OH$ also hastens the red to orange change. The interpretation of these results shows that the initial reaction in the pptn. reaction yields the complex Mn(OH)HS from which the stable green MnS is formed. In the presence of a large excess of $NH_4OH$, the equil., $Mn(OH)_2 + 2NH_4HS \rightleftharpoons Mn(HS)_2 + 2NH_4OH$, is shifted to the left. Green MnS is formed from $Mn(HS)_2$ only by evolution of $H_2S$, which accounts for the slow transformation.

H. F. Johnston

Lead oxides and their reducibility with carbon. P. Ya. Rode. *J. Russ. Phys. Chem. Soc.* 62, 1419–42 (1930).—The existence of 2 classes of lead oxides is established. To the first class belong oxides forming a series of solid solns., $\alpha$, from PbO to $PbO_{1.47}$ (content of active O from 0 to 1.47%). The color of these oxides varies from light to dark brown. To the second class belong lead oxides forming a series of solid solns. $\beta$ from $PbO_{1.5}$ to $PbO_{1.33}$ (active O content from 2.2 to 6.24%), and solid solns. $\gamma$, from PbO to $PbO_{1.5}$ (active O content from 0 to 0.1%). Between the $\beta$ and $\gamma$ series there is an interval from $Pb_3O_4$ to $PbO_{1.5}$. The color of the oxides varies from dark brown in $PbO_{1.33}$ to red in $PbO_{1.5}$ and from light brown in $PbO_{1.5}$ to yellow in PbO. The character of the bond of active O in all these oxides is of the zeolite type. Reduction with solid C is highly exothermic in the case of oxides rich in active O. Reduction takes place in 2 stages of which the first probably corresponds to formation of a suboxide and the other to complete reduction. Oxides rich in active O contain some $H_2O$ in the form of solid solns. The change of red lead oxide to yellow is not accompanied on the heating curve by any thermal effect.

S. L. Madorsky

Action of aqueous sodium polysulfide solutions on metallic copper. K. Fischbeck and E. Elben. *Z. Elektrochem.* 34, 642–5 (1928).—The times taken by sulfide solns. of various contents to form Cu$_2$S layers on metallic Cu of a standard color were measured. With solns. contg. virtually $Na_2S_4$ the velocity of thickening of the layer is proportional to the polysulfide content of the soln. and inversely proportional to the thickness of the layer. An analogous result is obtained with S vapor. The method of observation previously used (Fischbeck, *C. A.* 20, 3152) cannot be applied to the interaction of S and Cu. Some observations are made on sulfide solns.; the pentasulfide ion is probably more highly colored than the tetrasulfide ion.

B. C. A.

The action of hydrogen sulfide on potassium chromate solution. H. B. Dunnicliff and Chaman L. Soni. *Proc. 15th Indian Sci. Congr.* 1928, 167.—In dil. solns. (2.15% $K_2CrO_4$) the color changes from yellow to green with evolution of heat. The

Cr is recovered quantitatively as hydroxide and the K is obtained as $K_2S_4$ and $K_2S_2O_3$. E J C

The interaction of sulfur dioxide and ammonia. G Sambamurti and M N L Narasimham *Proc 15th Indian Sci Congr 1928*, 169.—Dry $SO_2$ and dry $NH_3$ interact to form 2 isomers of the constitutions $H_2NS(O)ONH_4$ and $H_2NS(O)_2NH_4$. No details are given. L J C

*Reactions involving hydrogen peroxide, iodine and iodate ion. III The reduction* of iodate ion by hydrogen peroxide. Herman A Liebhafsky *J Am Chem Soc* 53, 896–911(1931) cf *C A* 25, 1430.—The rate of reduction of iodate ion by $H_2O_2$ is expressed within ±5% by $-d[IO_3]/dt = 2.6 \times 10^{-4}[H_2O_2][IO_3^-] + 12.9 \times 10^{-4}[H^+][IO_3^-][H_2O_2]$. The first step in the reduction of iodate may occur in the following ways $IO_3^- + H_2O_2 \longrightarrow IO_2^- + H_2O + O_2$; $IO_3^- + H_2O_2 + H^+ \longrightarrow HIO_2 + H_2O + O_2$ followed by $H^+ + IO_2^- \longrightarrow HIO_2$, $HIO_2 + H^+ + I^- \longrightarrow 2HIO$; $2HIO + 2H_2O_2 \longrightarrow 2I^- + 2H^+ + 2H_2O + O_2$; $HIO + I^- + H^+ \longrightarrow H_2O + I_2$. At the beginning of every expt there is an interval of time during which the rate of formation of $I_2$ differs from that required by the equation $dI_2/dt = k_1[H_2O_2][IO^-] + k_2[H^+][H_2O_2][IO_3^-]$. *This time interval is necessary to establish the concns of intermediate products required for the reduction of the iodate ion.* Don Brouse

The influence of coördinately bound groups on the properties of the central iron *atom in iron cyanide compounds* Oskar Baudisch *Biochem Z* 232, 35–49(1931).—Reagents are described for the identification of complex Fe ions. Benzidine and guaiac solns are oxidized by ferri as well as autoxidized ferro-aquo salts, but 5 aminouracil reacts only with the latter at $p_H$ 3.8–8.0. Other compds of the same type as 5 aminouracil give the same reaction and serve as very sensitive reagents for the ferro-aquo salts. From fermentation isobutyl alc a N contg substance was obtained which also reacts with freshly prepd ferro-aquo salt solns. Ferric ions can be demonstrated in the presence of complex ferric ions by means of thioglycolic acid, while nitrosophenol distinguishes ferrous ions. For the identification of ferro-aquo ions the reaction with dithiooxamide has been employed. The ferro-aquo salt soln is oxidized by 0.01 *N* $H_2O_2$ *directly only in an acid medium. The ability of a series of substances to reduce* ferri aquo salt solns and to inhibit the reaction with dithiooxamide is recorded in a table. S Morgulis

The influence of $p_H$ upon the formation and decomposition of the chloro derivatives of ammonia. Robert M Chapin *J Am Chem Soc* 53, 912–20(1931), cf *C A* 23, 4158.—This paper is a study of factors influencing the kind and amt of products obtained by the chlorination of $NH_4$ ions. $Cl_2$ attacks $NH_4$ ion only after conversion into HClO. H ion induces the formation of $NH_4$ ion from $NH_2Cl$ and $NHCl_2$, particularly below a characteristic $p_H$, the HClO resulting ($NH_2Cl + H^+ + H_2O \longrightarrow NH_4^+ + HClO$) reacts to produce a more highly chlorinated deriv. OH ion induces the formation of Cl ion from $NCl_3$ or $NHCl_2$, *particularly above a characteristic* $p_H$, with $N_2$ and ClO ion as the principal assocd products. With increasing dilu $N_2O$, $NO_2$ ion and $NO_3$ ion also appear. C is unable to confirm the statement that some $O_2$ is formed by the passage of $Cl_2$ into $NH_3$ water. Cf *Chem News* 5, 246 (1862). W C Fernelius

The system water–potassium nitrate–calcium nitrate at 25°. Mohammad A Hamid and Ram Das *Proc 15th Indian Sci Congr* 1928, 169.—On account of the relatively great electroaffinity of the $NO_3$ ion, the formation of double nitrates is found to occur only when one of the metals has a valency greater than two or when one metal is of high at wt and vol. The unexpected formation of a double nitrate of K and Ba, $K_2Ba(NO_3)_4$ (*Wallbridge, Am Chem J* 32, 251(1904)) *led to a consideration of the* possibility of the existence of similar double nitrates of K with other alk earth metals. In the case of Ca no evidence of double-nitrate formation has been found from an investigation of the system $H_2O$–$KNO_3$–$Ca(NO_3)_2$ at 25°. A no of hydrates of $Ca(NO_3)_2$ have been reported in the literature. H and D 's observations that the only stable hydrate at 25° is the tetrahydrate, $Ca(NO_3)_2 \cdot 4H_2O$ agree with those of Basset and Taylor (*C A*. 6, 2044). E J. C

Pneumatolytic synthesis of silicates. I. C. J van Nieuwenburg and H B Blumendal. *Rec trav chim* 50, 129–38(1931).—On the basis of previous expts (*C. A* 24, 5553) *on* the volatilization of $SiO_2$ by steam above its crit temp., *silicates* have been *synthesized by placing* the metal oxide and $SiO_2$ in sep *crucibles and heating* them in an autoclave with steam at temps of about 365° and pressures of 200 to 250 atm. In this way β wollastonite, Sr metasilicate, alamosite, illemite, tephrosite, antigorite and diopside have been prepd. Such syntheses may be very significant from

a geological point of view. Ferricyanide may, in general, be used instead of $S_2O_3$. J. H. REEDY

The composition of the cyanide complex radical of metals. II. Cadmium cyanide complex radical. KOSAKU MASAKI. *Bull. Chem. Soc. Japan* 6, 60–4 (1931). *cf. C. A.* 24, 2178.—The complex of the cadmium cyanide complex ion is probably $Cd(CN)_4^{--}$ at all concns. The ratio of combined cyanide to Cd in the complex ion was detd. by the titration method previously described (*C. A.* 24, 2178) in solns. of $Cd(CN)_2$, $CdSO_4$ and $CdCl_2$ in NaCN. Electrometric measurements of the concn. of $Cd^{++}$ ion confirmed the above conclusion. F. L. BROWNE

Lanthanum alkali oxalates. I. M. KOLTHOFF AND RUTH DUGGIST. *J. Am. Chem. Soc.* 53, 1222–6 (1931).—$La_2(C_2O_4)_3$ is found to be in equil. with $La_2(C_2O_4)_3 \cdot Alk_2C_2O_4 \cdot aH_2O$ at approx. 0.012 *N* $(NH_4)_2C_2O_4$, 0.01 *N* $K_2C_2O_4$ or 0.02 *N* $Na_2C_2O_4$. With 0.125 *N* $K_2C_2O_4$ or 0.225 *N* $Na_2C_2O_4$ the compd. $La_2(C_2O_4)_3 \cdot 2Alk_2C_2O_4 \cdot nH_2O$ forms. Double compds. do not form with $H_2C_2O_4$. J. E. SNYDER

Ammines and amides of quadrivalent platinum as acids and bases. A. A. GRINBERG AND G. P. LAVRMANN. *Z. anorg. allgem. Chem.* 193, 193–23 (1930).—The ammines and amides of Pt in aq. soln. have weak acidic and basic properties, resp., owing to the reaction, $[R_2Pt(NH_2)_2]^{++} \rightleftharpoons [R_2Pt(NH_2)]^{+} + H^{+}$. The extent of this reaction for several complexes was detd. by colorimetric measurement of the $p_H$ of their dil. solns. Of the 5 amides studied the strongest base was $[en(NO_2)_2NH_2ClPt]$, for which the $p_H$ = 10.2 for 0.002 molar soln., at 25°, a value approx. equal to that of aq. $NH_3$. At the same concn. and temp. the $p_H$ values of the other amides were $[Pt(NH_3)_2(NH_2Cl)]Cl_2$ 9.1, $[Pt(NH_3)_2NH_2NO_2Cl]Cl$ 9.5, $[enNH_2ClNO_2ClPt]$ 9.8, and its isomer, $[enNO_2ClNH_2ClPt]$ 9.8. [en = $(CH_2NH_2)_2$.] The value of the const. $K = [OH^-]^2/C$ is only slightly affected by the concn. but increases greatly with temp. The acid reaction of the complex ammines decreases as follows: hexammine > pentammine > tetrammine > diammine. The value of $K = [H^+]^2/C$ for the hexammine is of the same order as that of boric acid. The hydroxo-ammines of Pt have amphoteric properties due to the cleavage of $H^+$ from the $NH_3$ and to attachment of $H^+$ by the OH group. From a similar study of Rh complexes it is concluded that the dissocn. of complex bound $H_2O$ is $10^8$ times that of complex bound $NH_3$. The data are in agreement with the theories of Kossel and of Brønsted on acid and formation. H. F. JOHNSTONE

Compounds of hexamethylenetetramine with certain salts of silver and other metals and the influence of anionic volume on the capacity for association by the central positive atom. PRIYADA K. RAI AND JNANENDRA D. GUPTA. *Proc. 15th Indian Sci. Congr.* 1928, 168.—It has been established by Ephraim (*C. A.* 14, 2309, 15, 2258) that the capacity of a cation to assoc. with neutral mols. increases with the anionic vol. To test further the validity of this conclusion R. and G. prepd. a no. of well-crystd. compds. of $(CH_2)_6N_4$ (I) with various Ag salts such as AgCN, $AgCNO$, $AgCNS$, $AgClO_4$, $AgCrO_4$, $Ag_2Cr_2O_7$, $Ag_2SO_4$, $Ag_2SeO_4$, Ag molybdate and Ag tungstate. From a study of the nature and compn. of these compds. as well as of some other Ag salts of I previously described by others, it was concluded that Ephraim's generalization holds good also in the case of compds. of I. The anomalous result in the case of AgF is attributed to the formation of a complex anion of Ag and F due to polymerization. With a common anion the capacity of the cation for assocn. has also been studied in the case of certain newly prepd. compds. of I with cyanides of Cu, Cd and Ag. The compn. of these last compds. can also be explained in the light of Ephraim's conclusion. The failure of Ag tellurate, phosphate, borate, iodate, arsenite and arsenate to assoc. with mols. of I can also be accounted for on similar grounds. All the compds. of I described in this paper were obtained by a method based on the principle of substitution from an ammoniacal soln. of the salts. E. J. C.

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The hydrolysis of $ZnSO_4$ solutions, solubility product of hydrous ZnO and composition of the latter precipitated from $ZnSO_4$ solutions (KOLTHOFF, KAMEDA) 2. Complex Ag hyposulfites of Na (CARRIÈRE, RATLET) 2. Fe oxides and their reducibility with H and C (RODE) 2. Aromatic Sn compounds with halogen in the $C_6H_5$ nucleus (KOCHESHKOV, NESMEYANOV) 10.

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SMITH, G. FREDERICK. Perchloric Acid. Columbus, Ohio: G. Frederick Smith Chemical Co. 61 pp. Reviewed in *J. Chem. Education* 8, 1012 (1931).

WASSER, BRUNO. Alkalien und Erdalkalien in ausgewählten Kapiteln. Dresden: T. Steinkopff. About 200 pp. About M. 14, bound, about M. 15.50.

Text-Book of Inorganic Chemistry. Edited by J. NEWTON FRIEND. Vol. III, Part

I. The Alkaline Earth Metals. By MAY SYBIL BURR 316 pp $0 50 (Published in 1925) Vol. VI, Part I. Nitrogen. By EDMUND B R PRIDEAUX AND HERBERT LAMBOURNE 242 pp $10 (Published in 1928) Philadelphia J B Lippincott Co

## 7—ANALYTICAL CHEMISTRY

W T HALL

Recommended specifications for analytical reagent chemicals. W. D COLLINS, GREGORY P BAXTER H V FARR, J V EBERMAN, JOSEPH ROSIN, G C SPENCER AND EDWARD WICHERS *Ind Eng Chem, Anal Ed* 3, 221–4(1931).—Specifications for reagents to be used in careful analytical work are given for 60% $HClO_4$, $CdCl_2 2½H_2O$ $CrO_3$, $Pb(NO_3)_2$, MgO, $HgCl_2$ $Hg_2Cl_2$ $Na_2NOFe(CN)_5$ and $UO_2(NO_3)_2$ Corrections are given for published specifications for the correction to be applied in the gravimetric detn of $SO_4^{--}$ for $H_3PO_4$, $(NH_4)_2HPO_4$, $BaCO_3$, $MgCl_2$, $K_4Fe(CN)_6$, $K_3Fe(CN)_6$, $KH_2PO_4$, $NaHCO_3$, $Na_2HPO_4$ and $Na_2S_2O_3$ W T H

A simple method for determining the concentration of definite colloidal solutions. OTTO FINSTEIN AND HERMANN BORCHERT *Z anal Chem* 83, 101–10(1931), cf *C A* 24, 1267.—To a soln contg *sol* add portions of liquid until the Tyndall or fluorescent effect disappears With the aid of standard curves it is then possible to est the concn of the sol Exptl results are shown with mixts of cholesterol and water and also eosin and water W T H.

*Applications of ceric sulfate in volumetric analysis. IX. Standardization of thiosulfate solutions. Determination of thiosulfate.* N HOWELL FURMAN AND JOHN H WALLACE, JR *J Am Chem Soc* 53, 1283–8(1931), cf *C A* 24, 3720.—$Na_2S_2O_3$ solns can be titrated iodometrically with standard $Ce(SO_4)_2$ soln, the starch iodide end point gives better results than the potentiometric method Air must be excluded and if $Fe^{+++}$ is present, it must be rendered inactive by adding $PO_4^{---}$ The initial vol should be 10 times that of the 0.1 *N* thiosulfate used and 0.15 g of KI should be used for each 125 cc. of the initial soln W. T. H

Stabilizing hydriodic acid. HENRY BUKOSKI. *Chemist-Analyst* 20, No 3, 15 (1931).—*The addn of 1 g of red P to 1 l of HI soln will stop the liberation of I* Filter just before using W. T. H.

The use of polarographic methods in applied chemistry. J. HEYROVSKÝ. *Chem Listy* 24, 110–28, 147–8(1930), cf *C A* 24, 4200.—A résumé of the application of polarographic methods is given FRANK MARSH

Some application of Wood's light. I. COLOMBIER *Ann falsi.* 24, 89–96(1931).—The fluorescence of various compds when exam'd by ultra-violet light was exam'd with the following results: *Eosin* varies from dark to luminous over a $p_H$ range of 2.5–4.5 *Erythrosin* varies from dark to luminous over a $p_H$ range of 4–4.5 *Fluorescein* varies from dark to luminous over a range of 4–4.5 *Quinine* shows strong fluorescence at $p_H$ 5, decreasing sharply at first and then more slowly, becoming dark at $p_H$ 9 *Acridine* shows a sharp change from green to violet at $p_H$ 5 With *umbelliferone* fluorescence appears sharply at $p_H$ 6.5 With *β-methylumbelliferone* fluorescence appears sharply at $p_H$ 7. With *β-naphthol* fluorescence appears sharply at $p_H$ 9.5 None of these compds. is suitable for $p_H$ detns, but the last 4 can be used as acidimetric indicators Particularly with umbelliferone and β-methylumbelliferone, good results were obtained with strong acids and bases at dilns up to 0.001 *N* and with AcOH and $NH_3$ at dilns up to 0.01 *N*; also with carbonates by working at boiling temp, or preferably by adding excess acid, boiling to expel $CO_2$ and titrating back with alkali Acridine gives good results, but its use is advantageous only for $NH_3$ for which it can be used at dilns. up to 0.002 *N*, at higher dilns. it is less sensitive than umbelliferone. *β-Naphthol* is of some interest, but its end point lies in the alk. range, and the use of umbelliferone is preferable. Detn of the acidity of wine by titration in ultra-violet light in the presence of umbelliferone is not satisfactory because of the strong absorption of ultra-violet rays by the wine; it can be carried out by microdetn (dilu of 1 cc. of wine to 250 cc. and titration with 0.001 *N* alkali), but the results are considerably lower than by titration in the presence of phenolphthalein because the end point of the latter is at a considerably higher $p_H$ (9–10 as compared with 6.5 for umbelliferone). The method gave excellent results for the direct titration of highly colored dye-house effluent with 0.1 or 0.01 *N* alkali A no. of qual. tests based on the formation of a fluorescent compd have been developed (1) *Detection of malic acid*: add 1 cc of 0.1% soln. of resorcinol *to a few cc. of soln. or a few particles of powder to be tested*, evap. to dryness on a water

...ut take up in 1 cc. of 3 1 $H_2SO_4$ (3 vols $H_2SO_4$ + 1 vol. water), heat 5 min. on the ... with dil. with 10 cc. water and neutralize exactly with NaOH; if malic acid is ... there is a beautiful blue fluorescence in ultra-violet light, the test is sensitive ... mg. The reaction is not absolutely sp., as it is given by all β-ketonic acids; but ... are of rare occurrence and their other characteristics are quite different. (2) ... *citric acid* boil a few cc. of the soln. with dil. $KMnO_4$ to a light yellow ... add 1 cc. of 0.1% resorcinol and proceed as for malic acid. The reaction is sp ... test to 0.1 mg. The color of the fluorescence is different from that produced by ... acid and is readily distinguished therefrom, especially if a comparative test is ... (3) *Detection of resorcinol* add 1 cc. of concd. $H_2SO_4$ to a small amt. of the ...mple followed by 1 cc. of acetoacetic ester. Sufficient heat is developed by the reaction. Observe directly; resorcinol gives a beautiful violet fluorescence, which is intense even with 0.05 mg. resorcinol. The reaction is sp., β naphthol being the only other phenol giving a similar reaction, but the coloration is quite different and is produced by the addn. of $H_2SO_4$ alone. (4) *Detection of β-naphthol* dissolve a few mg. of the sample in concd. $H_2SO_4$ and heat 2 min. on the water bath; in ultra-violet light there is a beautiful violet blue fluorescence if β-naphthol is present. The reaction is sp. and is particularly useful for distinguishing between α- and β naphthol. (5) *Detection of orcinol* in Crump's reaction (treatment with $CHCl_3$ and potash) after dilu. there is produced a beautiful green fluorescence, which is much stronger in ultra violet light than in ordinary light and which readily makes possible detection of a fraction of a mg. of orcinol. A. Papineau-Couture

Diphenylamine as an inside indicator for the determination of iron. Carroll B. Core. *Chemist-Analyst* 20, No. 3, 14 (1931).—Further commendation of this well-known method. Even with $KMnO_4$ titrations the addn. of 4 drops of the indicator soln. has been found advantageous. W. T. H.

Solutions for colorimetric standards. IV. Some factors affecting the color of indicator solutions. M. G. Mellon and G. W. Ferner. *J. Phys. Chem.* 35, 1025–43 (1931); cf. *C. A.* 24, 2962.—Because of trouble in detg. $p_H$ values with indicators from different sources the present work was undertaken to secure information on the effects of (1) the purity of the indicator, (2) the method of prepg. stock solns. of indicators and (3) aging, particularly with respect to the effect of light upon the color. Thirteen indicators were studied: methyl orange, tropeolin OO, bromophenol blue, bromocresol purple, bromothymol blue, phenol red, bromocresol green, methyl red, cresol red, thymol blue, chlorophenol red, bromophenol red and cresolphthalein. As a result of a systematic spectrophotometric study, it is clear that the source of the compds., the way in which the solns. are prepd. and the effect of ultra violet rays are not without influence on the color of the solns. On account of the decolorizing effect of ultra-violet radiation on buffered solns. contg. indicators, the solns. to be used as standards should be protected from strong sources of photochemically active radiant energy. A uniform method should be followed in making up the color standard solns. Definite specifications should be established for indicators to be used as color standards. W. T. H.

The reduction of phosphomolybdic acid by monomethyl-*p*-aminophenol and its use in the quantitative determination of phosphorus. S. L. Leiboff. *J. Lab. Clin. Med.* 16, 495–9 (1931).—Monomethyl *p*-aminophenol is a satisfactory reducing agent for phosphomolybdic acid in the detn. of P. The reagent is stable in the presence of $Na_2SO_3$ and the color produced is stable within a wide range of acidity. E. R. Main

Oxygen in aluminum and a method for its determination. Takayasu Hakada. *Anniversary Vol. Dedicated to Masumi Chikashige* 1930, 237–43.—Less than about 0.38% of O is present in solid soln. in Al metal. If more O is present in a sample, it exists as $Al_2O_3$ at the boundary lines of the Al crystals. The method described depends upon heating Al shavings gradually to 750° in a strong stream of $Cl_2$, which has been purified by passing the gas over hot C; it was proved that the CO formed had no effect upon the analysis. After 15 min. at 750° all of the Al should be removed as volatile $AlCl_3$. The residue in the boat was washed with very dil. HCl and analyzed for $Al_2O_3$ after removing Fe and $SiO_2$. W. T. H.

A qualitative color reaction for magnesium. J. V. Dubský and Arn. Okáč. *Chem. Listy* 24, 492–3 (1930).—*o,p*-Dihydroxybenzeneazo-*p*-nitrobenzene gives a blue coloration with salts of Mg in an alk. medium. The color is not a compd. of Mg or a lake, but an adsorption of the dye upon the $Mg(OH)_2$. The color is not sp.: Ni salts give an identical color, while Co salts give a different shade of the same color. The dye (0.5 g.) is dissolved in 100 cc. of a 1% alk. soln.; the dye is very insol. in neutral water. One drop of the dye soln. is added to an unknown Mg soln. and 2 *N* NaOH is added. The alk. dye soln. is violet, upon adsorption by the $Mg(OH)_2$ a distinct blue color

*appears It will detect 0.000002 mg Mg Thiazole yellow A in a 0.01% soln is pale* orange, upon adsorption by $Mg(OH)_2$ it becomes rose and will detect 0.0002 mg Mg per cc Toluyl orange R (S), benzopurpurin 4B(Gr-P), azo blue By and diamine pure blue FF (C) give only vague color changes FRANK MARSH

A method for the determination of thorium, uranium and potassium in specimens *of stones and minerals* HEINRICH GRAVEN *Sitzb Akad Wiss Wien Abt IIa*, 139, 181-93(1930).—A modified C T R Wilson tilted electroscope with ionization chamber attached was designed to use in detg the U, Th and K contents of stones and minerals without even breaking the specimens A careful study of the thickness correction was made by the use of artificial stones made of plaster of Paris with active substances mixed in To det U, Th and K it is necessary to make 3 measurements of the *ionizing* power, one without absorber, one with glass or gypsum absorber (differential absorption of U and Th series radiations), and one with Al foil for K detn An indication of the accuracy of the method is the uniform decreasing activity with increasing basicity of the rocks The method is probably accurate within 10% for U and Th but not so good for K ODIN P SHEPPARD

A sensitive test for molybdenum JOSEF V LASCHNA *Chem Ztg* 24, 105-6 (1930).—The test for Mo with K l t xanthate can be made more sensitive by using a deriv of a higher alc the cetyl alc deriv is the most sensitive The soln is prepd by mixing a satd soln of cetyl alc in $CS_2$ with powd KOH or a satd alc soln of KOH The unknown neutral soln is treated with a few drops of cetyl xanthate and made acid with 1.0 *N* HCl The presence of molybdic acid gives a dark violet color in extreme dilns the color adheres to the suspension of cetyl alc The limit of detection is 0.0005 *mg Mo per cc and the limit of dilu 1 2,000,000 Mo may be detected in a drop of* unknown liquid filter paper is impregnated with cetyl xanthate, dried, treated with a drop of unknown soln and exposed to HCl fumes The limit of detection is 0.0001 mg Mo per 0.05 cc The filter paper must be freshly prepd, as it keeps only about 24 hrs The effect of inorg salts upon the reaction is insignificant W gives no color *reaction with xanthates, so Mo may be detected in the presence of W Solns with* a high W content must be made strongly acid to insure a complete soln of Mo and W 0.01 mg Mo in the presence of 0.5 g W contained in 5 cc water was detected by the reagent The limit of dilu which still gave a color was 0.00002 mg Mo per 0.05 cc soln FRANK MARSH

Lead in basic bismuth nitrate. N SCHOORL *Pharm Weekblad* 68, 277-9(1931).—The $H_2SO_4$ test for Pb in basic Bi nitrate is capable of detecting 0.1% A W DOX

Method for the determination of silver. R STEVENS GIBBS *Chemist Analyst* 20, No 3, 10-1(1931).—*Directions are given for detg Ag as AgCl The manipulation* is somewhat different from that ordinarily recommended W. T. H.

Modified gravimetric determination of manganese. FREDERICK G GERMUTH *Chemist Analyst* 20, No 3, 11(1931).—$MnO(OH)_2$ can be ppted in the presence of $H_2SO_4$ by adding $K_2S_2O_8$ Upon ignition $Mn_3O_4$ is formed W. T. H.

*Determination of zinc with pyridine and ammonium thiocyanate.* C FRANKLIN MILLER *Chemist-Analyst* 20, No 3, 8-9(1931).—For the analysis of a Zn salt, take an aliquot contg about 0.3 g Zn, dil to 500 cc and add a soln of 4 g $NH_4CNS$ and 2 g pyridine in a little water. Filter, wash first with a soln contg 3 g $NH_4CNS$ and 5 cc pyridine per l, next with a mixt of 13 cc 95% alc, 85 cc water, 1.5 cc pyridine *and 0.1 g $NH_4CNS$, then with 10 cc of alc mixed with 1 cc of pyridine and finally* with 15 cc of ether contg 2 drops of pyridine Dry to const wt (10 min.) at 65-70°. The ppt contains 19.25% Zn W. T. H.

Colorimetric determination of minute amounts of cadmium. LAWRENCE T. FAIRHALL AND LEON PRODAN. *J Am Chem Soc* 53, 1321-3(1931).—The method, applicable to the detn. of traces of Cd in org material, depends upon pptn by means of $H_2S$ in the presence of 0.5 mg Cu and 2 g of Na citrate in a soln which has been made $p_H = 3$. The ppt of CuS and CdS is dissolved in aqua regia, the soln evapd to dryness and again treated with $H_2S$ *under the same conditions as before and finally a third* pptn is effected at $p_H = 2$ without any addn of citrate This last ppt is dissolved, the acid removed from the soln by evapn and the residue dissolved in a definite vol of water. Aliquots are then dild, treated with KCN soln and some $H_2S$ water. The color of the ppt is then compared with that of similarly-treated standard solns under *a flood of ultra-violet light.* The color deepens on standing W. T. H.

Colorimetric determination of tungsten. G HEVNE *Z. angew. Chem* 44, 217-8 (1931).—In the absence of $NO_3^-$, $Fe^{+++}$, $Tl^{++++}$, Cb, $CrO_4^{--}$, $ReO_4^-$ and $MoO_4^{--}$, small quantities of W can be detd *satisfactorily by the reaction with hydroquinone* in the presence of concd. $H_2SO_4$ If Mo is present, the test fails because of its color

reaction with the reagent In such cases *Rhodamine B* is a more satisfactory reagent. To be sure it also reacts with Mo salts but it requires 10–20 times as much Mo as of W to give the test so that it can be used when the quantity of Mo is smaller than that of W Otherwise it is necessary to det the Mo by a different method and apply a suitable correction Directions are given in detail for carrying out these tests, which have already been described by others W. T. H.

Estimation of copper in cyanide solutions. E H Smith *Chemist-Analyst* 20, No 3, 10(1931) —To det Cu in a soln used for extg Au from ores, take 100 cc. and destroy $CN^-$ by adding 5 cc of concd $HNO_3$ Evap to 20 cc., make acid with AcOH, add KI and titrate with $Na_2S_2O_3$ W. T. H

Study of the electrolytic determination of copper in the presence of platinic ion. T Leonard Kelly and Joseph J Molloy *J Am Chem Soc* 53, 1337–41(1931) —Fales and also Popoff, have shown that sometimes Pt is dissolved off the anode and deposited upon the cathode during electrolysis and the question arises as to whether the deposited Pt will dissolve off the cathode when the Cu is dissolved in $HNO_3$. In the 20 expts here described, a little $H_2PtCl_6$ was added to the electrolyte after a considerable part of the Cu had been deposited After the electrolysis, the gain in wt. indicated that practically all of the Cu and Pt had been deposited and, after dissolving off the Cu, the cathode weighed more than originally In only 6 cases, however, was the final gain in wt of the electrode equal to the total Pt in the soln and in no case was there any evidence of any Pt coming from the anode in spite of the fact that a little $Cl^-$ was added with the Pt The results show that Pt deposited on top of Cu during electrolysis is only partially dissolved by treatment with 6 *N* $HNO_3$ To test for Cu, diethyldithiocarbamate was used W. T. H.

New method for determining mercury in mercuric cyanide. E Cattelain *Ann chim anal chim appl* 13, 97–8(1931) —See *C A* 25, 1179 W. T H

Determination of traces of mercury Alfred Stock, Hermann Lux, Friedrich Cucuel and Franz Gerstner *Z angew Chem* 44, 200–6(1931) —After considering the various methods that have been proposed for the detn of traces of Hg, a method is described which permits the exact detn of as little as $1 \times 10^{-4}$ mg of Hg and the detection of $2 \times 10^{-5}$ mg The method depends upon the electrolytic deposition of the Hg on a Cu wire from a soln contg $HgCl_2$ After the electrolysis, the wire and its deposit are dried and heated The Hg distils off and is collected in a capillary. It is finally made to collect together into a tiny globule, the size of which is measured under the microscope To det Hg in urine, feces, etc., the Hg is pptd together with about 20 mg of added Cu by introducing $H_2S$ into the chlorinated soln , the mixt. of CuS and HgS is transformed to chloride and the soln (not over 20 cc ) is electrolyzed The method appears to be extremely sensitive and remarkably accurate but there are so many possible sources of error that the original paper should be studied carefully before attempting to make an analysis By means of this method, Hg has been detected in nearly every reagent in the lab , especially in HCl which has in every case showed a positive test Blue vitriol, $KClO_4$, tap water and distd water are among the few things that have been found to contain no Hg W. T. H.

Determination of a very small quantity of cadmium in a rich zinc ore. J G Fairchild *Chemist-Analyst* 20, No 3, 5–7(1931) —A soln 3 *N* in $H_2SO_4$ is recommended for the pptn of CdS in a sample sufficiently large to cause some pptn of ZnS. The ppt is dissolved and the pptn repeated twice more By evapn. with $H_2SO_4$, $CdSO_4$ is obtained and weighed W T. H.

Modification of Penny's method for determining iron in ores. Roy P. Hudson *Chemist-Analyst* 20, No 3, 6–7(1931) —The titration with diphenylamine as inside indicator is recommended with $H_2SO_4$-$H_3PO_4$ mixt added, as in $KMnO_4$ titrations Full directions for analyzing an ore are given W. T. H

Detection of the tin group metals and their separation from the copper group by means of ammonium monosulfide. Leo Lehrman *J Chem Education* 8, 946–51 (1931) —By passing $H_2S$ through 10 cc. of concd $NH_4OH$ for 15 sec a reagent is obtained which is recommended for the sepn of the sulfides of As, Sb and Sn from those of Hg, Bi, Pb, Cu, Bi and Cd. The advantage of such a reagent is that it does not dissolve appreciable quantities of the latter group of sulfides and the disadvantage is that it does not dissolve SnS well. The claim is made, however, that enough $Sb_2S_3$ and SnS dissolve to give pos tests W T H

Determination of silver in steel. Walter Berg *Chem.-Ztg* 55, 259(1931) —Treat 10–15 g of drillings with 250 cc. of 6 *N* HCl, evap to dryness and take up with HCl as in the detn. of $SiO_2$ Filter off the insol residue, which will contain AgCl, and

wash with hot water Digest the ppt with 5 *N* $NH_4OH$ and filter through the original filter Make the ammoniacal soln acid with HCl and set aside in a dark place. Heat the filtrate from the original $SiO_2$ pptn and introduce a vigorous stream of $H_2S$ for 0 5 hr Filter, wash with $H_2S$ water, dissolve the ppt in aqua regia and evap. to dryness Take up with 6 *N* HCl, make ammoniacal, heat to boiling and filter Make the filtrate acid with HCl, heat to boiling to coagulate the AgCl and filter off this ppt. together with that originally obtained Dry and weigh W T H

Thermal reduction of sulfur in a hydrogen atmosphere applied to the analysis of iron and steel Yoshito Yamaguchi *Anniversary Vol Dedicated to Masumi Chikashige* 1930, 111–8 —The assumption is made that aged samples of iron and steel contain free S and sulfates The following procedure is shown to take care of these constituents Weigh out a suitable quantity of sample into a porcelain boat and heat for *30 min at 800° in a stream of* $H_2$, *passing the gas from the furnace into ammoniacal* Cd soln Det the S in the resulting CdS by the usual iodometric method. Take the ignited residue, transfer to a flask and det its S content by the usual evolution method for detg S in steel W. T H.

Quantitative spectral analysis of metallic alloys. Gastone Guzzoni *Atti III congresso naz chim pura applicata* 1930, 636–7 —See *C A* 24, 2691 G M Murphy

Estimation of ferric oxide and magnetic oxide in the presence of iron and ferrous oxide. E W Cheesbrough *Chemist-Analyst* 20, No 3, 14–5(1931) —For detg. metallic Fe, treat 1 g with 100 cc of 20% $CuSO_4$ soln , filter, make acid with $H_2SO_4$ and titrate with $KMnO_4$ To det FeO, treat the residue from the Fe detn with 50 cc. of 7 *N* $H_2SO_4$ in a stoppered flask, filter, wash and titrate the filter with $KMnO_4$ To det total Fe, proceed in the usual manner To det. $Fe_3O_4$, place 0 5 g of sample on filter paper, rub the mass with another paper, tap off all powder from the latter, remove $Fe_3O_4$ with a magnet and weigh W T. H

Volumetric determination of magnesia and alumina in minerals and refractory stones. Horst Eckstein *Chem -Ztg* 55, 227(1931) —The following procedures are said to be accurate, but no analytical results are shown To det. Mg in ores, slags, etc., take up 2 5 g of sample in HCl, remove $SiO_2$ *as usual* and ppt Fe and *Al* twice with $NH_4OH$ Make up the filtrate to 500 cc. and take 20 cc. for the Mg detn. Dil to 100 cc., add 3–5 g $NH_4Cl$, 15 cc. of 3% 8-hydroxyquinoline and 2 cc. of concd $NH_4OH$. Boil, filter, wash, dissolve the ppt in HCl and titrate with 0 1 *N* KBr-$KBrO_3$ To det. *Al in refractory materials, fuse* 0 5 g *of* the sample in a Pt crucible with *5 g of borax*, take up the melt in dil HCl and remove $SiO_2$ in the usual way Make up the filtrate to 250 cc. and take 25 cc. for further analysis Dil to 100 cc., add 5 g $NH_4Cl$ and $NH_4OH$ until a faint turbidity results Add an excess of the reagent, heat to 70° and det the Al in the ppt. with 0 1 *N* KBr-$KBrO_3$ soln W T H.

Determination of lime and magnesia in roasted pyrite. Louis Schreiber. *Ann chim. anal chim. appl.* 13, 98–102(1931) —The method described calls for treatment with concd HCl, dehydration and removal of $SiO_2$, double pptn with $NH_4OH$ and $H_2O_2$, pptn of $CaC_2O_4$ and $MgNH_4PO_4$ No attempt is made to remove Pb or Cu but, when the former is present, $NH_4OAc$ is added to prevent formation of Pb oxalate or phosphate No analytical results are given to show that the procedure is accurate. W T H

Potassium permanganate as a reagent for the detection of lower oxides in phosphoric acid. John W Smith. *J Chem Soc* 1931, 528–9 —*To detect lower oxides in* $P_2O_5$, dissolve 1 g. of sample in 10 cc. of water in a glass-stoppered test tube In a similar tube place 10 cc. of pure $H_3PO_4$ soln of approx the same concn Add 1 cc. of 0 001–0 0002 *N* $KMnO_4$ to each soln and allow to stand for 2 hrs If there is any perceptible difference, the lower oxide is present. In this way as little as 0 002 mg of $P_2O_5$ can be detected For these small quantities of impurity it is well to keep the tube immersed in water at 60° for 2 min W. T. H

Quantitative analysis of phosphoric acid. V. New colorimetric determination. Masayoshi Ishibashi. *Anniversary Vol Dedicated to Masumi Chikashige* 1930, 1–7; cf. *C. A.* 23, 4645 —The method depends upon pptg the $PO_4^{---}$ as $MnNH_4PO_4$ and the colorimetric detn. of Mn as $MnO_4^-$ after oxidation with $NaBiO_3$ in $HNO_3$ soln In the expts described, in which the P content varied from 4 to 0 2 mg of $(NH_4)_2HPO_4$, the pptn , dissolving and treatment with bismuthate all took place in a centrifugal tube of 15 ml. capacity. *To the soln of* $(NH_4)_2HPO_4$ *a little 10% NH*$_2$*OH HCl* soln. and an excess of $MnCl_2$ were added together with about 100 mols of $NH_4Cl$ for each mol. of $MnCl_2$ The soln was heated to about 90° and concd. $NH_4OH$ added to effect complete pptn. of $MnNH_4PO_4$ After 5 hrs the ppt. was washed with a slightly ammoniacal molal soln of $NH_4Cl$ contg. a little $NH_2OH$. The ppt. was dissolved in 4

It seems probable that the Clark and Jelley test depends on some substance other than $S_4O_6^{--}$ which is formed from $S_2O_3^{--}$ by oxidation with I. By titrating dil $S_2O_3^{--}$ solns with I-starch azide mixt the method may be made quant In the discussion Clark and Jelley showed a new reaction a soln of $NaN_3$ and $K_2S_4O_6$ forms $S_2O_3^{--}$ and $N_2$ on heating They think it possible that nascent $S_4O_6^{--}$ is sufficiently active to react with $N_3^-$, re forming $S_2O_3^{--}$ which then reacts with the excess of I present, restarting the cycle, so that a small quantity of $S_2O_3^{--}$ can cause decompn of a large amt of azide E. E JELLEY

The detection and determination of methanol. LUCIEN SEMICHON AND MICHEL FLANZY *Ann falsi* 24, 80–7(1931) —A complete oxidation of MeOH to $CO_2$ and $H_2O$ *can be accomplished by excess* $K_2Cr_2O_7$ *in* $H_2SO_4$ *soln, when MeOH is in excess* the products consist of a mixt. of $CH_2O$, $HCO_2H$ and methylal or of a mixt of $HCO_2H$ and methylal The methods proposed to date for the oxidation of MeOH to $CH_2O$ give a yield of only 3 10% of theory, but S and F obtain a yield of about 32% by first detg the total oxidizability of the mixt Details of the technic are described The $CH_2O$ can be identified by means of $NH_2OH$, $PhNMe_2$ or preferably $PhNHNH_2$.HCl by the method of Bertrand, for the detn a known amt of MeOH is simultaneously treated in exactly the same way as the sample, and the 2 solns are compared colorimetrically A PAPINEAU COUTURE

The de Haas fluorescence reaction of β-naphthol N SCHOORL *Pharm. Weekblad* 68, 279 80(1931) —The green fluorescence described by de Haas (*C A* 25, 1183), obtained when an aq soln of β naphthol is treated with glacial AcOH and concd $H_2SO_4$ is added, does not occur immediately with purified AcOH unless a trace of AcH is added It does occur, however, with highly purified AcOH if the reaction mixt is allowed to stand for a long time A W DOX

The Hehner test for formaldehyde (in milk). CHARLES C FULTON *Ind Eng Chem, Anal Ed* 3, 199–200(1931) —The Hehner test is improved by using Br as oxidizer and by dilg the $H_2SO_4$ The improved test is sensitive to 1 1,000,000 Two procedures are given For a zone reaction dil 5 cc. concd $H_2SO_4$ with 1 cc. $H_2O$ and cool To 3 cc of this diluted acid add a small crystal of KBr Shake and then overlay with 1 cc. of the milk to be tested A violet zone quickly develops To obtain a uniform color throughout the soln, dil 8 cc. concd $H_2SO_4$ with 5 cc. $H_2O$ and cool To 4 cc. of this diluted acid add 1 cc of the milk and mix under cooling Add 0 5 cc of *a mixt of equal vols of concd* $H_2SO_4$ *and satd Br water and shake. A violet color* develops at once This procedure is well suited for distillates Dil the acid with the distillate to be tested and use pure milk C. A ABELEDO

The opium alkaloids as reagents for formaldehyde. CHARLES C FULTON *Ind Eng Chem, Anal Ed* 3, 200–1(1931); cf *C A* 24, 467 —The addn of an oxidizing agent increases the sensitivity of the test for detecting $CH_2O$ with alkaloids With *apomorphine, codeine or pseudomorphine the test is unmistakably sensitive to 1:500,000,* with papaverine, to 1 100,000 The oxidizing agent used is a 10% soln of $Fe_2(SO_4)_3$, or 5 drops of concd $HNO_3$ in 50 cc. water The tests are not sp for $CH_2O$ but when carried out on a distillate its identification is fairly certain. Papaverine gives the most nearly sp test. C. A ABELEDO

The iodometric determination of copper and its use in the estimation of reducing sugars. R INTONTI *Ann chim applicata 20, 583–90(1930)* —The iodometric titration of $Cu_2O$ dissolved in $HNO_3$ is preferred to the result obtained by the vol procedure of Fehling To make sure that no $HNO_2$ is present, treatment with $CO(NH_2)_2$ is recommended A W. CONTIERI

Bromopotentiometric titration of β-naphtholsulfonic acids in presence of each other. III. Mixtures containing oxy-Tobias acid, F acid and trisulfo acid. J. SMITH HARLAND, STANLEY D FORRESTER AND DAVID BAIN *J. Soc. Chem Ind* 50, 100–2T (1931); cf *C A*. 25, 474 —The β naphtholsulfonic acids, with no sulfonic group in the 8-position, can be detd in the presence of those acids which have the $SO_3H$ group in this place, but an excess of KBr is necessary for the potentiometric titration if crocein or oxy-Tobias salts are present In the presence of 10 *N* $H_2SO_4$, the OH group of the β naphtholsulfonic acids is converted completely to sulfate and this, when associated with the $SO_3H$ group in the 8-position, prevents the Br from entering at the 1-position. F acid exists as the tetra, di-, and mono-hydrates as well as in the anhydrous condition The tetrahydrate m 67°, the dihydrate m 95°, the monohydrate m 108–9° and the anhydrous acid m 115–6°. The method recommended for analyzing the mixts is that recommended in Part II W. T. H.

Qualitative testing of acetic acid. E. TSCHIRCH. *Oesterr. Chem.-Ztg* 34, 38–40 (1931) —The red color produced with $FeCl_3$ is not a reliable test for acetate, the for-

mation of ethyl acetate, to be identified by the odor, is a useful test but depends too much upon the personal equation. The cacodyl test is not at all reliable as the higher homologs of AcOH give a similar result. The test with phthalaldehyde and $NH_4OH$, which gives a bluish green color, is less well known, it is fairly sensitive but is given by the homologs of AcOH. The best test is that of treating 1–3 cc. of soln. successively with 1 cc. of 5% $La(NO_3)_3$ soln., 1 cc. of 0.02 *N* I soln. and a few drops of $NH_4OH$. On gradually heating to boiling, a starch blue color develops, which is a good test not only for La but also for $AcO^-$. The homologs of AcOH give similar color effects and $SO_4^{--}$ or any anion that ppts. La must be removed. The fact that AcOH can be distd. off easily from a soln. often helps in the prepn. of suitable solns. for the test. $SO_4^{--}$ and $PO_4^{---}$ can be removed by ppts. with Ba and when large quantities of $NO_3^-$ or $Cl^-$ are present, advantage can be taken of the fact that 100 cc. of abs. alc. dissolves 1.81 g. of NaOAc but only 30 mg. of $NaNO_3$ and 65 mg. of NaCl. W. T. H.

*Methods for the analysis of technical solvents. II. Color tests for benzene, nitrobenzene, toluene and xylene.* Hans H. Weber. *Chem. Ztg.* 55, 201–3(1931), cf. *C. A.* 24, 2083.—For the colorimetric detection of these aromatic hydrocarbons it is well to transform them first into polynitro compds. Take not over 0.5 cc. of the solvent, or *more* if it is a soln. in gasoline or the like, and mix with 1 cc. of concd. $HNO_3$ and 2 cc. of 100% $H_2SO_4$. Shake 1 min. and cool. Take 0.1 cc. of the acid layer and dil. with 1 cc. of water, which will cause the formation of a suspension in water of the nitro compds. Sufficient water must be used so that the alc. subsequently added will not be attacked. *Detection of benzene.*—Mix 0.5 cc. of the aq. suspension with 1 cc. of isoamyl alc., add 2 *N* NaOH till alk. and shake for 1 min. with a stick of NaOH 1 cm. long. If only benzene is present, the amyl alc. layer remains practically colorless, but if the higher homologs are present a dirty brown paste is formed with fugitive colorations. Now, with still a little solid NaOH remaining undissolved, add 1 cc. of acetone, an intense blue to permanganate-violet color should form, becoming brown on long standing. By this test benzene can be identified in the presence of its homologs and in mixts. with EtOH or $C_2H_3Cl_3$. *Detection of nitrobenzene.*—This gives the same test as benzene, but on account of the great difference in b. p. as well as odor, there is little danger of confusing the two. In case of doubt, however, take 10 cc. of the original sample and treat in a large test tube with 10 cc. of abs. alc. and 5 cc. of concd. HCl, add a small piece of Sn and some coppered Zn, heat 15 min. on the water bath, sep. from undissolved metal in a separatory funnel, pour off the liquid from the undissolved metal into a small separatory funnel, draw off the bottom layer, add a little $KClO_3$ and 0.5 cc. of concd. $HNO_3$ (Peset's test for aniline), after the mixt. has stood without shaking rings with red and blue edges form if only a trace of nitrobenzene was originally present (resin oils give brownish red colors and some phenols give pale red effects). *Detection of toluene.*—Mix 0.5 cc. of the aq. suspension with 1 cc. of pure benzyl alc., add 2 *N* NaOH to alk. reaction and shake. The alc. layer will be colored brownish red, a violet shade sometimes appearing first. *Detection of xylene.*—Mix 0.5 cc. of the aq. suspension with 1 cc. of cyclohexanol, make alk. with 2 *N* NaOH and shake well. The alc. layer should be an intense green. This test depends upon a reaction of *m*-xylene, which constitutes 70–85% of com. xylene. It can be used successfully in the presence of benzene and toluene when not more than 10% of these lower homologs is present in the original solvent. In case of doubt try the test after adding 96% alc. to the original solvent (xylene fraction) and then water until a turbidity results, xylene will sep. before benzene or toluene, and in this way a portion rich in xylene can be obtained and the presence of 2.5% xylene detected in a mixt. W. T. H.

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Furfural as an industrial poison and its determination in air (Korenman, Resnik) 13. Organic Pb compounds [determination of Pb in aryl Pb compounds] (Austin) 10. Quantitative chemical analysis by means of the absorption of x rays (Moxnes) 3. Apparatus and methods for precise fractional distillation. Analysis. New method of gas analysis (Podbielniak) 2.

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Analytical Reagents, Standards and Tests. 3rd ed., rewritten. Compiled first by Edmund White. London: Hopkin and Williams, Ltd. 135 pp. 2s. 6d. Reviewed in *Pharm. J.* 126, 364(1931).

Charles and Martin. Recueil de manipulations de chimie et métallurgie. Fasc. I. Analyse chimique qualitative et quantitative. Paris: Vuibert. 96 pp. F. 10.

Michiels, L. Éléments de chimie analytique. 2 vols. Louvain: Uystpruyst. F. 40 per vol.

Separating arsenic from vanadium and phosphorus. OSKAR JOCHUM Ger. 521,191, June 16, 1929 A soln contg these elements as alkali or $NH_4$ arsenates, vanadates and phosphates is satd at 30–100° with $SO_2$ or a bisulfite, and the soln is then boiled to remove excess of $SO_2$ A ppt contg the V and P but no As is thus obtained.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T WHERRY AND J P SCHAIRER

Practice of mineral polishing. WERNER GRÖNDER *Metall u Erz* 28, 143–7 (1931).—Various methods of prepg specimens for microscopic examn are investigated Relief polishing is not always the most suitable means of bringing out the structure of the sample Plane polishing in which the structure is brought out in only very weak relief, is often more satisfactory An oil emery mixt is found suitable for this purpose The details of mounting and prepg the specimens are given H STOBBTZ

Stephanite, argentite and silver, South Lorrain, Ontario. T L WALKER Univ Toronto Studies, *Geol Ser*, No 29, Contributions Can Mineral, 1930, 13–5.—The Ag minerals occur in veins with a gang of calcite assocd with arsenides of Co, Ni and Fe Some vein cavities contained argentite, wire Ag, stephanite, proustite and rarely pyrostilpnite followed by a final deposition of calcite lining the cavity walls Argentite was the most abundant J W SHIPLEY

Mineralographic study of the marcasite group ELLIS THOMSON Univ Toronto Studies, *Geol Ser* No 29, Contributions Can Mineral, 1930, 75–83.—A description is given of marcasite, loellingite, arsenopyrite, safflorite, rammelsbergite, glaucodite alloclasite and nickel skutterudite based on a study of polished mineral sections etched with various special reagents The phys and microchem properties are listed in a table J W SHIPLEY

Fibrous marcasite in crystalline calcite near Logansport, Indiana. ERNEST R SMITH AND RUSSEL A SCHROEDER *Proc Indiana Acad Sci* 38, 231(1929).—Analytical data are given to show that a fibrous greenish gold, metallic mineral zonally distributed through the outer portions of calcite masses has the compn $FeS_2$ The color of the sulfide indicated it was marcasite rather than pyrite, and this is considered to have been confirmed by soln in concd $HNO_3$, free S being formed H. M S

Lodestone from Bon Accord, Transvaal. T L WALKER Univ. Toronto Studies, *Geol Ser.* No 29, Contributions Can Mineral, 1930, 17–0.—The analysis of a sample from a specimen of lodestone secured 10 miles north of Pretoria, S. Africa, indicated magnetite 54 06%, limonite 9 35%, ferric titanate 35 32%, Si and Mg 1 62% when the Ti was considered as occurring as the dioxide and the reducing action toward $KMnO_4$ ascribed entirely to $Fe^{++}$ Since 95% of the specimen appeared to be one mineral species, W. suggests that the Ti is present as $Ti_2O_3$, which on going into soln reacts with the $Fe_2O_3$ as follows: $Fe_2O_3 + Ti_2O_3 \longrightarrow 2FeO + 2TiO_2$. A recast of the analysis would give 13 87% for spinel, 76 67% of sesquioxides largely ferric, and the residue limonite. The dominant mineral would then be titaniferous maghemite, $(Fe, Ti)_2O_3$ J. W. SHIPLEY

X-ray distinctions between magnesite and dolomite. FRANZ HALLA. *Monatsh* 57, 1–8(1931).—Powder spectrograms of very pure samples of the minerals from various sources have been utilized to establish their structure. They can be distinguished with certainty in this manner The parameters of the rhombohedral unit cell of $CaMg(CO_3)_2$ are $a$ 6 050 ± 0 004 A. U., and $\alpha$ = 46°54′. Detailed studies and reproductions are given. GREGG M. EVANS

The optical properties of manganese-poor grünerites and cummingtonites compared with those of manganiferous members. N SUNDIUS *Am J. Sci* [5], 21, 330–44(1931).—Full optical data are given ALDEN H EMERY

Pyroxene and scapolite from Templeton Township, Quebec. A. L. PARSONS Univ. Toronto Studies, *Geol. Ser* No 29, Contributions Can Mineral, 1930, 25–8.—A description of crystals of pyroxene and scapolite is given together with a chem analysis of each J. W. SHIPLEY

Chemical and optical study of amphibole. A L PARSONS Univ. Toronto Studies, *Geol. Ser.* No 29, Contributions Can. Mineral, 1930, 29–33.—A crystallographic and chem study of black crystd hornblende from Monteagle Township, Hastings County, Ontario, was made An increase in the $n$s of the amphiboles, closely related to the total Ti and $Fe^{+++}$ oxides, was observed J. W. SHIPLEY

Calamine, galena, magnetite. T. L. WALKER AND A L PARSONS Univ. Toronto

Studies *Geol Ser* No 29, Contributions Can Mineral, 1930, 21–3.—Specimens of calamine from the Broken Hill Mines, Northern Rhodesia, were examd crystallographically the form (052) was observed Galena from the Ivanhoe Pb-Ag mines at Sandon B C was found to contain free S The alteration products form a series of fine parallel bands in the mineral with an occasional small cavity containing brilliant crystals of anglesite Large crystals up to 10 lbs of magnetite were obtained from Faraday Township Ont The largest crystal encloses both apatite and lepidomelane and a cavity from which some mineral possibly calcite or apatite, has disappeared Analysis indicated an almost perfect balance between RO and $R_2O_3$ J W. S

Chemical formulas of hallyuite and cancrinite. L H Borgström *Bull comm geol Finlande* 1930, No 92 51–7.—An English version of the article abstracted in *C A* 24, 3196 H C. Duus

Lattice dimensions of heulandite from Wasson's Bluff, Nova Scotia. A L Parsons Univ of Toronto Studies, *Geol Ser* No 29, Contributions Can Mineral 1930, 37–8.—The dimensions of the unit cell for the heulandite were found to be *a* 7 5438, *b* 17 969 *c* 15 913 A U and β 83°34′ (Dana) The sp gr of the crystal was 2 22 Calcn from the chem analysis of heulandite from the traps of Digby Gut, Nova Scotia, failed to give a simple formula for the mineral but corresponded to a mixt of a hydrous metasilicate with a hydrous orthosilicate in the proportions of 4 1 From this assumption N = 1 0113 Other mixts are equally possible but the evidence indicates an isomorphous mixture of 2 types of mols in heulandite J W Shipley

Lattice dimensions of natrolite from Wasson's Bluff, Nova Scotia. A L Parsons Univ of Toronto Studies *Geol Ser* No 29, Contributions Can Mineral 1930, 35–6.—The dimensions of the unit cell for the natrolite were found to be *a* 18 306, *b* 18 708 and *c* 6 6814 A U The sp gr of the crystal was 2 257 and there were 8 mols in the unit cell by using Brögger's value for *c*, N is found to be 8 0934 J W. S

Collophanite from Miocene brown shales of California. E Wayne Galliher *Bull Am Assoc Petroleum Geol* 15, 257–69(1931).—An impure, pyritized oölitic collophanite occurs in the Miocene brown shales of the southern San Joaquin Valley, Calif The grains are 0 1–0 5 mm in diam Their chem compn and phys properties depend on the degree of pyritization The grains are embedded in a matrix which is dominantly clay These oölites are syngenetic The mechanism of pyritization is discussed Alden H Emery

British Columbia in 1930 Anon *Mining J* (London) *Ann Rev No* (Jan 24, 1931) 25 Eastern Canada in 1930 Anon *Ibid* 24 Gold Mining in Nova Scotia. Anon *Ibid* 27 Norway in 1930 Anon *Ibid* 28 Mining in Newfoundland. Anon *Ibid* 29 The mineral resources of Tanganyika Anon *Ibid* 31 Nigeria in 1930. Anon *Ibid* 33 The Federated Malay States in 1930. Anon *Ibid* 35 Australia in 1930. Anon *Ibid* 36 Portugal in 1930. Anon *Ibid* 36 Cornwall and Devon in 1930 Anon *Ibid* 37 The Minerals of the Hyderabad State, India. Anon *Ibid* 48 9 Alden H Emery

Quinquennial review of the mineral production of India for the years 1924 to 1928. *Chromite* E H Pascoe *Records Geol Surv India* 64, 28–31(1930), cf *C. A* 24, 1824.—Indian chromite is usually assocd with serpentine In Bihar and Orissa it occurs in bed like veins and as scattered granules in serpentinized saxonites and dunites forming laccolitic intrusions As in Baluchistan the chromite is of primary (magmatic) origin and contemporaneous with the peridotites. The subsequent serpentinization of the peridotites has been accompanied by widespread silicification with the production of marginal zones of chert. The output is steadily increasing Graphite. E L G Clegg *Ibid* 106–9.—Graphite occurs in various parts of India in schists Magnesite. E H Pascoe *Ibid* 166–72.—In the Salem district a network of magnesite veins pierces 2 great intrusive masses of serpentinized ultra basic rocks Production is steadily increasing Cyanite. J A Dunn *Ibid* 403–5.—Important deposits of cyanite and of cyanite quartz rock occur in India Sillimanite. J A Dunn *Ibid* 426–9.—Sillimanite-corundum deposits assocd with cordierite biotite quartz microclinegneiss and sillimanite quartz schists occur in Assam Alden H Emery

Relation of the ore deposits of the southern Rocky Mountain region to the Colorado Plateau. B S. Butler *Proc Colo Sci Soc* 12, No 2, 23–36(1929).—Ore deposits of the southern Rocky Mountain region are coned in a narrow belt surrounding Colorado Plateau, assocd with volcanic fields which are also largely confined to the same belt Igneous activity resulted in deposition of the ores A bibliography is given E I. S

Geological and metallogenetic study of South Africa A Demay *Rev ind minérale* 229, 271–98(1930).—A review of the essential elements of geology, stratigraphy and eruptive phenomena of South Africa, central Rhodesia and regions further north,

including the province of Katanga of Belgian Congo Notes are given on the principal deposits of this region which is one of the richest mining districts of the world
E I S

Impressions of the mineral industry of British South Africa. W B Timm. Can Dept. Mines, Mines Branch, *Memorandum Series* No 46, 27 pp (1931) —T. discusses diamonds, asbestos, Pb, Zn, V etc ALDEN H EMERY

Geology of South Park Section. A. Lakes *Mountain States Mineral Age* 1, No 3, 7, 20–1(1930) —*Notes on Au, Ag* Pb and coal deposits are given and oil possibilities discussed E I S

*Geology and ore deposits of Bannack and Argenta, Montana.* Philip J Shenon *Mont Bur Mines and Geol Bull* No 6(1931) —These 2 districts were the first important placer and lode mines in Montana and have produced Au, Ag, Pb, Zn and Cu The ore deposits are closely related to intrusive rocks, but occur also in sedimentary rocks near intrusive contacts Those with obvious exposures have been largely exhausted, but it is possible that additional discoveries may be made. CURTIS L WILSON

Geology of the Shonia Lake area, district of Kenora (Patricia portion). H C. Laird *Ann Rept Ont Dept Mines* 39, Pt 3, 1–21(1931) —Extrusive rocks (greenstones) forming the basement schist series are surrounded by granite. Gabbrodiorites *and amphibolites of pre granite age form 40% of the schist area* Descriptions of the rocks and Au prospects are given ALDEN H EMERY

Geology of the area from Minaki to Sydney Lake, District of Kenora. D R Derry *Ann Rept Ont Dept Mines* 39, Pt 3, 25–41(1931) —The consolidated rocks (all Pre Cambrian) fall into 2 series (1) a sedimentary-volcanic series, much folded and metamorphosed, and (2) an intrusive series ranging from diorite to granite and pegmatite The intrusives occupy 80% of the area They are described in detail Mineralization (usually replacement of the country rock) was closely assocd with the later phases of intrusion Quartz veins are rare. Pyrrhotite with minor pyrite and *molybdenite carrying Au and Ag is known in the coarser gneiss Pyrite, in a siliceous* groundmass with varying proportions of chalcopyrite and carrying Au, occurs in the volcanics and fine quartzitic sediments A cobaltite vein has been prospected
ALDEN H EMERY

Geology of the Shoal Lake (west) area, District of Kenora. Leonard Greer *Ann. Rept Ont Dept Mines* 39, Pt 3, 42–56(1931) —A thick and intricate Keewatin section is exposed Lava flows, agglomerates and obscure sediments are interbedded with no particular order *Intrusive into them are bodies of granite, felsite and quartz* porphyry Au-bearing quartz veins occur chiefly in greenstone The rocks are de scribed in detail ALDEN H EMERY

Geology of the Bigstone Bay area, Lake of the Woods, district of Kenora. G G Suffel. *Ann Rept Ont Dept Mines* 39, Pt 3, 57–71(1931) —A basic and siliceous series of volcanic rocks, largely extrusive, are intruded by a series of dioritic to gabbroic bodies. All of these are intruded by granite and many small granite, felsite and quartz porphyry dikes Much later the complex was intruded by narrow diabase dikes Au-bearing quartz veins occur assocd with the contact between the granite and basic schists *Ag, pyrite, arsenopyrite, chalcopyrite, sphalerite, galena and tellurides* have been reported The rocks are described ALDEN H. EMERY

Geology of the Eagle-Circle District, Alaska. J B Mertie, Jr *U. S. Geol Survey Bull* No 816, 166 pp (1930) —M discusses the geologic history, distribution of placers, sources of Au and placer mining operations Two groups of claims, comprising 7 mi of placer ground on Coal Creek, are regarded as good hydraulic venture
E. I. S

Geology of the Panamint Silver District, California. F. MacMurphy. *Econ Geol.* 25, 305–25(1930) —The Ag bearing fissure veins occur largely in limestone. They *comprise: quartz-galena-pyrite* veins and pyrrhotite-pyrite-quartz veins. The mineralogy of ores is described and origin and age of deposits discussed A bibliography is given. E. I. S

Mineral association at the Marble Bay Mine, Texada Island, B. C. T. L. Walker Univ. Toronto Studies, *Geol Ser* No 29, Contributions Can Mineral, 1930, 5–8 — The ores of the Marble Bay mine are chalcopyrite and bornite, rarely native Ag and molybdenite. The non-metallics are represented by garnet, wollastonite and epidote. *The deposits occur at the contact of a diorite porphyrite intrusion with Mesozoic lime*stone. Analyses of the bornite, wollastonite, andradite and grossularite are given
J. W. Shipley

Geological and microscopical study of some copper deposits of China. C. Y.

Hsieh *Bull Geol Soc China* 8, No 4, 263-326(1929)(in English)—Deposits in Hupeh Yunnan and Szechuan are described E I S

Lubi and Lukula lead-copper deposits, their origin and their relation to stratigraphy of the region. J Polinard *Ann soc geol Belg* 52, No 11, 85 pp (1929)—N'Tendu ore occurrence is regarded as float mineral and not a deposit in place A discussion of the assocd minerals and a theory of the origin of the deposits are given E I S

Iron and manganese deposits of Brazil. L P de Oliveira *Echo mines et métal* 57, 686-7(1929)—Iron deposits constitute the largest mineral resource of Brazil Outline descriptions of principal Fe and Mn ore deposits are given, with analyses of Mn ore E I S

The iron ore deposits of South Africa Hans Schneiderhöhn *Arch Eisenhüttenw* 4, 269-76(1930) A survey of the nature, geographical positions and sizes of the Fe ore deposits of So Africa based on the latest literature and some personal observations J Balozian

World deposits of nickel H Carlbom *Jernkontorets Ann* 1929, 493-4—C gives descriptions of Ni ore minerals mining and refining processes, and mine production statistics for 1913 to 1927 The present yearly consumption is 40 000 tons A bibliography is appended E I S

Platinum deposits of South Africa. P Kerlik *Glückauf* 66, 868-74(1930)—A review E I S

Tin deposits of Morococala, Bolivia. R Geyer *Z prakt Geol* 38, 113-21, 135-42(1930)—A geological treatment, including description of the deposits E I S

Mercury deposit in Coso range, Inyo County, California. T Warner *Min in Calif Calif Div of Mines and Min* 26, No 1 59-63(1930)—In a crater like opening in a conical hill of altered rhyolite, there is a network of veins seams, crevices and fractures through which cinnabar crystals and free S have been deposited Average samples contained 0 16 and 0 19% Hg selected ore 7 to 11 percent The origin of the deposit is discussed F I S

The geology of gypsum deposits. V Charrin *Rev matériaux construction trav publics* 1931, 99-101—The deposits of gypsum near Paris and in Lorraine or the Provençales occur either in Triassic or Miocene formations F O Andreegg

Gypsum of P'ing Lu District, South Shansi. S L Tsao *Bull Geol Soc. China* 8, No 4, 327-41(1929)(in English)—Veins veinlets and beds of gypsum occur in red marl both conformable and oblique to bedding, it is mined in a primitive manner, the output being about 10 tons per day and price at river bank $6 40 per ton E I S

Alabaster deposits at Campredon near Carcès V Charrin *Génie civil* 97, No 1, 18-9(1930)—Geological features of deposits and methods of mining are described E I S

Kentucky fluorites. W R Jillson *Pan Am Geol* 54, No 1, 29-30(1930)—Production data, 1926 to 1929 are given E I S

The origin of the Lichtenburg diamonds Alfred L Williams *S African Min eng and Eng J* 41, Pt 1, 314(1930)—Geological Alden H Emery

Carbons and industrial diamonds in 1930 L M van Moppes. *Mining J Ann Rev* No 9 Jan. 24, 1931 Alden H Emery

Contribution to study of evolution of fuels of the coal basin of Liége. M Legraye *Rev univ mines* [8], 4, No 1, 5-11(1930)—The nature of coal and variations in content of volatile matter are discussed. A map is shown of distribution of coal and coal formations in the Liége basin, Campine, Limbourg and western Germany Modifications are attributed to tectonic forces E I S

Genetic connection between salt deposits and petroleum. A Weinfeld *Intern Z Bohrtech., Erdölbergbau u Geol.*, May 1, *Oil and Gas J* 28, No 5, 159(1929)—Contrary to the current idea of migration of oil from mother rocks, W assumes that the greater part of the oil found in porous beds is primary in character, formed in rocks where actually found by drill His explanation is that animal organisms with soft bodies were abundant where the NaCl content of the water was high, and that these organisms constituted the mother substance of petroleum E I S

Some factors of solidification in relation to metallurgical and geological problems. S W Smith. *J. Chem Met Mining Soc S Africa* 31, 195-8(1931), cf *C A* 24, 3970, 5004, 5675, 25, 476, 1184 Alden H Emery

Separation of solid phases in heavy liquids and melts with aid of the centrifuge. W Jaeger *Glückauf* 66, 661-8(1930)—J discusses applications of the centrifuge to petrography, giving new methods of sepn with its aid, gravimetric and volumetric processes, with aid of heavy liquids, and details of Wolff centrifuge. E. I S

Petrography of the rocks in the vicinity of Killarney, Ontario. W A Jones. Univ of Toronto Studies, *Geol Ser* No 29, Contributions Can Mineral 1930, 39–60 — A detailed study of the rock types in the area adjacent to Killarney Village, Ont., was made. A sharp contact was observed in the field between the coarse-grained Killarney granite-gneiss on which the village stands and the fine-grained granite-gneiss to the east. Dikes of the fine-grained rock cut the coarse grained. At the contact of these 2 rock types the fine grained granite-gneiss has apparently been chilled, since its texture is unusually fine. A series of chem. analyses of samples taken across the strike of the rock from the quartzite into the coarse-grained rock showed no progressive decrease in silica and increase in alkalies. Microscopic examn. of thin sections did not reveal proof of the origin of the fine-grained granite gneiss by the metasomatic replacement of quartz by feldspar. The Killarney granite-gneiss is intrusive into sediments of Huronian age. Microscopically and chemically, its character is that of an igneous rock of plutonic origin. The compn. of the coarse-grained rock is not widely different from that of the fine grained, so that the latter is probably a slightly younger, more quickly cooled intrusive rock which has originated in the same magma reservoir. J W S

Certain xenoliths occurring in gabbro at Sudbury, Ontario. W A Jones. Univ of Toronto Studies, *Geol Ser*, No 29, Contributions Can Mineral 1930, 61–73 — The inclusions of white rock at Sudbury originated contemporaneously with the enclosing gabbro as a result of the action of the magma on a nucleus of siliceous sedimentary material. No remnants of foreign material were found to prove this conclusively. Actual fusion of the inclusions did not occur. The process was one involving the penetration of materials from the magma which reacted with quartzite to form hornblende and plagioclase in an essentially solid xenolith. Mol. transfusion of material from the magma into the xenolith accounts for the mineralogical symmetry of the inclusion. The penetrative ability of Fe and Mg would not be as great as Al, Ca, Na and K, and hence the border zone of the xenolith would tend to become rich in Fe and Mg and the formation of hornblende crystals would result. At the edge of the inclusion crystal centers would be close together and a medium textured aggregate made up chiefly of hornblende would result. Within the xenolith the penetration of Mg and Fe would not be so great, with the result that large crystals would gradually develop. Impoverishment of the reacting liquid in Mg and Fe due to the pptn. of hornblende would result in the development of bytownite in the interstices between the hornblende crystals. It is thought that Na and K would explain the presence of andesine in the center of the body rather than bytownite. The presence of a great no. of fluid inclusions in the residual quartz of the xenoliths indicates that the reaction between magma and quartzite took place in the presence of mineralizers. J W Shipley

The aqueous chilling of basaltic lava on the Columbia River Plateau. Richard E. Fuller. *Am J Sci* [5], 21, 281–300(1931) —A petrographic study. A H E

Dalmatianite, the spotted greenstone from the Amulet Mine, Noranda, Que. T. L. Walker. Univ Toronto Studies, *Geol Ser* No 29, Contributions Can Mineral 1930, 9–12 —Microscopic and chem. examn. of the greenstone indicated considerable variation in the compn. of the specimens, some being fairly acid while others are quite basic. The S and Zn contents indicate a change from the original volcanic type due to contact with the sulfide ore body. The spots represent amygdaloidal filling. J W Shipley

*Compaction of sediments.* Parker D Trask. *Bull Am Assoc Petroleum Geol* 15, 271–6(1931) —The initial $H_2O$ content of sediments varies with the fineness of the constituent particles. A tentative estimate indicates that it is approx. 45% in well sorted fine-grained sands, 60% in silts, 80% in clays and > 90% in colloids. A H E

The influence of withdrawn chemical substances in creating empty underground spaces and pressure. Cesare Vercelli. *Ind mineraria* 5, 81–2(1931) —Very strong pressure noted in the Monte Cani pits was studied as to its cause, with the conclusion that the $ZnCO_3$ and $PbCO_3$ of these were produced by the oxidation of the ZnS and PbS through the action of water, $CaCO_3$ and $MgCO_3$ and that the last 2 were transformed into the sol. sulfates and were carried off by water, leaving empty spaces, while the ZnS and PbS remained as insol. carbonates. R Sansone

Chemical transformations caused by the decomposition of vegetable wastes. P. Vinassa de Regny. *Ind mineraria* 5, 21(1931) —Many plants, or plant parts, die every season, and the waste produced contains mineral salts and org. matter with H, C, O, N. If in contact with much O as in tropical regions, a slow combustion follows, while under woods or in immature peat bogs in large masses, contact with atm. O is difficult, and these become putrid by the action of bacteria and fungi, and $H_2O$, $CO_2$ and a little N are produced, there being only as exceptions solid remains as liptobiolites. With excess

of $H_2O$ and absence of O or if the mass freezes, or the ground is calcareous or has salt, the fungi and decompn. bacteria do not vegetate, or even die. Besides this, if in a year fungi and bacteria cannot act on all the vegetable mass this is increased by other additn., and the wastes can rise for several yards being dry at the top and wet and rotten at the bottom. There is then formed mixed material where humus predominates. This is a collection of negatively charged colloids which remain such as long as there is water, resisting flocculation by univalent ions while they are more sensitive to bivalent such as Ca. Acid humus reacts in an opposite way to O and reduces and renders sol. ferric compds. In layers under sand and peat bogs all the Fe and CaO is eliminated in this way.
R. Simons

Recent advances in science geology. G. W. Tyrrell. *Science Progress* 25, 579–86(1931).—A review of recent work on the geochem. of the igneous rocks.
Joseph S. Hepburn

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Modern technic in the investigation of opaque minerals (Phillips) 9. Pneumatolytic synthesis of silicates (van Nieuwenburg, Blumendal) 6. The Charleston coalfield (Pepper) 21. Ra bearing minerals from Great Bear Lake, Northwest Territories (Spence) 3. Discoloration of minerals by β and γ rays (Hoffmann) 3. Cretaceous limestone as petroleum source rock in northwestern Venezuela (Hedberg) 22. III (Tyler) 38.

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Schmidt, Leopold. Der Bernstein. Separate of "Handbuch der Mineralchemie." Dresden: T. Steinkopff. 104 pp. M. 7.

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## 9—METALLURGY AND METALLOGRAPHY

D. J. Demorest, H. W. Gillett and Richard Kimbach

The fiftieth anniversary of Rudolf Vondráček. Ferdinand Schill. *Chem. Listy* 25, 73–5(1931).—A review of V.'s contributions to physicochemical *analyses of metallurgy*.
Frank Mares

Bibliography of the metallurgical work of the U. S. Bureau of Mines in 1930. R. S. Dean. Bur. Mines *Information Circ.* 6449, 7 pp. (1931).—Over 60 references are given to articles on *fundamentals ore dressing*, Fe and steel, hydrometallurgy, Mn investigations, rare and precious metals, non-ferrous metals, lab. app., methods and discussions.
Alden H. Emery

The metallurgy of some of the rarer metals. C. J. Smithells. *Metal Ind.* (London) 38, 836–8(1931).—The development of elec. lamps and thermionic valves has created a demand for metals and alloys with very special properties. While W has generally met the requirements for lamp filaments, Mo, Ta and Ni are used for electrodes of thermionic valves. The production of ductile Zr and of ductile Ta and of Mo are outlined as is the manuf. of sheet Mo.
W. H. Boynton

Calculation of metal yield in ore-dressing processes. Otto Stelzner. *Metall u. Erz* 28, 140–3(1931).—Methods of calcg. yields in the various ore-dressing processes are discussed.
H. Stoertz

The scientific fundamentals of colloidal ore dressing. Carl Goerz and Alexander Horovic. *Intern. Bergwirtsch. u. Bergtech.* 24, 37–42(1931).—The elementary theoretical principles relating to suspensoids are reviewed. The peptization of a complex Rammelsberg ore analyzing $SiO_2$ 19.67, S 24.63, CaO 16.31, Cu 8.3, Pb 5.17, Fe 17.28 and Zn 5.28%, and sieved through 10,000 mesh was studied by shaking with citric acid soln. for definite periods, settling, and detg. the quantity in suspension. The max. quantity of ore remaining in colloidal suspension depends on the citric acid concn. and on the ratio of ore to peptizing soln. The results are in agreement with Ostwald's pptn. rule.
Arthur Fleischer

Modern technic in the investigation of opaque minerals and ores. F. Coles Phillips. *Science Progress* 25, 633–41(1931).—A review with sections devoted to (*a*) the prepn. of polished surfaces, (*b*) reflecting power, (*c*) anisotropism, (*d*) other properties and (*e*) a bibliography of 24 references.
Joseph S. Hepburn

Flotation tests on converter slag. Frank S. Wartman. Bur. Mines, *Rept. of Investigations* 3068, 7 pp. (1931).—It is possible to recover by flotation about 90% of the Cu content of a chilled converter slag contg. 3% Cu and to obtain flotation concentrates

contg 35% Cu Reagents were 0.14 lb No. 5 G N S. pine oil per ton of slag, 0.1–0.15 lb amyl xanthate, 1.25–3.0 lb $H_2SO_4$ and 0.12–0.25 lb P E oil A H E

*Influence of the iron content of zinc blende upon its adaptability for flotation.* Ludwig Kraiber *Metall u Erz* 28, 128–30(1931) See *C A* 25, 2082 H S

Operating practice in the copper-flotation plant of Minas do Valle do Vouga, Portugal. G Telher *Metall u Erz* 28, 125–8(1931) The installation at this plant is described The ores are complex (Cu pyrites Zn blende, Fe pyrites) The processes used are described, and the difficulties and methods of overcoming them are recounted H Stoertz

Leaching copper from its ores. John D Sullivan *J Chem Education* 8, 829–47 (1931) A review E H

Extraction of soluble copper from ores in leaching by percolation. John D Sullivan and Kenneth O Bayard Bur Mines, *Rept of Investigations* 3073, 43 pp (1931) The phys nature of the rock its porosity degree of kaolinization and sericitization, and the amt of natural slime det the amt of soln that will be retained and the difficulty that will be found in washing out the sol salts The rate of removal of sol Cu decreased with increases in the amt of slime present and increased only slightly with temp Wet charging the ore into the vat was advantageous In washing, the cycles of submergence and draining should be as close to each other as possible, consistent with fairly thorough mixing of the $CuSO_4$ in the wash soln and thorough draining of the soln The $CuSO_4$ concn was greater at the bottom than at the top of the ore column Circulating the solns increased extn rates Piston displacement washing removed Cu more rapidly than batch washing, but the vol of wash soln required was greater Downward and upward percolation of wash solns gave virtually identical extn rates Less $CuSO_4$ was ppted in the ore when the impregnating solns were acidic Alden H Emery

The extraction of copper from oxidized ore by cyanide solution. E T Dunstan *J Chem Met Mining Soc S Africa* 31, 190–4(1931) Cyanide extn of a malachite ore from Katanga contg 0.36% Cu resulted in high cyanide consumption Elec regeneration was impossible Details are given Alden H Emery

Magnetite in copper mats F G Hawley *Eng Mining J* 131, 319–22(1931) — Magnetite causes Cu losses in the slag from the smelting of mat This study of the distribution of the magnetite should help in the soln of the problem and also demonstrate the value of improved chem and microscopic methods of analysis Analytical data are discussed The sulfide is sepd from the magnetite as follows Dissolve 30 g $NaClO_3$ in 50 cc hot water Cool and add 50 cc of $HNO_3$ Cool again and add 30 cc of 85% $H_2SO_4$ and cool to room temp or lower *The $NaClO_3$ must be entirely in soln when the acid is added* Weigh 0.5 g of mat into a 600 cc beaker and add 8–10 drops of water Spread the mat over the bottom of the beaker by shaking, place in a cooling trough and cautiously add 25 cc of the chlorate In a few min heat the beaker nearly to boiling add 50 cc of cold water and immediately filter and wash The magnetite may be weighed as such and then a correction made for the impurities, or it may be ignited and weighed as $Fe_2O_3$ and impurities deducted, or the Fe may be detd volumetrically and calcd to $Fe_3O_4$ W H Boynton

Significance of the Dwight-Lloyd method for working up of Rammelsberg ores. W Sauerbrey *Metall u Erz* 28, 101–11(1931) —The advantage of the Dwight Lloyd method for roasting Rammelsberg ores (galena, zinc blende, Cu pyrites, Fe pyrites and heavy spar) *is primarily in the fact that the process is uninterrupted* The capacity is also great and the efficiency good the operating cost for the roasting and sintering of a ton of raw ore being about a third less than the usual roasting and briquetting methods Another advantage is in the handling of large quantities of raw materials without a preliminary roasting, and in making available the $SO_2$ gas for $H_2SO_4$ manuf As a result of the increase in furnace capacity and the saving of coke, together with a more favorable yield of metal, the total cost has been lowered considerably H Stoertz

Milling methods at the Hughesville concentrator of the St. Joseph Lead Co., Hughesville, Mont. Wm O Vanderburg Bur Mines, *Information Circ.* 6447, 15 pp (1931) —Galena sphalerite, marmatite and pyrite occur in a fissure vein in syenite. The first 2 are argentiferous A small quantity of Cu occurs as cupriferous pyrite and chalcopyrite The gang consists of altered syenite and rhyolite with subordinate amts of calcite, barite, quartz, rhodochrosite and marcasite. The av. grade of the ore is Pb 6.21, Zn 5.01% and Ag 9.09 oz./ton By selective flotation 2 concentrates are made: one Pb 61, Zn 5.7% Ag 50 oz. and Au 0.05 oz. per ton and another Zn 51, Pb 1%, Ag 31 oz. and Au 0.02 oz./ton Pb recovery is about 97%, Zn about 92% and Ag 80%. Alden H. Emery

Milling methods at the Hurley plant of the Nevada Consolidated Copper Co.

Hurley, New Mexico FRED HODGES Bur Mines, *Information Circ* 6394, 16 pp (1931) The Cu mineral is chiefly chalcocite, although this is in places accompanied by azurite malachite chrysocolla and cuprite The gang is quartz, pyrite, sericite and halloysite For the first 4 months of 1930 heads averaged 1 32% Cu and 3 14% Fe Recovery was 83 9% Concentrates assayed 27 51% Cu, 0 04 oz Au and 0 55 oz Ag per ton Ore is concd by flotation with lime, raconite and pine oil A H F.

Metal working in power presses. E V CRANE *Am Inst Mining Met. Eng., Inst of Metals Division* (preprint) 1931, New York meeting, 31 pp —Metal working in presses is discussed under the subdivisions of shearing bending, drawing, stamping, squeezing extrusion and forging from both the metallurgical and stress analysis viewpoints The stamping trade does its engineering largely by trial and error The principal operations of metal forming have many features in common with rolling and wire drawing methods The division between hot and cold working is taken as the recrystn range of temp of the metal being worked The specific features of the different operations and the factors involved are analyzed in some detail C. L MANTELL

Recent design of quicksilver plants. C N SCHUETTE *Eng Mining J.* 131, 316–8(1931) —Three types of furnaces are in common use—the old Scott furnace, the rotary kiln and the Herreshoff furnace The Scott is unsuited to intermittent operation and requires a reasonably dry feed The Herreshoff furnace has the advantage of a higher fuel economy than the rotary kiln and no occasional shutdowns for relining are necessary Dust elimination is discussed and several illustrations from installations at different mines are shown W H BOYNTON

Reduction of zinc oxide by methane or natural gas. H. A. DOERNER. Bur Mines, *Rept of Investigations* 3091, 14 pp (1931) —$ZnO + CH_4 = Zn$ (gas) $+ CO + 2H_2$ is nearly complete when equil is attained (O gas velocity) at about 927° The reaction rate increases with temp, but $CO_2$ formation and subsequent reoxidation of Zn also increase Temps should therefore be kept below 1000° Crude natural gas gives approx the same results as $CH_4$, the higher reducing power of the homologs of $CH_4$ being compensated by their greater tendency toward thermal decompn. A preliminary treatment to remove (sulfate) S is advantageous. This may be accomplished by heating the calcine at 800° in an atm of natural gas or the gaseous products from the Zn condenser Cd may also be eliminated by this step In the temp range 975–1000° the rate of Zn distn. compares favorably with that obtained from retorts by standard practice the metal produced is of exceptional purity and no appreciable amt. of blue powder is formed. The special requirements of a furnace for com. reduction of Zn by natural gas are (1) a retort and condensing system as nearly gas-tight as possible, (2) continuous feed and discharge of ore at a slow rate (time of residence about 34 hrs.), (3) continuous counterflow of gas at a low velocity (time of contact, about 1 min.) (4) retorts having a large capacity, and (5) pretreatment of the ore in a sep retort at 800° or lower with gas from the Zn metal condenser Under these conditions Cd and S are volatilized and Fe is reduced to metal. The length of the retort is limited by the resistance of the ore to the flow of gas and by the necessity to prevent transportation of dust incident to the higher gas velocity required by long retorts if the time of contact is const. The smallest dimension of the retort will be limited by the requirements of heat transfer The relatively low operating temp and the presence of the excellent thermal conductor, $H_2$, facilitate the flow of heat and permit large units to be used ALDEN H EMERY

Iron and steel in 1930 ANON *Mining J.* (London) *Annual Rev No.* (Jan. 24, 1931) 1 Copper in 1930 EDWARD H ROBIE *Ibid* 2 Tin in 1930. E BALIOL SCOTT *Ibid* 3–4. Lead and spelter in 1930. P W SMITH *Ibid* 6 Gold and silver in 1930. ANON *Ibid* 7 Platinum in 1930 ANON *Ibid* 8. Cadmium. W. G RUMBOLD *Ibid* 13 Modern industrial applications of steel. ANON *Ibid* 15, 17, 19, 21–2 —The following uses of steel are discussed the constructional industry, high-pressure and high temp vessels, chem and allied industries, automobile and aircraft construction, mine shafts and underground supports, rock drilling, railroad, bridge parts, crushing and pulverizing machinery The use of alloy metals in iron and steel. ANON *Ibid* 23 ALDEN H EMERY

New views on smelting [of iron ores] and remelting processes. J E FLETCHER. *Foundry Trade J* 44, 175–6, 195–7, 211–3, 227–9(1931) —See *C. A* 24, 5263 D S

Smelting in the lead blast furnace. Handling rich charges. VI. Conditions and problems introduced by increasing the ratio of concentration. G L. OLDRIGHT AND VIRGIL MILLER. Bur Mines, *Rept of Investigations* 3088, 7 pp (1931), cf *C A* 24, 319 ALDEN H EMERY

Design of open-hearth ports. V BALABANOV *Iron Age* 127, 1254–7, 1273(1931) E H.

*Graphical carbon balance of the blast furnace.* T J Ess *Iron Steel Eng* 8, 173–6(1931) —Charts developed to facilitate a check on gas production, blast vol and furnace practice are shown and the application is explained in detg the carbon balance The balance, worked through analytically, agrees substantially within slide rule limits W H Boynton

Carbon can be regulated by cupola practice. Gottfrid Olson *Foundry* 59, 62–3 (1931) —In order to control the C in cupola low C gray irons it is necessary to have (1) a forehearth, (2) low tuyères, (3) correct tuyère ratio, (4) proper amt of air supplied under proper pressure, (5) rapid melting, (6) high temp in melting zone, (7) large amts of steel scrap, (8) coke with approx 7% ash, (9) coke with moisture under 1% Downs Schaap

Regularities in the composition of basic Siemens-Martin slags. Siegfried Schilfichier *Arch Eisenhüttenw* 4, 239–44(1930) —From the analyses of 29 slags it appears that the MnO content depends on the value of CaO + MgO The sum of the 3 values is practically const at 61 5% Furthermore, the Fe content decreases with increasing $SiO_2$ and $P_2O_5$ If the Fe and MnO contents of a slag are known the approx compn can be calcd H F Johnstone

Application of cementation methods of the systems Sb–Cd, Zn–Cd, Pb–Cd, Sn–Cd and Bi–Cd. W L Loskiewicz *Przeglad Tech* 69, 508–13(1930) —A cementation method as described elsewhere (*Przeglad Gorniczo Hutniczy* 1929, 583) was employed in investigating the cementing characteristics of the systems Sb–Cd, Zn–Cd, Pb–Cd, Sn–Cd and Bi Cd, which on cementation below the eutectic temp form permanent openings *at the junction* By *cementation at a temp above the eutectic temp the eutectic is* formed, this is followed by fusion at the junction, which prevents permanent openings Tests carried out below the respective eutectic temps showed no evidence of cementation, while those cemented 3% above the eutectic temp showed fusion and quantities of the eutectic Methods employed are discussed In the Sb–Cd system Cd–Sb is formed at the junction, while in the other systems investigated, eutectics were formed in every case In the system Bi–Cd, there exists a fusion in a stable form and in the other systems tests corroborate the existence of such fusion Frank Kokoski

The constitution of the iron–carbon–silicon–system. II. Section through the tridimensional diagram at 8% silicon A Kříž and F Pobořil *Collection Czechoslov Chem Comm* 3, 61–72(1931), cf *C A* 24, 5705 —The properties of 7 alloys were investigated These alloys were prepd by melting in an elec resistance furnace. The percentage chem compn. of the alloys tested is

| Alloy No. | C | Mn | Si | P | S | $Ac_2$ in degrees |
|---|---|---|---|---|---|---|
| 34 | 0 14 | 0 43 | 7 97 | 0 041 | 0 011 | 645 |
| 35 | 0.21 | 0 31 | 7 87 | 0 045 | 0 011 | 660 |
| 36 | 0 34 | 0 40 | 7 63 | 0 062 | 0 015 | 645 |
| 37 | 0 50 | 0 48 | 8 12 | 0 038 | 0 016 | 650 |
| 38 | 0 86 | 0 38 | 7 94 | 0 062 | 0 023 | 650 |
| 39 | 1 88 | 0 46 | 7 45 | 0 052 | 0 024 | 665 |
| 40 | 2 7 | 0 55 | 7 84 | 0 097 | 0 009 | 665 |

Samples for thermal analysis and microscopic examn after heat treatment were taken from each alloy The constitutional diagram of the ternary Fe–C–Si system contg 8% Si is given The region of the homogeneous γ phase does not exist in these alloys The pearlitic transformation of the alloys with more than 0 48% C ends at the beginning of melting The transformation $Ac_2$ in the alloys with 8% Si lies in the region α + C at 665° G T. Motok

Practical use of the knowledge of structure of steels. F González V *Rev quim* 6, No 2, 21–5(1930) —Based on the chem compn of the steel an attempt is made to calc all the structural phases existing in steel such as free pearlite, $Mn_3C$, MnS, $Fe_3P$ and free ferrite The Juptner, Neil and Osmond formulas have been used in calcg tensile strength, hardness and elasticity G T. Motok

*Corrosion* and metal protection in steam power plants. IV. R. Stumper *Korrosion Metallschutz* 7, 25–8(1931), cf *C A*. 25, 1206 —A boiler-tube failure from a gas fired furnace using a hard water was investigated metallographically A deposit of $CaSO_4$ was found to exist throughout the entire length of the tube Sections of the tube were cut from the tube at the point of failure and at a point some distance from the blow out Microscopic examns of the metal surface of both sections revealed decarburization of the outer side of the section which failed, and indicated that the temp of the inside of the tube had been between the $Ac_1$ and $Ac_3$ points, while temp conditions in the other portions of the tube had apparently been such as to cause no changes in the micro-

structure The conclusion was reached that localized overheating due to an impinging flame had caused the failure R J Roehrig

**The corrosion of iron by steam at high temperatures and its physico-chemical basis** I W Kraus *Korrosion Metallschutz* 7, 29-31(1931).—A method is described for measuring the rate of oxidation of Fe in superheated steam at high temps The method consists in measuring the increase in elec resistance of a metal wire during the process of oxidation The resistance $R = \frac{\varphi \rho_2 l}{\pi}\left[\frac{1}{\varphi r_2^2 \rho + \rho_2(r_1^2 - r_2^2)}\right]$, in which $r$ and $r_1$ are radii of the bare wire and the oxide covered wire $\rho_1$ and $\rho_2$ the sp resistances of the metal and the oxide $\varphi$ is the ratio of molal vols of the metal and the oxide, and $L$ the length of the wire Measurements of resistance changes made at temps ranging from 400 to 800° and detns of $O_2$ in the oxide film showed the ratio of $O_2$ used to be reacting to be approx that found in $Fe_3O_4$ Sep detns of wt increases due to oxidation of Fe in a furnace at the same temps were found to agree well with those calcd from the resistance changes Both methods indicated that the thickness of the oxide layer increased with time according to the diffusion equation $y^2 = kt$ in which $y$ = thickness in $\mu$, $t$ the time in min The values of $k$ were detd for temps of 800°, 700°, 600° and 400° and were resp $8.08 \times 10^{-4}$, $1.77 \times 10^{-4}$, $1.22 \times 10^{-5}$ and $1.27 \times 10^{-7}$ Temp coeffs for the reaction rate were found to be 3% per degree between 800° and 700° and 1.5% per degree between 700° and 800° R J Roehrig

**Corrosion of iron by carbon tetrachloride** J Milbauer *Collection Czechoslov Chem Comm* 3, 73-75(1931) Iron is corroded by $CCl_4$ in presence of EtOH and water A test made consisted in boiling iron for 1 hr in a mixt of $CCl_4$, EtOH and water The results obtained were

| % $CCl_4$ | % $C_2H_5OH$ | % $H_2O$ | g Fe dissolved |
|---|---|---|---|
| 80 | 11 | 9 | 0.21 |
| 50 | 41 | 9 | 0.93 |
| 30 | 60 | 10 | 0.9 |
| 80 | 18 | 2 | 1.04 |
| 45 | 5 | 50 | 0.13 |
| 90 | 9.1 | 0.9 | 0.63 |
| 70 | 27.3 | 2.7 | 1.81 |
| 70 | 20 | 10 | 0.74 |
| 70 | 10 | 20 | 0.16 |
| 100 | 0 | 0 | 0 |
| 0 | 100 | 0 | 0 |

Max corrosion is obtained with a mixt of 70% $CCl_4$, 27.3% EtOH and 2.7% water The presence of EtOH favors the corrosion of Fe by $CCl_4$ G T. Motok

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Problems of insulation [of metals against access of moisture] (Moll) 13 Some factors of solidification in relation to metallurgical problems (Smith) 8 New methods of coke testing (Melzer) 21. The molecular constitution of the $\alpha$ solid solutions of Sn in Cu (Jeffery) 2 The molecular constitution of the $\beta$ solid solutions of Sn in Cu examined thermodynamically (Jeffery) 2 Detonators [alloys for their capsules] (Fr pat 696,663) 24. Lixiviating materials (Ger pat 517,920) 13 Rotary tube furnace and cooler for ores (Ger pat 520,212) 20 Apparatus for cleaning blast furnace gases (U S pat 1,797,906) 1

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*Aerating apparatus for flotation plant for ores, etc.* CENTRAL-EUROPÄISCHE SCHWIMM-AUFBEREITUNGS A G (R C Gibbs, inventor) Ger. 510,033, Feb 2, 1929 Addn to 1 [illegible] (C A 25, 1200)

Concentrating ores RUTHERFORD B MARTIN U S 1,797,356, March 24 In effecting [illegible] such as Florida phosphate ore screenings with selective agents such as [illegible] the water content of the ore is regulated to the amt necessary to wet [illegible] all the ore particles without having present an excess which will settle out [illegible] and the wetted ore is tumbled with the selective agents to prepare it for [illegible]

Electromagnetic separator for ores, etc. WM M MORDEY Ger 521,020, May 16, 1924 Corresponds to Brit 224,024

Briquetting ores FRIED KRUPP GRUSONWERK A G (ALBERT KNAPP and LÉON MAYER Ger 517,735 April 1, 1926 Addn to 501,585 (C A 24, 4752) The method of 501,585 for briquetting Mn ores [illegible] with C and low stage oxidation compds of Fe, is extended to ores of Cr W V Mo U Ni Co and P

Treating ores, etc FRIED KRUPP GRUSONWERK A G Ger 519,484, April 13, 1926 Addn to 473,016 (C A 23, 2859) The method of Ger 473,016 is modified by supplying the materials to the furnace in a pre warmed state, or by heating the end of the furnace at which the materials enter *The reaction zone is thus extended toward* that end of the furnace and thus facilitates the completion of the volatilization before the residue in the furnace softens or sinters

Treating sulfide ores, etc HARALD SKAPIEL U S 1,797,700, March 24 Material such as sulfided heavy metal ore is subjected to a reducing smelting operation in the presence of light metal compds such as those of Ca or Mg, in such quantity and with such regulated conditions of reduction as to produce a slag having an Fe content of *below 15% FeO and a mat contg light metals* Numerous details and examples are given

Sulfide ores. SULPHIDE CORP Fr 696,520, May 22, 1930 Ores contg Fe and S are treated for the production of S, oxide of Fe and chlorides of other metals contained in the ores by forming $FeCl_2$ *with displacement of S in the form of vapors, followed by* oxidation of the $FeCl_2$ to $Fe_2O_3$ and $FeCl_3$, the latter did with N being used as a chlorinating agent for displacing S The temp in the chlorinating and oxidizing gases is maintained above the condensation pt of the S or of the $FeCl_3$, but below the temp which would produce fusion of the solids present

Chromium ores. I G FARBENIND A G (Paul Weise and Julius Drucker, inventors) Ger 511,743, Apr 17, 1927 Cr ores which have been heated and quenched *are decomposed* by subjecting them to the action of gases contg HCl Cl and reducing agents may be present in the gas Thus, Cr ore is heated to 800° and quenched in water The quenched ore is subjected to the action of gases contg HCl and a reducing agent at 550-600°, leaving moderately pure $CrCl_3$ Other examples are given

Extraction of iron from its ores. VEREINIGTE STAHLWERKE A -G Ger. 517,060, June 8, 1927 Fe ores are treated with Cl HCl gaseous chlorides, etc, and the resulting $FeCl_3$ is decomposed to obtain the Fe The $FeCl_3$ is heated to above its dissocn temp in an elec arc and the decompn products, Fe and Cl, are cooled and sepd

Extracting copper. ANGLO AMERICAN CORP OF SOUTH AFRICA, LTD Ger. 521,184, May 19, 1928 See Brit 301,859 (C A 23, 4181)

Extracting copper, etc. PATENTAKTIEBOLAGET GRÖNDAL-RAMEN Ger 521,111, July 10 1929 Ores contg Cu and Zn are treated with $SO_2$, after addn of chlorides if necessary, until the HCl content is 5-10 g per l Part of the Cu is thus pptd as CuCl, and the pptn is then completed with Cu The lye and the ppt are then treated with Fe,

either separately or together to recover Cu The method may be applied to the lyes obtained by extg pyrites that have been roasted under chloridizing conditions, and if Ag and Au are present they may be pptd with the CuCl by using an excess of Cu

Nickel and copper. The International Nickel Co., Inc Fr 696,456, May 8, 1930 Ni and Cu are extd from materials contg them, particularly mats contg sulfides of Ni and Cu by heating the materials in the presence of a flux to obtain a molten mass and stratifying to sep the material contg Ni from that contg Cu The part contg Cu is heated in the presence of air to obtain porous Cu and the part contg Ni is submitted to the carbonyl process to obtain Ni

Reduction of tin Berzelius' Metallhütten G m b H Fr 696,146, May 27 1930 Finely granulated materials contg $SnO_2$ are reduced by solid, liquid or gaseous agents at a temp kept below the m p of the charge during the reduction and raised at the end of the reduction sufficiently to give a molten or pasty slag which surrounds the reduced Sn and preserves it from reoxidation in the furnace itself or during a subsequent treatment

Extracting zinc, etc Hanns Beermann Ger 521,485, Nov 7, 1929 In extg Zn and other volatile metals from a mixt of oxide ore and C in a horizontal, externally heated muffle a porous or perforated tube, to which gas is supplied, is arranged along the whole length of the bottom of the muffle The charge is loosened and agitated by the fine streams of gas ascending through it

Zinc. The New Jersey Zinc Co Fr 697,217, June 11, 1930 Cd and the like are removed from zinciferous materials by heating the materials in the presence of carefully regulated amts of a chlorinating agent, steam and air and the treatment is selectively regulated to volatilize the Cd without appreciable loss of Zn Cf *C. A.* 25, 907

Roasting pyrites, etc. Alexandre Follet and Nicolas Saindrichin Fr 697,006, May 20 1930 Pyrites and S contg ferruginous materials are roasted and agglomerated at the same time, by the progressive action of air, heated in a special app to temps of 650-800°, on the material advancing progressively in a thin layer in a rotating or other furnace

Treating roasted pyrites. Reymersholms Gamla Industri Aktiebolag Ger 517,748, Nov 13, 1925 The valuable constituents of chlorinated roasted pyrites are obtained by lixiviating the pyrites in stages with (1) lye poor in Cu but rich in Zn, contg mainly chlorides and (2) lye poor in Zn but rich in Cu, contg mainly sulfates Cu, Zn, Ag, Co, S and Cl compds are so obtained

Rotary ore-roasting and sintering apparatus. George E Storer (to National Processes, Ltd) U S 1,797,931, March 24 Structural features

Refining metals Syndicat des laitiers et scories. Fr 696,779, Sept 11, 1929 Loss of metals in slags during the refining of ferrous metals is reduced by adding to the slag, during or after refining suitable compds such as oxides, carbonates, chlorides borates or sulfates of alkali or alk earth metals or Mg

Refining metals Emil Vidal and Arnold H Stockhausen Fr 695,623, May 15, 1930 A system of extg and refining metals is described in which oily schist heated by oil burners fed by compressed air liberates oxidizing and reducing gases to the ore which, in the form of briquets or broken, is placed above the schist in a refractory brick furnace and covered with a layer of lime The metal in fusion falls through a grid of refractory bricks to wells which are heated from below The combustion products are delivered to clarification condensation and extn chambers

Volatilizable metals Metallges A G Fr 696,151, May 27, 1930 Metals such as Pb and Zn are volatilized by introducing the metal contg material mixed with a reducing substance into a rotating furnace and causing it to move continuously in the furnace The air is introduced into the reaction chamber in amt sufficiently low to insure a reducing atm in the reaction chamber The material is preliminarily heated by the complimentary combustion of the gases from the reaction chamber

Protecting metals C F Boehringer & Soehne G m b H Fr 695,787, May 17, 1930 Metals and their alloys are protected against destructive action by adding quinoidine or substances contg quinoidine to the agents coming in contact with the metals

Porous masses of metal or metal oxides. I G Farbenind A.-G Brit 339,645, Sept 5, 1929 A foam is formed from a mixt of a liquid, a foam producing agent and finely divided metals or metal oxides (or compds which are converted into metal oxides when heated) and the foam is dried Numerous details and examples are given, and according to the materials used the products may be suitable for use as bearing metals, storage battery plates or fillings for them, filters for liquids or gases, fillers for building

stones or bricks, diaphragms, molds for casting gypsum, glass or metals, backfire preventing devices for gas burners, fillings for teeth, etc

**Metal founding.** Fritz Singer Ger 516,575, July 23, 1926 A protecting layer is formed on molds, especially for Al, by coating with Zn or Mg and heating The Zn or Mg is applied as dust, optionally with a binding agent

**Foundry molds and cores** Jean B Durand Ger 520,175, April 5, 1929. A mortar is used which consists of a hydraulic binder, sand and an amt of water insufficient for the complete hydration of the binder A suitable compn is fine portland cement 100 sand 600 and water 90 pts by vol Cf *C A* 24, 2416

**Core-inserting or -removing apparatus for molds for centrifugal casting.** Centrifugal Castings Ltd Ger 519,236, Dec 11 1928 Corresponds to Brit 304,015

**Double-walled ingot mold.** Hubert Kamps and Hermann Zeppernick Ger 519 235 April 9, 1929

**Water-cooled mold for casting roller plates** Anton Mohr Ger 517,780, Feb 1, 1930

**Molds for casting iron and steel** Wilhelm Klepsch Ger 520,232, June 30, 1926 See U S 1,777,975 (*C A* 24, 5710)

**Block mold for casting steel.** Maxwell G Dumas Ger 517,778, June 2, 1928

**Apparatus for casting metals such as aluminum.** Birmingham Aluminium Casting (1903) Co., Ltd., and C Vaughan Brit 339,721, May 22, 1930 *Structural features*

**Casting aluminum and its alloys.** H Röhrig Brit 339,624, July 8, 1929 For obtaining a uniform cryst structure in an ingot of Al or Al alloy, the mold is cooled at the bottom only, the top and sides being heated or packed with heat insulating material

**Apparatus for centrifugal casting of metal pipes, etc.** J A Byers and M C Smotzer (to Centrifugal Pipe Corp) Brit 340,137, Dec 31, 1928 Structural features and various details of operation are described

**Centrifugal casting of metal pipes.** Leon L Mathieu (to Soc anon des hauts fourneaux et fonderies de Pont à Mousson) U S 1,797,872, March 24 Mech features

**Centrifugal casting of metal pipes, etc.** A Possenti and C Scorza Brit 340,129, April 12, 1929 App and various mech features are described

**Method of making hollow bodies by centrifugal casting.** Mannesmannröhren-Werke Ger 519 237, June 16, 1928

**Casting carbides of metals difficult to fuse.** Gewerkschaft Wallram Ger 516,656, Sept 9, 1924 Metals and metalloids difficult to fuse, such as W, B, etc, are superheated in a crucible with C, with such rapidity that an excessive amt of C is not taken up by the fused metal in forming the carbide The carbide is cast in the usual way Cf *C A*. 24, 5211

**Furnace for fritting powdered ores and metallurgical products.** Vereinigte Stahlwerke A.-G Fr 696,562, June 2, 1930

**Lining metallurgical furnaces.** Hirsch, Kupfer- und Messingwerke A.-G Ger 521,295, June 6, 1928 An elec conductive core corresponding in shape to the furnace interior and having a higher m p than the lining compn is introduced into the furnace The lining compn is placed in the space between the furnace wall and the core, and the latter is then electrically heated, directly or inductively, to a temp above the m p or sintering temp of the lining

**Cupola and like furnaces.** Joseph E Fletcher and The British Cast Iron Research Association Fr. 695,555, May 14, 1930 Means for controlling admission of air to the cupola is described

**Regenerative furnaces for fusing metals.** Walter Alberts and Paul Zimmermann Fr 695,850, May 19, 1930

**Method and apparatus for reducing dust losses in blast-furnace operation.** Georg Eichenberg and Nikolaus Wark Ger 520,164, Sept 15, 1929

**Water-cooling system for blast furnaces, etc.** B J Mullen Brit. 339,972, Dec 19, 1928 A signal system (details of which are described) is provided for operation *when leakage of gas into the water cooling system causes fall in the liquid level*

**Furnace for reclaiming scrap metal.** Theron D Stay and Harrison O Burrows (to Aluminum Co of Am) U. S 1,797,276, March 24

**Furnace for heating metal sheets and pairs.** Charles A Davis and Frank L Leahy. U. S 1,797,902, March 24 Structural features

**Cast iron.** Meier & Weichelt. (Emil Schuz, inventor). Ger. 521,432, May 14, 1924 Gray cast iron with a tensile strength above 28 kg per sq mm is prepd by casting com. Fe contg about 3 5% of Si under such conditions of regulated cooling that

the free C is uniformly distributed in the metal as graphite Fe eutectic. Casting may be effected in Fe molds

**Spongy iron** IVAR RENNERFELT and IVAR C S G BOHM Fr 697,038, June 3 1930 Spongy Fe is made by introducing a mixt of Fe ore and a carboniferous material into a furnace similar to a coke oven heated on the exterior by gas Toward the end of the operation gas is introduced into the furnace itself to absorb the remaining O The cake of spongy Fe is removed and introduced into a case kept free from air The reduction may be completed by the gas introduced

**Iron-reenforced converter floor for steel manufacture.** MANNESMANNRÖHREN WERKE Ger 517 814 May 8 1929

**Steel** FREDERICK F MCINTOSH to Crucible Steel Co of Am ) U S 1,797,728, 24 In melting and refining steel the product is withdrawn from the refining ce and while still molten there is added to it a predetd quantity of Mo sulfide, in r r to effect combination of both S and Mo with the steel

**Phosphorus steel** F BORGGRAEFE Brit 339 016, Dec 22, 1928 Easily machinable steel for pressed nuts etc , of high P content, is prepd by first melting down in a cupola a mixt of scrap iron siliceous pig iron and a material rich in P such as basic pig iron apatite or vivianite or ferro P (with adjustment of the P content according to the product desired) and decarburizing the melt in an acid lined Siemens Martin furnace Ferro-Mn may be added as a deoxidizing agent The steel produced may contain P 0 2–0 5 Mn 0 3 0 6 C 0 04–0 1 S 0 05 0 15 and Si up to 0 25%

**Rustless steel** VEREINIGTE STAHLWERKE A G Fr 695,398, May 10, 1930 A steel or cast iron which does not tend to rust is made by alloying, with the steel or Fe, elements whose electrolytic potential is below the const oxidation potential of the corrosion agent but is above the electrolytic potential of the steel or Fe, and which by reason of their electrochem properties provoke during the corrosion, the formation of an adhering anti rusting layer Sb As, Bi or Sn in amts of 0 5–5% alone or together and with or without Cu may be used

**Apparatus for heat-treating steel rolls for rolling mills.** CHARLES F LOGAN (to Union Elec Steel Corp ) U S 1,797,430, March 24 Structural features

**Alloys.** COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON Fr 696,142, May 27 1930 Alloys are made by intimately mixing easily reducible compds of the constituent metals, and reducing the mixt to the metallic state

**Alloy suitable for jewelry** HARRY KLAUSMANN and HENRY R KIEFF (to Baker & Co ) U S 1 797 236, March 24 An alloy, which is whiter and harder than Pd, is formed from Pd 75–98 and Rh 24 1%, the remainder being Ru (which may be present in the proportion of 2%)

**Aluminum alloys** THEODORE W BOSSERT and JOSEPH A NOCK, JR (to Aluminum Co of Am ) U S 1 797 801 March 24 Alloys which are suitable for mech working comprise Al at least 95% together with Mn 1–1 5 and Mg 0 5–1 5%, free from other substances except such as are present as incidental impurities

**Aluminum alloy** OTTO KASPER. Fr 695 838, May 19, 1930 An alloy of Al contains Ag Cu and Tl V Cd and Ni may also be added An example contains Cu 2–5 or Ni 0 2–0 8 or Cu and Ni together 2 5, Ag 0 2–1, Tl 0 02–0 2, V or Pd about 0 1% and Al the rest The stability on annealing of the alloy is increased by submitting the alloy in a liquid state and at a temp of about 750° to a refining with $SrCl_2$ The $SrCl_2$ may be introduced to the fused mass in an Al capsule *Cf C A* 25, 2410

**Improving iron-chromium-nickel-carbon alloys** FRIED KRUPP A-G Fr 697-188, June 11 1930 The resistance values of austenitic alloys of Fe-Cr Ni C (*e g*, Cr 6–40 Ni 40–4 and C 1%) are improved by submitting these alloys to a sudden tempering from a temp below 1000°

**Iron-nickel alloy for vapor burners.** AKTIEBOLAGET B A HJORTH & Co Brit 339 831 Feb 4, 1929 Double-walled caps forming the mixing chambers of vapor burners are made at least in part of an alloy comprising Fe 62–67 and Ni 38–33% which is stated to have a suitably low heat cond

**Ferrosilicon** I G FARBENIND A G (Carl Müller, Alfred Curs and Leo Schlecht, inventors) Ger 519 066, Apr 9, 1926 Fe Si alloys free from C or of predetd C content are prepd from Fe obtained by decompg $Fe(CO)_5$

**Magnesium alloys for pistons** I G FARBENIND A G Ger 519,377, Dec 6, 1923 Alloys for making pistons of internal combustion engines comprise Zn 1 5 and Si up to 6, with or without Al, Cu and (or) Sn up to a combined total of 5%, the remainder being Mg *Cf C A* 25, 2109

**Manganese steels.** TAYLOR WHARTON IRON & STEEL CO Fr. 695,871, May 20, 1930 See Brit 336,091 (*C A.* 25, 1792)

Steel alloys. Fried Krupp A.-G and Heinrich Koppers A.-G Fr. 697,053, June 2, 1930 Steel alloys resistant to chem. agents, *e. g.*, solns contg $H_2SO_4$, contain Cr 17–40, Ni 6–25 and C up to 0.5%, and particularly Cr 17–18, Ni 8–10 and C 0.02–0.2%, with or without Mo 0.2–3%

*Zinc alloys.* E. A. Anderson (*to New Jersey Zinc Co.*) *Brit.* 340,104, *June 5, 1929* Alloys suitable for die-casting are formed of Zn (of about 99.99% purity) together with an addn. of Al 2–10 and Mg 0.01–0.3% (the Pb and Cd together not being more than about 0.01%, preferably not more than 0.003% each of Cd and Pb and not more than 0.001% Sn) Zn alloys are also mentioned contg Al 4 and Cu 3%, with or without Mg 0.1% Cf. *C. A.* 25, 66

Cleaning metallic surfaces. James H. Gravell. Fr. 695,914, May 21, 1930 Metallic surfaces are exposed to the action of a soln. which contains a compd. of $H_3PO_4$ one atom of H of which is replaced by a metal or radical such as $NaH_2PO_4$ or $NH_4H_2PO_4$.

Rustproofing metals. Chemieprodukte G. m. b. H. Ger. 517,579, Oct. 18, 1928 Metal parts are protected against rusting when under water by giving them a ground coating of bitumen etc. to which is then added a difficultly sol. inorg. substance which will readily enter into ionic exchange with bases. Thus, the parts are coated with bitumen to which is added a coating of $HgSiO_3$. Further examples are given.

Rust-proofing iron, steel, etc. Wm. H. Cole Ger. 516,729, Mar. 19, 1928 See Brit. 292,666, (*C. A.* 23, 1382)

Coating metals with refractory materials. Doherty Research Co. Fr. 696,422, Apr. 8, 1930 Metals are coated by applying a refractory agglomerate to the surface and the free surface of this agglomerate is exposed to a high temp. to calcine or harden it, the subjacent parts of the agglomerate being exposed to progressively decreasing temps., and the metal is protected against exposure to a high temp. A binding substance capable of attacking the metal when heated may be added to the refractory material so that the products of the reaction, *e. g.*, the oxide of the metal, penetrate the refractory material which may be a compd. of Zr

Apparatus for annealing metal objects. Akt.-Ges. Brown, Boveri & Cie. Swiss 143,457, Jan. 4, 1930

Aluminum heat-transfer surfaces. Vereinigte Aluminium Werke A.-G. Brit. 339,722, Oct. 11, 1929 The heat absorbing or -radiating capacity of articles made of Al or its alloys is increased by producing an oxidized layer on the material, *e. g.*, an engine cylinder of Mg Al alloy may be coated with a layer of pure Al and the surface of the latter then oxidized.

Nickel products such as eyeglass frames. Wm. J. Wrighton and Edgar D. Tillyer (*to* American Optical Co.) U. S. 1,797,254, March 24 Ni products such as eyeglass frames are shaped to the desired form by stretching beyond the elastic limit of the material, and the surface fractures and pits are then filled with Ni which has not been worked beyond its elastic limit (suitably by electrodeposition)

*Non-corrosive water and alcohol solution.* Wm. S. Calcott (*to* E. I. du Pont de Nemours & Co.) U. S. 1,797,401, March 24 Corrosion of Fe and Cu by aq. alc. solns. is inhibited by adding a sol. amino carboxylic acid deriv. such as an ethanol amine salt of phenylglycine and a substance such as a mercaptothiazole such as is used as a collecting agent in the flotation of metals U. S. 1,797,402 specifies a similar mixt. in which the flotation collecting agent used is an org. tervalent N compd. such as azobenzene, aminoazotoluene or aminoazotolueneazonaphthol. Numerous examples are given. Cf. *C. A.* 24, 2755

Arc-welding electrodes. J. M. Weed (*to* British Thomson Houston Co., Ltd.) Brit. 339,930, July 8, 1929 An electrode is coated with an alkali metal acetate such as NaOAc in order to obtain a short arc with a low rate of fusion and deep penetrating power so as to produce a ductile weld, and the acetate may be mixed with carbonates of alk. earths such as those of Ca and Ba and with $TiO_2$, and, prior to coating the electrode with flux, the electrode may be pickled with a 10% HF soln. followed by rinsing and drying and it may be preliminarily degreased with a caustic soln.

Fusible electrodes for welding. La Soudure électrique autogène (Soc. anon.). Fr. 696,592, June 3, 1930 Electrodes for welding Al and its alloys in the elec. arc are composed of an Al-Si alloy, the content of Si being 3–13%

Welding magnesium. I. G. Farbenind. A.-G. Brit. 339,923, June 7, 1929 Welding is effected with the use of a flux as described in Brit. 313,487 (*C. A.* 24, 1075).

Solder. Siemens-Schuckertwerke A.-G. Ger. 520,336, Sept. 23, 1927. An approx. eutectic Ag-Pb alloy contg. Ag 0.25–5 and Pb 99.75–95% is alloyed with 0.25–10% of Cu The solder thus obtained m. between 300° and 325°.

# 10—ORGANIC CHEMISTRY

CHAS A ROCHELLE AND CLARENCE J WEST

Relativity and organic chemistry. W A WATERS *Science Progress* 25, 627–32 (1931).—Theories concerning the structure of org compds are reviewed "Only the resulting symmetry of our chem mols, inspected in the aggregate, is observable, and of the actual relative positions of the various atoms, one can be certain of very little" JOSEPH S. HEPBURN

The progress of organic chemistry 1924-1928. IV. Heterocyclic series. ERICH LEHMANN *Z angew Chem* 43, 1061–70, 1092–7, 1112–3(1930); *cf C A.* 24, 4755 V. Natural substances of less well-known constitution. *Ibid* 1113–9 VI. Organic compounds *Ibid* 1138–42 VII. New working methods of organic chemistry. *Ibid* 1142 5 E. H

Progress in the knowledge of oxidation processes. K. W. ROSENMUND *Arch Pharm* 269, 126–38(1931).—This is a review on the mechanism of oxidation, principally of organic compounds W. O. E.

Acetic acid and cellulose acetate in the United States. EVERETT P. PARTRIDGE. *Ind Eng Chem* 23, 482–98(1931).—A survey giving a general view of the AcOH industry in the U S and of the cellulose acetate industry as it affects the consumption of AcOH and $Ac_2O$ Five divisions were made as follows (1) the general developments affecting AcOH manuf since 1914, (2) the general technology of the various processes used or proposed for AcOH manuf, (3) the production of AcOH and its consumption in various industries during 1929 (4) the general development of the cellulose acetate as it affects the consumption of AcOH and $Ac_2O$ A complete bibliography of 44 references is appended and several illustrations charts and tables are included W H BOYNTON

Partial oxidation of methane in the presence of oxides of nitrogen. DAVID F. SMITH AND REID T MILNER. *Ind Eng Chem* 23, 357–60(1931).—The partial oxidation of $CH_4$ is markedly affected by addns of N oxides ($NO_2$, $NO + O_2$) and $HNO_3$ vapor Complete data on this reaction when carried out in glass or quartz in a small app are reported for varying conditions of heating time (0.19–0.66 sec.), temp (500–700°), gas compn and amt of catalyst A smaller vol of $CH_2O$ was always obtained than that of the N oxide used and as this latter was always destroyed if efficient conversion was had, it is concluded that the process offers *no commercial possibilities for $CH_2O$ synthesis* The mechanism is probably loose combination of $CH_4$ and N oxide with subsequent decompn to $CH_2O$ and $N_2$ ALBERT THOMAS FELLOWS

The formation of ethylene and acetylene from methane in electric discharges KURT PETERS AND O H WAGNER *Z physik Chem*, Abt A, 153, 161–86(1931).—An investigation of the optimum conditions of gas flow and compn, pressure and c. d. for the formation of $C_2H_4$ and $C_2H_2$ from $CH_4$ have been investigated The min. energy consumption was 13 kw hr per cu m of $C_2H_2$ and 53 kw hr per cu m of $C_2H_4$ Under the condition of min energy consumption, the exit gas from the discharge tube contained 4.2% $C_2H_2$ and 0.8% $C_2H_4$, whereas the max concns of these gases obtainable were 20 and 3% resp The best gas mixt. for the prepn. of $C_2H_2$ and $C_2H_4$ contained $CH_4$ and $H_2$ in a 2 1 ratio A spectral analysis of the products showed that the reaction region might be either one of 2 types In one of these only the CH bands were visible, whereas in the other with a high energy input there were in addn to the CH bands, the Swan spectrum, the Balmer series, and the C line spectrum The spectral measurements were supplemented by temp measurements in the discharge For the reaction mechanism in the region of low energy input the known scheme for the decompn of $CH_4$ into a series of H poor radicals was confirmed and the formation of the separate reaction products discussed The presence of higher satd and unsatd hydrocarbons in addn. to $C_2H_4$ is assumed to indicate polymerization reactions resulting from the impact of 2 or more radicals In the region in which the Swann spectrum is visible, there are 2 possibilities for the formation of $C_2H_2$ either the combination of 2 CH radicals, or of some reactive form of H with the $-C \equiv C-$ radical P H E

Catalytic condensation of amylenes. A MAILHE AND RENAUDIE *Compt rend* 192, 561–3(1931).—Isoamylene, $Me_2CHCH{:}CH_2$ (I), and 2-pentene (II) were each passed over silica gel in a quartz tube heated to 670° and at ordinary pressure I yielded a gas contg 47% ethylenic hydrocarbons ($C_4H_8$, $C_5H_{10}$), 38% $CH_4$ and 7% $H_2$; an oil and tar remained which on fractionation gave higher ethylenic and aromatic hydrocarbons and a residue in 80°. The gas from II was 52% $C_4H_8$ and $C_5H_{10}$ 34%

$CH_4$ and 6% $H_2$, the oil and tar yielded higher ethylenic and aromatic hydrocarbons and a residue m 53° The d n and I nos of the fractions are given D S S

**The oxidation of propenyl derivatives with diazo compounds.** A Quilico *Atti accad Lincei* **12**, 341–4(1930).—The oxidation of propenyl compds with normal diazo hydrate noted by Q (cf Q and Ferri, *C A* **23**, 597) was explained by the interpretation by Angeli and Polverini (*C* **24**, 4770) A shows that the general reaction is.

$$\begin{array}{l} \text{RCH} \\ \| \\ \text{CHMe} \\ | \\ \text{O} \end{array} \longrightarrow \text{RCHO} + \text{OHC Me}$$

Thus using $PhN_2OH$ as oxidizing agent the reaction takes place in either of the following ways

$$\begin{array}{l} \text{RCH} \\ \| \\ \text{CHMe} \\ | \\ \text{O} \end{array} \longrightarrow \begin{array}{l} \text{RCH} \\ \| \\ \text{NNHPh} \end{array} + \begin{array}{l} \text{HCMe} \\ \| \\ \text{O} \end{array}$$

$PhN_2H$

or

$$\begin{array}{l} \text{RCH} \\ \| \\ \text{CHMe} \\ | \\ \text{O} \end{array} \longrightarrow \begin{array}{l} \text{RCH} \\ \| \\ \text{O} \end{array} + \begin{array}{l} \text{CHMe} \\ \| \\ \text{NNHPh} \end{array}$$

$N_2HPh$

*i e*, forming either the alkyl or arylphenylhydrazone The former is not isolated as it combines with unchanged azo compd forming a formazylic deriv, $PhN_2CMe$ NNHPh A W Contieri

**Cuprous chloride as a catalyst for acetylene.** J A Nieuwland and W. L. Foohey *Proc Indiana Acad Sci* 38, 196(1929).—$C_2H_2$ when run into a soln contg CuCl and $NH_4Cl$ and satd with HCl forms $CH_2$ CHCl $C_2H_2$ run into a soln contg both CuCl and $CuCl_2$ forms equil mixts of *cis* and *cis trans* dichloroethylenes Solns of $CuCl_2$ in the absence of CuCl do not absorb $C_2H_2$ H M Stark

**Oleastene (hydrocarbon contained in the fruit of olives).** Giovanni Sani *Atti accad Lincei* **12**, 238–42(1930).—During the extn of olive oil with alkali to remove phytosterol, an orange oil seps which is unaffected by the alkali Extd with ether, crystals separate out, leaving the oil itself, which is insol in water and *dil* EtOH, but sol in other org solvents Its EtOH soln is flourescent $d_{17.5}$ 0.8934, analysis indicates the formula $C_7H_{12}$ It absorbs a max of 33.15% $O_3$, indicating that the mol formula is $C_{21}H_{36}O_3$, and the mol wt of the hydrocarbon is 288, $C_{21}H_{36}$ Two $N_2$ derivs were also prepd which will be described in a later paper A W C.

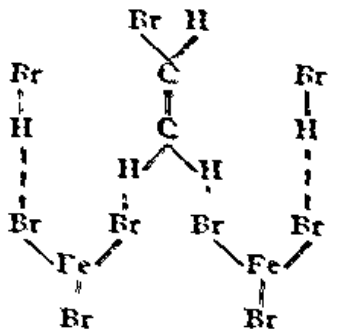
**The synthetic product cuprene (carbene).** Walter Herzog *Kunststoffe* **21**, 49–53(1931).—Cuprene, a polymerization product of $C_2H_2$, obtained when the latter is brought in contact with Cu or CuO at elevated temps, was first prepd by Erdmann and Kothner (*Z anorg Chem* **18**, 49, 57(1898)) Later investigations of this substance were carried out by Gooch and Baldwin (*Z anorg Chem* **22**, 255(1900)), Alexander (*Ber* **32**, 2381(1899)), Sabatier and Senderens (*Compt rend* **130**, 250(1900)) and Kaufman and Schneider (*C A* **13**, 1825, **16**, 2302 **18**, 1465) Although cuprene now is made on a large scale the technical details of the mfg process have so far remained a secret It is known only that Cu or cupriferous bronze powders are used as catalyzers at a temp of 200–260° under pressure with the combined action of dark elec discharges The presence of O (air) is a necessary factor A special arrangement to prevent the voluminous polymerization products from clogging up the reaction chamber is described in Swiss Pat 95,237, May 7, 1921 Addn of 5–15% N to the $C_2H_2$ has been found to give homogeneous and lighter colored products With undild $C_2H_2$ there is, as a result of the high reaction temp, a tendency to coking, resulting in dark products of less H content and a smaller yield A greenish blue, neutral, strongly unsatd, tar like liquid, the "*cuprene tar*," d 0.89 is obtained as a by product in amts of 5.5–7% besides 13–17% waste gases This tar has been investigated by Schläpfer and Stadler (*C A* 20, 1384) Under the proper conditions the yield of cuprene is 25% of the wt of $CaC_2$ used According to Ger pat 407,485, Dec 30, 1922, $C_2H_2$, mixed with indifferent gas, is conducted into stearic acid heated to 250–300° to which has been added Cu bronze The cuprene obtained by this process is finely powdered and of a light to dark brown color After sepn from the stearic acid the last traces of

the latter are removed by washing with caustic lye or solvents Addn. of air or O to $C_5H_8$ or addn of substances giving off O to the contact medium, has been found advantageous Sulfurized cuprene, contg 11% S has been prepd. by heating cuprene with $S_2Cl_2$ in the presence of benzene as suspending agent under reflux When working under 10 atm pressure and at 180–200° a product contg 13.6% S and 4% Cl was obtained These substances may be employed in the rubber industry. Because of its chem indifference and highly voluminous structure cuprene presents a material with possibilities for a large no of uses Its application in the manuf of acid resistant and elec insulating materials plastic masses electrodes and explosives, as a cork substitute in the linoleum industry and absorbing agent for illuminating materials and fuels or volatile matters is discussed D Thiessen

**Nuclear synthesis in the olefin series. II. 1,4-Diolefins.** Bernard H. Shoemaker and Cecil F Boord *J Am Chem Soc* 53, 1505–12(1931), cf *C A*. 24, 4756.—By the use of $CH_2$ $CHCH_2MgBr$ the β Br ether synthesis of olefins has been extended to the prepn of 1,4 diolefins *α Chloropropyl Et ether*, $b_{14}$ 34–6°, $d_4^{22}$ 0.954, $n^{25}$ 1.4129 (74% yield) *α chlorobutyl deriv*, $b_{18}$ 49–51°, $d_4^{22}$ 0.938, $n^{20}$ 1.4168 (81% yield) Bromination gives the *α β-dibromoalkyl Et ethers*, RCHBrCHBrOEt; R = *Me*, $b_{18}$ 79–82 $d_4^{22}$ 1.649 $n^{20}$ 1.5000, R = *Et*, $b_{14}$ 99–101°, $d_4^{22}$ 1.564, $n^{20}$ 1.4968. With $CH_2$ $CHCH_2MgBr$ (details of its prepn are given), there results *α-allyl β bromoalkyl Et ethers* RCHBrCH($C_3H_5$)OEt, R = *H*, $b_{11}$ 69–71°, $b_{18}$ 84–6°, $d_4^{22}$ 1.225, $n^{20}$ 1.4592 R = *Me* $b_{14}$ 72.5° $d_4^{20}$ 1.162, $n^{20}$ 1.4592, R = *Et*, $b_{18}$ 88–92°, $d_4^{22}$ 1.150, $n^{20}$ 1.4606 By the action of Zn in PrOH or BuOH there results 1,4 pentadiene, -hexadiene and *heptadiene*, the new compd $b_{738}$ 92–3.3°, $d_4^{22}$ 0.7176, $n^{20}$ 1.4202, the *tetrabromide* liquid, $d_4^{22}$ 2.091, $n^{20}$ 1.5734 The rule that unsatd compds with a double bond in the α position boil lower than the corresponding satd hydrocarbons has been confirmed It is further shown that in any given family the continuous chain diolefins form a definite series with gradually increasing b ps depending upon the relative position of the double bonds C J West

**Addition of gaseous hydrogen bromide to acetylene and to gaseous vinyl bromide under the influence of catalysts and the addition of hydrogen bromide to vinyl bromide and allyl bromide in the liquid phase.** J P Wibaut *Rec trav chim* 50, 313–37 (1931), cf *C A* 22, 1949, 24, 1076.—An apparatus was designed wherein the rate of flow of the reacting gases could be maintained fairly const., in this way a series of expts. under well-defined conditions could be made otherwise conflicting results were obtained as to the proportion of isomerides formed, even in duplicate expts The polymerization of vinyl bromide could be avoided by the addn of 0.1–0.2% hydroquinone (cf Moureu and Dufraisse *C A* 17, 2105) $MeCHBr_2$ was prepd from AcH and $PCl_3Br_2$ (Perkin, *J Chem Soc* 45, 522(1884), Anschutz, *Ann* 235, 300(1886)), the contact substances consisting of metallic bromides on asbestos, were prepd by impregnating the asbestos with the soln. of the bromide in concd HBr, evapg the latter on the water bath and drying in a current of dry HBr Anhyd HBr was prepd by the action of Br on boiling tetrahydronaphthalene (Houben *Methoden der organischen Chemie*, I 746) in an all glass app The detn of the solidification points of mixts. of $MeCHBr_2$ and $(CH_2Br)_2$ gave the following results 0% $MeCHBr_2$ 9.9°, 3.4, 7.3°, 6.0 5.4° 10.6, 2.6°, 14.0, 0.6°, 20.8, —4.2°, 25.5, —8.2°, 32.8, —13.6°, 47.4, —26.0° 57.8, —35.2° 78.8, —61.0°, 84.6 —77.5°, 90.1, —76.5°, 91.4, —74.0°, 100 —63.5° Samples contg more than 60% $MeCHBr_2$ were analyzed by means of the *n* 0% $MeCHBr_2$, $n_D^{25}$ 1.5372, 10.0, 1.5322, 29.9, 1.5270, 49.9, 1.5214, 59.9, 1.5194, 69.9 1.5167 80.0 1.5141, 84.9, 1.5129, 90.0, 1.5114, 100, 1.5080 In the expts. with vinyl bromide 50 g was used in the course of 4 hrs., an excess of HBr being used the results are given in the table below in the order contact substance temp (°C.), di Br compds. (g), $(CH_2Br)_2$ in reaction product (%) empty tube 100, 0, . . .; glass wool 100, 53, 99.7, 100 52, 100.0 200, 6 99.7, asbestos 100, 5, 68.1, silica gel 100, traces, , 200, 18, 6, 100, 5, 3 asbestos from another lot 100, 42, 98.2, $HgBr_2$ on asbestos 100, 20, 4, 100, 18, 20, 200 15 9, $HgBr_2$ cryst., no carrier 100, 0, . . .; $BiBr_3$ no asbestos 100, 16, 10, 100, 48, 48 200, 19, 6, $BiBr_3$ powder, no carrier 100, 3, 3, 150, 15, 4 $SbBr_3$ on asbestos 100, 30, 41, 150, 22 10, $AlBr_3$ on asbestos 100, 10, 48, 100, 34, 88.8, 200, 7, 0, 200, 6, 0, $AlBr_3$ powder, no carrier black condensation product formed, $FeBr_3$ on asbestos 100, 32, 2.5%, 100 66, 76, 200, 9, 33, $FeBr_3$ in small lumps, no carrier 100, 22, 9, 200, 6, 6 With *acetylene* the expts were made in order to find out the conditions under which the dibromoethanes could be prepd from $C_2H_2$, twice the quantity of HBr required for the complete conversion of the $C_2H_2$ into dibromo-

ethane being used. Results with 6.4 l. acetylene and 26.0 l. HBr in the course of 4 hrs.: pure asbestos 100, traces, . . ; $FeBr_3$ on asbestos 100, traces, . . , 200, traces, . . ; $FeBr_3$ on pumice 100, 7, 65.6; 200, 13, 95.8; 300, 23, 96.5; 100, 9, 77.0; $BiBr_3$ on pumice 100, 2, 96.0; 200, 1.5, 12; $HgBr_2$ on asbestos 100, 25, 97; 150, 19, 94.4; 150, 29, 96.4; $SbBr_3$ on asbestos 100, 10, 65; 100, 19, 87.1; 150, 14, 56. It thus appears that *the reaction between* $C_2H_2$ *and HBr is more difficult to realize than between vinyl* bromide and HBr; nevertheless, the prepn. of $(CH_2Br)_2$ from $C_2H_2$ and HBr is possible with reasonable yields. In the expts. in the liquid phase, 0.1 mol. vinyl bromide was heated with 30% excess of HBr for several days at 100°; another set of expts. was performed *with AcOH as a solvent and with the addn. of metallic salts.* The results are given in the following table in the order: temp. (°C.), duration of heating, substance added, yield $C_2H_3Br_3$ (%), MeCHBr, in reaction product (%). *Without solvent* — 100, 69 hrs., HBr d. 1.60, 16; 100, 100, 68 hrs., HBr d. 1.72, 24.9; 100, 42 hrs., HBr d. 1.82, 40, 60; 100, 68 hrs., HBr d. 1.80, 36, 65. *With 30% HBr in glacial AcOH* — 50, 14 days, none, 82, 90; 50, 14 days, none, 82, 98; 50, 14 days, none, 87, 80; 50, 17 days, none, 42, 70; 50, 12 days, $FeBr_3$, 82, 97; 50, 14 days, $HgBr_2$, 48, 100; 100, 44 hrs., none, 27, 70; 100, 70 hrs., none, 64, 71; 100, 60 hrs., none, 45, 75; 100, 66 hrs., $FeBr_3$, 53, 91; 100, 71 hrs., $HgBr_2$, 42, 80; 100, 68 hrs., $AlBr_3$, 50, 92; 100, 74 hrs., glass wool, 48, 92; 100, 47 hrs., asbestos, 82, 97. In these expts. $MeCHBr_2$ always is the chief product of the reaction while the metallic salts have little or no influence. With *allyl bromide*, 15 g. was heated with 42 g. glacial AcOH and 24 g. anhyd. HBr in sealed tubes at 50° or 100°, or was kept at room temp. either in the dark, in diffuse daylight or irradiated by an U. V. lamp; the highest yield obtained amounted to 48%, and 1,2-dibromopentane always was the chief product of the reaction. It follows from these expts. that the presence and nature of the solvent is the most important factor detg. the course of this reaction. If a liquid mixt. of allyl bromide and anhyd. HBr (without any solvent) is exposed to sunlight or to U. V. light, $CH_3(CH_2Br)_2$ is the chief product of the reaction, while in the dark a mixt. of both isomers is formed. In the gas reaction between vinyl bromide and HBr, glass wool and asbestos favor the formation of $(CH_2Br)_2$, while silica gel and ferric or Bi bromide, if used without a support, direct the reaction to the formation of $MeCHBr_2$. The reaction leading to $MeCHBr_2$ is the slower one of the 2 reactions, for in all reactions in which this isomer is obtained as the chief reaction product the yields are considerably lower than when $(CH_2Br)_2$ is the chief product. Obviously in a contact catalyst consisting of asbestos impregnated with a metallic bromide 2 catalytic activities are to be distinguished. With the freshly prepd. contact substance the influence of the metallic bromide predominates and $MeCHBr_2$ is formed as the chief product. If, however, the metallic bromide has lost its catalytic properties, the influence of the carrier, the asbestos, predominates and the 1,2 isomer is the main product. The formation of the $(CH_2Br)_2$ is explained by the repelling action of the Br atom in vinyl bromide, while the influence of the catalytic properties of the metallic bromides is explained by the phenomenon of directed adsorption (Kruyt and van Duin, *C. A.* 15, 3783, 22, 3031; 23, 5395). In the case of glass wool or asbestos there seems to be no reason why the mols. of vinyl bromide or HBr should be fixed on the adsorbent in a special manner, while for the contact substances, formed with metallic bromides, the assumption is made that the outer layer of the contact substance consists mainly of Br atoms and that complexes are formed of the (I)



type in which steric conditions are favorable for the formation of $MeCHBr_2$. The results obtained with vinyl and allyl bromide in the liquid phase are considered not to be in accordance with the theory of alternating polarity. C. F. VAN DUIN

Oxidation of methanol with air over iron, molybdenum and iron-molybdenum oxides. HOMER ADKINS AND WESLEY R. PETERSON. *J. Am. Chem. Soc.* 53, 1512–20(1931) —

of *2-ethoxy-1 butene*, b 85–7°, $n_D^{24.5}$ 1.4011. PhMgBr gives 60% of *α-phenyl-β bromoethyl Et ether*, $b_{18}$ 129–33° $n_D^{25}$ 1.5317. KOH gives 62% of $CH_2$ C(OEt)Ph, $b_{11}$ 109–12°, $n_D^{25.5}$ 1.5287 MeCHBrCH(OMe)Br and PhMgBr give 71% of MeCHBrCH(OMe)Ph, $b_{14}$ 122–4°, $n_D^{25}$ 1.5316 KOH gives 42% of *α methoxy β methylstyrene*, $b_{14}$ 96–8°, $n_D^{25}$ 1.5271 EtCHBrCH(OMe)Br and EtMgBr give 50% of *3-bromo-4 methoxyhexane*, $b_{14}$ 74–8°, $n_D^{25}$ 1.4495 KOH gives 79% of *3 methoxy-3 hexene*, b 114–5°, $n_D^{25}$ 1.4130 These unsatd ethers in the presence of a trace of acid or even semicarbazide-HCl, hydrolyze to the corresponding ketones C J West

**Methyl selenomercaptan.** A Baroni *Atti accad Lincei* 12, 234–7(1930).—MeSeH was prepd by treating alc NaSeH with MeI The NaSeH was made by satg a 10% soln of EtONa with $H_2Se$ until the NaSeH first pptd redissolved The reaction *was carried out in a flask equipped with a condenser, the receiving flask was cooled* with liquid $CO_2$ and $Me_2CO$ the product being distd off by heating on a water bath MeSeH is an almost colorless liquid having a very disagreeable odor $b_{744}$ 12° The *following metal salts were also prepd* (CH₃Se)₂Hg *is formed by addn of* Hg(CN)₂ while cooling strongly as yellow crystals The Pb salt is obtained by adding Pb(OAc)₂, the Ag salt by means of $AgNO_3$ and NaOAc, the Cu salt with Cu(OAc)₂, and the Bi salt with $BiCl_3$ and NaOAc These are all obtained as yellow cryst powders, whose analysis agreed very closely with that calcd A W Contieri

**Effects of activated and non-activated magnesium-copper alloy on the yields of some organomagnesium halides.** Henry Gilman and E A Zoellner *J Am Chem Soc* 53, 1581–3(1931).—When equiv quantities of Cu-Mg alloys are used alone, either in the activated or non activated condition the yields of some Grignard reagents are lowered However, small but effective quantities of the activated alloy appear to have no significant effect on the yield The other more commonly used catalyst, I, apparently has the same effect as the alloy on the yields of some Grignard reagents. C J West

**Preparation of organomagnesium halides in the presence of magnesium iodide. Studies on the capture of free radicals** Henry Gilman and E A Zoellner. *J Am Chem Soc* 53, 1583–6(1931).—In studies concerned with the capture of free radicals *formed during the prepn* of organomagnesium halides it has been shown that the quantity of I used to catalyze the formation of *tert* BuMgI has a significant effect on the yield There is no appreciable lowering of yield with a very small quantity or a full atom equiv of I Another catalyst, the Mg Cu alloy which is used with more refractory RX compds., also appears to have a corresponding effect on the yields of other RMgX compds. The av % yields of $Me_3CMgCl$ with varying amts of I (at. equiv given) are 0, 83.3, 0.0125, 83.6 0.025, 77.1, 0.05, 72.2, 0.1, 65.5, 0.2, 64.9, 0.3, 64.8, 0.4, 71.8 0.6, 76.2 1.0, 79.7 C. J West

**Some mechanisms for the formation of organomagnesium and other organometallic compounds.** Henry Gilman and R E. Brown *Rec trav chim* 50, 184–7(1931).—*The formation of Grignard reagents may be explained by the reactions* RX + Mg ⟶ R— + —MgX (I) R— + —MgX ⟶ RMgX (II) This mechanism, however, does not include all organomagnesium compds., *e. g.*, the prepn of $MgEt_2$ *from* $HgEt_2$ and Mg moreover, the Mg subhalides are hypothetical and the possibility exists that the reactions of the MgX compds. may be essentially those involving a catalytic effect of $MgX_2$ on Mg (cf Gilman and Brown, *C A* 24, 1857) Therefore, the following reactions are proposed for the formation of organomagnesium compds: 2 RX + Mg ⟶ 2 R— + $MgX_2$ (III), 2 R— + Mg ⟶ $R_2Mg$ (IV), $R_2Mg$ + $MgX_2$ ⟶ 2 RMgX (V) *There is definite expt evidence in support of reaction* III, *e. g.*, the transitory existence of benzohydryl radicals (Gilman and Zoellner, *C A.* 24, 5746) while there is also very compelling evidence for the correctness of reaction V (Gilman and Fothergill *C A* 23, 5468 Gilman and Brown, *C A* 24, 1853) All that is needed is support for reaction IV and this will probably come forth from the work *of Paneth on free Me and Et radicals* (*C A* 23, 5159 24, 3750), *in which it is* shown that some organometallic compds. decomp by pyrolysis *in vacuo* with the formation of the metal and free radicals $Et_4Pb$ ⟶ 4 Et— + Pb, which can then unite with some other metals to give other organometallic compds Although no expts. were carried out with Mg, the close relationship between Zn and Mg suggests the possibility of such reactions with Mg Expts. carried out with Et radicals, obtained by Paneth's method from $PbEt_4$ and a Be mirror, did not result in the formation of $BeEt_2$ and thus it could not be decided whether the removal of the Be mirror is due to atomic H such as had been suggested by Schultze and Muller (*C A* 24, 2036) C. F van Duin

**Effect of copper upon the yields of Grignard reagents.** GEO JOHNSON AND HOMER ADKINS *J Am Chem Soc* 53, 1520–3(1931).—The following yields were obtained with Mg and a Mg (88%) Cu (12%) alloy. BuBr 92.5, 78.7, *sec* BuBr 73.8, 49.6, BuI 82.4, 64.2, EtI 83.4, 76.1, $PhCH_2Cl$ 94.1, 80.2, cyclohexyl bromide 82.5, 64.7, allyl bromide 72.1, 60.0, PhBr 90.8, 89.1. These values show that the yields of the Grignard reagent were very considerably lowered, except from PhBr, by the presence of Cu which promoted the competitive Wurtz reaction. C. J. WEST

**Organic lead compounds. I. Action of acids on lead aryls.** PAUL R. AUSTIN *J Am Chem Soc* 53, 1548–52(1931).—The strong tendency of organo-Pb compds. to retain at least 2 Pb–C linkages has been further demonstrated by the action of $HNO_3$ and HBr on $Pb(o\text{-}MeC_6H_4)_4$. Heating $(o\text{-}MeC_6H_4)_3PbH$ in $C_6H_4Me_2$ for 24 hrs. gives *tetra-o-tolyllead*, m. 201.2°. $(o\text{-}MeC_6H_4)_3PbBr$ (18 g.) and PhMgBr give 16 g. *phenyltri-o-tolyllead*, m. 101.2°. $(o\text{-}MeC_6H_4)_3PbH$ (8 g.) and 40% HBr in $CHCl_3$, shaken for 2 hrs., give 4 g. *tri-o-tolyllead bromide*, m. 129–30°; the action of a larger quantity of HBr or the action of Br in $CHCl_3$ on $(o\text{-}MeC_6H_4)_4Pb$ gives *di-o-tolyllead dibromide*, m. 160°. $(o\text{-}MeC_6H_4)_3PbPh$ and 40% HBr, refluxed for 45 min., give 10% of *phenyldi-o-tolyllead bromide*, m. 117–8°; a larger quantity of HBr, refluxed 8 min., gives 44% of *phenyl-o-tolyllead dibromide*, m. 116–7°. $(o\text{-}MeC_6H_4)_3PbPh$ and $HNO_3$ in petr. ether give 69–93% of *phenyl-o-tolyllead dinitrate dihydrate*; the same product was obtained even with boiling $HNO_3$ (d. 1.42), together with some *di-o-tolyllead dinitrate*. A new volumetric method for the *detn. of Pb* in aryl Pb compds. is described. C. J. WEST

**Reactions of some organic lead compounds.** CHARLES D. HURD AND PAUL R. AUSTIN *J Am Chem Soc* 53, 1543–8(1931).—$PhEt_3Pb$ and HCl give $C_6H_6$ and $Et_3PbCl$; further reaction gives the less sol. $Et_2PbCl_2$. Both $PhEt_3Pb$ and $Et_4Pb$ react readily with $HNO_3$ to produce $Et_3Pb(NO_3)_3$, which reacts metathetically in MeOH with HCl to give the dichloride. In 0.1 *M* aq. soln. the dinitrate is apparently 79% ionized. Pyrolysis of $Pb(OBz)_4$ gives rise to BzOH and *Pb dibenzoate*, m. 119–20° (crystd. from MeOH) or 145–7° (block, after crystn. from $C_2H_4Cl_2$). Similarly, $Pb(OAc)_4$ gives AcOH and $Pb(OAc)_2$. C. J. WEST

**Synthesis of formaldehyde by catalytic oxidation of methanol.** H. KADOWAKI AND M. YAMADA *Repts Osaka Imp. Ind. Research Lab. Japan* 11, No. 19(1931). cf. *C. A.* 23, 4926.—A Ag catalyst was prepd. by evapg. to dryness a mixt. of $AgNO_3$ (2.5–3.0 g.) and pumice (1 g.) in water and later heating to 400–500° in an elec. furnace. The expt. was carried out under the same conditions as those reported previously. The effects of other elements are also discussed. Fe, Co, Cr, Mo, W, U, Mn, Zr, Th, Cu, Zn and Al show poisonous effects while Se and V slightly accelerate the reaction. Excess $CO_2$ is harmful, but its effect is negative if the % of $CO_2$ in the air is below 8%. F. I. NAKAMURA

**The oxidation of gaseous acetaldehyde with oxygen as an example of the combustion of hydrocarbons.** MAX BODENSTEIN *Sitzb. preuss. Akad. Wiss.* 1931, 73–88.—The reaction between gaseous AcH and $O_2$ at 0.1 atm. pressure and 70° gives $AcO_2H$ as the principal product. The rate is given by $d(AcO_2H)/dt = k(AcH)^2/(O_2) + m$, where $m = 150$ if the pressure is measured in mm. bromonaphthalene. It is not a chain reaction but the mechanism is as follows. A mol. of AcH becomes activated, reacts with $O_2$ and forms an energy rich mol. of $AcO_2H$. This transfers its energy to the AcH mol. primarily but secondary reactions are with $O_2$, negative catalysts or with the walls. The results are discussed in connection with the oxidation of $C_2H_4$ and other gaseous hydrocarbons. It is probable that the scheme could account for the oxidation of all hydrocarbons. G. M. MURPHY

**The course of the reaction between citronellal oxime and acetic anhydride.** J. ZIMMERMANN *Rec. trav. chim.* 50, 283–6(1931).—On boiling with $Ac_2O$, citronellal oxime passes into citronellonitrile (Semmler *Ber.* 26, 2235(1893)) and on this reaction the method of Dupont and Labaune (*Ber. Roure Bertrand fils* 1912, 3) for the quant. detn. of citronellal in essential oils is based. After having boiled the oxime with $Ac_2O$, the reaction product is treated with 0.5 *N* alc. KOH, the assumption being made that this has no influence on the nitrile. This assumption is, however, invalid, 7–12% of a non volatile residue being obtained by Z. in this way. The reaction between citronellal oxime and $Ac_2O$ is a very violent one if NaOAc is present, within a short time the temp. rises to 145°, while without NaOAc this violent reaction only occurs after heating on the water bath. In this reaction a partial resinification takes place and the formation of citronellamide besides a small amt. of a N compd. with a coumarin like odor was obtained, the same reaction occurs with concd. $H_2SO_4$ and, therefore, a N detn. cannot be carried out by the Kjeldahl method. The citronellolnitrile formation

is therefore unsuitable for the quant detn of citronellal The citronellal used in these expts was purified through the bisulfite compd; it $b_{4-6}$ 68–71°, $d_4^{27.5}$ 0 8435, $n_D^{27.5}$ 1.4435, $\alpha_D^{25}$ 10 10', citronellal oxime, $b_7$ 124–5°, $d_4^{27.5}$ 0 8971, $n_D^{27.5}$ 1 4711.

C. F VAN DUIN

**The action of Japanese acid clay on terpene compounds. II. Cyclization of citronellal.** TSUTOMU KUWATA. *J Soc Chem Ind, Japan* 34, Suppl binding, 70–2(1931); cf *C A* 24, 1857 —This clay with citronellal in MeOH gives 32% isopulegol and compds contg 23 44% MeO groups No menthoglycol was found V F HARRINGTON

**Syntheses from natural gas hydrocarbons. I. Caproic acid from pentane.** H B HASS AND J R MARSHALL. *Ind Eng Chem* 23, 352–3(1931) —Treatment of AmCl with NaCN gave 70% yields of AmCN, with recovery of 25–28% of unchanged chloride Other primary chlorides also reacted satisfactorily, but secondary chlorides or bromides gave poor yields (approx 30%), and tertiary chlorides and bromides, no nitrile NaI, acting as an intermediate compd catalyst, leads to 90% yields, although its use is only recommended for cyaniding the less reactive chlorides and bromides Hydrolysis of the AmCN with 67% $H_2SO_4$ is complete in 30 min Sepn of the nitrile from the halide is possible because AmCl and BuCl form binary min.-boiling azeotropic mixts with EtOH and ternary azeotropic mixts with EtOH and $H_2O$ These processes are suitable for the manuf of caproic acid with EtOH and ternary azeotropic mixts The method is a general one for the conversion of any primary alkyl chloride to the fatty acid contg 1 more C atom ALBERT THOMAS FELLOWS

**The bromides of the eleostearic acids. I. The hexabromides.** J VAN LOON *Rec trav chim* 50, 32–6(1931) —Recent researches have shown the eleostearic acids have the formula $Me(CH_2)_3CH\ CHCH\ CHCH\ CH(CH_2)_7CO_2H$ (Eibner and Rossmann, *C A* 22, 4839, Böeseken, *C A* 23, 5160, van Loon, *Diss* Delft, 1929, 62, *C A* 24, 4178) The formation of hexahalogen compds, however, does not take place easily and Kaufmann was the first to show the presence of 3 double bonds (*C A*. 20, 2989) titrimetrically although he did not isolate any hexa Br compd In order to prep these compds β-eleostearic acid was brominated in $CCl_4$ with the theoretical amt of Br under the influence of Uviol light after it had been shown that this light does not provoke any particular intramol change After evapn of the solvent and recrystn of the residue from petroleum ether to which a small amt of ether had been added, 0 5 g of the *hexabromide*, m 157°, was obtained from 7 g of the acid On debromination with Zn and alc HCl the hexabromide gave β eleostearic acid in quant yield, the same acid was again obtained on debrominating the oily mixt. of hexabromides which results after sepn of the cryst compd The same cryst hexabromide was also obtained from α-eleostearic acid, which is easily converted into the β form by traces of halogen, therefore most probably the hexabromides are formed in both cases from the same mixt of tetrabromides which are formed as the primary reaction products, tetrabromination taking place instantaneously and further bromination only very slowly The solid tetrabromide, m 114°, on bromination gives the same hexabromide, m 157°, the yield being only 10 g from 100 g of the tetrabromide, in this case again the oily hexabromides on debromination gave β-eleostearic acid C F VAN DUIN

**Preparation of dichloroacetic acid.** HOWARD W DOUGHTY AND GERHARD J. DERGE *J Am Chem Soc* 53, 1594–6(1931).—A simple and convenient method is described for the prepn of $Cl_2CHCO_2H$ by the reaction of Cu with $Cl_3CCO_2H$ in $H_2O$ The hydrolysis of $Cl_3CCO_2H$ has been studied at 60° and 100° and the temp coeff. found to be 2 576 The yield of the acid, m 5–6°, $d_{22}^{22}$ 1 5594, was about 80%

C. J WEST

**Esterification in the presence of anhydrous salts.** FRANCIS M. WHITACRE AND H T. BRISCOE *Proc Indiana Acad Sci* 38, 187–94(1929) —The anhyd sulfates of Cu, Cd, Al, Mn, Fe, Ca and K alum were tested as catalysts in the esterification reaction between EtOH and HOAc Higher alcs and higher acids and branched-chain compds were used with $CuSO_4$ $CuSO_4$ gave the highest yield of EtOAc, 84 1% after 264 hrs refluxing Plaster of Paris was a retardant and anhyd $Na_2SO_4$ had no effect. The temp at which the salt is dehydrated is important When the temp at which the salt is dehydrated is high enough to remove all the water of crystn the promoting effect is accelerated but this accelerating effect is reduced when the temp of dehydration is high W. and B conclude that the promoting effect of anhyd salts is partly due to removal of water and partly to other causes H M STARK

**Esterification with thiolacetic acid.** FRANCIS B STEWART AND PAUL V. MCKINNEY. *J Am Chem Soc* 53, 1482–90(1931) —$Me_2CHOH$ and AcSH yield only $H_2S$ and the normal ester, $Ph_3COH$ only $H_2O$ and the thiol ester, MeOH and EtOH

give 78% $H_2S$ and 22% $H_2O$. MeOH appears to esterify somewhat more rapidly than EtOH but both are much more reactive than $Me_2CHOH$, the data for $Ph_2COH$ are at 108° and since the higher temp. was necessary to obtain accurate results it is undoubtedly less reactive than $Me_2CHOH$. The quantities of $H_2S$ evolved by the 3 reactions show that there are 3 distinct processes, in $Ph_2COH$ only the HO group enters into the reaction, in $Me_2CHOH$ only the H takes part in the reaction, while in the cases of MeOH and EtOH either H or OH can split off. The question of the mechanism of esterification in general is considered and an explanation of certain anomalies is attempted. C. J. West

**Preparation of bisacetamide hydrochloride and its use as an acetylating agent.** Henry Stephen. *J. Chem. Soc.* 1931, 672-3.—$AcNH_2$ and $SOCl_2$ in $Et_2O$ give $(AcNH_2)_2$.HCl and MeCN. When $(AcNH_2)_2$.HCl is fused with an equimol. proportion of the HCl of a primary aromatic amine the Ac deriv. of the latter is formed together with a trace of an amidine. The reagents have been applied with success to the prepn. of $PhNHAc$ o-, m- and p-$MeC_6H_4NHAc$ and α- and β-$C_{10}H_7NHAc$. C. J. West

**The preparation of glycol chlorohydrin.** E. D. G. Fraim. *Rec. trav. chim.* 50, 261-7(1931).—$HOCH_2CH_2Cl$ (I) is always prepd. by the addn. of HOCl to $C_2H_4$, the HOCl being used in the form of $Ca(OCl)_2$ (cf. Norris, *C. A.* 13, 2740), NaOCl (Hasse and Ward, U. S. Pat. 1,534,608, *C. A.* 20, 3170) or Cl and water (Gomberg, *C. A.* 13, 2368). Irvine and Haworth (U. S. Pat. 1,496,675, *C. A.* 18, 2315) have proposed to use a 5% $CuCl_2$ soln. as a catalyst in this process but their method of prepn. is far too complicated. It is now pointed out that the reaction proceeds better on using 1% CuCl, while with 3% $CuCl_2$ less favorable results are obtained, the best results are, however, obtained with 0.1% $CuCl_2$, a rapid absorption of the $C_2H_4$ taking place with hardly any formation of $(CH_2Cl)_2$. Without the addn. of Cu salts a high yield of I may only be obtained when an excess of $C_2H_4$ is present during the whole course of the reaction; under these conditions, however, losses of $C_2H_4$ cannot be avoided. The formation of I is not only catalyzed by Cu salts, but Ni, Co and Fe salts exert the same action and it is noteworthy that all these salts accelerate the decompn. of HOCl into HCl and O as well. These results show that the formation of I from $C_2H_4$, water and Cl is not to be considered as an addn. of HOCl to $C_2H_4$ *but as an oxidation to ethylene oxide*, followed by a reaction of the latter compd. with HCl to form I. This conception of the reaction is supported by the formation of both isobutylene oxide and $Me_2COH$ on passing isobutylene into I KI (Pogorzelski, *Chem. Zentr.* 1905, I, 797). The amt. of acid formed in the reaction always surpasses the yield of I, which points to the formation of higher chlorinated products. By distn. of a larger amt. of $(CH_2Cl)_2$, obtained in several expts., a small amt. of tetrachloro- and pentachloroethane could be isolated. C. F. van Duin

**Reaction between propylene oxide and diethylamine.** K. A. Krasuskii and G. T. Pilyugin. *Ukrainskii Khem. Zhur.* 5, Sci. Pt. 135-8(1930).—The reaction between 1 mol. of $MeCH\,CH_2O$ and 2 mols. of $Et_2NH$ in water at concns. of 33 or 70% results in the formation of 85% of 3-diethylamino-2-propanol (I), $b_{758}$ 157.5-9°, $d_0^0$ 0.8677, $d_5^{20}$ 0.8511. The HCl salt is prepd. by passing dry HCl into I in $Et_2O$ and recrystg. from $Me_2CO$. The picrate is obtained by mixing I and picric acid in mol. proportions in alc., m. 89°. Chas. Blanc

**The reaction between ethylamine and diethylamine and isopropylethylene oxide.** F. F. Krivonos. *Ukrainskii Khem. Zhur.* 5, Sci. Pt. 141-6(1930).—The reaction between isopropylethylene oxide, $Me_2CHCH\,CH_2O$ (I), and $EtNH_2$ gives α-ethylamino-β-hydroxy-γ-methylbutane (II) when $EtNH_2$ is used in excess (2 mols. of amine to 1 mol. of I), while excess of I (1.5 mols. of I to 1 mol. of amine) produces bis(β-hydroxy-γ-methylbutyl)ethylamine (III). Similar reaction between I and $Et_2NH$ in all proportions gives only α-diethylamino-β-hydroxy-γ-methylbutane (IV). II was prepd. when a mixt. of 10 g. of I and 31% aq. $EtNH_2$ was heated 10 hrs. in a sealed tube in a water bath, the reaction product treated with $K_2CO_3$, separd., dried with KOH and redistd., yield 8 g., $b_{18}$ 150-2°, $d_0^0$ 0.9076, $d_5^{20}$ 0.8929. The HCl salt, m. 145°, is obtained by passing dry HCl into II in $Et_2O$. The picrate, m. 149-50°, results by mixing the alc. solns. With an excess of I under similar conditions are obtained 5 g. of II and 3.5 g. of III, $b_{18}$ 244-7°, the HCl salt is a heavy liquid. IV is prepd. when a mixt. of 15 g. of I and 15 g. of $Et_2NH$ in 30 g. of water is treated as described above, yield 14 g., $b_{18}$ 151-4°, $d_0^0$ 0.8671, $d_5^{20}$ 0.8512. The HCl salt is formed by dropping HCl into IV in water to acid reaction, evapg. and allowing to stand in a vacuum desiccator. The

picrate, m 80–1°, was obtained by mixing equimol amts of alc solns. of the acid and IV, adding drop by drop water to permanent turbidity, allowing to stand and filtering
CHAS BLANC

*Tin tetrahalides and dioxane.* HEINRICH RHEINBOLDT AND RICHARD BOY. *J. prakt Chem* 129, 268–72(1931).—$O(CH_2CH_2)_2O$ and $SnCl_4$, with cooling, give the compd $SnCl_4$ $2C_4H_8O_2$, sol in cold $H_2O$ and insol in $CS_2$, the same compd is prepd by soln of $SnCl_4$ 2H$_2$O $SnCl_4$ 2BzH, $SnCl_4$ 2BzMe or $SnCl_4$ 2PhCH CHAc in dioxane The compds $SnCl_4$ $2C_4H_8O_2$ and $SnI_4$ $2C_4H_8O_2$ were also prepd The dark violet iodide turns yellow in 2–3 hrs
C J WEST

**Dioxane and halogens.** HEINRICH RHEINBOLDT AND RICHARD BOY *J. prakt. Chem* 129, 273–7(1931).—Wurtz (*Ann chim phys* 69, 321(1863)) described the compd O $(CH_2CH_2)_2$ O $Br_2$ Kehrmann and Falke (*C A* 19, 816) prepd the same compd, but ascribed to it the formula O $(CH_2CH_2)_2O$ $HBr_2$ The following work confirms Wurtz's structure The compd was prepd from 10 cc dioxane and 5 g Br with or without cooling the Br detd titrimetrically and gravimetrically was the same, thus confirming the Wurtz structure, the compd, orange, m 65–6°, is stable for only a short time, is not attacked by cold $H_2O$ but is easily decompd by alkalies. I gives the *compd* $C_4H_8O_2$ $I_2$ red violet, m 84–5°, and is more stable than the Br compd, I being split off only after several hrs ICl gives the *compd* $C_4H_8O_2$ ICl, red-brown, m 50–8°, and is unstable The *compd* $C_4H_8O_2$ IBr, red brown, m 65°, is stable for only a short time
C J. WEST

**The methylation of putrescine.** WERNER KEIL *Z physiol Chem* 196, 81–6 (1931).—Of the 9 possible methylation products of putrescine 7 are already known Four of these have again been prepd, also the 2 missing members, thus completing the series *N N N′,N′ Tetramethylputrescine*, b 167–70°, was obtained by heating $(CH_2)_4(NH_2)_2$ 2HCl with paraformaldehyde in an oil bath at *190–210° for 0.5 hr*, then adding $H_2O$, filtering off the excess paraformaldehyde, adding NaOH to the filtrate and extg with $CHCl_3$ chloroaurate, m 210°, chloroplatinate, m 236–7° *N,N′-Dimethylputrescine* was prepd by heating $(CH_2)_4(NH_2)_2$ 2HCl with 40% $CH_2O$ and $CaCl_2$ until the temp reached 170°, adding $H_2O$ and NaOH, filtering off the $Ca(OH)_2$ and extg the filtrate with $CHCl_3$, chloroaurate, m 172°, chloroplatinate, m 237° Under the same treatment $Me_2N(CH_2)_4NH_2$ 2HCl yielded *N,N,N′-trimethylputrescine, chloroaurate, m 151°* Methylation of $PhO(CH_2)_4NH_2$ with $Me_2SO_4$ gave *δ* phenoxy-*α*-*N,N,N*-trimethyltetramethyleneammonium chloride (chloroaurate, m 112°), which was then refluxed with HI The resulting *δ* iodo-*α*-*N,N,N*-trimethyltetramethyleneammonium iodide (I), after removal of PhOH by $Et_2O$, was heated with alc $MeNH_2$ 1 hr at *100°*. Alc and *MeNH$_2$* were removed by evapn, *HI* by *TlOAc* and excess *Tl* by HCl The product was *δ N′-methylamino-α-N,N,N trimethyltetramethyleneammonium chloride* (II), corresponding to the base $MeNH(CH_2)_4NMe_2OH$, chloroaurate, m 205–6° A similar condensation of I with $Me_2NH$ yielded *δ-N′,N′-dimethylamino-α-N,N,N trimethyltetramethyleneammonium chloride* (III), corresponding to the base $Me_2N$-$(CH_2)_4NMe_2OH$, chloroaurate, m 244–5° (decompn), picrate, m 260°. *N,N-Dimethyl putrescine* was obtained by heating $Cl(CH_2)_4N(CO)_2C_6H_4$ with $Me_2NH$ in EtOH, evapg to dryness, adding KOH and distg. to dryness several times, the chloroaurate was prepd as usual II and III are the new methylated putrescines derivs A W. DOX

**The structure of the "mercaptomethanetrisulfonic acid" (thiosulfuricmethionic acid).** H J BACKER *Rec trav chim* 50, 268–78(1931); cf *C A*. 25, 76.—The acid *formed by the interaction of* $Cl_3CSCl$ *and* $K_2SO_3$ (*Rathke and Albrecht, Ber.* 3, 858 (1870), *Ann* 161, 129(1872)) has, up to the present, always been considered to be *$(HO_3S)_3CSH$, on oxidation with Br this acid gives* $CH(SO_3H)_3$, *exactly 6 atoms* of Br being necessary $(KO_3S)_3CSH + 6Br + 4H_2O \longrightarrow (SO_3H)_3CH + 6HBr + H_2SO_4$ (cf Backer, *C A* 25, 76) The acid, however, does not form mercaptides, reacts neutral, does not give ppts with Pb, Cu and Hg salts, is odorless and dissolves HgO with the formation of a white ppt, and the absence of most of the characteristic mercaptan reactions rendered the constitution as a mercapto compd doubtful On adding alkali to the soln of the acid, a yellow color is developed, which disappears on acidification, subsequent addn of $FeCl_3$ then produces a dark blue color This color reaction with $FeCl_3$ is obtained only when alkali has first been added and thus is not a *characteristic reaction* for the "mercapto compd" itself, but for the degradation product obtained by the action of alkali The same series of reactions is given also by thiosulfuric-carboxylic acids, their salts and esters which also dissolve HgO with the formation of a white ppt On heating salts of the acid, $SO_2$ is evolved with the formation of sulfate, *the same reaction taking place on heating the soln with HCl, with KCN* a ppt of $BaSO_3$ is formed if Ba salts are present. All these facts and analogies point

Recent work by Hill and Hibbert (*C A* 18, 1987) has shown that glyceryl acetal made *from paraldehyde consists of 80% I and 20% II, and that from the* $C_2H_2$ *method* ($HgSO_4$ and $H_2SO_4$ catalyst) is 64% I and 30% II. Ethylideneglycerol was made by N. and F. from $C_2H_2$ using $HgSO_4$ and anhyd fluo acids as catalysts, and the low temp of 37°. The products consisted of 78% of the I and 22% of II. The higher yield of the I in this case is attributed to the use of the fluo acid catalyst and to keeping the liquid cool during the reaction H M Stark

**Polymerization of methyl esters of highly unsaturated acids. VI. Hydrogenation of the polymerized product. VII. Hydrogenation of linseed oil and of the methyl esters of its liquid acids.** Kiichiro Kino *Sci Papers Inst Phys.-Chem. Research* (Tokyo) 15, 127–9, 130–6(1931)(in German), cf *C A* 25, 914.—The contentious *question is reexamd, whether polymerized acids suffer depolymerization when* hydrogenated The intrapolymerized complex $C_{21}H_{39}CO_2Me$ (3 double bonds), was hydrogenated in presence of Pd in AcOH at 90°, and without solvent at 180–220°. The I no was strongly reduced, the mol wt remained const In AcOH, more $H_2$ was absorbed than could be calcd from the I nos It is assumed, therefore, that *the 4-C ring was reopened.* Linseed oil, I no 183, sapon no 194, mol wt. 886, was polymerized by heating it under $H_2$ for 5 hrs at 290–300° The treated oil was extd 3 times *with 3–5 vols. of* $Me_2CO$ *The first* $Me_2CO$ *ext (I), and the final insol residue (II)* showed I no 118, 104, sapon no 191, 195, mol wt 861, 2311 The liberated acids from I and II were distd *in vacuo* to sep the liquid monomol acids from higher polymers. I furnished mainly intrapolymerized acids (III), II gave largely nondistillable high polymers (IV) The acids from III and IV, purified through the Pb salts, were hydrogenated in AcOH, in presence of Pd, at 50–70° The absorbed $H_2$ corresponded nearly to the figures calcd from the I nos Characteristics of the acids from III, before and after hydrogenation, were *I no* 146, 65 (calcd from $H_2$ absorption, 9), mol wt 285, 278 The high I no of the hydrogenated product must be ascribed to *reopening of the intramol 4 C ring* The hydrogenated acids from IV showed unchanged mol wts (564, 568) *Hydrogenation,* therefore, *did not cause depolymerization of intermol combined acids* A similar examn of the Me esters of the liquid acids from linseed oil led to the same conclusions K H Engel

**Continued studies on the splitting off of halogen from haloacylamino acids and polypeptides by dilute alkali.** Emil Abderhalden and Edgar Haase *Fermentforschung* 12, 313–28(1931).—The rate at which halogen is split off by dil alkali varies considerably with different haloacylamino acids according to the acyl group which carries the *halogen and the configuration of the amino acid* to which the acyl is attached A series of $BrCH_2CO$ derivs has now been prepd and studied with respect to rate of halogen cleavage. The derivs were obtained by treating the amino acid or peptide soln in *N* NaOH with $BrCH_2COBr$, and comprise the following *bromoacetylglycine* (I), m 115–6°; *bromoacetyl-d-alanine* (II), m 96–7°; *bromoacetyl-dl-α-aminobutyric acid* (III), m. 119–20°; *bromoacetyl α aminoisobutyric acid* (IV), m 159–60°, *bromoacetyl-β aminobutyric acid* (V), m 99–100°, *bromoacetyl-dl valine* (VI), m 142–4°, *bromoacetyl l-aspartic acid* (VII), m 134–5°, *bromoacetyl-d-glutamic acid* (VIII), sirup, *bromoacetyl l-proline* (IX), m. 118–20°, *bromoacetyl-d phenylalanine* (X), m 116–9°, *bromoacetyl l tryptophan* (XI), m 158–9°, *di(bromoacetyl) l-cystine* (XII), m 126–7°, *bromoacetylglycyl-dl valine* (XIII), m. 170–1°, *bromoacetyl-dl valylglycine* (XIV), m. 155–6°, *bromoacetylglycyl-dl-leucine* (XV), m 145–6°, *bromoacetyl dl leucylglycine* (XVI), m 147–8°; *bromoacetyl dl alanyl dl leucine* (XVII), m 154–5°, *bromoacetylglycyl dl-alanyl-dl leucine* (XVIII), m 167–8°; ⟶ *diglycyl dl-alanyl dl leucine*, m 110–2° (decompn), ⟶ *bromoacetyldiglycyl-dl-alanyl-dl leucine* (XIX), m 168–70° (decompn) These haloacyl derivs were subjected to the action of NaOH at $p_H$ 8.4° and 37° The liberated Br ion was detd. by the Volhard titration at intervals of several hrs By far the most rapid liberation of Br was from IX. The least reactive was VII, then in increasing order, XI, X, VIII, bromoacetyl *l*-tyrosine, VI, III, bromoacetyl *dl*-leucine, I, V, II and IV. Observations were not conclusive with XII because of its insoly Among the dipeptide derivs XIII gives up Br more readily than its isomer XIV, and XVI more readily than its isomer XV. *A comparison of* the $BrCH_2CO$ derivs of di-, tri-, and tetrapeptides, XVII, XVIII and XIX, shows that the rate of Br cleavage increases with increasing length of the peptide chain. The liberation of Br from I was not greater in the presence of 0.5 *N* $H_2SO_4$ than in $H_2O$ alone A. W. Dox

**The behavior of dipeptides containing *m*- and *o*-tyrosine, *p*-nitrotyrosine and phenyl-β-alanine toward *N* alkali, erepsin and trypsin-kinase** Emil Abderhalden and Walter Schairer. *Fermentforschung* 12, 295–312(1931).—Of the dipeptide derivs contg. no naturally occurring component, chloroacetyl-*dl*-*o*-tyrosine is the only one thus far found

to trypsin) enzyme hydrolysis. A no. of new derivs. have now been prepd. contg. glycine or leucine or the corresponding haloacylamino acids, linked to *m*- and *o*-tyrosine, *o*-nitrotyrosine and phenyl β-alanine. The tyrosines were prepd. by previously described methods: glycine anhydride was condensed with *o*-HOC$_6$H$_4$CHO, NaOAc and Ac$_2$O to yield bis(*o*-acetoxybenzal) 2,5-diketopiperazine, the latter reduced and hydrolyzed by HI and I, and the resulting *di-o-tyrosine* purified by esterification and saponification of the ester. *m*-HOC$_6$H$_4$CHO was condensed with hippuric acid, NaOAc and Ac$_2$O to the acylated lactimide of *m*-hydroxybenzoylaminocinnamic acid, the latter hydrolyzed and reduced to *m*-benzoyltyrosine, and finally the Bz removed by hydrolysis to yield *di-m-tyrosine*. Direct nitration of ordinary tyrosine gave *2-nitro-l-tyrosine*. The coupling of these tyrosines with haloacylamino acids and amination to the dipeptides was performed in the usual manner. *l*-Tyrosine + ClCH$_2$COCl ⟶ chloroacetyltyrosine ⟶ *glycyl-l-tyrosine*, decomps. 130°. *l*-tyrosine ester + *dl*-α-MeCHCH$_2$CHBrCOBr ⟶ *dl*-α-bromoisocaproyl-*l*-tyrosine ester, m. 70°, ⟶ free acid ⟶ *dl-leucyl-l-tyrosine* + 2 H$_2$O. *d*-*o*-tyrosine Et ester + ClCH$_2$COCl ⟶ *chloroacetyl-d-o-tyrosine Et ester*, sinters 90° ⟶ *chloroacetyl-dl-o-tyrosine*, sinters 121° ⟶ *glycyl-dl-o-tyrosine* + 2 H$_2$O, decomps. 120–30°. *o*-tyrosine + MeCHCH$_2$CHBrCOBr ⟶ *dl*-α-*bromoisocaproyl-dl-o-tyrosine*, sinters 94°, ⟶ *dl-leucyl-dl-o-tyrosine*. Similarly, *dl-m*-tyrosine ⟶ *chloroacetyl-dl-m-tyrosine*, m. 150° ⟶ *glycyl-dl-m-tyrosine*, m. 120–30° (foaming), *dl-m*-tyrosine ⟶ *dl*-α-*bromoisocaproyl-dl-m-tyrosine*, sinters 127°, ⟶ *dl-leucyl-dl-m-tyrosine*, m. 120–30° (foaming). 2-Nitrotyrosine Et ester ⟶ *chloroacetyl-l-2-nitrotyrosine Et ester*, sinters 92°, ⟶ *chloroacetyl-l-2-nitrotyrosine*, sinters 165–6°, ⟶ *glycyl-l-2-nitrotyrosine*, sinters 220° (decompn.). *l*-2-nitrotyrosine ester ⟶ *dl*-α-*bromoisocaproyl-l-nitrotyrosine ester*, sinters 72°, ⟶ *dl*-α-*bromoisocaproyl-l-nitrotyrosine*, sinters 170°, ⟶ *dl-leucyl-l-nitrotyrosine*, sinters 210–20° (decompn.). *dl*-phenyl β-alanine ⟶ *chloroacetyl-dl-phenyl β-alanine*, m. 141°, ⟶ *glycyl-dl-phenyl β-alanine*, m. 222° (decompn.). *dl*-phenyl β-alanine ⟶ *dl*-α-*bromoisocaproyl-dl-phenyl β-alanine*, m. 132°, ⟶ *dl-leucyl-dl-phenyl β-alanine*, m. 200° (decompn.). All of the above dipeptides were resistant to N alkali at 37°, showing practically no cleavage in 120 hrs. Chloroacetylnitrotyrosine was readily hydrolyzed. Erepsin attacked only the 2 peptides of *p*-tyrosine. An erepsin-free prepn. of trypsin kinase also attacked these 2 peptides, the relative extent of cleavage varying with the age of the enzyme prepn. A prepn. 24 hrs. old hydrolyzed leucyltyrosine more rapidly and glycyltyrosine less rapidly than the fresh prepn. The previously reported cleavage of chloroacetyl-*o*-tyrosine by trypsin kinase was confirmed, but the analogous bromoisocaproyl deriv. was found to be resistant, as were all the remaining haloacyl derivs. and their corresponding dipeptides.

A. W. Dox

**Preparation of dimethylacetoacetic ester and of Δ$^1$-2,2-dimethylbuten-1-ol.** Karl Folkers and Homer Adkins. *J. Am. Chem. Soc.* 53, 1416–9(1931).—Details are given for the prepn. of AcCHMeCO$_2$Et (70% yield) and of AcCMe$_2$CO$_2$Et (34% yield). Reduction of Et Δ$^1$-2,2-dimethylbutyrate with Na and EtOH, using the method of Adams and Marvel (*C. A.* 14, 1677) gives 61.8% of Δ$^1$-2,2-dimethylbuten-1-ol, b. 128.5–31°; there was also recovered 7.9% of the Na salt of the acid. C. J. West

**Rate of hydrogenation of acetoacetic ester, dehydroacetic acid, benzene, phenol and aniline over nickel at pressures from 27 to 350 atmospheres.** Homer Adkins, Howard I. Cramer and Ralph Connor. *J. Am. Chem. Soc.* 53, 1402–5(1931).—The relationship of pressure to the rate of catalysis by Ni of the hydrogenation of AcCH$_2$CO$_2$Et (I), dehydroacetic acid (II), C$_6$H$_6$, PhOH and PhNH$_2$ has been found to differ greatly among these 5 compds. It was entirely feasible to reduce I at pressures in the vicinity of 30 atm. but the rate of reduction was greatly increased by increases in pressures, especially in the range from 120 to 370 atm. II reduced more than twice as rapidly at 149 as at 108 atm. and about 4 times as rapidly at 323 as at 108 atm. It was found impractical to reduce PhNH$_2$ in the 30-atm. range. Increasing the pressure greatly increased the rate of hydrogenation but increasing the pressure in the higher ranges up to 350 atm. was not found to be particularly advantageous. The rate of reduction of PhOH and of C$_6$H$_6$ proceeded well in the 30–40 atm. range, increased with pressure to the 150–170 atm. range but was not sensitive to further increase in pressure up to 330 atm. C. J. West

**Reactions of malonic esters with formaldehyde. II.** Kenneth N. Walden. *J. Chem. Soc.* 1931, 653–7; cf. *C. A.* 24, 2429.—The reaction of malonic esters with HCHO is obviously of the 2nd order, the initial speed of reaction, *v*, is approx. proportional to the first power of the concn. of each reactant separately. Within the limits that could be conveniently investigated, *k* is inversely proportional to the H ion concn.

*Piperidine has a profound effect on the reaction velocity, while* $Me_3N$ and $NH_3$ are without action within the limits of exptl error, the action of $MeNH_2$ appears to be temporary (possibly due to the destruction of the catalyst) C J. WEST

Preparation of ethyl methylenedimalonate. KENNETH N WELCH *J Chem Soc* 1931, 673–4. cf *C A* 24, 2429.—$CH_2(CO_2Et)_2$ (36 g.) and 3 g. paraformaldehyde, heated on the water bath and treated with 10% EtOH KOH drop by drop until reaction commenced and then heated 6 hrs., give 8 g. $CH_2(CO_2Et)_2$ and 28 g. Et methylene dimalonate C J WEST

The structure and properties of crystal hydrates of oxalic acid. M A RAKUSIN *Chem.-Ztg* 55, 128(1931).—R discusses the structure of oxalic acid from the point of view of his theory of 'hydroxyl loading' (cf *C A* 25, 69). He concludes that the dihydrate is not $C_2(OH)_6$, as suggested by Mendelyeev and by Genther, but is $(CO_2H)_2 \cdot 2H_2O$. It has been incorrectly stated that cryst. oxalic acid begins to effloresce at 20°. A sample on a watch glass did not lose a trace of $H_2O$ in 29 days. B S LEVINE

Chemistry of the glutaconic acids. XXII. Optically active α,γ-dimethylglutaconic acid. TERENCE H McCOMBS, JOHN PACKER AND JOCELYN F THORPE *J Chem Soc* 1931, 547–60. cf *C A* 21, 1257.—*trans* $HO_2CCHMeCH$ $CMeCO\text{-}H$ (I), m. 147°, is easily resolved by strychnine in $Me_2CO$ or $Me_2CO$ and $Et_2O$. *strychnine l l* I ppts. on cooling, m. 208–9°, then solidifies and m. 200–3° and then decomps. dil. $NH_4OH$ gives *l* I, m. 132.5–3°, $[M]_D^{25}$ −100 ± 1° ($H_2O$, *c* 1 g. in 100 cc.), −106° ($H_2O$, *c* 4 g. in 100 cc.), $[M]_D^{25}$ −136° (EtOH, *c* 0.46 g. in 100 cc.). solns. of *l* I in $H_2O$ and dil. HCl, $NH_4OH$ and NaOH undergo no change in rotation at 25° for 3 days. The *d* I contained approx. 25% *dl* I, because of racemization in hot solns. of the strychnine salt. Brucine, quinine, quinidine, cinchonine and *d* $MeCHPhNH_2$ gave salts which either would not crystallize or were otherwise unsuitable for the resolution of the acid. Recombination of the active forms gives the *dl* acid, m. 147°. The action of strychnine on *dl* I in *insufficient and sufficient boiling* $Me_2CO$ *to dissolve the salts formed, in a cold* $Me_2CO$-$CHCl_3$ mixt. and in sufficient boiling $H_2O$ to dissolve the salts formed and of brucine in sufficient boiling $Me_2CO$ to dissolve the salts formed is described. Racemization of *l*-I in solvents is reported as follows (solvent, temp., *k* (hr.$^{-1}$) and half-change period are given). $H_2O$, 100°, 0.0388, 17.8 hrs., *N* HCl, 101.5°, 0.0325, 21.3 hrs., 5 *N* HCl, 101°, 0.128, 5.4 hrs. *N* NaOH, 101.5°, 1.70, 24.5 min., $Me_2CO$, 56.5°, about 0.0088, about 80 hrs. Mutarotation or racemization of *l* I also takes place more rapidly in hot solvents in the presence of strychnine than in its absence and even occurs very slowly in its presence in the cold, in boiling $H_2O$, *k* 0.577 hr.$^{-1}$, half-change period 72 min.; in boiling acetone the values are 0.451 and 92. I and AcCl, heated at 100° *for 6 hrs., give only 7% of the hydroxy anhydride*, m. 210°. *Strychnine H glutaconate*, m. 195° (decompn.); fractionation of this salt showed no resolution. C J. WEST

Structure of the glutaconic acids and esters. I. Cyanoglutaconic esters. GEORGE A. R. KON AND HOMI R. NANJI *J Chem Soc*. 1931, 560–75.—The cyanoglutaconic esters display tautomerism of the same type as that of many other unsatd. cyano esters. They can in some cases be isolated in 2 distinct forms, the reactions of these isomers are fully accounted for by the α,β- and β,γ-unsatd. formulas and the "normal" formulation suggested for some of them is no longer necessary. These isomers are interconvertible in the presence of suitable catalysts, forming equil. mixts., notably when they are liberated from their Na derivs. and for this reason the method of distinguishing between "normal" and "labile" isomers used by Thorpe and Bland is not effective. This statement applies only to α-cyano- and α-carbethoxyglutaconic esters, because the terms "normal" and "labile" have also been used to denote the esters of the glutaconic acids themselves. These are no doubt distinct and their isomerism presents a separate problem in which stereoisomerism unquestionably plays an important part. $EtO_2CCH(CN)CMe$ $CHCO_2Et$ [equil. mixt. with $EtO_2CC(CN)$ $CMeCH_2CO\text{-}Et$] (I) was prepd. by the following methods. Rogerson and Thorpe's method (*J. Chem. Soc.* 87, 1669), 33%; excess of *EtOH* removed *in vacuo* at 60°, 35%. EtONa prepd. *from* "mol." Na *in* dry $Et_2O$ with theoretical quantity of EtOH, 35%. K in place of Na, 56%. 20 g. K in 150 cc. EtOH, cooled, is treated with 56 g. $NCCH_2CO_2Et$, then with 65 g. $AcCH_2CO_2Et$ and kept at room temp. for 2 days, 80%; the yield with triethanolamine or piperidine is only 10 and 3%, resp. I $b_{14}$ 170°, $d_4^{15}$ 1.0897, $n_D^{15}$ 1.46917. Oxidation of I with $O_3$ gives $OHCCO_2Et$, $AcCH_2CO_2Et$, $AcCH(CN)CO_2Et$ and $OC(CN)CO_2Et$, whose *phenylhydrazone*, yellow, m. 127°. The pure β,γ-ester could not be prepd. The pure α,β-ester, *Et α-cyano-β methyl-Δ$^{\alpha}$-propene-α,γ-dicarboxylate* (II), $b_{14}$ 178–80°, $d_4^{19.6}$ 1.0918, $n_D^{19.6}$ 1.47409, I addn., 3% in 1 hr., results from the K salt of I with BrOH or HCl or by the action of *EtOH EtOK* on *I*; $O_3$ gives a mixt. of $AcCH_2CO_2Et$ and OC-

$(CN)CO_2Et$. EtONa gives the equil ester, the equil mixt. contains about 23% of α-ester. The K deriv. of II and MeI give the β,γ-di-Me deriv., of II, $b_{14}$ 162°, $d_4^{18}$ 1.0485, $n_D^{18}$ 1.46519; oxidation gives $AcCHMeCO_2Et$ and $OC(CN)CO_2Et$. $EtO_2CC(CN):CMeCHMeCO_2Et$ (equil. ester), $b_{14}$ 160°, $d_4^{18}$ 1.0708, $n_D^{18}$ 1.46996, $O_3$ gives $AcCHMeCO_2Et$, $MeCOCO_2Et$ and $AcCH(CN)CO_2Et$. The pure β,γ-compd. $EtO_2CCH(CN)CMe:CMeCO_2Et$ results by the action of BrOH on the K deriv. or with I and EtOK and $b_{14}$ 174°, $d_4^{20}$ 1.0720, $n_D^{20}$ 1.46918, the structure was established by oxidation. The γ-benzyl deriv., $b_{14}$ 215°, $d_4^{19.5}$ 1.0997, $n_D^{19.5}$ 1.51890, I adds 0, the action of EtONa gives the normal and labile esters as described by Thorpe and Bland. *Et α-cyano-α-methyl Δ^β^-propene α,γ-dicarboxylate*, $b_{14}$ 160–1°, $d_4^{22}$ 1.0662, $n_D^{22}$ 1.45244; does not react with ICl (30% yield), $O_3$ gives $OHCCO_2Et$. The α-*Et deriv.* $b_{14}$ 158.5–60°, $d_4^{20}$ 1.0483, $n_D^{20}$ 1.5324 (25% yield). $EtO_2CCH(CN)CH:CMeCO_2Et$, $b_{14}$ 165°, $d_4^{19.5}$ 1.0743, $n_D^{19.5}$ 1.45933, I adds 60% in 1 hr.; the use of EtOK in the cold gives a 65% yield; the color produced by aq. $FeCl_3$ quickly fades; oxidation shows the presence of the α,β- and β,γ-esters. *Et α-cyano-α,γ-dimethyl Δ^β^-propene α,γ-dicarboxylate*, $b_{14}$ 176.7°, $d_4^{20}$ 1.0729, $n_D^{20}$ 1.46818 (70% yield), oxidation gives $AcCO_2Et$ and a *phenylhydrazone*, m. 207–8°, doubtless from the ester $OHCCMe(CN)CO_2Et$. EtONa gives $Et_2CO_3$ and probably *Et α-cyano-α,γ-dimethylcrotonate*, $b_{14}$ 103°.

C. J. West

**The asymmetry of *meso*-tartaric acid.** F. Boesseken. *Pharm. Weekblad* 68, 246–8 (1931).—A theoretical discussion of the possible asymmetry of *meso*-tartaric acid and certain objections to the hypothesis proposed by Scheringa (*C. A.* 25, 1803).

A. W. Dox

**Theoretical and experimental study of a high-yield technical urea process.** A. Kallenberg. *Z. Elektrochem.* 36, 799–802(1930).—Urea may be prepd. by a method represented by $2NH_3 + CO_2 \rightleftharpoons CO(NH_2)_2 + H_2O$ (I) between a temp. range of 100° to 130°. At equil. the urea content calcd. on carbamate is 39–43%. The equil. is affected decidedly by the $H_2O$ so as to prohibit greater yields. Another method which has been previously studied from the standpoint of constitution of $NH_4$ thiocarbamates is represented by the equation $COS + 2NH_3 = CO(SNH_4)NH_2 \rightleftharpoons CO(NH_2)_2 + H_2S$ or $CO_2 + 2NH_3 = CO(NH_2)_2 + H_2S$ (II). K. studied the kinetics and quant. aspects of these methods, concg. more particularly upon the 2nd. The free energy of the reactions was calcd. from the knowledge of the free energies of the individual reactants. The pressures in atms. with which urea is formed in both cases are as follows: I, $1.9 \times 10^{-4}$ at 25°, $2.1 \times 10^{-2}$ at 77°, 0.57 at 100° and 0.74 at 130°. II, 42 at 25°, $4 \cdot 10^4$ at 100° and $3 \cdot 10^5$ at 130°. The enormous differences in pressures are not sufficiently accounted for by the differences in the reaction velocities. A more complete account will appear in *Z. anorg. allgem. Chem.*

W. Vansplow

**Structure of the urea molecule.** L. Ebert. *Ber.* 64B, 679–81(1931); *cf. C. A.* 17, 1579.—According to Devoto (*C. A.* 25, 626) urea and thiourea in $H_2O$ have the structure represented by the "zwitter-ion" formulas $NH_2{}^+C(:NH)O^-$ and $NH_2{}^+C(:NH)S^-$. Arndt (*C. A.* 25, 2145) suggests another polar formula, $NH_2{}^+ C(NH_2)S^-$. E. asserts that there is no basis for the assumption of a polar formula for urea because: (1) analysis of the dielec. polarization of aq. solns. gives no proof of the existence of an especially strongly polar form of urea. (2) "zwitter ion" formation can occur only if the product of the 2 dissocn. consts. of the neutral form of urea is greater than $10^{-28}$, this requirement can be fulfilled neither by the formula $CO(NH_2)_2$ nor by the formula $H_2NC(:NH)OH$. (3) the crystal mol. of urea is very sym. and there is no evidence that dissolving urea in $H_2O$ causes noticeable change in its structure.

Louise Kelley

**Configuration of the doubly-linked tervalent nitrogen atom. IV. The resolution of β-methyltrimethylene dithiocarbonate carboxyphenylhydrazone.** Wm. H. Mills and Bernard C. Saunders. *J. Chem. Soc.* 1931, 537–46.—Mills and Schindler (*C. A.* 17, 1628) resolved the pyridylhydrazone of cyclohexylene dithiocarbonate and concluded that its mol. dissymmetry was to be referred to the non-planar distribution of the valencies of the doubly linked N atom. Because of the absence of definite proof as to whether this has the *cis* or the *trans*-configuration, work was undertaken to prep. a doubly linked tervalent N compd. which would be better fitted to provide definite evidence of the non-planar distribution of the valencies of the N atom in this state of combination. EtONa, satd. with $H_2S$, $CS_2$ added and the soln. boiled for 0.5 hr. and then treated with $MeCH(CH_2Br)_2$ and allowed to stand 24 hrs., gives 50% of *β-methyltrimethylene trithiocarbonate* (I), yellow, m. 74°. I and EtOH-$PhNHNH_2$,

With the Na compd of $CH_2(CO_2Et)_2$ there results Et cyclopentane 1,1-dicarboxylate; $[NaC(CO_2H)_2]_2$ gave a mixt of *cis*- and *trans* hexahydrophthalic acids when the tetra-$CO_2H$ acid was converted by heating to the di $CO_2H$ acid $CH_2[NaC(CO_2Et)_2]_2$ gives a mixt of $(CH_2)_4C(CO_2Et)_2$ and a polymer of $CH_2C(CO_2Et)_2$ (Zelinskii, *Ber.* 22, 3296(1889)) C. J. West

**1-Benzylcyclohexene. Condensation of benzyl alcohol with cyclohexene under the action of phosphoric anhydride.** D. N. Kursanov *J. Russ. Phys.-Chem. Soc.* 62, 1691–5(1930).—1-Benzylcyclohexene (I) was obtained by dehydration with $P_2O_5$ of $PhCH_2OH$ in cyclohexene $C_6H_{11} + HOCH_2Ph \longrightarrow C_6H_9CH_2Ph$. Another product of the reaction is a resinous mass which cannot be distd. without decompn. To 80 g. cyclohexene and 50 g. $P_2O_5$ cooled with ice 30 g. $PhCH_2OH$ was added by drops. The mixt. was, after 12 hrs.' standing, treated with $NaHCO_3$ soln., washed with water, dried with $Na_2SO_4$ and fractionated, the collected fraction $b_{15}$ 127.2–8.4°, $d_{20}$ 0.9634, $n^{20}$ 1.5400. Other consts. as well as analysis show the product to be identical with I as described by its earlier investigators. K. assumes that the reaction takes place in 2 steps: (a) benzyl phosphate combines with cyclohexene at the double bond, (b) $H_3PO_4$ is liberated. Partial oxidation of I by means of alk. $KMnO_4$ at 0–4° results in formation of what K. believes to be the glycol $C_6H_9(OH)_2CH_2Ph$ and BzOH. J. G. Tolpin

**Preparation of highly active aluminum chloride.** K. Bodendorf *J. prakt. Chem.* 129, 340(1931).—Five g. Al powder, 1 g. $HgCl_2$ and 0.5 g. I in 100 cc. $C_6H_6$ are warmed nearly to boiling and dry HCl passed in with stirring, the $H_2O$ bath may be removed as soon as H evolution starts, the Al is not completely consumed since it is covered with $AlCl_3$; the product is ready to use when the H evolution ceases. C. J. West

**Reaction of aliphatic aldehydes according to Friedel-Crafts.** K. Bodendorf. *J. prakt. Chem.* 129, 337–9(1931).—Anhyd. $AlCl_3$ (1.2 mols.) in 300 cc. $C_6H_6$ is satd. with HCl at 0° and then treated slowly with 1 mol. aldehyde in 100 cc. $C_6H_6$ during 2 hrs. and then stirred 1–2 hrs. The $C_6H_6$ free residue (150 g.) from AcH gave 8 g. PhEt, 88 g. $MeCHPh_2$ and 33 g. of a yellow oil from which was recovered 4.5 g. of 9,10-dimethyl-9,10-dihydroanthracene (I). $MeCHPh_2$ (10 g.) and 20 g. $AlCl_3$ in 100 cc. $C_6H_6$ heated 1 hr., give 1.5 g. PhEt and 4 g. I. 10 g. of the oil, heated with $AlCl_3$, gives 1 g. $MeCHPh_2$ and 4 g. I. The residue from EtCHO (154 g.) gave 16 g. PhPr, 91 g. $EtCHPh_2$ and 36 g. high boiling products. The residue from PrCHO (173 g.) gave 29 g. PhBu, 82 g. $PrCHPh_2$ and 33 g. yellow oil, $b_{15}$ 175–240°. The residue from iso-PrCHO (162 g.) gave 21 g. iso-BuPh, 102 g. $Me_2CHCHPh_2$ and 29 g. yellow oil, $b_{17}$ 170–240°, 20 g. of the latter with $AlCl_3$ heated 1 hr., gave 7 g. iso-BuPh and 5 g. $Me_2CHCHPh_2$. C. J. West

**Electric moments of some organic molecules in benzene solution.** A. E. Eide and O. Hassel. *Tids. Kjemiog. Bergvesen* 10, 93–5(1930), cf. following abstract.—A series of results of detns. of elec. moments of various org. mols. in $C_6H_6$ soln. is given. The small value obtained for *p*-$O_2NC_6H_4CN$ ($0.72 \times 10^{-18}$) seems to be due to a neg. effect of the N when assocd. with C. The 2 hydrobenzoins were investigated as examples of 2 compds. standing to each other in the relationship of meso- and *dl* form. The moments are almost the same. The dipole moment of *p*-chloroaniline is $2.9 \times 10^{-18}$ while the calcd. value is about $3.0 \times 10^{-18}$. B. C. A.

**Electric moments of organic molecules. IV.** O. Hassel and E. Naeshagen *Tids. Kjemiog. Bergvesen* 10, 81–4(1930), cf. *C. A.* 24, 2346–7.—The structure of ring systems is discussed on the basis of the elec. moments of the mols. Results are given for a no. of cyclic compds. in $C_6H_6$ soln., and these are in general agreement with those of other observers. The moments of some methylated sugars are given, but from these data it is not possible to arrive at any accurate conclusions concerning the structure of sugars. For thiophene, the max. value found for the elec. moment was $0.63 \times 10^{-18}$, which may be compared with that for furan. The moment of carbone is $3.17 \times 10^{-18}$, which is somewhat different from that for menthone ($2.80 \times 10^{-18}$). B. C. A.

**Electric moments of organic molecules. VI. Ortho-effect of derivatives of *p*-dichlorobenzene and of the *sym*-trichloro- and tribromobenzenes.** O. Hassel and E. Naeshagen. *Z. physik. Chem.*, Abt. B, 12, 79–88(1931), cf. preceding abstr.—The position of substituents in benzene rings and in $C_6H_6$ may be detd. by measuring the dipole moment in benzene soln. The dipole moments were detd. for 2,5-$Cl_2C_6H_3NO_2$, *o*-, *m*-, *p*-dichloroaniline, 2,4,6-trichloro- and tribromoaniline, *o*-$ClC_6H_4CN$, 2,5-$Cl_2C_6H_3CN$, 2,4,6-$Cl_3C_6H_2CN$, 2,4,6-$Cl_3C_6H_2OH$, 2,4,6-$Br_3C_6H_2OH$, 1,2,4-$C_6H_3Cl_3$, 1,2,4,6-$C_6H_2Cl_4$ and $C_6H_3Br_3$, 2,4-$(O_2N)_2C_6H_3Cl$. Derivs. of sym-$C_6H_3Cl_3$ and $C_6H_3Br_3$ showed the ortho-effect distinctly. Frank Urban

**Nitridation studies. III. Phenyl iodide dichloride and the *N*-chloroacid amides as nitridizing agents.** A Laurence Curl and W. Conrad Fernelius *J. Am. Chem Soc* 53, 1478–82(1931) cf *C A* 24, 3498 —$PhICl_2$ and ICl may be used as nitridizing agents in liquid $NH_3$ but the *N*-Cl acid amides so far investigated are valueless in this connection $PhICl_2$ reacts with $NH_3$ (liquid or gas) to give N, PhI and $NH_4Cl$ The *N* Cl acid amides react with $NH_3$ to give the parent amides, $NH_4Cl$, N and, under certain conditions, tarry decompn products In $CHCl_3$, $PhICl_2$, dichloramine-T, AcNClPh and *N*-chlorosuccinimide convert $(PhNH)_2$ into a mixt of $(PhN)_2$ and $(H_2NC_6H_4)_2$ 2 HCl C J West

**1,3,5-Trinitrobenzene or benzite.** Louis Desvergnes *Chimie & industrie* 25, 3–17, 291–306(1931) —The properties and prepn of 2,4,6 $(O_2N)_3C_6H_2Cl$ and of 1,3,5-$C_6H_3(NO_2)_3$ are reviewed. A bibliography of 86 references is given Expts undertaken to det the most suitable process of manuf of these 2 compds are described Comparison of the Griesheim Chemische Fabrik process (Ger pat 78 309), Desvergnes process (modification of the preceding process in which the amt of $HNO_3$ is considerably reduced) and Frankland and Garner process (*C A* 14, 3068) for the prepn of picryl chloride showed that, from the standpoint of cost and consumption of raw materials, the Desvergnes and Frankland Garner processes yield a technically pure product at practically the same cost, which is much lower than that of the Griesheim process Comparison of the prepn of *s* $C_6H_3(NO_2)_3$ by (*a*) reduction of picryl chloride, (*b*) oxidation of trinitrotoluene with $K_2Cr_2O_7$ and (*c*) nitration of *m* $C_6H_4(NO_2)_2$ showed that (*b*) is the most advantageous from the doublest andpoint of the purity of the product and cost of production A Papineau Couture

**Determination of constitution by changing the order in which groups are introduced into the benzene nucleus.** J W Dienske *Rec trav chim* 50, 21–31(1931), cf *C A*. 25, 922 —4-$NCSC_6H_4NH_2$ was converted by means of the Sandmeyer reaction into *4 chlorothiocyanobenzene*, m 35 5–6°, which was obtained also from *p*-$ClC_6H_4NH_2$ by diazotization and treatment with CuSCN $Co(SCN)_2$ gives better results in this reaction than CuSCN, but much better results are always obtained in reactions of this kind by the method of Thurnauer (*Ber* 23, 769(1890)) namely, by taking a *soln* of CuSCN in a concd soln of KCNS Application of the Sandmeyer reaction to 4-$NCSC_6H_4NH_2$ also gave *4 bromothiocyanobenzere* m 54° (Challenger and Collins, *C. A* 18, 2689 give 56°), which could be prepd also from diazotized *p*-$BrC_6H_4NH_2$ by Thurnauer's method *4-Iodothiocyanobenzene*, m 51°, was prepd from 4-$NCSC_6H_4NH_2$ in the usual way, but could not be obtained from 4 $IC_6H_4NH_2$ on treating the diazotized soln with CuCNS, which is in accordance with the experience of Challenger and Collins (*C A* 18, 2689) Detailed directions are given for the prepn of *4-cyanothiocyanobenzene*, m 127 5°, and of *1,4-dithiocyanobenzene*, m 108 5°, from 4 $NCSC_6H_4NH_2$, on nitration with $HNO_3$ and $H_2SO_4$, the latter compd gives *2 nitro-1,4-dithiocyanobenzene*, m 146 5° (cf Challenger and Peters, *C* 1 22, 3152) which was now obtained also by means of abs $HNO_3$ The hydrolysis of 4-$NCSC_6H_4Br$ with boiling 10% KOH gave $(p\text{-}BrC_6H_4)_2S_2$ m 93°, together with 4-$BrC_6H_4SH$, the same compds being formed on boiling with 75% $H_2SO_4$ The compd remained unchanged, however, on boiling with 10% $H_2SO_4$ On hydrolyzing 4 $NCSC_6H_4I$ with boiling 10% NaOH, $(p\text{-}IC_6H_4)_2S_2$, m 125°, and 4 $IC_6H_4SH$, m 82–6°, were obtained These reactions are in accordance with the general rule that NCS compds are decompd by heating with acids or alkalies with the formation of mercaptans and disulfides (cf. Brüning, *Ann.* 104, 198(1857)) C. F van Duin

**The nitration of 4-thiocyanoacetanilide.** J W Dienske *Rec trav chim* 50, 165–83(1931) —The nitration of 4 $NCSC_6H_4NHAc$ (I) was studied in order to investigate whether the NCS group is displaced in nitration processes like the $SO_3H$ group (cf Zincke, *Ann* 339, 202(1905), de Lange, *C A* 20, 1982) Challenger and Peters (*C. A* 22, 3152) nitrated this compd with $HNO_3$ and $H_2SO_4$ to 2,4 $O_2N(NCS)C_6H_3NHAc$, D, using abs $HNO_3$, obtained *2,6-dinitro-4 thiocyanophenylnitramine* (II), the NCS group *not* being displaced At first an attempt was made to det the constitution of this compd by converting 4 thiocyanoanisole or -phenetole into the 2,6-dinitro deriv, which was further transformed into the amino compd The latter, however, could not be transformed into the nitramine The NCS group was then oxidized to a $SO_3H$ group, which was subsequently displaced by a nitro group, finally the 2,4,6-$(O_2N)_3C_6H_2NHNO_2$ being hydrolyzed to picric acid I was nitrated with abs $HNO_3$ at —10° to II, decompg explosively at 70°, II is rather unstable and was converted into a sticky mass on keeping in a bottle for 4 weeks *4-Thiocyanophenetole* (III), m 47 5–8°, was obtained from *p*-phenetidine in the usual way together with some of the isomeric mustard oil to be described later, the ethylation of 4-$NCSC_6H_4OH$

(Söderback *C A* 14, 1808), however, did not give III, but an unknown substance which could not be identified On nitrating III with 65% $HNO_3$, *2 nitro-4 thiocyano-phenetole*, m 85° (IV), is formed, while from the mother liquors of the recrystn of IV, some 4-nitrophenetole, m 58°, was obtained A 2nd by product, formed in this nitration, is picric acid, formed by further nitration and hydrolysis of the 4 nitrophenetole. The constitution of IV was proved by its formation from 2,4 $O_2N(H_2N)C_6H_3OEt$ (Reverdin, *C A* 21, 1451) by the Sandmeyer reaction Nitration of IV with abs $HNO_3$ at 0° gives *4 thiocyano-2,6-dinitrophenetole* (V), m 77°, the constitution of which was established by converting it into picric acid, first the SCN group was oxidized to the $SO_3H$ group with $HNO_3$, then the OEt group was hydrolyzed with alkali to the OH group and the resulting $4,3,5\text{-}HO(O_2N)_2C_6H_2SO_3H$ nitrated to picric acid On warming with alc. $NH_3$, V is converted into *4 thiocyano 2,6-dinitroaniline* (VI), m 180°. On carrying out the Sandmeyer reaction with *p*-anisidine, *4 thiocyanoanisole* (VII), m 35°, is obtained, together with some of the isomeric mustard oil, to be described later In the nitration of VII, *2 nitro-4 thiocyanoanisole* was formed together with some 4-nitroanisole and some picric acid, while further nitration affords *4 thiocyano-2 6-dinitroanisole*, m 93°, which was again converted into VI by means of alc $NH_3$ VI was recovered unchanged after treatment with abs $HNO_3$, while II was not converted into VI on heating with phenol by van Romburgh's method, a substance, m 200–1°, which was not investigated further, being obtained instead of VI. The constitution of II was proved, however, by boiling II with $HNO_3$, hydrolyzing the $SO_3H$ acid with alkali to the corresponding phenol and nitrating the latter to picric acid Finally, a discussion of the m ps of the various thiocyano compds in connection with the m p rules postulated by Franchimont (*Rec trav chim* 16, 126(1897)), is given

C F VAN DUIN

**Hydrogenation of aniline under pressure in presence of activators (cerium and lanthanum).** V S SADIKOV AND A YU SHAGALOV *J. Russ Phys.-Chem Soc.* 62, 1635–42(1930) —In search for a new and cheaper catalyst, a series of expts on hydrogenation of aniline under pressure were carried out by S and S., using as catalysts Os and Ni with addn of activating agents (Ce and La) The results for Os tend to show that addn of Ce has no influence on the duration of hydrogenation, decreases the quantity of benzene 3 times of cyclohexylamine twice, increases twice the quantity of dicyclohexylamine, and by 10% that of non reacting aniline The quantity of H consumed is somewhat smaller With Ni + Ce the addn of Ce renders the catalyst more sensitive to thermal decompn on prolonged heating in the process of its reduction Although the system Ni + Ce cannot substitute Os it is a more efficient catalyst than Ni. For Ni + La a short time of preheating is more important than for Ni La does not possess the condensing properties of Ce and the reaction results in formation of more cyclohexylamine (70 21% compared to 33%) and less dicyclohexylamine (17% against 52%) In general the greater efficiency of Os is based on its ability for reduction at room temp as heating is shown to poison Ce and La J G TOLPIN

**Interaction of alcohols and ethers with aniline hydrochloride.** S A BUSSE AND A I. TRAVIN *J Russ Phys.-Chem Soc* 62, 1685–90(1930) —It has been shown many times that chlorozincaniline with aliphatic alcs gives at high temps and pressures mostly homologs of aniline substituted in the ring Halogen salts of aniline or its homologs give secondary and tertiary bases B and T worked out a method of obtaining benzylaniline and octylaniline and investigated the interaction of benzyl and octyl alc with aniline-HCl and obtained BzH and $C_7H_{15}CHO$ by oxidation of the corresponding anilines Heating at low temp for a short time gave good results It is important to drive off the water as it is formed $PhCH_2OAc$ gives a higher yield than $PhCH_2OH$ For octylaniline the reverse is true Benzylaniline was obtained by heating in an oil bath 10 g benzyl alc with 20 g $PhNH_2$ HCl 4–5 hrs at 180–90°, cooling, treating with NaOH, washing, drying with fused $Na_2SO_4$ and fractionating Yield, 59% By using 20 g $PhCH_2OAc$ and 35 g $PhNH_2$ HCl the yield is 79 3%. Oxidation of benzylaniline to BzH is done most effectively by ferric salts and $ONC_6H_4NMe_2$. To 20 g $PhNHCH_2Ph$ 150 g of $Fe_2(SO_4)_3$ was added in 10 g portions and in presence of $H_2SO_4$. BzH was distd., extd with ether and treated with a satd soln of bisulphite Yield 61 7% $FeCl_3$ gave only a 51 7% yield Oxidation by means of $ONC_6H_4NMe_2$ is effected by adding 8 g of it to 5 g of benzylaniline and slowly heating the mixt. to 150° for 1 hr., using an air condenser An excess of dil $H_2SO_4$ is added and BzH distd Yield, 73 8% $ONC_6H_4NMe_2$ is reduced to azoxydimethylaniline ($PhCH_2NHPh + 2ONC_6H_4NMe_2 = PhCH{:}NPh + (Me_2NC_6H_4)_2N_2O + H_2O$), the latter, m 241°, was isolated from the reaction mixt. by extg the sol part with alc., washing and recrystg from benzene and $CHCl_3$ Octylaniline was prepd

by heating a mixt of 50 g octyl alc and 100 g aniline-HCl on an oil bath 7–8 hrs to 210–40°, treating with NaOH, washing with water, drying with $Na_2SO_4$ and rectifying Yield, 75%, b. 146–8° $C_6H_{17}OAc$ was also used instead of octyl alc at 270–80° The product b. 158–8.5° corresponds to the formula $C_{14}H_{23}N$, gives no cryst. salts and no isonitrile or diazo reaction Oxidation with $Fe_2(SO_4)_3$ and $ONC_6H_4NMe_2$ gives octanal, the semicarbazone of which m. 100°, it is therefore concluded that the compd is $Me(CH_2)_6CH_2NHPh$, $d_{25}^{25}$ 0.9089, $n_D^{20}$ 1.5132 J. G. Tolpin

**Reactions of some carbonyl compounds with phenylhydrazine.** L. Chas. Raiford and Wilbur T. Daddow *J. Am. Chem. Soc.* 53, 1552–8(1931).—The CO radical in HCONHPh does not condense with $PhNHNH_2$ to give a hydrazone under the conditions studied The products are $PhNH_2$ and HCH NNHPh Substitution products of HCONHPh react similarly $(PhNH)_2CO$ reacts with $PhNHNH_2$ to give a semicarbazide and eliminates $PhNH_2$, the corresponding thiourea behaves in the same way *sym* Di(2,5-dibromophenyl)thiourea m. 191° (Dyson, George and Hunter, *C. A.* 21, 1637, give 154°), the *2,4-di Br isomer*, m. 203° The following *thiosemicarbazides* were prepd. by heating the required urea with $PhNHNH_2$ in EtOH for 6 hrs *1-phenyl-4 (4 bromophenyl)*, m. 179–80°, *1 phenyl 4-(2,5-dibromophenyl)*, m. 188°, *2,4-di-Br isomer*, m. 177–8°, 1 pheny-4 (*o* tolyl), m. 170.1°, *m* tolyl isomer, m. 173–4°, *1-phenyl-4-(α-naphthyl)*, m. 192–3°, *1 phenyl-4 (3 nitrophenyl)*, m. 172° Oxidation of thioureas with $PbO_2$ in $C_6H_6$ gives *carbodiimides di m tolyl*, m. 118–9°, *di(2 bromophenyl)*, m. 98–100°, *di 4 bromophenyl*, m. 144°, *di 2,4-dibromophenyl*, m. 156–7°, *di 2,5-dibromophenyl*, m. 172.3° With $PhNHNH_2$ in $C_6H_6$ these compds yield *anilguanidines*, *di o tolyl*, m. 137°, *di m tolyl*, m. 158.9°, *di 2 bromophenyl*, m. 147–8°, *di-3 bromophenyl*, m. 162–3°, *di-4 bromophenyl* m. 202–3°, *di α naphthyl*, m. 157–9°, *di β naphthyl*, m. 181–2° Oxidation of these gives *azo compds di-o tolyl*, pale red, m. 113–4°, *di m tolyl*, brilliant red, m. 107–8°, *di 2-bromophenyl*, brilliant red, m. 132–3°, *3-Br isomer*, dull red, m. 131.2°, *4 Br isomer*, red, m. 163–4° The evidence indicates that these guanidine derivs are not hydrazones C. J. W.

**Reduction of azobenzene, azoxybenzene and nitrosobenzene by the system magnesium + magnesium iodide.** W. E. Bachmann *J. Am. Chem. Soc.* 53, 1524–31 (1931).—$(PhN)_2$ is reduced by the system Mg + $MgI_2$ to $[Ph(MgI)N]_2$ PhNN(O)Ph is reduced by the binary system to $(PhN)_2$ or to $(PhNH)_2$ according to the amt. of reducing agent employed Substituted azobenzenes and azoxybenzenes react in the manner of the unsubstituted compds except that in certain instances reduction proceeds to a considerable extent beyond the hydrazobenzene stage PhNO is reduced principally to $[Ph(MgI)N]_2$, $(PhN)_2$ is formed as an intermediate product in this reaction The reactions of $[Ph(MgI)N]_2$ with I, O, $CO_2$, PhNN(O)Ph, $(PhCO)_2$ and BzH are described The results obtained, in agreement with those of previous studies, lend support to the hypothesis that the active reducing agent is MgX, generated by interaction of Mg and Mg halide C. J. West

**Action of amines on 2-substituted semicarbazones.** James Chapman and Forsyth J. Wilson *J. Chem. Soc.* 1931, 507–14.—$Me_2C$ NNPhCONH$_2$ (I), heated with $PhCH_2NH_2$ until the evolution of $NH_3$ had ceased (1 hr. at 160°), gave a mixt. of $(PhCH_2NH)_2CO$, m. 171°, and $PhCH_2NHCONH_2$, m. 149° With $PhNH_2$ 40 min. at 155–60° it gave $(PhNH)_2CO$ and a small quantity of a compd. m. 133° *p*-$MeC_6H_4NH_2$, heated 40 min. at 145–50°, gives $(p\text{-}MeC_6H_4NH)_2CO$ and a small quantity of a compd. m. 162°. $PhCH_2CH_2NH_2$ at 150–60° gives $(PhCH_2CH_2NH)_2CO$ and a tar. $C_7H_{15}NH_2$ 45 min. at 160° gives $(C_7H_{15}NH)_2CO$, m. 91°, and a tar Heating I at 140–5° for 1 hr. gives cyanuric acid and $Me_2C$ NNHPh Thus the reaction with the amines may be formulated as a thermal decompn., followed by the reaction of the $Me_2C{\cdot}N{\cdot}NHPh$ with the amine to give the $(RNH)_2CO$ and $NH_3$, hence none of the expected *2,4-disubstituted* semicarbazone would be expected PhMeC *NNPhCONH*$_2$, m. 126°, behaves similarly, $PhNH_2$ giving $(PhNH)_2CO$ and PhMeC NNHPh PhCH.N·N(CH$_2$Ph)CONH$_2$ is stable even after 1.5 hrs. heating at 200°, since the reaction with $PhNH_2$ and *p*-$MeC_6H_4NH_2$ occurs at 165–70°, the products are PhCH NN(CH$_2$Ph)CONHPh, m. 152°, and *benzaldehyde 4-p tolyl 2 benzylsemicarbazone*, m. 172°, $PhCH_2NH_2$ at 175° gives some $(PhCH_2NH)_2CO$ and *benzaldehyde 2,4-dibenzylsemicarbazone*, m. 124°. PhCH NNMeCONH$_2$ and $PhNH_2$ at 180° give PhCH NNMeCONHPh, m. 108°; apparently the decompn. temp. of the semicarbazone is above 180°. With $PhCH_2NH_2$ at 165–70° for 1 hr. the main product was $(PhCH_2NH)_2CO$, only a small quantity of *benzaldehyde 4-benzyl-2-methylsemicarbazone* (II), m. 106°, being formed, there also results a minute quantity of a *compd.*, $C_{11}H_{12}O_2N_2$, m. 88–9° Heating for 3 hrs. gives a small quantity of a *compd.*, $C_{17}H_{18}O_2N_2$, m. 63° PhCH NNPhCONHMe

did not react with $PhNH_2$ at 180° II and $PhCH_2NH_2$ at 170° give $(PhCH_2NH)_2CO$ The mechanism of these reactions is discussed C. J. West

**Reactions of nitrosulfonyl chlorides. II. Separation of nitrosulfonyl chlorides by means of hydrazine hydrate.** Wm Davis Frederick R Storrie and Stanley H Tucker *J Chem Soc* 1931, 624-9 cf *C A* 23, 3064.—*o* $O_2NC_6H_4SO_2NHNH_2$ and Me CO give *acetone o nitrobenzenesulfonhydrazone* m 147-8° (decompn), *piperonal deriv* bright yellow m 177-9° (decompn), the prepns were carried out by adding the cold solid to the aldehyde or ketone and boiling 1 min *p* $O_2NC_6H_4SO_2Cl$ (4.43 g) in $C_6H_6$ gradually added to $N_2H_4$, $H_2O$ in abs EtOH at 40°, 0.5 *N* AcONa added and the $C_6H_6$ removed in a stream of air gives 3.7 g *p nitrobenzenesulfonhydrazide*, m 150.2° (decompn), it is decompd by boiling EtOH *Acetone p nitrobenzenesulfonhydrazone*, m 169.71° (decompn), *benzaldehyde deriv*, m 142-4° (decompn), *piperonal deriv*, golden m 189.90° (decompn) The *m isomer* was prepd as above in 90% yield and m 130° (decompn) it is stable in boiling EtOH, *acetone m nitrobenzenesulfonhydrazone*, m 148.50° (decompn) *MeEtCO deriv*, m 124-5° (decompn) *benzaldehyde deriv*, m 150-1° (decompn) *piperonal deriv*, bright yellow, m 173-5° (decompn) *2,4-Dinitrobenzenesulfonhydrazide*, prepd at −10°, light yellow, m 110° (decompn), it is very unstable to heat evolving N heating with aq $N_2H_4$ or dil HCl gives *2,4-dinitrobenzenesulfinic acid*, m 196° either compd, heated in $H_2O$, gives quant *m*-$C_6H_4(NO_2)_2$ The $RSO_2NHNH_2$ may be converted into RSO Cl by passing Cl through a $CHCl_3$ soln *o* and *p* $O_2NC_6H_4SO$ Cl may be sepd by adding the soln in $C_6H_6$ to $N_2H_4$ $H_2O$ in abs EtOH, heating at 35°, adding 0.5 *N* AcONa and crystg the *p*-$O_2NC_6H_4SO_2NHNH_2$ the AcONa soln contains the *o* $O_2NC_6H_4SO_2H$, converted by Cl in $CHCl_3$ to *o* $O_2NC_6H_4SO_2Cl$ Details are given for the sepn of the *o* and *m*, *m* and *p*- and *o*, *m* and *p* isomers, also for the sepn of 2,4,5-$ClMe(O_2N)C_6H_2SO_2H$ from a mixt of 2.4.5- and 2.4.6 $ClMe(O_2N)C_6H_2SO$ Cl C. J. West

**Tertiary arylalkylphosphines. II.** Ivor K Jackson and Wm J Jones *J. Chem Soc* 1931, 575-8, cf *C A* 25, 283.—2.5 $Me_2C_6H_3PCl_2$, $b_{12}$ 129°, $b_{13}$ 140° (20 g), and MeMgI give 14 g of *p-xylyldimethylphosphine*, $b_{12}$ 106°, $d_4^{25}$ 0.9541; boiling in a current of air gives the *oxide*, m 91-5°, distils without decompn · *mercurichloride*, m 225° $CS_2$ gives the *inner anhydride* of *p-xylyldimethylhydroxyphosphinocarbithionic acid* $C_6H_3PMe_2$ CS S deep red, m 76° MeI gives *p-xylyltrimethylphosphonium iodide*, m 204°, the *mercuriiodide* m 152°, the *chloroplatinate*, orange, m 236°; *tri iodide*, dark red, m 91° *p-Xylyldiethylphosphine*, $b_{12}$ 157°, $d_4^{25}$ 0.9392, *mercurichloride*, m 184° the *methylphosphonium iodide*, m 137° (*chloroplatinate*, orange, m 217°, *mercuriiodide*, pale yellow m 105°, *triiodide* chocolate, m 85°) *p-Xylyldipropylphosphine*, $b_{14}$ 161° $d_4^{25}$ 0.9231, *mercurichloride*, m 188°, *methylphosphonium iodide*, m 105° (*chloroplatinate*, orange m 141°, *mercuriiodide*, yellow, m 90°, *tri iodide*, m 76°) *p-Xylyldibutylphosphine* $b_{18}$ 171°, $d_4^{25}$ 0.9124, *mercurichloride*, m 179°, *methylphosphonium iodide* m 93° (*chloroplatinate*, orange, m 215°, *triiodide* m 70°) *p-Xylyldiisobutylphosphine*, $b_{16}$ 184°, *mercurichloride*, m 227°, *methiodide*, m 120° *p-Xylyldiamylphosphine*, $b_{23}$ 214°, *mercurichloride*, m 117°, the *methylphosphonium chloroplatinate*, orange, m 151° C. J. West

**Magnesium derivatives of dichlorotriphenylphosphine and of the pentaphosphines.** V Grignard and J Savard *Compt rend* 192, 592-5(1931).—Dichlorotriphenylphosphine (I), m 176°, was obtained by treating $Ph_3PO$ with $PCl_5$ I with RMgX gave $Ph_3P(MgX)_2$ (II) II with ROH (R alkyl) gave $Ph_3PR_2$, m 163-6°, 172°, 179-82° for R = Me, Et, Pr, resp This is the 1st time that all 5 valences of P have been substituted by hydrocarbon radicals Julius White

**Aromatic tin compounds with halogen in the benzene nucleus.** K A. Kochesikov and A N Nesmeyanov *Ber* 64B, 628-36(1931), cf *C A* 25, 927.—The following new compds were prepd *Dichlorostannanes* $(p\text{-}ClC_6H_4)_2SnCl_2$ (I) (75% yield) by heating $(p\text{-}ClC_6H_4)_2Hg$ (II) (see *C A* 23, 5172) and $SnCl_2$ in abs EtOH, m 86.5°, hydrolyzed by $H_2O$, *p*-Br deriv (III) (85% yield by a similar method), m 103°, *p*-I deriv (IV) (75% yield from $(p\text{-}IC_6H_4)_2Hg$ (V) and $SnCl_2$ in abs $Me_2CO$), m 147°. *Dibromostannanes* $(p\text{-}ClC_6H_4)_2SnBr_2$ (92% yield from II and $SnBr_2$ in EtOH), m 73° (cf Krause and Weinberg, *C A* 24, 349), *p*-Br deriv (96% yield), m 82°, *p*-I deriv (VI) (75% yield from V and $SnBr_2$ in $Me_2CO$), m 102° *Diiodostannanes* $(p\text{-}ClC_6H_4)_2SnI_2$ (almost quant yield from I and a large excess of NaI in hot abs EtOH) m. 46-7°, not hydrolyzed by $H_2O$, *p*-Br deriv, m 79-80°, *p*-I deriv (80% yield from IV and NaI in hot MeOH), m 88.5° *Stannones* $(p\text{-}ClC_6H_4)_2SnO$ (90% yield from I in EtOH treated with an excess of 5% aq KOH) sol in mineral acids giving the corresponding

salts: *p*-Br deriv. (92% yield from III), *p*-I deriv from IV. *Thiostannones:* $(p\text{-}ClC_6H_4)_2SnS$, prepd by dissolving I in EtOH and adding a slight excess of 5% alc KOH satd with $H_2S$, m 179°, *p*-Br deriv., prepd by passing $H_2S$ into a soln of III in abs EtOH, m 228-9°, *p* I deriv., prepd by adding 10% alc KOH satd with $H_2S$ to a soln of IV in abs EtOH, m 248° *Trichlorostannanes* $p\text{-}ClC_6H_4SnCl_3$ (VII), prepd in almost quant yield by heating I and $SnCl_4$ in a bomb tube at 150°, m 39°, insol in $H_2O$ but made sol by the addn of a few drops of concd HCl, hydrolyzed by $H_2O$, *p*-Br deriv (VIII), by heating III and $SnCl_4$ in a bomb tube at 150°, m 64.5–5°, has properties similar to those of the corresponding Cl deriv., *p*-I deriv (IX), by heating IV and $SnCl_4$ in a bomb tube at 165°, m 55-6°, very hygroscopic, decomps in air in a few min *Tribromostannane* $p\text{-}IC_6H_4SnBr_3$, from VI and $SnBr_4$, m 80–80.5°, hydrolyzed by $H_2O$ *Stannonic acids* $p\text{-}ClC_6H_4SnO_2H$, prepd by dissolving VII in petroleum ether and adding an excess of 5% aq KOH, easily sol in aq caustic alkali and in mineral acids with formation of the corresponding salts *p* Br deriv., prepd from VIII; *p* I deriv., prepd from IX, sol in mineral acids and caustic alkali *Thioanhydrides of dithiostannonic acids:* $(p\text{-}ClC_6H_4Sn)_2S_3$, prepd by dissolving VII in $H_2O$ with the addn of a few drops of concd. HCl and satg the soln with $H_2S$, sol in HCl (1 1) with evolution of $H_2S$, *p* Br deriv., prepd from VIII, resembles the Cl deriv., *p*-I deriv., prepd from IX, resembles the Cl deriv Two compds contg multivalent I were prepd $(p\text{-}Cl_2IC_6H_4)_2SnCl_2$, prepd by dissolving IV in $CHCl_3$ at —15° and adding $CHCl_3$ satd with Cl at —15°, bright yellow, m 82-2.5°, *p* $Cl_2IC_6H_4SnCl_3$ prepd by passing Cl at —15° into as concd a soln as possible of IX in $CHCl_3$ bright yellow decomps gradually 50-70° L K

**Piria reaction. I. The over-all reaction.** W H Hunter and Murray M Spruno *J Am Chem Soc* 53, 1432–43(1931) —The Piria reaction is the prepn of aminosulfonic acids from aromatic $NO_2$ compds by heating the latter with m tal sulfites and then boiling with mineral acids (*Ann* 78, 31(1851)) In an attempt to explain the mechanism, a standard procedure has been developed for the reaction which consists in adding a weighed quantity of the $NO_2$ compd to enough of a 5.2 *N* soln of $Na_2SO_3$ to constitute approx a 75% excess over that calcd on the basis of 3 mols of bisulfite per mol of $NO_2$ compd Enough 5 *N* NaOH was then added to neutralize 25% of the bisulfite and to the whole was added $H_2O$ in the ratio of 1250 cc for each mol of $NO_2$ compd The mixt was then refluxed until homogeneous In the acid treatment the mixt. was evapd to about 50% of the original vol and treated while hot with 250 cc concd HCl for each mol of original $NO_2$ compd and boiled for 0.5–2 hrs. The combination of the 2 reactions gives in every case an aminosulfonic acid and an amine (except in the case of *p* $O_2NC_6H_4OH$), it appears that a ring Me group favors the formation of amines, while the presence of a $CO_2H$, a 2nd $NO_2$ or a condensed ring favor the formation of the acids In most cases the yield of the 2 chief products is slightly in excess of 80% The speed of the 1st phase of the reaction (reduction) increased with dilu Using the standard procedure $PhNO_2$ gives 26% of $PhNH_2$ and 27% of *p* $H_2NC_6H_4SO_3H$, α-$C_{10}H_7NH_2$ gives 2% of α $C_{10}H_7NH_2$, 25% of naphthionic acid and 66% of 2,4-$(HO_3S)_2C_{10}H_5NH_2$, *o*-$MeC_6H_4NH_2$ gives 40% of *o* $MeC_6H_4NH_2$, 34% of 2 toluidine 5 sulfonic acid and 12% of Na *o* tolylsulfaminate *p* $MeC_6H_4NH_2$ gives 72% of *p*-$MeC_6H_4NH_2$ and 11% of 4 toluidine 3 sulfonic acid nitro *p* xylene (using 3 times the usual amt of $H_2O$) gives 60% of *p*-xylidine and 16% of 3 amino-1,4 xylene 6 sulfonic acid, *m* $C_6H_4(NO_2)_2$ with a 10% excess of $Na_2SO_3$ gives a trace of *m* $O_2NC_6H_4NH_2$ and 64% *m* nitroaniline-*p*-sulfonic acid, using a 110% excess of $Na_2SO_3$ gives 1% of this acid and 10% of *m*-phenylenediamine *p* sulfonic acid, *p* $O_2NC_6H_4CO_2H$ gives 21% of *p*-$H_2NC_6H_4CO_2H$ and 61% of 4.3 $H_2N(HO_2C)C_6H_3CO_2H$, *p* $O_2NC_6H_4OH$ gives 14% of the same acid These yields are the av of several expts Details are given for the isolation and identification of the reaction products *II. The role of the sulfaminic acids. Ibid* 1443–7 — The *Na salts* of *phenylsulfaminate* (crystg with 1 mol $H_2O$), *p*- and *o tolylsulfaminates* and *p acetamidophenylsulfaminate* (crystg with 2 mols $H_2O$) have been prepd., with HCl concns from 0.5 to 5.35 *N*, these salts hydrolyze quantitatively to $H_2SO_4$ and the corresponding amines, giving absolutely no trace of aminosulfonic acids Hence the aminosulfonic acids which are produced by the 'over all' Piria reaction are certainly not formed by rearrangement of sulfaminic acids C J West

**Preparation and properties of some ethyl arylsulfonates and a comparative investigation of their velocities of hydrolysis with those of the corresponding ethyl arylcarboxylates.** Laslo Demény *Rec trav chim* 50, 60–71(1931) —The velocities of hydrolysis of $PhSO_2Et$ and its *o*, *m* and *p*-nitro derivs have been measured and compared with those of theEt esters of BzOH and the 3 $O_2NC_6H_4CO_2H$. According to Wegscheider (*C A* 13, 2213 *Z physik Chem* 41, 52(1902)) the hydrolysis of sulfonic esters by water is not accelerated by H ions and Olivier and Berger have shown (*C A* 17,

1783) that the same holds for all esters derived from strong acids The difference in behavior between esters of $CO_2H$ acids and of $SO_2H$ acids clearly appears from an investigation of Karlsson (*C A* 20, 690) who showed the velocity of hydrolysis of AcOEt to be largely dependent on the H ion concn and to have a min at *p*H 5.35, while the velocity of hydrolysis of $PhSO_2Et$ (I) was nearly independent of the *p*H The following compds were prepd by the interaction of the sulfonyl chloride and NaOEt in EtOH: *Et benzenesulfonate* (I), $b_{14}$ 153–4°, *Et 3 nitrobenzenesulfonate* (II), m 42°, *4 nitro isomer* (III) m 92°, 2 nitro ester (IV) m 15°, b 163–4° in an abs vacuum Working at 25° and with 30% EtOH (by vol) as a solvent, the following values were obtained for *K* calcd from the equation for a monomol reaction (the values in parentheses represent the mean alky of the soln) I 0.00036 (0.005 *N*) 0.00041 (0.008 *N*) IV 0.0073 (neutral soln) 0.0077 (0.0017 *N*) II 0.0022 (0.0017 *N*), 0.0023 (0.0035 *N*), 0.0026 (0.006 *N*), III 0.0026 (0.0012 *N*) I or *K* calcd from the equation for a bimol reaction were obtained the following figures under the same conditions I 0.46 (in water 1.96), IV 1.23, II 11.4 III 19.0 the alky varying between 0.003 and 0.005 *N* It now follows that the introduction of a $NO_2$ group into the benzene ring exerts an accelerating influence on the hydrolysis of both the sulfonates and the benzoates While, however, a $NO_2$ group in the *m* and *p* positions has a similar effect in both types of esters the effect produced by an *o* nitro group is very different, a slight accelerating effect being observed in BzOEt and a powerfully accelerating effect with I. With *Et p-toluenesulfonate*, *K* = 0.00019 (mean alky 0.0017 *N*) was found under the same conditions, thus showing the retarding influence of a *p*-Me group The difference between $SO_2H$ and $CO_2H$ acids is discussed at length in the original paper, to which reference must be made for details

C F VAN DUIN

**Arylsulfonalkylamides.** LASLO DEMÉNY *Rec trav chim* 50, 51–9(1931), cf. *C A* 24, 835.—This paper deals with the arylsulfonalkylamides derived from $PhSO_2H$, 4 $BrC_6H_4SO_2H$, *p*-$MeC_6H_4SO_2H$ and 2 4 6 $Me_3C_6H_2SO_2H$, which were prepd from the corresponding sulfonyl chlorides and 2 mols of the amines They were purified by pptn from 12% KOH with HCl, followed by recrystn from a suitable solvent *Benzenesulfonbutylamide* was obtained as a viscous oil which did not crystallize even at —30°, but was converted into a vitreous mass at that temp (cf Ssolonina, *Chem Centr* 1899, II 869) *Amylamide* was also obtained as a viscous colorless oil, passing into a vitreous mass at —30°, *heptylamide*, m 20° 4 $BrC_6H_4SO_2H$ was prepd by sulfonation of PhBr with the addn of a trace of I as a catalyst (cf Rây and Dey, *C A* 15, 513), yield 38 g Na salt from 62 g PhBr, the chloride m 75°. *4 Bromobenzenesulfonamyl amide*, m 55° *hexylamide* m 55°, *heptylamide*, m 65° *4 Methylbenzenesulfonbutyl amide*, m 43° *amylamide* did not crystallize on standing for a long time in the ice chest, *hexylamide* m 62° *heptylamide* m 27° 2 4 6 $Me_3C_6H_2SO_2Cl$, m 56°, was prepd by adding 24 g mesitylene with continuous stirring to 42 g $ClSO_2H$ at 0°; yield, 20 g *2 4 6 Trimethylbenzenesulfonpropylamide*, m 54°, *butylamide*, m 41°, *amylamide*, m 42°, *hexylamide*, m 64° *heptylamide*, m 45°. From the graphs constructed with the aid of these m ps it was noted in agreement with other investigators, that the introduction of alkylamine residues into arylsulfonalkylamides brings about a marked lowering of the m p In general, however, a rise in the m ps was observed with the introduction of the 5th $CH_2$ group and onward which was to be expected from Timmermans' law of the convergence of m ps (*C A* 16, 2060) Considering the graphs obtained with 4 bromo- and with 2 4 6 trimethylbenzenesulfonalkylamides a min. in the m p curves of the arylsulfonalkylamides is observed in the $AmNH_2$ derivs In several other cases deviations or anomalous positions with regard to homologs have been noted with a normal alkyl group contg 5 C atoms This is found in the mol vols. of the 5th term of the homologous series (Le Bas *The molecular volumes of liquid chemical compounds*, 24, 146, 148 150(1915)), the velocity of hydrolysis of valeramide (Crocker, *C. A* 1, 2076) the velocity of reaction of AmI on PhONa (cf Segaller, *C A* 7, 3316 8, 1267, Gluud and Kempf, *C A* 7, 3753) and the optical rotatory power of homologous series in which the 5th term shows an abnormal behavior (Pickard and Kenyon, *J Chem Soc* 75, 362(1889)) Thus, besides the ordinary oscillation (cf Nekrassov, *C. A* 22, 56, Verkade *C A* 24, 4204) there appears to be a 2nd type, which shows an anomaly in the 5th term in the homologous series (cf van der Kam, *C A* 21, 2883) C F VAN DUIN

**New derivatives of *p*-arsanilic acid. I. *p*-Arsonosuccinanilic acid and related compounds.** GILBERT T. MORGAN AND ERIC WALTON *J. Chem Soc* 1931, 615–9.—Compds of the type $H_2O_3AsC_6H_4NHCO(CH_2)_xCONR_1R_2$ from which the apparently toxic $NHCH_2$ group is absent, have been examd Atoxyl (12.8 g) and succinic anhydride (12 g), heated 1 hr at 170–80°, give 10 g *p-arsonosuccinanilic acid* (I), silky prisms, if the resulting mass is boiled with $H_2O$ slightly acidified with HCl there results

*succinanilide p p'-diarsonic acid*, ill defined solid, *di Na salt*, amorphous, dissolving in $H_2O$ to give a soln of approx *p*H 7.5. I and $PhNH_2$, heated for 2 min give *succinanilide p-arsonic acid*, small leaflets. Na salt, needles, giving a soln of approx *p*H 8; the *methylamide deriv* prisms. *Na salt*, crystals with 2 mols $H_2O$; the *ethylamide deriv*, silky prisms; yields a *Na salt* leaflets. I and HCl, satd with $SO_2$, give *p-dichloroarsino succinanilic acid*, pale buff, m. 210.1°. Heating I at 210° for 1.5–2 hrs., gives succinanil *p*-arsonic acid, amorphous, which regenerates I on addn of $H_2O$; with 1 tOH $NH_3$ at 75–80° for 3–4 hrs. there results *succinanilamide p-arsonic acid* leaflets whose *$NH_4$ salt* crystallizes with 1 mol $H_2O$. *Na salt*, plates with 1 mol $H_2O$; the corresponding *dimethyl amide* forms leaflets. Na *salt*, crystallizes with 1 mol $H_2O$; the *piperidide* crystallizes as needles. Preliminary pharmacol. reports on the mono Na salts indicate very low toxicities combined with therapeutic activity against trypanosomes in all cases except that of the diarsonic acid. Values are given and compared with tryparsamide.

C. J. West.

**Diphenyl ether series. III. Derivatives of the local anesthetic type.** C. M. Suter and Emer Ohler. *J. Am. Chem. Soc.* 53, 1961–9(1931); *cf. C.* 1, 25, 1818.—*4 (4 Nitrophenoxy)benzaldehyde* (I), m. 104.5°, results in 75% yield from *p*-$KOC_6H_4CHO$ and *p*-$ClC_6H_4NO_2$, after heating 6 hrs. at 190–200°; the *2 $NO_2$ isomer*, m. 84–5°. 4-$O_2NC_6H_4OPh$ and AcCl with $AlCl_3$ in $CS_2$ give 55% of *4 (4 nitrophenoxy)acetophenone* (II), m. 80.1°. Oxidation of I or II gives *p*-$O_2NC_6H_4OC_6H_4CO_2H$, m. 235.6°; *chloride*, m. 79–80°; *amide*, m. 167.8°; *Et ester*, m. 71.5°; reduction gives *Et 4 (4-aminophenoxy)benzoate*, oil; the *HCl salt* decomps. about 165°; *Ac deriv*, m. 122.3°. *Bu 4-(4 nitrophenoxy)benzoate*, yellow oil, $b_3$ 250.5°; the *$NH_2$ deriv* yields a *HCl salt*, decomps. 155–60°; *Ac deriv*, m. 98.9°. *β Diethylaminoethyl 4 (4 nitrophenoxy)benzoate HCl*, decomps. 100–10° (90% yield). *$NH_2$ deriv*, amorphous. Although these derivs. show considerable anesthetic action, they are too toxic to be of practical value.

C. J. W.

**Substitution products of 2-nitro- and 2-acetamidodiphenyl ethers and the corresponding diphenylene oxides.** Hamilton McCombie, Wm. Geo. Macmillan and Harold A. Scarborough. *J. Chem. Soc.* 1931, 529–37.—2 $AcNHC_6H_4OPh$ and $HNO_3$ (d. 1.42) at room temp. for 15 min. give the *Ac deriv*, yellow, m. 180°, of *5 nitro 2 aminodiphenyl ether*, yellow, m. 116°; the diazo soln., dropped into hot 50% $H_2SO_4$, gives 2 nitrodiphenylene oxide, m. 186°. More concd. $HNO_3$ gives *5,4'(?)-dinitro 2-acetamidodiphenyl ether*, pale yellow, m. 190°; the free *base*, yellow, m. 192°. *o*-$ClC_6H_4OK$ and *o*-$ClC_6H_4NO_2$, heated 18 hrs. at 170°, give 2 $ClC_6H_4OC_6H_4NO_2$-2, yellow, m. 49°; the 2'-$NH_2$ deriv., pale yellow, $b_{15}$ 203°, m. 45°. *Ac deriv*, m. 104°; an attempt to prep. the corresponding diphenylene oxide was unsuccessful. $HNO_3$ gives the *5'-$NO_2$ deriv*, yellow, m. 142°; the free *base*, yellow, m. 125°; further nitration gives the *Ac deriv*, orange, m. 176°, of *2 chloro-4(?), 5'-dinitro 2'-aminodiphenyl ether*, yellow, m. 202°. 2,5-$Cl_2C_6H_3NO_2$ and PhONa, heated 5 hrs. at 170–80°, give *4 chloro 2 nitrodiphenyl ether*, pale yellow, $b_{16}$ 211°; $SnCl_2$ in EtOH HCl gives the *2 $NH_2$ deriv*, $b_{16}$ 215°, m. 41°; *HCl salt*, m. 192°; the Ac deriv could not be purified. *3-chlorodiphenylene oxide*, b. 106°. Chlorination of 2 $O_2NC_6H_4OPh$ or condensing *p*-$ClC_6H_4ONa$ and *o*-$ClC_6H_4NO_2$ give 4-$ClC_6H_4OC_6H_4NO_2$-2, m. 46°; the 2 $NH_2$ deriv., $b_{16}$ 215°; *HCl salt*, m. 181°. *4-Chloro-2'-acetamidodiphenyl ether* (I), m. 99°, refluxing with $Ac_2O$ and AcOH gives the *di Ac deriv*, m. 106°. Nitration of I gives the *Ac deriv*, yellow, m. 203°, of *4-chloro-5'-nitro-2'-aminodiphenyl ether*, yellow, m. 123°; there is also formed a small quantity of the *2(?),5'-di-$NO_2$ deriv* of the *Ac deriv*, m. 198°. *3 Chloro 7 nitrodiphenylene oxide*, pale yellow, m. 226°. *p*-$ClC_6H_4OK$ and 2,5-$Cl_2C_6H_3NO_2$ give 4,2 $Cl(O_2N)C_6H_3OC_6H_4Cl$-4, m. 78°; 2 $NH_2$ deriv., $b_{15}$ 235°, m. 66°. *HCl salt*, m. 145°. *Ac deriv*, m. 100°. *3,6-dichlorodiphenylene oxide*, b. 190°. 4,2 $Cl(AcNH)C_6H_3OC_6H_4Cl$-4 on nitration gives the *5-$NO_2$ deriv*, m. 150°, and a small quantity of the *2'(?),5-di $NO_2$ deriv*, m. 212°. Nitration of 4 $BrC_6H_4OC_6H_4NHAc$-2 or bromination of 5,2 $O_2N(AcNH)C_6H_3OPh$ gives the *Ac deriv*, yellow, m. 208°, of *4' bromo-5-nitro 2-aminodiphenyl ether*, yellow, m. 133°. 5,2 $Br(H_2N)C_6H_3OPh$, through the diazo reaction, gives *2 bromodiphenylene oxide*, m. 120°. 5,2 $Br(H_2N)C_6H_3OC_6H_4Br$-4 gives *2,6-dibromodiphenylene oxide*, m. 176°. 4,2-$Br(H_2N)C_6H_3OC_6H_4Br$-4 gives the *7,6 isomer*, m. 195°, also obtained by bromination of $(C_6H_4)_2O$ in $CS_2$. 4,2 $Cl(O_2N)C_6H_3OC_6H_4Br$-4 results from the bromination of 4,2-$Cl(O_2N)C_6H_3OPh$ or by the condensation of *p*-$BrC_6H_4OK$ and 2,5-$Cl_2C_6H_3NO_2$. 2-$O_2NC_6H_4OPh$ and ICl in AcOH give *4-iodo 2'-nitrodiphenyl ether*, pale yellow, m. 86°; Cl in $CCl_4$ gives the *dichloride*, m. 96°. 4-$IC_6H_4OC_6H_4NH_2$-2, $b_{16}$ 210°, gives a *HCl salt*, m. 219°, an *Ac deriv*, m. 115°, and a *di Ac deriv*, m. 94°. The results show that chlorination and iodination of 2 $O_2NC_6H_4OPh$ follow the same path as bromination but that in these cases the introduction of more than 1 substituent atom is not attained.

C. J. West.

part of the I to sol products by $CrO_3$, the amt of such oxidation depending upon the relative amt of oxidant used and the state of dispersion of I. Nevertheless when the above cycle of operations is repeated a large no of times a const. increase in insol material results. Therefore Green's conception of a definite oxidative condensation of I with 3 mols II must be abandoned. LEWIS W. BUTZ

Synthesis of simple and of substituted 2-alkylcinnamic alcohols, including a monomolecular cubebin. MARSTON T. BOGERT AND GARFIELD POWELL. *J. Am. Chem. Soc.* 53, 1605–9(1931).—PhCH:CCl·CHO (30 cc.) is reduced by a soln. of Mg in EtOH-HCl in a N atm. giving 22 cc. of *2 ethylcinnamyl alc.*, $b_4$ 131–2° (cor.), it instantly decolorizes Br in $CCl_4$ and is readily catalytically reduced to $PhCH_2CH(CH_2OH)CHEtMe$, *p nitrobenzoate*, m. 110.1° (cor.). *phenylurethan* m. 63–4° (cor.). *2 Amyl cinnamyl alc.* was similarly prepd. in 50% yield, it $b_4$ 141–3°, *phenylurethan*, m. 61–2°. *2 Methyl 3 p-tolylallyl alc.* $b_{11}$ 142–3° (60% yield). *2-Piperonylideneethanol* (monomol. cubebin") $b_4$ 167–8°, m. 78–8.8° (cor.), results in 20% yield with the Mg reagent and in 30% yield with $Al(OEt)_3$. *benzoate*, m. 96–7° (cor.), *phenylurethan*, m. 96–7° (cor.). C. J. WEST

The oxidation of benzyl alcohol by the three isomeric nitrochlorobenzenes. ROBERT E. LYONS AND GUIDO H. STEMPEL, JR. *Proc. Indiana Acad. Sci.* 38, 197–200 (1929).—I. $p$-$C_6H_4ClNO_2$ and $PhCH_2OH$. The reaction of $PhCH_2OH$ with $p$-$C_6H_4ClNO_2$ gave BzOH and $p,p'$-dichloroazoxybenzene, m. 156°, with a little $(ClC_6H_4N)_2$. The reaction was initiated by dropping the soln. of the nitro compd. in xylene into a 78% NaOH soln. contg. the $PhCH_2OH$. The reduction at 139° was 100%, at 60°, 60.6%. The amt. of NaOH used was not important. When the nitro compd. was introduced in the solid form instead of as a xylene soln. the product was 100% azoxy compd. II. $m$-$C_6H_4ClNO_2$ and $PhCH_2OH$. The reaction took place quantitatively at room temp. yielding ($m$-$ClC_6H_4)_2N_2O$ and $PhCH_2OH$. III. $o$-$C_6H_4ClNO_2$ and $PhCH_2OH$. The conditions used successfully in the reactions of the $p$- and $m$-$ClC_6H_4NO_2$ with $PhCH_2OH$ caused thermal decompn. when the $o$-compd. was used. By using a large amt. of solvent and dropping the alkali in slowly this decompn. was curbed and a yield of 17% obtained. The product could not be identified but contained either a nitroso-, an azoxy or an azo group. H. M. STARK

The formation of thioamides from acylated aldehyde cyanohydrins. VII. JOHN F. OLIN AND TREAT B. JOHNSON. *Rec. trav. chim.* 50, 72–6(1931); cf. *C. A.* 21, 98.—The practical method of synthesizing thiazoles is to allow an $\omega$-halogenated ketone to interact with a thioamide. For the synthesis of certain thiazoles thioamides of HO acids were necessary and the latter were synthesized from acylated aldehyde cyanohydrins and $H_2S$ in the presence of KSH, $NH_4$, triethanolamine or pyridine. The superior action of these bases over $NH_3$ is ascribed by O. and J. to their greater basicity by virtue of which they are able to hold much larger quantities of $H_2S$ in contact with the nitrile. The action of pyridine is not so favorable as that of the other bases mentioned above, which is not surprising in view of the fact that pyridine exerts a desulfurizing action on several org. compds. (Raffo and Rossi, *C. A.* 8, 2683; 9, 1473). On account of its great cheapness and its remarkable influence on this addn. reaction, triethanolamine was found to be the most suitable catalyst. The following compds. were all prepd. on passing a current of $H_2S$ through the EtOH soln. of the acylated aldehyde cyanohydrin to which triethanolamine was added. *Mandelic thioamide benzoate* (cf. Francis and Davis, *C. A.* 3, 2973), m. 139°, *acetate* m. 104°. *Hydroxyacetic thioamide benzoate*, m. 103°, *lactic thioamide benzoate*, m. 104°, *α-hydroxybutyrothioamide benzoate* m. 106°. The acylated aliphatic cyanohydrins could not be prepd. according to Francis and Davis' technic (*loc. cit.*) and were obtained by shaking the aldehyde, equiv. amts. of BzCl, NaCN and cracked ice until the odor of BzCl disappeared. The cyanohydrin was estd. with $CHCl_3$ or $CCl_4$ and purified by distn. *in vacuo*. C. F. VAN DUIN

The nickel salt of benzamidoxime. J. V. DUBSKÝ AND M. KURAŠ. *Chem. Listy* 24, 464(1930).—Benzamidoxime (1.3 g.) in $H_2O$ is mixed with 1.2 g. $NiCl_2·6H_2O$ in $H_2O$ and treated with 3 drops AcOH to prevent the pptn. of $Ni(OH)_2$. Dil. $NH_4OH$ is added until the odor of $NH_3$ is noticeable, and the mixt. is left standing for 12 hrs. Fine, purple red needles are filtered off. The addn. of $NH_4OH$ to the mother liquor yields a 2nd crop of crystals. They are sol. in hot $H_2O$, insol. in cold $H_2O$, sol. in EtOH, forming a red soln., decomp. 90–125° and are stable in air. Analysis shows the structure $\left(\begin{matrix} PhC(-NH_2)=N \\ \diagdown \quad \diagup \\ \quad O \end{matrix}\right)_2Ni$ (I). In the presence of $H_2O_2$ the formation of I is hastened but no further oxidation occurs. With $NH_4OH$ and NaOH an intense blue soln. forms, boiling with $PbO_2$ decolorizes solns. of I. FRANK MARESH

**Action of bromine on acetamidohydroxybenzoic acids and acetamidophenols.** GUSTAV HELLER WITH FRITZ SOLDNER *J prakt Chem* 129, 257–67(1931).—5,2-AcNH(HO)$C_6H_3CO_2H$ (I), m 218°, with 1 or 3 mols Br without or with heating on the water bath, gives the *mono-Br deriv*, m 217°, $FeCl_3$ gives a blue color, only with the excess of Br is a small quantity of bromoanil formed. I and $HNO_3$ in AcOH give a $NO_2$ *deriv*, darkens 270°, does not m 300°, $FeCl_3$ gives a violet color, heating with Br-AcOH gradually causes soln., giving bromoanil. *3-Acetamido-4-hydroxybenzoic acid* (II), by reduction of the $NO_2$ deriv. and acetylation, m 251–2° (decompn.), 2 mols Br in AcOH, heated several hrs. on the water bath, gives the *mono-Br deriv*, m 254° (decompn.), $FeCl_3$ gives a brown color, 5 mols Br gives a *di-Br deriv*, m 219°, $FeCl_3$ gives no color, at a somewhat higher temp., there results a *tri-Br deriv*, pale yellow, m 230° (decompn.), further heating of the reaction mixt. gives *tribromo-2-bromoaminophenol* (?, III), yellow-brown, darkens 190°, m. above 305°. Concd. $HNO_3$ and II give a *2,5,6-trinitro deriv*, yellow, m. 204°. $FeCl_3$ gives a dark red $FeCl_3$ reaction, with Br-AcOH this gives *pentabromoacetanilide*, m. 222°, further heating gives pentabromoaniline, m. 226°. *4-Acetamido-3-hydroxybenzoic acid*, m. 250–1°, 2 mols Br in 10 parts AcOH gives a *mono-Br deriv*, m. 255° (decompn.). $FeCl_3$ gives a blue color. 5 mols Br gives a compd. apparently identical with III. *3-Acetamido-2-hydroxybenzoic acid*, m. 230° (decompn.), $FeCl_3$ gives a deep blue color. 2 mols Br gives a *mono-Br deriv*, m. 255° and giving an indigo blue color with $FeCl_3$. 5 mols Br gives a *tri-Br deriv*, m. 259°. 6,3-AcNH(HO)$C_6H_3CO_2H$ and 2 mols Br give a *mono-Br deriv*, m. 267°. 5 mols Br gives a *compd*, $C_6H_3ONBr_4$, carbonizes about 200°, which resembled III. *5-Acetamido-2,4-dihydroxybenzoic acid*, m. 220° (decompn.). $FeCl_3$ gives a dark blue color. 2 mols Br in 15 parts AcOH gives a *mono-Br deriv*, decomps. 200° and giving a deep blue $FeCl_3$ reaction, excess Br gives a mixt. of products, which could not be sepd. *o*-AcNHC$_6$H$_4$CO$_2$H and 5 mols. Br in 5 parts AcOH, on heating until HBr evolution ceases, give a mixt. of the 5-Br, 3,5-$Br_2$ and *tetra-Br derivs*, m. 228°, further addn. of Br to the reaction mixt. and heating 20 hrs. give BrC$_6$H$_3$NHAc in small yields. *p*-$H_2NC_6H_4OH$ and Br AcOH give bromoanil. *p*-AcNHC$_6$H$_4$OH and 5 mols. Br in AcOH give the *2,6-di-Br deriv*, m. 188°, further heating of the filtrate gives bromoanil and tetrabromohydroquinone. With 10 mols. Br, there results the *tetra-Br deriv*, m. 216–7°, heating with concd. $H_2SO_4$ 3 hrs. on the $H_2O$ bath gives *tetrabromo-4-aminophenol*, m. 215° (decompn.). *o*-AcNHC$_6$H$_4$OH and 5 mols. Br give a *tri-Br deriv*, m. 183° (decompn.), if the reaction mixt. is heated 0.5 hr. there results *tetrabromoacetylbromoaminobenzene*, m. 185°; if the latter is heated with 5 mols. Br in AcOH for 4 hrs., there results a *penta-Br deriv*, m. 207–8°. C. J. WEST

***N*-Methyl-*N*-phenylalkylaminoalkyl benzoates and *p*-aminobenzoates.** ARTHUR C. COPE AND S. M. MCELVAIN *J. Am. Chem. Soc.* 53, 1887–94(1931).—Previous work indicated that it was desirable to prep. and submit for pharmacol. study a series of compds. of the procaine type in which various phenylalkyl groups would be attached to the N atom. This paper reports a series of compds. of the type BzO(CH$_2$)$_x$NMe-(CH$_2$)$_y$Ph, in which *x* is 2 and 3 and *y* is varied from 1 to 4. All b. ps. and m. ps. given are cor. *γ-Phenylpropyl p-toluenesulfonamide*, m. 65.1–5.7°. *δ-phenylbutyl deriv.*, m. 53.5–3.9°. *N-methyl N-γ-phenylpropyl deriv.*, $b_2$ 231–8°, m. 41.8–2.4°. *N-methyl-δ-phenylbutyl deriv.*, $b_7$ 241–5°, m. 60.5–1.1°. *N-phenylpropyldi-p-toluenesulfonamide*, m. 113.3–3.7°. Hydrolysis gives the following products: PhCH$_2$CH$_2$NHMe, whose HCl *salt* m. 164.1–4.9°. PhCH$_2$CH$_2$CH$_2$NHMe, $b_4$ 85.5–6.1°, $d_{25}^{25}$ 0.9205, $n_D^{25}$ 1.50877; *HCl salt*, m. 145.6–6.1°. *δ-phenylbutylmethylamine*, $b_4$ 95.0–5.4°, $d_{25}^{25}$ 0.9126, $n_D^{25}$ 1.50350; *HCl salt*, m. 126.2–6.8°. These amines were condensed with *p*-$O_2NC_6H_4CO_2CH_2CH_2Cl$ *and γ-chloropropyl p-nitrobenzoate*, $b_3$ 168.5–9.5°, $d_{25}^{25}$ 1.3222, $n_D^{25}$ 1.54756, the benzoates were isolated as the HCl salts in 50–75% yields, unreacted sec. amines are removed by treatment with BzCl. The following *N-methyl-N-phenylalkylaminoalkyl benzoate-HCl*, BzO(CH$_2$)$_x$NMe(CH$_2$)$_y$Ph, were prepd. where *x* and *y* are: 2 and 1, m. 145.6–6.4°. 2 and 2, m. 134.2–4.8°. 2 and 3, m. 106.3–7.1°. 2 and 4, m. 106.9–7.5°. 3 and 1, m. 145.4–6.3°. 3 and 2, 128.8–9.4°. 3 and 3, m. 117.5–8.3°. 3 and 4, m. 121.7–3.7°. *N-Methyl-N-phenylalkylaminoalkyl p-nitrobenzoate-HCl*, *p*-$O_2NC_6H_4CO_2(CH_2)_xNMe$(CH$_2$)$_y$Ph, where *x* and *y* are: 2 and 1, m. 216.6–7.6°. 2 and 2, m. 170.9–1.9°; 2 and 3, m. 122.6–3.6°. 2 and 4, m. 120.6–1.6°. 3 and 1, m. 206.6–7.4°. 3 and 2, m. 147.2–8.2°. 3 and 3, m. 99.5–100.3°. 3 and 4, m. 150.3–60.3°. Catalytic reduction gives the *N-methyl-N-phenylalkylaminoalkyl p-aminobenzoate HCl*, *p*-$H_2NC_6H_4CO_2(CH_2)_xNMe$-(CH$_2$)$_y$Ph.2HCl, where *x*, *y* and *z* are: 2, 1 and 2, m. 200.6–10.6°. 2, 2 and 2, m. 245.2–7.4°. 2, 3 and 2, m. 182.3–4.3°; 3, 1 and 2, m. 219.1–20.1°. 3, 2 and 1, m. 190.7–2.2°. 3, 3 and 1, m. 178.8–9.8°. 3, 4 and 1, m. 156–8°. *N-Methyl-N-γ-phenylpropylamino-*

*ethanol* b$_4$ 132.6–3.0° $d_{25}^{25}$ 0.9883 $n_D^{25}$ 1.51723 (75.3% yield) *N-Methyl N-γ-phenyl propylaminopropanol*, b$_4$ 147.3–7.9°, $d_{25}^{25}$ 0.9785, $n_D^{25}$ 1.51337. The *N*-methyl-*N*-phenylalkyl benzoates are much less toxic than procaine, both subcutaneously and intravenously. The corresponding *p*-aminobenzoates show a decidedly different and most unusual toxic effect. Their intravenous toxicities are rather low as a group, certain ones approaching the toxicity of procaine. The subcutaneous toxicities, however, are considerably higher than would be expected from the intravenous values. *N*-Methyl *N*-benzylaminoethyl *p*-aminobenzoate is about 80% as toxic as procaine intravenously but is over twice as toxic subcutaneously. Details of the pharmacol. tests are given.

C. J. West

**Titrimetric and spectrometric analysis of keto-enol mixtures. β-Phenylacetoacetic ester.** Karl v. Auwers. *J. Am. Chem. Soc.* 53, 1496–500(1931).—Polemic with Post and Michalek, *C. A.* 25, 96. The rule that titrimetric and spectrometric detns. of the enol content of tautomeric mixts. gives results in satisfactory agreement holds for α-phenylacetoacetic ester (I). Titrimetrically, the enol content of the ester is found to be 39.2% and spectrometrically 36.7%; therefore materially higher than for α-alkylacetoacetic esters (II). For I, in contrast to II, the direct Br titration is just as applicable as the indirect Br titration.

C. J. West

**Condensation of aromatic aldehydes with phenylacetonitrile.** Theodora de Kiewiet and Henry Stephen. *J. Chem. Soc.* 1931, 639–40.—2,4-(MeO)$_2$C$_6$H$_3$CHO and PhCH$_2$CN in EtOH-EtONa give almost quant. *2,4-dimethoxy-α-phenylcinnamonitrile*, pale yellow, m. 95°; it could not be demethylated. *3,4-di-MeO deriv.*, pale cream, m. 88°. *o*-Vanillin with 6 *N* EtOH-KOH gives almost quant. *8-methoxy-3-phenylcoumarin*, straw-colored, m. 155.5°. 4-HO(MeO)C$_6$H$_3$CHO with EtONa gives *4-hydroxy-2-methoxy-α-phenylcinnamonitrile*, pale yellow, m. 195°; *4-Ac deriv.*, m. 158°. *4-hydroxy-3-methoxy deriv.*, pale cream, m. 99°; the yields of these 2 nitriles is 90% if 6 *N* EtOH-KOH is used. All attempts to hydrolyze the nitriles were unsuccessful, they are thus probably *cis* forms.

C. J. West

**Esculetin dimethyl ether from Artemisia capillaris. II.** Shoichi Sera and Chuzo Shibuya. *J. Agr. Chem. Soc. Japan* 6, 1003–12(1930); cf. *C. A.* 24, 5742.—Esculetin di-Me ether (I) was treated with concd. caustic alkali for several hrs. Dimethoxy-*o*-coumaric acid (II), m. 197.8°, was formed. Ac deriv. (III), m. 211°, was obtained from II. III was saponified by caustic alkali and then acidified with HCl. II was regenerated. I was demethylated by HIO$_3$ and esculetin, m. 268–70°, was obtained. I, m. 145°, was regenerated by methylation. Mono- (IV) and dibromide (V) (m. 235°) were prepd. from I in AcOH or benzene with Br. Sapong. IV by Tilden and Burrow's method colorless needles, m. 245–6°, were obtained. They were dimethoxycoumarilic acid. Colorless needles, m. 220–2°, (MeO)$_2$C$_6$H$_2$BrCO$_2$H were obtained from V. One of the Br atoms may be combined with the side chain and the other with the benzene nucleus. Hence the formula of V should be $C_{11}H_9O_4Br_2$, not $C_{11}H_{10}O_4Br_2$. Y. Kihara

**Action of hydroferrocyanic acid upon bicyclic terpenes; a new partial synthesis of terpene bases and alcohols.** K. Stephan and Th. Hammerich. *J. prakt. Chem.* 129, 283–308(1931).—Camphene and $H_4Fe(CN)_6$ give the *compd.* $(C_{10}H_{16})_2Fe(CN)_6$; heating 160 g. of this compd. in 1.2 l. 15% KOH in an autoclave at 160° (9–10 atm.) for 13 hrs. gives 7% isobornylamine, 50% nearly pure camphene and 43% of a mixt. contg. 74.4% camphene, 23.1% camphene hydrate and 2.5% isoborneol; details of the sepn. of these products and their identification are given. The *compd.* with α-pinene on alkali decompn. at 160° gives 70% of a mixt. of α-terpineol, limonene and dipentene and 30% of a mixt. of isobornyl- and isofenchylamines. The verbenol formed from α-pinene in the air also forms a complex with $H_4Fe(CN)_6$, which is easily decompd. with the reformation of the verbenol. α-Terpineol formed by the action of $H_2O$ on α-pinene behaves in the same way. Nopinene (β-pinene) also gives a mixt. of compds. with $H_4Fe(CN)_6$; the easily decompd. part gives α-terpineol and terpine hydrate, the more difficultly decompd. part gives 45% of isofenchylamine and 55% of α-terpineol and limonene.

C. J. West

**Fixation of hydrogen by acetylene derivatives. XVIII.** Yu. S. Zalkind and V. O. Mokhnach. *J. Russ. Phys. Chem. Soc.* 62, 1043–7(1930).—Dihydroxybornylacetylene $C_{10}H_{16}(OH)C{\equiv}CC_{10}H_{16}OH$, was synthesized by mixing 90 g. camphor in 200 cc. ether with $(CMgBr)_2$ prepd. from 18 g. Mg, 90 g. EtBr and 200 cc. ether. The mixt. was left for several days being heated 4 or 6 hrs. daily or altogether about 20 hrs. After decompn. with water a basic Mg salt was sepd. and dissolved in 20% AcOK, the product, extd. with $Et_2O$ and recrystd. from petr. ether, m. 201–2°, is sol. in $Et_2O$, acetone, $CHCl_3$, benzene. Yield 43%; analysis confirmed the compn. The assigned

ucture was proved by heating with KOH which decompd the compd into camphor $C_9H_{14}$. For H fixation several catalysts were tried. Pd black is more efficient than loidal Pd and that pptd on $BaSO_4$. Pd black (0.6 g.) effects an addn. of 2 H atoms the mol. of the glycol (1.6 g. dissolved in 50 cc. $Et_2O$) in 10–15 min. while the satn. uired 315 min. This difference in time of reaction is characteristic for hydrogenation a triple bond with Pd, as Pt requires for fixation of the first 2 atoms as much time as the 2nd pair. The ethylene glycol crystd. from MeOH + $Me_2CO$ gives crystals 165–7° sol. in ether, benzene, $CHCl_3$, petr. ether, mol. wt. 316–323 (calcd. 332), es a yellow color with concd. $H_2SO_4$, does not decolorize $KMnO_4$ but reacts with Br. e satd. glycol, recrystd. from acetone, m. 204°, sol. in $CHCl_3$, ether, benzene, petr ier, mol. wt. 315 (calcd. 334); the yellow color with $H_2SO_4$ is very slight. Br and $KMnO_4$ are not decolorized. This acetylene glycol is more difficult to synthesize and to drogenate than other acetylene glycols. J. G. Tolpin

**Action of substituted aromatic amines on camphoric anhydride. The rotatory wers of some disubstituted camphoranilic acids.** Maitan Singh and Dara Singh *Chem. Soc.* 1931, 478–82; cf. *C. A.* 24, 4286.—The following substituted *camphoranilic ds* were prepd. by heating camphoric anhydride and the amine with fused AcONa at 5–50° for 3–4 hrs., in no case was there any residue of imide. *2',3'-di Me* (I), m. )–2°, *2',6'-di Me* (II), m. 236–8°, *2',5'-di Me* (III), m. 203–4°, *5'-nitro 2'-methoxy* (), m. 162–3°, *4' nitro 2' methoxy* (V), light brown, m. 185–6°. *5' nitro-2'-methyl* I), straw colored, m. 220–1°. *3' nitro 4' methyl* (VII), light brown, m. 204–5°, *nitro-4'-methyl* (VIII), deep yellow, m. 187°. *4' nitro 2' methyl* (IX), m. 229–30°. e following acids were prepd. by the action of fuming $HNO_3$ in AcOH. *4'-chloro-2'-ro* (X), deep yellow, m. 204–5°. *4' bromo 2' nitro* (XI), deep yellow, m. 212°. *2',6'-nitro-4'-methoxy* (XII), light orange, m. 228–9°. *2',6' dinitro 4' ethoxy* (XIII), orange, 189–90°. Mol. rotatory powers in MeOH, EtOH, $Me_2CO$ and MeCOEt, resp., re detd. as follows: 2'-Me I 51, 144, 98, 91; I 168, 148, 120, 109; III 203, 165, 147, 127, 174, 168, 109, 102; 2'-MeO 30, 28, —16, —10; 4' MeO 163, 153, 123, 100; 4' EtO 9, 154, 116, 104; IV 141, 128, 109, 104; V feeble rotation; XII —306, —412, —270, 255; XIII —263, —353, —211, —192; 4' Me 170, 146, 122, —; VI 214, 219, 154, 4; IX 96, 80, 77, —; VII 141, 123, 111, 101; VIII —167, —202, —161, —138. Two oups of the same polarity reinforce each other when they are in the *p* position with spect to each other, *e. g.*, III and VI exceed any of their resp. isomers in rotatory power oups of opposite polarity neutralize each other's effect. The rotatory power of IV practically the same as that of the unsubstituted compd. The $NO_2$ group in the 4'-sition has a depressing effect on the rotatory power of the original compd.

C. J. West

**Stereochemistry of biphenyl compounds. XIV. Preparation and resolution of 5,3',5'-tetramethyl-2,2'-difluoro-6,6'-diaminobiphenyl.** E. C. Kleiderer and oger Adams. *J. Am. Chem. Soc.* 53, 1575–80(1931); cf. Bock and A., *C. A.* 25, 1.—3,5,2,6-$Me_2(H_2N)(O_2N)C_6HBr$ was transformed into the 2 diazonium borofluoride 7% yield), decomps. about 195°, which decomps. on heating to *3,5-dimethyl-2 fluoro-nitro-1-bromobenzene*, yellow, m. 49–51° (45% yield), with Cu in $PhNO_2$ there results % of *3,5,3',5' tetramethyl 2,2' difluoro-6,6'-dinitrobiphenyl*, m. 231–6°, reduction th Zn and AcOH–HCl gives 68% of the *6,6'-diamino deriv.* (I), m. 154–5° (cor.); esolution of I was effected by *d* camphorsulfonic acid in abs. AcOEt. *l* I, m. 151–2° or.), $[\alpha]_D^{20}$ —4.1° (0.4000 g. in 15 cc. $Me_2CO$). *d camphorsulfonate*, m. 171–3°, $[\alpha]_D^{20}$ 0° (0.1500 g. in 15 cc. abs. EtOH). *d* I, m. 150–1° (cor.), $[\alpha]_D^{20}$ 3.2° (0.1000 g. in 15 $Me_2CO$); *d-camphorsulfonate*, m. 125–30°, $[\alpha]_D^{20}$ 32.5° (EtOH), the active forms are adily racemized by heating in a neutral solvent, such as MeOH or EtOH or more pidly in glacial AcOH. *3,5 Dimethyl 1 bromobenzene-2 diazonium borofluoride*, comps. 161° (60% yield), on heating, gives quant. *3,5-dimethyl-2 fluorobromobenzene*, 87–9°, $d_{20}^{20}$ 1.452, $n_D^{20}$ 1.3100, nitration gives 88% of the *4,6 di-$NO_2$ deriv.*, light llow, m. 86–7°, Cu in $PhNO_2$ gives 69% of *3,5,3',5' tetramethyl 2,2'-difluoro 4,6,4',6'-ranitrobiphenyl*, m. 202–4° (cor.), the *tetra-$NH_2$ deriv.*, yellow, m. 250–3° (74% yield). is could not be resolved by *d*-camphorsulfonic acid, *d*-bromocamphorsulfonic acid or tartaric acid.

C. J. West

**Monoacetylation and monodiazotization of diaminobiphenyl.** C. Finzi *Gazz. im. ital.* 61, 33–42(1931).—In connection with an investigation in progress on the epn. of derivs. of the $Ph_2$ series, a special study was made of the behavior of *o*-$H_2NC_6H_4C_6H_4NH_2$-*p* (I) when monoacetylated and monodiazotized in order to establish which the 2 $NH_2$ groups first reacts with AcOH and with $HNO_2$, resp. A survey of the erature shows that most $Ph_2$ derivs. known up to now are sym., but since I is unsym.,

it is only by settling the initial reaction mentioned above that the constitution of I derivs obtained by the Sandmeyer reaction can be established. I (5 g.) in hot 60% EtOH (50 cc.) and $Ac_2O$ (2.80 g.) brought almost to boiling, poured into cold water, let stand several days, decanted, the residue (a mixt. of a cryst. compd. and a pitch) washed with $Et_2O$ (to remove the pitch), the cryst. residue digested repeatedly with a large vol. of warm dil. HCl (the insol. residue is the di-Ac deriv., cf. *Ann.* 207, 354), filtered, the filtrate neutralized with $Na_2CO_3$ and the ppt. purified by repeated recrystns. from dil. EtOH and decolorization with animal charcoal, yields *2-amino-4'-acetylaminobiphenyl* (II), m. 176–7°. I (10 g.), dissolved in hot 40% $H_2SO_4$ (50 cc.), cooled (with rapid agitation to assure the formation of fine crystals) to —4° or —5°, aq. $NaNO_2$ (3.7 g. in 15 cc.) added, let stand at room temp., heated until N is no longer evolved, filtered, the filtrate decolorized with animal charcoal, made alk. with aq. $Na_2CO_3$, the ppt. dissolved in 5% aq. KOH, filtered, acidified with excess of HCl, filtered, decolorized again with animal charcoal, reppt'd. with $Na_2CO_3$ and recrystd. from boiling EtOH, yields 2-hydroxy-4'-aminobiphenyl (III), already described but the exact constitution not established by Bamberger (*Ann.* 390, 161), yellowish, m. 181–2°, is readily diazotized at room temp. with formation on heating of 2,4'-dihydroxybiphenyl (cf. *Ber.* 13, 2234, *Ann.* 207, 357). II (5 g.), suspended in 20% $H_2SO_4$ (30 cc.), diazotized at 0° with aq. $NaNO_2$ (2 g.), let stand a short time, heated gently until N is evolved, the ppt. washed with dil. HCl (to remove small quantities of III), and purified by repeated recrystns. from boiling EtOH, yields *2-hydroxy-4'-acetylaminobiphenyl* (IV), pale yellowish, m. 198–9°, sol. in aq. alk. hydroxides and insol. in dil. acids. $Ac_2O$ (2 cc.) added to III (1 g.) (spontaneous heating), let stand a short time, poured into water, let stand until all excess $Ac_2O$ has dissolved, filtered, the residue washed with water and recrystd. from EtOH, yields IV. *III (2 g.) and $Ac_2O$ (7–8 cc.), boiled for a short time, poured into cold water, the pitchy* ppt. washed with $Et_2O$, the residue washed with dil. NaOH, then with HCl, and crystd. from boiling EtOH, yields *2-acetoxy-4'-acetylaminobiphenyl*, m. 138°. Aq. $NaNO_2$ (0.68 g.), added to II (2 g.) suspended in ice-cold water and concd. HCl (2.8 cc.), 50% $H_3PO_2$ (15 cc.) added and the ppt. recrystd. from boiling EtOH, yields *4-acetylaminobiphenyl* (V), m. 170°. If the reduction is carried out with EtOH, a considerable yield of IV and of pitchy substances are also formed. V and excess dil. HCl, boiled a long time, dild. with hot water, cooled, diazotized with $NaNO_2$, heated almost to the b. p. until N is no longer evolved, and the ppt. recrystd. from EtOH, yields 4-hydroxybiphenyl (VII), m. 160° (the highest m. p. in the literature is 164–5°). VII can also be prepd. thus: I (5 g.), dissolved in hot 40% $H_2SO_4$ (40 cc.), cooled to —4° and to —5°, aq. $NaNO_2$ (1.8 g. in 10 cc.) added, EtOH (equal vol.) added, let stand overnight, the soln. sepd. from the pitch, the EtOH evapd. *in vacuo*, the residue made alk. with aq. $Na_2CO_3$, the ppt. (mixt. of 4-aminobiphenyl (VIII) and III) dissolved in 5% KOH, the insol. residue (VIII) dissolved in dil. HCl, decolorized with animal charcoal, diazotized with $NaNO_2$, the diazo deriv. decompd. by heating, and the ppt. recrystd. from EtOH, yields VII, m. 160–1°. III (2 g.) in dil. HCl, diazotized at room temp., 50% $H_3PO_2$ (15 cc.) added, warmed gently until N is no longer evolved, the sepd. oil washed with water and crystd. from petr. ether, yields *2-hydroxybiphenyl*, m. 56°. Other reducing agents were tried, but in all cases the yields were very low. C. C. Davis

Oximes of *o*-hydroxybenzophenone. E. P. Kohler and W. F. Bruce. *J. Am. Chem. Soc.* 53, 1569–74 (1931).—The stereoisomeric oximes of *o* $HOC_6H_4COPh$ cannot be dehydrated to a cyclic compd. Their behavior, therefore, contributes no independent evidence with respect to the proper interpretation of the Beckmann rearrangement, but indicates that this rearrangement is reliable when it is employed with sufficient care. Both of the oximes may be obtained directly from the ketone and $NH_2OH$ in alk. soln., at the ordinary temp. the product is almost pure *h*-oxime (I), in boiling solns., the product is a mixt. in which the quantity of *n*-oxime (II) increases with the time that the soln. is boiled. I crystallizes from $C_6H_6$ in thin plates, m. 142–3°. II is probably obtained most readily by heating I with strong alkalies. II crystallizes in needles, m. 141–2°. II is stable to boiling 20% aq. NaOH for 2 hrs. I sublimes at 175–80°, while II is changed into I at 185–200°, but even at 185–200° the process is exceedingly slow. With $PCl_5$ I gives *o*-$HOC_6H_4CONHPh$, while II gives 2-phenylbenzoxazole (III). Attempts to dehydrate the oximes with dry HCl were unsuccessful. I gives a yellow HCl salt, m. 118–20°, decompn. with EtOH gives I but heating at 140–5° gives III and the ketone. II also gives a HCl salt, m. 132–4°, which likewise gives III on heating. $HCO_2H$ changes II into I and also causes a Beckmann rearrangement. C. J. West

The oxidation of acetylene glycols. An *o*-diketone of the tetrahydrofuran series. T. I. Temnikova and P. A. Tikhomolov. *J. Russ. Phys.-Chem. Soc.* 62, 1217–22

(1930).—*Tetratolylbutinediol* (5 g.) in 25 cc. AcOH with 2.2 g. $CrO_3$ in 25 cc. 95% AcOH gave *2,2,5,5 tetratolyl-3,4-diketotetrahydrofuran* (I), and 2 g. of ditolyl ketone (II). I was obtained in 42% yield as crimson red crystals, m. 182°, sol. in PhH, $CHCl_3$ and AcMe, almost insol. in AcOH and EtOH. At 50–60° I is oxidized to II by $CrO_3$ in AcOH. I gives a phenylhydrazone, orange yellow, m. 184–6°, an oxime, pale yellow, m. 226° (decompn.), and a deriv. with *o* $C_6H_4(NH_2)_2$, m. 220–1°. Only one CO group reacts with $NH_2OH$ or $PhNHNH_2$. I with MeMgI and EtMgBr gave rose crystals, m. 150°, extremely labile and oxidizing rapidly back to I. I was not attacked by PhMgBr nor Zn and HCl. LEWIS W. BUTZ

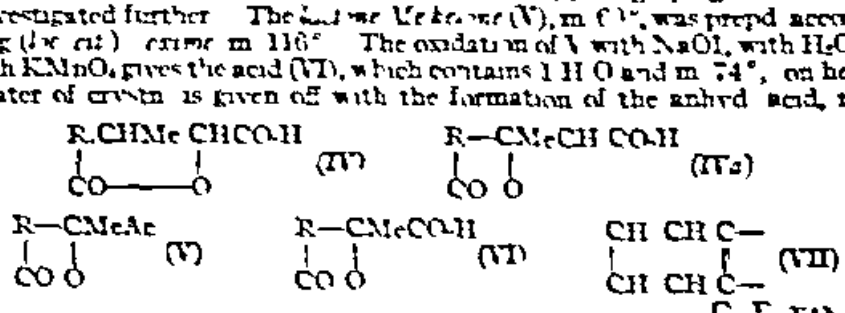
**The action of halogen acids on acetylene glycols. VI. The action of hydrogen iodide on dimethyldiphenylbutinediol.** YU. S. ZALKIND AND S. V. NEDZVETZKII. *J. Russ. Phys. Chem. Soc.* 62, 1011–19(1930). cf. *C. A.* 21, 56.—*Symmetrical dimethyldiphenylbutinediol* (isomer m. 103°) (I) gives with HI a mixt. of *2,5-dimethyl-2,5-diphenyl-3-iodo-2,5-dihydrofuran* (II) and *2,5-diphenyl-3,4-diiodo-2,4-hexadiene* (III). I with a satd. soln. of HI in AcOH (10 cc. per 2 g. of glycol) at room temp. for 4 hrs. gave a reaction product sepg. as a heavy oil when poured into $H_2O$. The oil was washed by decantation, dissolved in $Et_2O$, washed with $Na_2S_2O_3$, and dried with $CaCl_2$. Vacuum distn. after removal of the $Et_2O$ gave a yellow oil in 80% yield, easily sol. in AcMe, $Et_2O$ and PhH, more difficultly in EtOH and petr. ether. The oil was not further investigated, but the analytical results and mol.-wt. detn. indicated II mixed with III. *I with HI in AcOH (10%) at room temp. after 2.5 hrs. gave crystals of III in 25% yield*, colorless, m. 145–6°, very sol. in AcMe, $Et_2O$, PhH, hot EtOH and petr. ether. The filtrate from III contains II and unchanged I. Increased HI concn. increases the amt. of II. III does not decolorize $KMnO_4$ in the cold, does not add $Br_2$, and is not saponified by heating 20 hrs. with 20% KOH. III with 3% $KMnO_4$ in AcMe at 40–5° or with $CrO_3$ in AcOH at the b. p. is converted to a small extent to AcPh and a small amt. of acids not identified. The isomer of I which m. 126° (IV) gave with 10% HI in AcOH at room temp. after 2.5 hrs. 20% of III together with some I. IV is isomerized to I by HI. *The reverse transformation by HI was not observed. Probably only I gives II and III directly.* III (8.5 g.), refluxed 9 hrs. with 100 g. EtOH and 6 g. Zn dust, gave V, m. 84°, easily sol. in AcMe, $CHCl_3$, $Et_2O$, PhH, EtOH, and petr. ether. Analysis of V corresponded roughly to $C_{14}H_{17}I$. V in the cold decolorizes neither $Br_2$ in $CHCl_3$ nor alk. $KMnO_4$ soln. V did not split out III with alc. KOH nor was it oxidized by heating 8 hrs. at the b. p. with 3% $KMnO_4$ in AcMe. The analysis for V indicated a compd. richer in H than required by the suggested formula, but since V is so stable to oxidants it is not an olefin. Heating III in $Et_2O$ with Mg or in PhH or cumene with Zn leaves it unaltered. *Heating 3 g. III, 1.5 g. Zn, and 15 cc. of freshly distd. quinoline for 1.5 hrs. at the b. p. in $H_2$ or $N_2$ gave VI, m. 103–4°, sol. in AcMe, $CHCl_3$, PhH, petr. ether and EtOH. VI is probably $C_{14}H_{12}O$, the structure was not detd.* LEWIS W. BUTZ

**Hydrogenation of certain branched compounds over nickel.** HOMER ADKINS, WALTER H. ZARTMAN AND HOWARD CRAMER. *J. Am. Chem. Soc.* 53, 1425–8(1931).—Exptl. conditions for the successful hydrogenation over Ni of $Ph_3COH$, $Ph_3CH$, dicyclohexylphenylmethane (I), 1,3,5-$C_6H_3Ph_3$, $Ph_3N$, 1,3,5-$C_6H_3Me_3$ and (2,4,6-$C_6H_2Ph_3$)$_2$ are reported. $H_2O$ and EtOH inhibit the hydrogenation of I. *1,3,5-Tricyclohexylcyclohexane*, $b_{2.5}$ 228–8.5°, m. 159–60°. *2,2',4,4',6,6'-Hexamethylbicyclohexyl*, $b_3$ 123–6°, $d_{25}^{25}$ 0.8932, $n_D^{25}$ 1.4873. Tricyclohexylmethane, $b_3$ 164–5°, m. 58.5–9.5°; tricyclohexylamine, $b_7$ 188–9°, m. 160–1°, HBr salt, m. 267–8°, HCl salt, m. 264°, picrate, m. 172.5–3°. C. J. WEST

**Mixed benzoins. III. The structure of some unsymmetrically substituted desoxybenzoins.** JOHANNES S. BUCK AND WALTER S. IDE. *J. Am. Chem. Soc.* 53, 1530–42(1931). cf. *C. A.* 24, 5748.—The Beckmann transformation has been used to *det. the structures of certain unsymmetrically substituted desoxybenzoins and to assign* configurations to the oximes derived from them. Desoxy compds. of the mixed benzoins formed from the following pairs of aldehydes were investigated: *o*-$ClC_6H_4CHO$ and veratric aldehyde (I), *p*-$MeOC_6H_4CHO$ (II), *p*-$Me_2NC_6H_4CHO$ (III), piperonal (IV), BzH and *p*-$MeOC_6H_4CHO$ (V), piperonal (VI) and *p*-$Me_2NC_6H_4CHO$ (VII). Reduction of I gives $ClC_6H_4CH_2COC_6H_3(OMe)_2$, whose *anti-oxime* m. 137° (64% yield) and yields on the Beckmann rearrangement *1-chlorophenylacet-3,4-dimethoxyanilide*, m. 177°; this was also synthesized by heating the acid and amine at 180–200° for 2 hrs. II gives $ClC_6H_4CH_2COC_6H_4OMe$ *on reduction, whose anti-oxime* m. 97° (86% yield), rearrangement gives *1-chlorophenylacetaniside*, m. 163°. Reduction of III gives *1-chlorobenzyl 4-dimethylaminophenyl ketone*, m. 122°; *anti oxime*, m. 173°, rearrangement gives *1-chlorophenylacet-4-dimethylaminoanilide*, m. 165°, also synthesized by the

Schotten Baumann reaction IV gives *1-chlorophenyl-3,4-methylenedioxyphenyl ketone* m. 105°, *anti-oxime* m. 121° (42% yield); rearrangement gives *1-chlorophenyl-acetyl-3,4-methylenedioxyaniline* buff, m. 175°. V gives 4-MeOC$_6$H$_4$CH$_2$COPh *anti-oxime*, m. 133° (23% yield); rearrangement gives *4-methoxybenzylbenzamide* m. 117°; *syn-oxime*, m. 94° (13% yield); rearrangement gives 4-MeOC$_6$H$_4$CH$_2$NHBz, m. 0°. PhCH$_2$COCl and PhOMe give *benzyl-4-methoxyphenyl ketone* m. 75°, *anti-oxime* m. 114° (34% yield); rearrangement gives *phenylacetanisidide* m. 121°. Reduction of VI gives 64% of *benzyl-4-methoxyphenylcarbinol* m. 80°, *anti-oxime*, m. 103° (60% yield); rearrangement gives *phenylacetyl-3,4-methylenedianisidide*, buff, m. 143°. Reduction of VII gives PhCH$_2$COC$_6$H$_4$NMe$_2$; the *anti-oxime* gives on rearrangement *phenylacetyl-4-dimethylaminoaniline* cream, m. 144°. The above results support the view that the transformation takes place between the vicinal groups of the oximes. C. J. West

**Congo copal oil. II. The oxidative degradation of the naphthalene hydrocarbon $C_{12}H_{14}$ from Congo copal oil.** L. Westenberg and J. P. Wibaut. *Rec. trav. chim.* 50, 185–90 (1931); cf. *C. A.* 23, 3210.—The same hydrocarbon $C_{12}H_{14}$ was obtained by Westenberg (*C. A.* 23, 3210) by dehydrogenation of Congo copal oil with S, by Ruzicka, Steiger and Schinz (*C. A.* 21, 908) by pyrogenetic decomposition of a mixt. of acids from Manila copal, followed by dehydrogenation with S and by Harvey, Heilbron and Kamm (*C. A.* 21, 1112) on dehydrogenating squalene with S. The structure of this hydrocarbon as 1,2,5-$C_{10}H_5Me_3$ was proved by Ruzicka and Hosberg (*C. A.* 25, 1232) and Heilbron and Wilkinson (*C. A.* 25, 684). On oxidizing the hydrocarbon in the way described by Westenberg (*loc. cit.*) with $CrO_3$, the reaction products, sol. in NaHCO$_3$, do not only contain an acid $C_9H_{10}O_4$, but also the ketonic acid 2,6-MeAcC$_6$H$_3$CO$_2$H (I), which can be isolated by boiling out the NaHCO$_3$-sol. reaction products with water and recrystg. the oily residue several times from dil. alc. and water. *1-methyl-3-acetyl-2-benzoic acid* (I), m. 116°, is then obtained in 10% yield. *oxime*, m. 162°. I may be converted easily into its *Me ester*, m. 67–8°, thus showing that the so-called esterification rule of Victor Meyer is only to be used with caution. The oxidation with KMnO$_4$ converts I into hemimellitic acid (m. p. of the anhydride 162° and mixed with an authentic specimen (m. 160°) prepd. from 1,3-$C_{10}H_6$(CO$_2$H)$_2$, m. 190°). With NaOI, I is converted into *3-methylphthalic acid* (II) (m. p. of the anhydride 111°) identical with an authentic specimen prepd. from *m*-toluic acid (Jurgens, *C. A.* 2, 479; Muller, *C. A.* 3, 1018). The oxidation of the hydrocarbon $C_{12}H_{14}$ with less $CrO_3$ gives *trimethyl-3-naphthoquinone* (III) (R = VII) in 6% yield; with *o*-$C_6H_4$(NH$_2$)$_2$ this quinone forms a *quinoxaline* m. 142°, while the oxidation with $CrO_3$ gives the acid IV or IVa, m. 234°, already obtained by Westenberg (*loc. cit.*). The lactone character of the latter acid was proved by the fact that the exactly neutral soln. became alk. in the course of a few min. The oxidation with $CrO_3$ or KMnO$_4$ converts IV into an acid $C_9H_{10}O_4$, m. 205–6°, which was not investigated further. The *lactone Me ketone* (V), m. 60°, was prepd. according to Westenberg (*loc. cit.*); *oxime* m. 116°. The oxidation of V with NaOI, with $H_2O_2$ in alk. soln. or with KMnO$_4$ gives the acid (VI), which contains 1 H$_2$O and m. 74°; on heating at 80° the water of crystn. is given off with the formation of the anhyd. acid, m. 130°.




C. F. van Duin

**The dibromonaphthalenes obtained by the action of bromine upon naphthalene.** Yu. S. Zalkind and S. B. Falkman. *J. Russ. Phys. Chem. Soc.* 62, 1021–32 (1930).—Earlier workers did not consider the influence of reaction conditions upon the yields and nature of di-Br isomers obtained by the direct bromination of $C_{10}H_8$ (I). One procedure used in the present work follows. With strong mech. agitation powd. I is added to excess Br$_2$ in 1.6 aq. NaOH. This is followed by the addn. of 1 N HCl when crystals sep. These are washed successively with water, warm NaOH and water, and the product is then recrystd. from EtOH giving 2 fractions, A, m. 81–2°, and B, m. 67–8°. The milder the cond. tions used, *e. g.* taking the I and Br$_2$ in suitable solvents (CS$_2$ or CHCl$_3$), slow addn., cooling, etc., the greater the yield of A, which is shown conclusively to be *1,4-dibromonaphthalene* (II). Addn. of Fe does not affect the yield of II if mild conditions are employed, but at high temps., with undissolved I, the yield of II is greatly reduced in the presence of Fe. By bromination of I at 60–70° with Br$_2$ in alk. soln., a theoretical yield of B is obtained. The highest yield of II obtainable directly from the

bromination mixt was 10%. B was found to be a eutectic mixt of II with *1,5-dibromonaphthalene* (III), m. 131°, in the ratio 3:1. This eutectic mixt is very difficult to resolve into II and III, although by further bromination II can be converted to $C_{10}H_6Br_2$ $Br_4$ and $C_{10}H_6Br_2$ $Br_4$ while III is not affected. It was found possible to obtain III in 10% yield by treating α $C_{10}H_7Br$ at 170–80° for 1–3 hrs. with excess $Br_2$, and recrystg successively from petroleum ether and EtOH. II and III were the only dibromonaphthalenes obtained by direct bromination. LEWIS W. BUTZ

**Derivatives of 1-chloro-2-nitronaphthalene.** A. P. J. HOOGVLIET. *Rec. trav. chim.* 50, 37–40(1931). Previously H. showed that 1,2 $C_{10}H_5ClNHAc$ is readily produced by the action of bleaching powder soln. on β $C_{10}H_7NHAc$ (*C. A.* 25, 911; Backer and Klazsens, *C. A.* 25, 915) and this procedure was used for the prepn. of a larger amt. of this compd., details of which are given in the original paper. On boiling the EtOH soln. with concd. HCl this compd. was hydrolyzed to 1,2 $C_{10}H_5ClNH_2$·HCl which was converted into 1,2 $C_{10}H_5ClNO_2$ according to the directions given by Hantzsch and Blagden (*Ber.* 33, 2544(1900)) for the prepn. of 2 $C_{10}H_7NO_2$ from β $C_{10}H_7NH_2$. The 1,2 $C_{10}H_5ClNO_2$, obtained in this way was identical with a specimen prepd. from 1,2 $C_{10}H_5(NH_2)NO_2$ by the Sandmeyer reaction (Hodgson and Kilner, *C. A.* 20, 1074), it m. 76°. On heating with alc. $NH_3$ for 6 hrs. in a sealed tube at 180°, the $C_{10}H_5ClNO_2$ was converted into *1-amino-2-nitronaphthalene*, m. 111°; on heating with alc. $MeNH_2$, *1-methylamino-2-nitronaphthalene*, m. 114°, was formed and with alc. $EtNH_2$, *1-ethylamino-2-nitronaphthalene*, m. 76°, the amines reacting more easily than $NH_3$, as is usually the case. On heating with alc. $Na_2S_2$, *2,2′-dinitrodinaphthyl disulfide*, m. 204°, is obtained. C. F. VAN DUIN

**Condensations of secondary amines with naphthols and aldehydes. II.** WALLACE R. BRODE AND JOSEPH B. LITTMAN. *J. Am. Chem. Soc.* 53, 1531–2(1931); cf. *C. A.* 24, 2155.—1-Naphthol (0.1 mol.) and 0.1 mol. of aldehyde in 10 cc. abs. EtOH were treated with 0.1 to 0.15 mol. of sec. amine and allowed to stand from 2 days to 5 months, the yields varied from 20 to 70%. BzH and $Pr_2NH$ with β $C_{10}H_7OH$ give *1-(α-dipropylaminobenzyl)-2-naphthol*, m. 95°; *p*-$MeOC_6H_4CHO$ and $Me_2NH$ give *1-(α-dimethylamino-p-methoxybenzyl)-2-naphthol*, m. 132°; piperidine gives *1-(p-methoxy-α-1-piperidylbenzyl)-2-naphthol*, m. 131.5°; piperonal and $Me_2NH$ give *1-(α-dimethylaminopiperonyl)-2-naphthol*, m. 120°; α $C_{10}H_7OH$, BzH and piperidine give *2-(α-1-piperidylbenzyl)-1-naphthol*, m. 110°. C. J. WEST

**Optical activity and the polarity of substituent groups. XVII.** *l*-**Menthyl hydrogen naphthalate, its alkali salts and methyl ester.** H. GORDON RULE AND ANDREW MCLEAN. *J. Chem. Soc.* 1931, 669–72; cf. *C. A.* 25, 289.—Menthol (25–30 g.) in 50 cc. hot PhMe contg. 0.04 g. Na, added to a hot soln. of 8 g. naphthalic anhydride in 1000 cc. PhMe and heated 2 hrs. on a steam bath, give 11 g. *l-menthyl II naphthalate* (I), m. 141° (decompn., preheated bath) and then solidifies and m. 271° (m. p. of the anhydride), at room temp. the ester decomps. slowly. *Na salt*, very sparingly sol. in $H_2O$, also slowly *decomps. at room temp.*; *K salt*, *rhombic crystals*, *is less stable than the Na salt*; *Li salt*.—The Ag salt and MeI give the *Me ester* (II), m. 96.5–7° (slight decompn.). In $C_6H_6$, *c* 4.004, II shows $[\alpha]_{6708}$ −89.1°, $[\alpha]_{5893}$ −120.1, $[\alpha]_{5461}$ −147.3, $[\alpha]_{4358}$ −268.2°; in $MeNO_2$, *c* 3.996, the values are −35.3°, −48.3°, −59.1°, −133.8°, in $C_6H_6$, *c* 4.014, I shows the values 117.1°, 165.9°, 203.3° and 397.0°, in MeCN, *c* 4.008, −35.2°, −47.4°, −55.8°, −82.3°. The influence of the $MeO_2C$ substituent raises the rotatory power of the *peri* naphthoate, as well as of the *o*-benzoate, when the rotations are measured for the esters in EtOH soln. A remarkable fall in rotatory power occurs when the $CO_2H$ group in I is modified by salt formation. The Li, Na and K salts all give positive rotations under the conditions of the expt., the values not *differing greatly from* one another and being in the order K < Na < Li ≪ H. In MeOH, *c* 1, the following rotations of *l*-menthyl 8 substituted 1-naphthoates are given $[\alpha]_{5461}^{20}$: $CO_2Me$, −38.3°; H, −30.2°; $CO_2H$, −218°; $CO_2Li$, 0.67°; $CO_2Na$, 4.25°; $CO_2K$, 11.9°. C. J. WEST

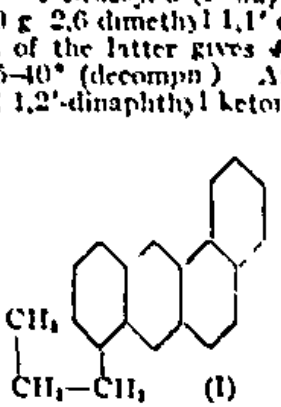
**Dyes derived from acenaphthenequinone. II. Azine and azonium derivatives.** SISIR KUMAR GUHA. *J. Chem. Soc.* 1931, 582–6; cf. Sircar and G., *C. A.* 18, 1202.—3-Bromoacenaphthenequinone, m. 238°, and *o* $C_6H_4(NH_2)_2$ give 3-bromoacenaphthaphenazine, cream, m. 272°; *3-Cl deriv.*, m. 278°, gives a reddish brown soln. in concd. $H_2SO_4$. 3,4-$(H_2N)_2C_6H_3Me$ gives *3-bromoacenaphthalolazine*, cream, m. 270°; *3-Cl deriv.*, cream, m. 250°; $H_2SO_4$ gives a brownish *red color*. *2,3-Diaminophenazine gives 3-bromoacenaphthaphenazinazine*, which does not melt and dyes wool light chocolate shades; *3-Cl deriv.* gives greenish black solns. in concd. $H_2SO_4$ and dyes wool light chocolate shades from an acid soln. 1,2 $C_{10}H_6(NH_2)_2$ gives *3-bromoacenaphthanaphthazine*, lemon yellow, m. 266°, and dyes wool in pleasant lemon-yellow shades; *3-Cl*

*derv*, lemon yellow, m 274°, and dyes wool the same color 1,2,5-$C_{10}H_4(NH_2)SO_3H$ gives *3 bromoacenaphthanaphthazine-5' sulfonic acid*, canary yellow, *3-Cl derv*, brownish yellow, does not m 300°, conced $H_2SO_4$ gives blood red solns., wool is dyed light yellow shades Phenyl 1 amino-β naphthylamine gives *phenyl-3-chloroacenaphthanaphthazonium nitrate*, yellow-orange, m above 300° (decompn), conced $H_2SO_4$ gives a violet color, wool is dyed yellow-orange shades from an acid bath The tinctorial properties of some of these compds are not less developed than those of the available, most nearly corresponding phenanthraquinone derivs. C. J. West

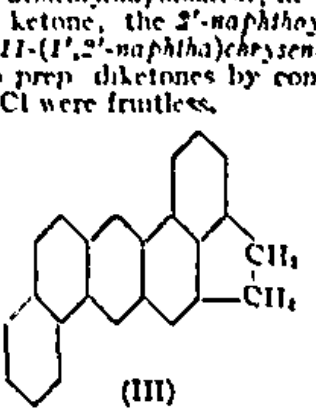
**The anomalous decomposition of the tetrazo derivative of 2,2'-diamino-1,1'-binaphthyl.** A. Corbellini and L. Barbaro *Atti accad Lincei* 12, 445-51(1930).—It has already been shown that tetrazotized 2,2'-diamino-1,1'-binaphthyl decomps giving an acidic deriv (I), m. 250–2° (C and Debenedetti, *C A* 24, 359), from $H_2SO_4$ or HCl solns. With HBr and $Cu_2Br_2$ the normal di Br derivs are formed Purified, I m 269.5° and has the compn $C_{21}H_{14}O_2N_2$ With the Ag salt and MeI or EtI, the resp esters, m 158° and 143°, are formed The formation of a monobasic acid with 2 N atoms and the evolution of $N_2$ during decompn indicate that one N N group behaves differently from the other If it is assumed that one of the N N groups in $(C_{10}H_6NX \cdot N)_2$ reacts normally to the —OH deriv., $HOC_{10}H_6C_{10}H_6NX$ N, while the other as a normal diazohydrate, $HOC_{10}H_6C_{10}H_6N(O)NH$, oxidizes the double bond, then either of the tautomers $HO_2CCH(CHC_6H_4CH)NNC_{10}H_6$ or $HO_2CCH(CHC_6H_4C)NNHC_{10}H_6$ would result The reactions of I show its resemblance to PhCH:CHCO₂H On sublimation, it loses $CO_2$, forming a neutral product m. 154°, its compn being $C_{19}H_{14}N_2$ $KMnO_4$ oxidizes it, producing (1) an aldehyde $C_{13}H_{10}ON_2$, m 230°, (2) an acid which has not been purified but is probably related to benzoic or phenylglycerie acid, and (3) an acid, m 287° On bromination of the esters unstable derivs are obtained which are apparently di Br addn products. A. W. Contieri

**Polycyclic aromatic hydrocarbons. II. The non-existence of 1,2,7,8-dibenzanthracene.** James W Cook. *J Chem Soc* 1931, 457–9; cf *C A* 24, 4020.—By pyrolysis of 2 methyl 1,1' and 1,2'-dinaphthyl ketones Clar (*C. A* 23, 2906) and Fieser and Dietz (*C A* 23, 5472) obtained compds which they believed to be, resp., 1,2,7,8- (I) and 1,2,5,6-dibenzanthracenes (II) A further study of these compds. shows that they have the same fluorescence spectrum (Hieger, *C A* 24, 5369) and yield the same derivs. That the compd is II is shown by its synthesis by Weitzenböck and Klinger (*C A* 13, 423) Homer (*C A* 5, 1076) claimed that I was formed by the action of $AlCl_3$ on $C_{10}H_8$ in $C_2H_2Cl_4$ repetition of the work showed that the product is perylene It appears, therefore that I has not yet been prepd. III. Derivatives of 1,2,5,6-dibenzanthracene. *Ibid* 489–99.—The following compds were prepd in a further effort to identify the carcinogene principle in coal tar 2,6-$C_{10}H_6Me_2$ and α-$C_{10}H_7COCl$ with $AlCl_3$ in $CS_2$ give 50% of *2,6-dimethyl 1,1'-dinaphthyl ketone* (I) yellow, m 162–3°, *2,7-di Me derv* (II), m 161–2° (70% yield), 2,7-$C_{10}H_6Me_2$ and β-$C_{10}H_7COCl$ give 40% of *2,7-dimethyl-1,2'-dinaphthyl ketone* (III), m 113.5–4.5°, 1,6-$C_{10}H_6Me_2$ and BzCl give *4 benzoyl 1,6 dimethylnaphthalene* (IV) m 77–8°, it is scarcely attacked by alk $KMnO_4$ after boiling 10 hrs 2-$C_{10}H_7Me$ and 4-$MeC_{10}H_6COCl$ give a poor yield of *2,4'-dimethyl 1,1'-dinaphthyl ketone* (V), m 120–1°, *2,7,4'-tri Me derv* (VI), m 140°. Heating V at 440–50° until $H_2O$ was no longer eliminated gives 1,2,5,6-dibenzanthracene (VII), I under the same conditions gives the 3' Me deriv of VII, which was also obtained from the crude condensation product of 2,6-$C_{10}H_6Me_2$ and 4-$MeC_{10}H_6COCl$. III, on pyrolysis, gives the *2' Me derv of* VII, m 256–7.5°, as does the pyrolysis of II, of the ketone from 1,6-$C_{10}H_6Me_2$ and 2-$MeC_{10}H_6COCl$ and of VI. In each case the Me group in the α-position to a condensed ring is eliminated The structures of the ketones were not rigidly established but follow from general considerations 1,2,5,6-Dibenzanthraquinone (10.5 g.) and MeMgI in $C_6H_6$ give 10.2 g. of *9,10-dihydroxy 9,10-dimethyl 9,10-dihydro-1,2,5,6-dibenzanthracene* (VIII), m 245–50°, conced $H_2SO_4$ gives an intense cornflower blue color, reduction with Zn and AcOH gives only resinous substances but HI in glacial AcOH gives *9,10-dimethyl 1,2,5,6-dibenzanthracene*, yellow, m. 205.5–6.5°, and gives an intense violet soln in conced $H_2SO_4$ the same compd was obtained from the so-called 1,2,7,8-dibenzanthraquinone of Clar Reduction of VIII with red P and HI in glacial acetic acid gives a mixt. of the *cis* and *trans 9,10-dimethyl 9,10-dihydro derivs*, m 207–9° and 277–8° resp the 2 were sepd by crystn. from $C_6H_6Me_2$, the *cis* form being the more sol the *cis* form shows a feeble fluorescence in ultra violet light The *9,10-di Bu derv* corresponding to VIII, m 214–5°, and gives the same color in $H_2SO_4$, a *Bu ether* (?), m 225–6°, was obtained when HCl was used to decomp the Grignard reagent, reduction of the diol with Zn and AcOH gives the *9,10-di-Bu derv* of

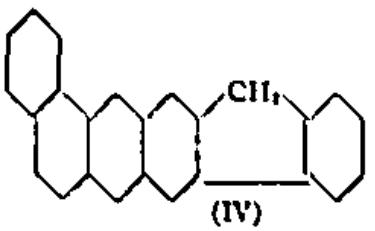
VII, yellow, m. 143.5–4.5°, warm concd. $H_2SO_4$ gives a purple soln. with a dark red fluorescence. The *9,10-dibenzyl deriv. of* VII, m. 195–201° (decompn.), purified through the red picrate, was obtained by reduction of the corresponding *diol*, m. 249–51°, which gives an orange-red soln. in concd. $H_2SO_4$. Reduction of VII with Na and AmOH gives an *octahydro deriv.*, m. 188.9°, also obtained from Clar's compd. A preliminary note is added on the isolation of a hydrocarbon, m. 153.6°, from the high boiling constituents of coal tar, which, on oxidation, gives a mixt. of quinones. IV. **Condensed derivatives of 1,2-benzanthracene.** *Ibid.* 499–507. - This work was for the purpose of prepg. an unsubstituted hydrocarbon having the same fluorescent spectrum as that of the powerful cancer producing mixts. of unknown composition. This was largely realized in the compds. III and IV or V. 2 $MeC_{10}H_5COCl$ and $Ph_2$ give only 1,2-($p$-$PhC_6H_4CO$)$C_{10}H_6Me$ ($m$ $MeC_6H_4$)$_2$ and $\alpha$-$C_{10}H_7COCl$ with $AlCl_3$ give *4,4'-di α-naphthoyl-3,3'-dimethylbiphenyl*, cream, m. 159.5–60.5°; pyrolysis gives *1,2 1',2'-dibenz-6,6' (or 7,7')-bianthryl*, m. and decomps. above 310°, sublimes about 175° at 2 mm.; it may be a mixt. of the 2 isomers. The ketone from hydrindene and 2 $MeC_{10}H_5COCl$ could not be crystd.; pyrolysis gives *cyclopenteno 1,2 benzanthracene* (probably I), m. 199–200°; concd. $H_2SO_4$ gives a crimine soln. This was also obtained by pyrolysis of the crude ketone from hydrindene-5-carboxylyl chloride and 2 $MeC_{10}H_6MgBr$. *2 Methyl-5',6',7',8' tetrahydro-1,2'-dinaphthyl ketone*, m. 122.5–3.5°, results in 70% yield from tetralin and 2 $MeC_{10}H_6COCl$; dehydrogenation with S at 210–20° gave a resin from which 2 methyl 1,2' dinaphthyl ketone was isolated; pyrolysis gave only 1,2 5,6-dibenzanthracene (II). Acenaphthene and 2 $MeC_{10}H_6COCl$ give 65% of *5 (2' methyl 1' naphthoyl)acenaphthene*, m. 184.5°; pyrolysis gives *phenanthra acenaphthene* (III), golden yellow, m. 231–2°, sublimes at 330° and 3.4 mm.; it was purified through the chocolate-brown picrate, concd. $H_2SO_4$ gives a fugitive bluish violet color; distn. gives II, the 5 membered ring being eliminated. Fluorene gives 85% of *2 (2' methyl 1' naphthoyl)fluorene*, m. 169–70°; pyrolysis gives *2,3 phenanthra 5',2' fluorene* or *2,3 phenanthra 1',2' fluorene* (IV or V), pale yellow, m. 302–4°, concd. $H_2SO_4$ gives a pale blue soln. with a pinkish red fluorescence, which becomes emerald green on standing or gentle warming. *3-Phenanthroyl chloride*, m. 110°, from the acid and $SOCl_2$, gives with $o$-$MeC_6H_4MgBr$ a ketone, which could not be crystd. but gave on pyrolysis 2',3' naphtha 2,3 phenanthrene, m. 203–4°; with 2 $MeC_{10}H_6MgBr$ there results *3-(2' methyl-1' naphthoyl)phenanthrene*, m. 145–6°, giving on pyrolysis *2',1'-phenanthra-2,3-phenanthrene* (VI), canary-yellow, m. 311–3°, giving an indigo-blue color in concd. $H_2SO_4$, changing to emerald-green on warming; a small quantity of another *hydrocarbon*, orange, m. 215–8°, is formed, probably isomeric with VI. 2 $MeC_{10}H_6MgBr$ and 1-anthroyl chloride give a ketone as a viscous oil, which, on pyrolysis, gives *2',3'-phenanthra 1,2-anthracene*, canary-yellow, m. 281–2° (decompn.). *1-Benzoyl-5 (1'-naphthoyl) 2,6-dimethylnaphthalene*, m. 206–8°, in 8.9 g. yield from 10 g. 2,6 dimethyl 1,1' dinaphthyl ketone; the *2'-naphthoyl deriv.*, m. 222–3°; pyrolysis of the latter gives *4,5-benz-10,11-(1',2'-naphtha)chrysene* (VII), golden yellow, m. 435–40° (decompn.). Attempts to prep. diketones by condensing 2,7-dimethyl 1,1'- and 1,2'-dinaphthyl ketone with BzCl were fruitless.



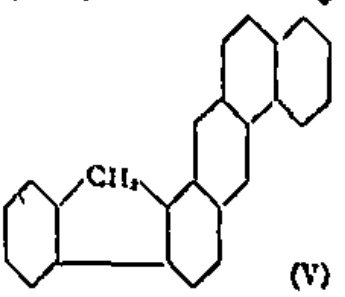
(I)



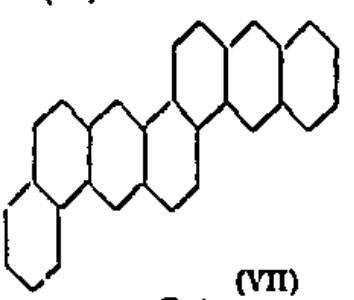
(III)



(IV)



(V)


(VII)

C. J. West

Syntheses of antiseptic derivatives of indan-1,3-dione. II. Interaction of alkylmalonyl chlorides with *p*-tolyl methyl ether. THOMAS K. WALKER, ARTHUR J. SUTHERS LESLIE I. ROE AND HERBERT SHAW. *J. Chem. Soc.* 1931, 514-20; cf. *C. A.* 25, 2140.—*p*-$MeC_6H_4OMe$ (5 g.) and 5.8 g. $CH_2(COCl)_2$ in 50 cc. PhNO treated with 11.5 g. $AlCl_3$ during 30 min. and the mixt. warmed at 60° for 45 min., give 50% (4 g.) of *4-hydroxy-7-methylindan-1,3-dione* (I), lemon yellow, m. 258°. *p*-$MeC_6H_4OH$ (2.4 g.) and 3.4 g. $MeCH(COCl)_2$ give 0.8 g. of the *2,7-di-Me deriv.* (II), m. 253°. *p*-$MeC_6H_4OMe$ and $EtCH(COCl)_2$ give 20% of the *2-Et deriv.* (III), m. 197°. $Et_2C(COCl)_2$ and *p*-$MeC_6H_4OMe$ give the *2,2-di-Et deriv.* (XII), m. 199-200°, if the reaction was carried out in $CS_2$ the main product was the corresponding *4-MeO deriv.*, only. heating with $AlCl_3$ gives a good yield of III. $PrCH(COCl)_2$ and *p*-$MeC_6H_4OMe$ give *4-hydroxy-7-methyl-2-propylindan-1,3-dione* (IV), m. 187°, this was also obtained in quant. yield from *p*-$MeC_6H_4OAc$. $BuCH(COCl)_2$ gives the *2-Bu deriv.* (V), m. 165°. The same compd. was also obtained with *p*-$MeC_6H_4OH$ with $AlCl_3$ or $FeCl_3$ and from $PCl_5$ *p*-$MeC_6H_4OAc$, $BuCH(CO_2H)_2$, and $PhNO_2$, the product finally being treated with $AlCl_3$. *2-Im deriv.* (VI), m. 140° (20% yield). *2-hexyl deriv.* (VII), m. 136° (31% yield); *2-heptyl deriv.* (VIII), m. 124° (50% yield). *2-iso-Pr deriv.* (IX), m. 224° (16% yield). *2-iso-Bu deriv.* (X), m. 152.5° (47% yield). *2-iso-Am deriv.* (XI), m. 142° (44% yield). The following figures were obtained for the equimol. PhOH coeff. of bacteriostatic power: I 64, II 30, III 37, IV 64, V 170, VI 440, VII 1305, VIII 1170, IX 106, X 133, XI 360, XII 89. The concns. of V required to inhibit *S. pyogenes albus*, *B. subtilis* and *B. pyocyaneus* for 48 hrs. at 37° were 1:25,000, 1:25,000 and 1:83,000, resp., the same organisms were inhibited under the same conditions by VIII in resp. concns. of 1:500,000, 1:333,000 and 1:500,000. The attachment of 1 of the lower alkyl groups in place of a H atom, to the C atom in the medial position with respect to the 2 CO groups results in a diminution of antiseptic potency. As the length of the alkyl chain is increased, this effect becomes neutralized, groups higher than Pr giving rise to considerably enhanced activities, the progressive increase of which appears to have reached its limit with the introduction of the $C_5H_{11}$ radical. C. J. WEST

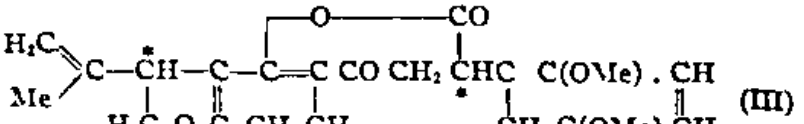
Anthraquinone azo compounds. II. Insoluble disazo dyes from 1,5-diaminoanthraquinone. TOSHIO MAKI. *J. Soc. Chem. Ind., Japan* 34, *Suppl. binding* 51-6 (1931); cf. *C. A.* 24, 4780.—Tetrazotized 1,5-diaminoanthraquinone when coupled gives dyes as follows: with α-$C_{10}H_7NH_2$ violet brown, m. 256°, with β-$C_{10}H_7NH_2$, violet brown, m. 269.9°, $PhNH_2$ orange, m. 248.5°, *m*-$C_6H_4(NH_2)_2$, dark brown, m. 259.6°, α-$C_{10}H_7OH$ violet brown, m. over 300°, PhOH, yellow brown, m. 280.8°, *m*-$C_6H_4(OH)_2$, red brown, m. 400°. V. I. HARRINGTON

Velocity measurements on the opening of the furan ring in hydroxymethylfurfuraldehyde. II. H. P. TEUNISSEN. *Rec. trav. chim.* 50, 1-20 (1931); cf. *C. A.* 24, 4782.—In the 1st. paper measurements of the hydrolysis of hydroxymethylfurfuraldehyde under various conditions were described, water being the solvent, the present paper deals with the same subject, mixts. of water and MeOH or EtOH being used as a solvent. The 1st. series of measurements was carried out with EtOH-water mixts. *at the b. p. of the mixt.*, the following results being obtained with 0.5 *N* HCl as a catalyst: 5% EtOH, $k$ = 0.00129, 10% 0.00106, 15% 0.00083, 25% (b. 90.9-91.2°), 0.00046, 30% (b. 89.9-90.0°), 0.00034, 40% (b. 87.6-87.7°), 0.00023, 50%, 0.000125, 70%, 0.00003. Although these reaction consts. do not refer to the same temp., they show clearly that the velocity of the hydrolysis of hydroxymethylfurfuraldehyde into formic and levulic acids decreases on increasing the EtOH content of the mixt. Moreover, it was observed that the reaction const. always decreases during an expt., most probably alcoholysis taking place simultaneously, in mixts. with the higher EtOH contents the quantity of humus formed is much less than in water and in mixts. with the lower EtOH content. The same results were obtained on carrying out these measurements in a sealed tube or a closed flask at 100°, again a continuous decrease of the reaction const. being observed during the course of each expt. *With 0.5 N HCl as a catalyst, the following results* were obtained at 100°: 10% EtOH $k$ = 0.00159, 15% 0.00131, 25% 0.00090, 35%, 0.00055, 50% 0.00022, 70%, 0. From these results the temp. coeff. of the reaction is calcd. to be about 2.0. With mixts. of MeOH and water again the same phenomena were observed as regards both the continuous decrease of the reaction const. during each expt. and the retarding effect of the alc. in general. With 0.5 *N* HCl as a catalyst the following figures were obtained at 100°: 10% MeOH, $k$ = 0.00111, 20%, 0.00063, 30% 0.00020, 40% about 0. The general retarding effect of the addn. of MeOH or EtOH is in accordance with the researches of Weehuizen who recommends the use of a satd. soln. of HCl in EtOH instead of concd. HCl in both the Selivanov and the Bauduin reactions (*C. A.* 12, 1004, 2029) in order to prevent decompn. of the hydroxymethyl-

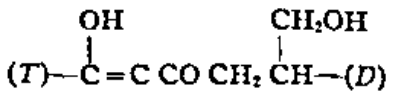
furfuraldehyde into levulic and formic acids The side reaction plays a more important role with MeOH than with EtOH and it was found that with MeOH a compd. is formed in the side reaction which easily gives $CHI_3$ with an alk. I KI, the nature of the product could, however, not be elucidated further The hydrolysis of furfuryl alc. with the formation of levulic acid (Pummerer and Gump, *C A* 17, 3163) was also studied in water the alc was prepd from furfuraldehyde by means of the Cannizzaro reaction and the reaction was measured with HCl and with oxalic acid as a catalyst at 100° A real reaction *const* was not obtained in any of these measurements with 0 1 *N* HCl, *k* decreases from 0 00302 to 0 00068 in 0 5 *N* HCl from 0 00307 to 0 00067 in 0 02 *N* HCl from 0 00221 to 0 00048 with 0 4 *N* oxalic acid from 0 00274 to 0 00099 and with 0 02 *N* oxalic acid from 0 00135 to 0 00033 More than 50% of the furfuryl alc resinifies during this process this resinification also takes place on boiling the aq solution, only a small quantity of levulic acid being formed in this case C I VAN DUIN

Syntheses in the thiophene series with the aid of stannic chloride. YA L GOLDFARB *J Russ Phys Chem Soc* 62, 1073–82(1930) —The yields obtained in the acylation of thiophene (I) in the presence of $SnCl_4$ depend upon the solvent used. In benzine (b 120–40°) soln crude $C_4H_3SAc$ (b 200–214 5 ) was obtained in 56% yield, in PhH it was 96% using 1 mol I, 1 mol AcCl and 1 or 0 5 mol $SnCl_4$. With 0.25 mol $SnCl_4$ the yield was cut to 48 6% BzCl I and $SnCl_4$ in PhH gave 82 5% of $C_4H_3SBz$ (m 55°) As indicated above I is more reactive than PhH with regard to acylation in the presence of $SnCl_4$. Condensation with ethers also occurs more rapidly with I than with PhH. $(Ph_2CH)_2O$ (II) gives in the cold in $CS_2$ or PhH soln *dibenzohydrylthiophene*, $C_4H_2S(Ph_2CH)_2$ (III) lemon yellow m 85–85 5 One mol III upon oxidation with $CrO_3$ gave 2 mols BzPh III is sol in PhH Et$_2$O AcMe and warm AcOH, difficultly sol in EtOH It is very photosensitive, deepening in color upon exposure By recrystn in the dark nearly colorless crystals are obtained III reacts energetically with $HNO_3$, dissolves upon gentle heating in $H_2SO_4$ and gives a reddish violet color with isatin and $H_2SO_4$. III is also obtained, in 60% yield, by substituting $Ph_2CHOH$ (IV) for II. AcCl with III and $SnCl_4$ in PhH gave $C_4Ac_2S(Ph_2CH)_2$ m 152° II reacts with PhH only at higher temps and only the mono deriv is produced IV with PhH and $SnCl_4$ gives principally $Ph_2CH$, a cryst. product, m. 165°, was also obtained The exact structure of III was not detd. LEWIS W BUTZ

Rotenone, the effective constituent of derris root. IX. The structure of rotenone. SANKICHI TAKEI, SHIKIRO MIYAJIMA, MINORU ŌNO *Bull Inst Phys-Chem Research* (Tokyo) 10, 211–9(1931). *Abstracts* 19–28(in German) published with *Sci Papers Inst Phys-Chem Research* (Tokyo) 15, Nos 289–91). cf *C A* 25, 1510 —From the formulas of derric acid (I) and tubaic acid (II), a formula for rotenone (III) is derived. This formula explains all the known properties and derivs of III, except the formation of derritol (IV) (*C. A* 22, 3660) On oxidation with $KMnO_4$ IV gives II. It must therefore contain the nucleus of tubaic acid. This is not in agreement with the view of Haller and La Forge (*C A* 25, 105) The reactions of III are discussed critically and an extensive bibliography is added. The name rotenol for the compd. obtained by decarboxylation of rotenic acid has to be changed to roteol, because rotenol is used for another substance (*C A* 22, 3660 *C A* 25, 105) Regarding the structure of IV and its derivs , another paper will follow



(III)



(IV)

In this scheme (*T*) means a part of the tubaic acid group, (*D*) a part of the 2,5-dimethoxyphenyl group of rotenone ALFRED BURGER

Stereoisomeric catechols. R P BIGGS, W L COOPER, EDITH O HAZLETON, M. NIERENSTEIN AND PHYLLIS H PRICE *J Am Chem Soc* 53, 1500–5(1931) —Eight stereoisomeric catechols have been shown to exist in nature, of which *d*-acacatechol (I) and *d* isoacacatechol (II) have been discovered in the present work. The products were identified as the penta-Ac derivs The material was extd. with AcOEt (or $CHCl_3$) and the residue from this solvent extd with Et$_2$O The following yields are reported: 56 kg mahogany wood (South Africa), 12 g I and 3 5 g *dl*-acacatechol (III); 42 kg

mahogany wood (West Indies) 6 g I and 6 g III; 8 kg Australian kino (IV) from *Eucalyptus terminalis* 16 g I and 22 g III; 6 kg IV from *E. leucoxylon*, 5 g I and 10 g III; 9 kg IV from *Angophora intermedia* 14 g I and 8 g III; 86 kg heartwood of *Anacardium occidentale*, 21 g II; 4 kg Malabar kino (V) from *Myristica malabarica*, 3 g *l* acacatechol (VI) and 11 g III; 7 kg V from *Pterocarpus marsupium*, 9 g VI and 17 g III, 6 kg IV from *E. corymbosa*, 4 g VI and 9 g III; 28 kg *Uncaria gambir* leaves, 56 g *d* gambir catechol (VII) and 6 g *dl* isomer (VIII), 2.8 kg *U. acida* leaves, 17 g VII and 3 g VIII, 11 kg Chinese rhubarb, 17 g VII and 3 g VIII; 2 kg Guarana paste, 5 g VII and 8 g VIII, 10 kg kola nuts, 58 g VII and 8 g VIII. C. J. West

Polyhalogenated ketones of indole. G Sanna with Farhadla Massidda *Gazz. chim. ital.* 61, 60-74(1931).—The present paper describes the prepn of 2 polyhalogenated ketone derivs of methylketole and the behavior of these derivs with alkalies and with $NH_4OH$ which differed greatly in the 2 cases. $Cl_3CHCOCl$ in anhyd $Et_2O$ added dropwise to magnesylmethylindole (I) (1 mol.), keeping cold, kept ice-cold several hrs., ice water added, the $Et_2O$ layer sepd., the aq. layer filtered, the residue washed with water, allowed to dry, dissolved in hot MeOH, cooled and the purification repeated several times, yields almost 100% of *β-dichloroacetyl α methylindole* (*α methylindacal chloride*) (II), m. 195°; gives green solns. in cold concd. $H_2SO_4$, and solns. in hot concd. $HNO_3$ which are at first green and then yellow. It is almost insol. in boiling dil. acids. It is slightly sol. in hot aq. NaOH and KOH and these yellow solns. give amorphous red *ppts.* when acids are added. It is far more sol. in alc. KOH, and addn. of water or of dil. acids to these solns. ppts. rose-colored amorphous products. It is insol. in hot $NH_4OH$, but sol. in hot alc. $NH_3$. Its solns. in hot $C_5H_5N$ do not ppt. on cooling, but on addn. of dil. EtOH a ppt. contg. Cl is formed (perhaps II). II reduces hot $NH_3$ $AgNO_3$ and slowly reduces Fehling soln. It gives *ppts.* of various colors with the general reagents of alkaloids. The Cl of II is very stable, and there is no decompn. when a 1% aq. soln. is boiled for several hrs. The Cl can, however, be removed by boiling several hrs. in concd. alc. KOAc. In this latter case the product is amorphous and is difficult to purify, but is probably *β-diacetoacetyl α methylindole*. Fusion with KOH, carried out in the same way as with other monohalogenated derivs., yields α methyl β indolecarboxylic acid. Oxidation is more difficult than with indacyl chloride (III), and it is necessary to boil it for a long time in more concd. $KMnO_4$, the products are, however, the same (cf. *C. A.* 24, 2127) from II and from III. The ease with which III reacts with KBr and KI suggested the same reaction with II. II in MeOH and concd. aq. KBr (2 mols.), refluxed 48 hrs., cooled, filtered, the residue washed with water, dried, fractionally crystd. from MeOH (the greater part is II), gives a small yield of a *compd.* which is probably

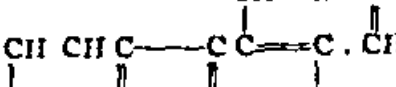
*α methylindacal, dibromide*, $C_6H_4\overline{NH\ CMe\ CCOCHBr_2}$, m. 178°. Following the same procedure with KI the yield of the *compd.*, which is probably *α methylindacol diiodide*, is still smaller. This difficulty of substitution of Cl by other halogens is a new example of the great stability of Cl in dihalogenated derivs. II (2 g.) and 5% aq. KOH (2 mols.), refluxed 12 hrs. (60% of II is still unaltered), filtered, the filtrate acidified with dil. HCl extd. with $Et_2O$, the ext. dried with anhyd. $Na_2SO_4$, concd. on a water bath, the yellow oil kept *in vacuo* until crystd. and recrystd. from $Et_2O$, yields *α methyl β indyl glycolic acid* $C_6H_4\overline{NH\ CMe\ CCH(OH)CO_2H}$ (IV), m. 90° (decompn. to $CO_2$ and α methylketoylcarbinol), insol. in dil. acids, its soln. in concd. $H_2SO_4$ is at first yellow but this changes to red, in concd. $HNO_3$ it is rose-yellow, in hot concd. HCl rose, in $NH_4OH$ straw yellow (addn. of HCl ppts. a rose-colored amorphous powder), and in caustic alkalies yellow (reppted. in cryst. form by dil. acids), it reduces Fehling soln. immediately and $NH_3$ $AgNO_3$ without formation of a metal mirror, does not give any color with Schiff reagent. Aq. $BaCl_2$ added to IV in aq. KOH (calcd. quantity) ppts. the *Ba salt* of IV, could not be fused. Dil. aq. $AgNO_3$ added to IV (calcd. quantity) in $NH_4OH$ ppts. the *Ag salt* of IV, turns a rose color in light. m. 247°. $Cl_3CCOCl$ in anhyd. $Et_2O$, added dropwise to I (1 mol.) keeping cold, let stand 2 hrs. at 0°, ice water added, the $Et_2O$ layer sepd., the aq. layer extd. with $Et_2O$, the combined $Et_2O$ exts. dried with anhyd. $Na_2SO_4$, filtered, the $Et_2O$ evapd., the residual oil washed with petr. ether, allowed to crystallize and the product purified by recrystn. successively from boiling $C_6H_6$ and MeOH (with animal charcoal), yields almost 100% of *α methyl β trichloro acetylindole* (*methylketoylchloroform*) $C_6H_4\overline{NH\ CMe\ CCOCCl_3}$ (V), m. 167°, barely sol. in hot dil. acids and in hot concd. HCl, its soln. in hot concd. $HNO_3$ is at first yellow, then rose, in hot caustic alkalies rose (odor of $CHCl_3$) and in $C_5H_5N$ also rose (addn. of dil. EtOH ppts. V again), it is insol. in $NH_4OH$, reduces hot Fehling soln. (this is prob-

ably due to $CHCl_3$ formed by the action of alkali in the reagent, which transforms it into formate), reduces $NH_3$-$AgNO_3$ soln V (1 g) and 5% aq KOH (3 mols), refluxed 6 hrs (most of the V is still undissolved), filtered, the filtrate cooled, acidified with dil $H_2SO_4$, extd with Et$_2$O, the ext dried with anhyd $Na_2SO_4$, concd to a small vol, the residual soln evapd *in vacuo in a desiccator yields a compd* (VI), *red, m approx* 80°, insol in dil acids, slightly sol in hot concd HCl, its soln in concd $H_2SO_4$ is at first yellow but turns red, it is partially sol in $NH_4OH$ (yellow color), slightly sol in cold caustic alkalies, easily sol in hot caustic alkalies and the yellow soln thus formed becomes rose colored on addn of HCl and a rose colored amorphous ppt. is formed VI reduces Fehling soln and $NH_3$ $AgNO_3$ soln (without formation of a mirror) It does not contain Cl, behaves as a weak acid and the closeness of its m p to that of IV suggests that IV and VI are the same compd, but this was not ascertained V (1 g) and dil. alc KOH (3 mols), heated gently, dild with water ($CHCl_3$ is evolved), acidified with HCl, extd with Et$_2$O, the ext dried, concd and let stand *in vacuo*, deposits *α-methyl β indolecarboxylic acid*, $\overline{C_6H_4\ NH\ CMe\ CCO_2H}$, m 174° (decompn) The same reaction occurs with cold concd alc KOH and with hot concd aq KOH A suspension of V (1 g) in 30% aq $K_2CO_3$, refluxed several hrs, filtered, the filtrate cooled, the ppt filtered, dried and recrystd from EtOH, yields *methylketosylformic acid* (*α methyl β indylglyoxylic acid*), $\overline{C_6H_4\ NH\ CMe\ CCOCO_2H}$ (VII), golden yellow, m 186° (decompn. to $CO_2$ and α-methyl β indolic aldehyde), insol in dil acids, its soln in concd $H_2SO_4$ is yellow, it is sol in caustic alkalies and in $NH_4OH$, does not reduce Fehling soln or $NH_3$-$AgNO_3$ Its formation is therefore as follows $2V + 3K_2CO_3 + H_2O \longrightarrow VII + 3CO_2 + 6KCl$ As described for II, attempts were made to substitute the Cl of V with Br and I, to which end alc. V was treated with KBr (3 mols), but there was no reaction even after boiling for several hrs Further expts to obtain the Br and I derivs are in progress II (2 g), suspended in concd $NH_4OH$, heated in a sealed tube for 6 hrs at 100°, cooled, the ppt dissolved in boiling water and cooled, ppts 100% of *α methyl β indolecarboxylic acid amide*, $\overline{C_6H_4\ NH\ CMe\ CCONH_2}$ (VIII), silky, m 218°, its solns in boiling dil acids are yellow-rose, and in concd $H_2SO_4$ yellow, it is insol in cold and only slightly sol in hot aq alkalies. The formation of VIII should be thus $II + NH_3 \longrightarrow VIII + CH_2Cl_2$, and since $CH_2Cl_2$ was not detected in the reaction product it is probably transformed first into HCHO and thence into hexamethylenetetramine. Further expts on this reaction are in progress Under the same conditions, the reaction of V and $NH_3$ did not give definite results The V hardly dissolved even after prolonged heating, and the soln, which turned yellow, deposited, after long standing, a red *powder*, the quantity of which was too small for analysis C. C Davis

Preparation of isatin from isonitrosoacetanilide according to Sandmeyer's method. J. P. Wibaut and M C Geerling *Rec trav chim* 50, 41–3(1931) —On prepg isatin by heating isonitrosoacetanilide and concd $H_2SO_4$ to 70° and pouring the reaction mixt on ice (Sandmeyer, *C A* 13, 1840, Marvel and Hiers, *C A* 20, 193) it is often observed that the isatin seps from the soln only after inoculation or after scratching with a glass rod, while in other cases isatin monoxime, m 201–2°, is obtained instead of isatin, the oxime compd may also be obtained from solns from which isatin itself has already crystd The $NH_4OH$, necessary for the formation of the isatin monoxime, is produced by hydrolysis of the isonitrosoacetanilide, which is not converted into isatin in the dil $H_2SO_4$; it was shown that this hydrolysis does not take place in the concd $H_2SO_4$ C. F. van Duin

Action of hydrogen peroxide on benzo-6,7-diketo-2,3-dihydro-2,3-dithionaphthene in sodium hydroxide solution. R Stollé and W Badstübner *J. prakt Chem* 129, 309–11(1931) —The action of $H_2O_2$ on benzo-6,7-diketo-2 3-dihydro-2,3-thionaphthene in NaOH gives *bis(2-carboxy-1-naphthyl) disulfide*, m 156°, $KMnO_4$ is reduced in the cold. Titration with 0 1 *N* alkali to neutrality gives the di-K salt; if excess KOH is added the acid is apparently decompd into 1,2 $C_{10}H_5(SO_2K)CO_2K$ and 1,2-$C_{10}H_5$-$(SK)CO_2K$. C. J. West

Carbazolic derivatives. E Ghigi *Gazz. chim. ital* 61, 43–6(1931) —In previous expts (cf. *C. A.* 24, 3797) condensation of β tetralone phenylhydrazone (I) with dil. $H_2SO_4$ led to the formation of a compd (II), m. 100°, which may have had either one of two formulas, for a choice between which there were at the time insufficient data. In the present paper, the identity of this compd. is definitely established It was dehydrogenated by the method of Borsche (*C. A.* 2, 1716), *i e*, by heating II (5 g) mixed with PbO (equal vol) in a current of $CO_2$ and purifying the distillate by crystn from ligroin

The product was identified as 3 4 benzocarbazole, and this in turn proved that II is *1,2-dihydro 3 4 benzocarbazole*,  I (25 g) and anhyd $ZnCl_2$ (83 g) in abs EtOH refluxed for 10 hrs., 5% aq HCl added, extd with $Et_2O$, the ext dried with anhyd $Na_2SO_4$, the $Et_2O$ eliminated, distd *in vacuo* and the residue recrystd from $C_6H_6$ yield the *compd* $C_{16}H_{11}N$ (III), m 228°, heated with anhyd $(CO_2H)_2$ it gives the blue color characteristic of carbazole derivs. III (1 g) and picric acid (1 g) in $C_6H_6$, refluxed until clear cooled and the ppt recrystd from $C_6H_6$, yield the *picrate* $C_{16}H_{11}N \cdot C_6H_2(NO_2)_3OH$ red m 184°. III, $Ac_2O$ (4 parts by wt) and anhyd $ZnCl_2$ refluxed 15 min. cooled and the ppt recrystd from EtOH, yield the *Ac deriv.*, m 289–90°. Following the method of Borsche as before (*loc. cit.*), but purifying the product from $C_6H_6$ 1 2 benzo-3 4 dihydrocarbazole (cf. *C. A.* 24, 3797) and PbO form III. III is therefore 1 2 benzocarbazole, obtained by Borsche (*loc. cit.*) by oxidation of 1,2 benzo >6 7 8 tetrahydrocarbazole. C. C. DAVIS

Synthesis of 4-phenylthiazole-2-methanol and some of its derivatives. VIII. JOHN T. OLIN AND TREAT B. JOHNSON. *J. Am. Chem. Soc.* 53, 1470–3(1931).—$BzOCH_2CSNH_2$ (30 g.) 38 g. $BzCH_2Br$ and 20 cc. $C_5H_5N$ in 100 cc. EtOH, heated 1 hr. on the $H_2O$ bath give 80% of the *benzoate*, m. 73–4°, of *4 phenylthiazole 2 methyl alc.* (I), PhC(CH)SC($CH_2OH$)N, b$_4$ 210–5°, m. 88–9°. Similarly, $EtOCH_2CSNH_2$ gives the *Et ether* of I, b$_4$ 187–8°, unchanged by 40% HBr for 4 hrs. heating with 80% $H_2SO_4$ at 145–50° for 0.5 hr. gives 65% of I. The *acetate* of I b$_4$ 193°, m. 40°. Bubbling HBr through I in $Ac_2O$ while warming on the $H_2O$ bath gives 90% of the *bromide*, b$_{14}$ 195°, the *chloride* b$_{14}$ 184°. Oxidation of I with $Na_2Cr_2O_7$ in AcOH gives *4 phenylthiazole 2 aldehyde*, b$_{14}$ 160–2°. *phenylhydrazone*, canary yellow, m. 131–2°. KCN in EtOH gives *4 phenylthiazole 2-aldoin*, yellow, m. 256°. C. J. WEST

Synthesis of 4-phenyl-2-acetylthiazole. IX. JOHN T. OLIN AND TREAT B. JOHNSON. *J. Am. Chem. Soc.* 53, 1473–5(1931).—Benzoyl lactic thioamide (53 g.) and 50 g. $BzCH_2Br$ in 150 cc. EtOH, heated 1.5 hrs. on a steam bath, give 35 g. of the *benzoate*, b$_4$ 252–4°, of *4 phenylthiazole 2 α ethanol*, PhC(CH)SC[CH(OH)Me]N, yellow, b$_4$ 191–4°, m. 76°; this could not be dehydrated by $P_2O_5$. Oxidation of the alc. with $Na_2Cr_2O_7$ in AcOH gives a nearly quant. yield of *4 phenyl 2-acetylthiazole* PhC(CH)SCAcN, yellow, m. 78–9°. *phenylhydrazone*, yellow, m. 208–9°. Br in $CCl_4$ gives the *2 bromo acetyl deriv.* buff, m. 106–7°, when warmed in dil. alk. soln. or with an amine, it readily lost Br, indicating that the halogen occupies a reactive position in the Me radical of the ketone group. C. J. WEST

Synthesis of some new thiazole amines containing the catechol group. X. JOHN F. OLIN AND TREAT B. JOHNSON. *J. Am. Chem. Soc.* 53, 1475–7(1931).—$ClCH_2CH_2CH_2CN$ is converted into the phthalimido deriv., m. 81°, in 80% yields with EtOH-$(NH_4)_2S$, after standing 72 hrs., there results *γ phthalimidobutyrothioamide*, m. 181–2°, with chloroacetocatechol this gives *4 (3,4-dihydroxyphenyl) 2 γ phthalimidopropylthiazole*, yellow, m. 114–5°, heating with $N_2H_4 \cdot H_2O$ gives *4 (3,4-dihydroxyphenyl)-2 γ-aminopropylthiazole*, isolated as the *sulfate*, $C_{12}H_{14}O_2N_2S \cdot H_2SO_4$, m. 226–8°; it crystallizes with 3.5 mols $H_2O$ m. 120–40° (decompn.). *Phthalimidopropionitrile*, m. 147–8° (the yield is small owing to the formation of acrylic nitrile). *phthalimidopropionic thioamide*, m. 187–9°. *4 (3,4-dihydroxyphenyl) 2 β phthalimidoethylthiazole*, m. 203–5°. $N_2H_4 \cdot H_2O$ gives *4 (3,4-dihydroxyphenyl) 2 β-aminoethylthiazole*, whose *sulfate* crystallizes as needles. The pharmacol. study is in progress. C. J. WEST

Anthracene derivatives. V. 2,1-Thioindigoids of the anthraquinone series. PAUL RUGGLI AND WALTER HEITZ. *Helv. Chim. Acta* 14, 257–75(1931). cf. *C. A.* 25, 947.—The starting material for these syntheses was *1-amino 2 mercaptoanthraquinone* (I) (cf. Ger. pat. 290,084. *Friedl.* 12, 439(1916)), prepd. by adding rapidly with stirring 40 g. 1 aminoanthraquinone to 800 g. technical crystd. Na S previously heated in a paraffin bath and allowed to cool to 70°; the temp. was increased to 140° during 4 hrs. and kept at 140° for 5 hrs.; the mixt. was then poured into a porcelain dish, leached with 2 l. of boiling $H_2O$, filtered through cotton to remove unchanged aminoanthraquinone and $Na_2SO_4$, the filtrate evapd. to 0.5 vol., allowed to crystallize by standing overnight, it yielded 36–41 g. I. When 3 g. I was dissolved in 150 cc. hot $H_2O$, then cooled to 40°,

12 cc 30% NaOH added, then 9 cc $Me_2SO_4$ added slowly with shaking, allowed to stand 0.75 hr at 70°, an equal vol of $H_2O$ added, warmed 15 min on the water bath, filtered, the ppt washed with $H_2O$ and EtOH, it gave 2.2 g of *1-amino-2 (methylthio)anthraquinone*, red needles, m. 186° Treatment of 3 g I in 30 cc warm $H_2O$ with $BrCH_2COPh$ in 10 cc EtOH gave a ppt of 3.6 g *1-aminoanthraquinone 2-(thiomethyl) Ph ketone* (II), $C_{14}H_6O_2(SCH_2COPh)(NH_2)$ red needles decompg with ring closure at 130°, the same ring closure of II with loss of $H_2O$ to form *1-aminoanthraquinone-2-thiomethyl phenyl ketimide*, $C_{14}H_6O_2S\,CH_2\,CPh\,N$, occurs when II is heated with AcOH, $PhNO_2$ or on dissolving in concd $H_2SO_4$ and pptg with $H_2O$, it forms blue black crystals, m. 262° A soln of 10 g of the Na salt of I in 120 cc $H_2O$ at 80° was treated with 12 g $ClCH_2CO_2H$ (neutralized with $Na_2CO_3$) in 40 cc $H_2O$, allowed to stand 1.5 hr on the water bath, filtered while hot and the filtrate on the addn of NaCl gave 10.5 g of *Na 1-aminoanthraquinone 2 thioglycolate* (III). 4 g III on boiling with 20 cc $Ac_2O$ gave 3.5 g *1-aminoanthraquinone-2 thioglycolic lactam* (IV), $C_{14}H_6O_2S\,CH_2\,CO\,NH$, IV is also formed from III on heating with concd $H_2SO_4$ or on boiling with AcOH *Et 1-aminoanthraquinone 2-thioglycolate* (V), prepd in 75% yield by adding $BrCH_2CO_2Et$ to 1,2 $C_6H_4(CO)_2C_6H_2(NH_2)SNa$, red m. 116.5°, when warmed with concd $H_2SO_4$ it forms the lactam IV. Diazotization of V (20 g.) in 300 cc cold, concd $H_2SO_4$ with 6 g $NaNO_2$ in 40 cc $H_2SO_4$ with continued stirring 2 hrs after all of the $NaNO_2$ was added, then pouring into 1 l. ice water, rapidly filtering, treating the filtrate with a cold, satd $KClO_4$ soln., filtering off the pptd diazonium perchlorate (which is remarkably stable) suspending the latter in $H_2O$, adding a KCN CuCN soln warmed to 70° (from 24.5 g $CuSO_4$ in 200 cc $H_2O$ and 27 g KCN in 100 cc $H_2O$), heating 2 hrs on the water bath, filtering while hot, washing successively with boiling $H_2O$, dil $HNO_3$ and boiling $H_2O$, gave 16.4–18.6 g of *Et 1-cyanoanthraquinone 2 thioglycolate*, brown, m. 222°, the corresponding *Me ester* similarly prepd., m. 217° hydrolysis of these esters by boiling with a mixt of concd HCl and AcOH gave an almost quant yield of *1-cyanoanthraquinone 2 thioglycolic acid* (VI), gray brown, m. 260–70° (decompn.), and on boiling with $C_5H_5N$ forms the pyridine salt Hydrolysis of 23 g VI by boiling with a mixt. of 184 cc. concd $H_2SO_4$ and 112 cc $H_2O$, then pouring into $H_2O$, gave 14.1 g of crude *anthraquinone 1 carboxamide-2-thioglycolic acid* (VII), which was purified by recrystn from $C_5H_5N$ in which the pyridine salt is formed and from which it is regenerated by warming with 5% HCl and recrystg from $PhNO_2$ forming olive-green needles, m. 276° Boiling 31.5 g VII for 1.5 hrs with 1 l. 2% NaOH, cooling, and adding HCl until acid, gave 29 g. *anthraquinone-1-carboxylic-2-thioglycolic acid* (VIII), yellow, m. 244–50°. When 42 g VIII was boiled for 15 min with 9 g NaOAc and 150 cc $Ac_2O$, cooled, 150 cc. AcOH added, poured into $H_2O$, warmed, filtered and recrystd from AmOH it gave brown needles of *acetylanthraquinone-2,1-(β hydroxythiophene)*, $C_{14}H_6O_2S\,CH\,COAc$, m. 154°, removal of the Ac group by boiling with 5% NaOH gave anthraquinone 2,1-(β hydroxythiophene) (IX), $C_{14}H_6O_2S\,CH_2\,CO$, violet-black, m. 230–40° (decompn.), when boiled with *p*-$BrC_6H_4COCl$ in $C_5H_5N$ it forms the *p-bromobenzoyl deriv.*, $C_{14}H_6O\,S\,CH\,CO_2CC_6H_4Br$, yellow, m. 228°. *Anthraquinone 2,1-(α bromo-β-hydroxythiophene)* (X), obtained by adding $Br_2$ to IX in $PhNO_2$, violet blue, m. 220° (decompn.) A *benzylidene deriv.* (XI) of IX, $C_{14}H_6O_2S\,C(\,CHPh)\,CO$ prepd by condensation with BzH at 130°, golden brown, m. 257–61° *Anthraquinone 2,1-thiophene-2'-indoleindigo* (XII), $C_{14}H_6O_2S\,C(\,C_8H_4ON)\,CO$, which was prepd in 51% yield by heating 2 g. IX, 2 g isatin α-anil and 7 cc $Ac_2O$ for 8 hrs. at 130°, violet brown, m. 290° (decompn.). Similarly, 2 g IX, 1.8 g acenaphthaquinone, 20 cc. $PhNO_2$ and 2 cc. $Ac_2O$, heated for 2.5 hrs at 130°, yield 1.4 g. *anthraquinone-2,1 thiopheneacenaphtheneindigo* (XIII), $C_{14}H_6O_2S\,C(.C_{12}H_6O)\,CO$, violet brown, m. 320° (decompn.). Condensation of IX and thionaphthenequinone gave *anthraquinone 2,1 thiophenethionaphtheneindigo* (XIV), $C_{14}H_6O_2S\,C(.C_8H_4OS)\,CO$, brown violet, m. 360° (decompn.) XI, XII, XIII and XIV form green solns in concd. $H_2SO_4$, which is characteristic of most of the anthraquinonethioindigoids; they are not technically useful because of a lack of fastness for cotton and the poor shades of color Oxidation of IX to *bis-2,1-anthraquinonethiophenindigo*, ($C_6H_4$-

$(CO)_2C_6H_2\langle^{CO}_{S}\rangle C$ )$_2$ with persulfates in $C_5H_5N$ or $K_4Fe(CN)_6$ in alk. soln. was not successful an impure product, m above 440°, was obtained by boiling X in $C_5H_5N$ with piperidine or KOH (cf Ger pat. 461,503(1926)) VL Derivatives of anthraquinone-2,1-thiazole and other products from 1-amino-2-mercaptoanthraquinone and halogen compounds. *Ibid* 275–85.—A 63% yield of *(m-nitrophenyl)anthraquinone 2,1-thiazole* (I) $C_{14}H_6O_2S\,C(C_6H_4NO_2)\,N$ was obtained by adding slowly with stirring 50 g *m*-$O_2NC_6H_4COCl$ to 20 g 1,2 $C_6H_4(CO)_2C_6H_2(NH_2)SH$ (II) in 200 g $PhNO_2$ at 170–5°, continuing heating and stirring for 1 hr., cooling, filtering, washing the ppt. with hot $H_2O$ then extg with EtOH and recrystg from $PhNO_2$, it forms green crystals m. 318–20° when nitrated in $H_2SO_4$ with fuming $HNO_3$ it forms *dinitroanthraquinone 2,1-thiazole*, m 350–5° (decompn.) Reduction of 2 g I on boiling for 3 hrs. with 30 g Na$_2$S in 200 cc. $H_2O$ and 10 cc. 30% NaOH, filtering, washing with hot $H_2O$ and extg with PhMe gave 1.3 g *(m-aminophenyl)anthraquinone 2,1 thiazole* (III), red, m. 241°. reduction of 3 g I with $Na_2S_2O_4$ in dil. EtOH and 30% NaOH gave 2.9 g crude III. Red azo dyes were prepd. by diazotization of III and coupling with β $C_{10}H_7OH$, with 2,6-$C_{10}H_4(OH)SO_3H$ and with 1,3,8-$C_{14}H_5(OH)(SO_3H)_2$ Acetylation of III with $Ac_2O$ gave *(m-acetamidophenyl)anthraquinone 2,1 thiazole* light yellow, m 296°. When COCl$_2$ was passed for 30 min. in a slow stream into 4 g III in 450 cc. dry PhMe at 90–5°, cooled, filtered, washed with gasoline and dried *in vacuo* over paraffin, the crude *isocyanate deriv* (IV), $C_{14}H_6O_2S\,C(C_6H_4NCO)\,N$ was obtained, m. 350–60°, the identification as an isocyanate was established by conversion to the very insol. *urea deriv*, $[C_6H_4(CO)_2C_6H\langle^{N}_{S}\rangle CC_6H_4NH]_2CO$ (by heating IV with III in $PhNO_2$ for 2 hrs. at 150–60°, washing with hot AmOH and EtOH), m. above 300°. boiling IV with AmOH gave the *amylurethan deriv*, $C_{14}H_6O_2S.C(C_6H_4NHCO_2Am)\,N$, yellow, m. 221°, boiling IV with $PhNH_2$ gave the *phenylurea deriv*, $C_{14}H_6O_2S.C(C_6H_4NHCONHPh)\,N$, which could not be recrystd. and m. above 300°. A soln. of 2 g II in 10 cc. $PhNO_2$ at 120° was treated with 0.3 g cyanuric chloride in 4 cc. $PhNO_2$, cooled, filtered, the ppt. washed successively with warm EtOH, $H_2O$, 1% NaOH, EtOH and gave 0.8 g of the *cyanuric deriv*., $(NH_2C_{14}H_6O_2S)_3C_3N_3$, red cryst. product which could not be recrystd. and m. above 210° (decompn.) Condensation of 20 g II in 50 cc. $H_2O$, 50 cc. EtOH and 6 g NaOH with the gradual addn. of 7 cc. $(CH_2Cl)_2$ to the boiling soln., continuing the heating and stirring on the water bath for 2 hrs., filtering, washing the ppt. with warm $H_2O$ and alc., gave 16 g crude *bis(1-amino-2-mercaptoanthraquinonyl)ethylene* (V), $(NH_2C_{14}H_6O_2SCH)_2$, red, m. 270° (decompn.). Addn. of 5 g II to a boiling soln. of 50 cc. $C_6H_4Cl_2$, 25 cc. $H_2O$, 25 cc. EtOH and 1.5 g NaOH similarly gave 3.5 g of a crude product from which 1.8 g V was extd. with AmOH and the residue, which was recrystd. from $PhNO_2$, is the β-chlorovinyl ether of II, $NH_2C_{14}H_6O_2SCH\,CHCl$, red, m. 180°.

N. A. Lange

Derivatives of 1,2-dihydroxythioxanthone. Alfred A Levi and Samuel Smiles *J. Chem. Soc* 1931, 529–8.—4,1,2-$BrC_6H_2(OMe)_3$ and $ClSO_3H$ give the 5-sulfonyl chloride, characterized as the *amide*, m. 226°, reduction of the chloride with Sn and HCl gives a thiol, oxidized to *diveratryl 4-disulfide*, m. 94°, with $Na_2SO_3$ the chloride gives the *sulfinic acid*, m. 122°, with concd. HI and $SO_2$ there results *di-4-bromoveratryl 5-disulfide*, m. 118–9° 2-$HSC_6H_4CO_2H$ and *p*-$MeC_6H_4OH$ with $H_2SO_4$ give *4-hydroxy-1-methylthioxanthone*, yellow, m. 245° it does not yield a diacetoborate. *1 Hydroxy-4-methylthioxanthone*, deep yellow, m. 160°, results from the 1-MeO deriv and concd. HCl, the red *diacetoborate* m. 226° and is decompd. by hot $H_2O$, this is also obtained from the 1 $NH_2$ deriv through the diazo reaction and in small yields from 2 $HSC_6H_4CO_2H$ and *p*-$MeC_6H_4CO_2H$. 4,1,2 $Br$-$C_6H_2(OMe)_3$ and $HSC_6H_4CO_2H$ with $H_2SO_4$ give 40% of *4-bromo-1,2-dimethoxythioxanthone* (I) yellow, m. 159°, HCl gives a bright red soln. 4,5 1,2-$Br(HS)C_6H_2(OMe)_2$ and 2 $BrC_6H_4CO_2H$ with $K_2CO_3$ in AmOH give *2-bromo-4,5-dimethoxy-2'-carboxydiphenyl sulfide*, m. 211–2°, concd. $H_2SO_4$ gives the above thioxanthone. 5,2-$Br(MeO)_2C_6H_2OH$ and 2-$HSC_6H_4CO_2H$ with concd. $H_2SO_4$ give 25% of *4-bromo-2 hydroxy-1-methoxythioxanthone*, yellow, m. 208°, it does not give a diacetoborate, concd. HCl gives the *1,2-di-HO deriv*., orange, m. 212°, the Ac deriv. yields a red diacetoborate, the purple Na salt is sparingly sol. in $H_2O$ Hydrolysis of I with

concd HCl gives *4 bromo-1 hydroxy 2-methoxythioxanthone* (II), orange, m 191°, also obtained from 4,2 Br(MeO)$C_6H_3OH$ and 2-$HSC_6H_4CO_2H$, the red *diacetoborate* is hydrolyzed by hot $H_2O$ Creosol and 2 $HSC_6H_4CO_2H$ give 20% of *1-hydroxy 2 methoxy-4-methylthioxanthone* (III), red, m. 173–4°, the purple *diacetoborate* is hydrolyzed with difficulty The *1,2-di MeO deriv* (IV), yellow, m 125°, dry HCl gives the deep red *di-HCl salt* II and $H_2O_2$ in AcOH give the *dioxide*, yellow, m 243°, which gives an unstable *diacetoborate* III gives a *dioxide, yellow, m* 190°, *the red diacetoborate*, m 222°, was sufficiently stable for isolation IV gives a *dioxide*, yellow, m 154° The *dioxide* of I, yellow, m 165°, was obtained by methylation of the K salt of the 1-HO deriv Attempts to oxidize I with $H_2O_2$ gave *1,2-dimethoxythioxanthone dioxide* (?), pale yellow, m 246° The study of the basic strength of these derivs confirms the conclusions previously attained from other materials Derivs contg the 1-HO group gave no evidence of basic character either with dry HCl or with the aq reagent. The selective attack of the 1 MeO group in demethylation is adequately explained by the structure assigned to the cation of the salts. This interpretation suggests that the 1-HO compds formed contain a similar chelate structure, which is also indicated by the insoly of all of the 1-hydroxythioxanthones examd in aq NaOH C J West

*Derivatives of pyridine.* A Binz and C Räth IX. *A new method for the* preparation of 2-chloropyridines. C Räth *Ann* 486, 71–80(1931), cf *C A* 25, 953—2 Hydroxy 5-chloropyridine and KOH in abs EtOH, treated gradually with MeI, give 80% of *N methyl 2-keto 5 chloropyridine* (I), $b_{15}$ 153–5°, m 44–5°, *5-Br deriv*, $b_{12}$ 157°, m 53° (75% yield), *3,5-di-Cl deriv*, m 142° (80% yield), *3,5-di-Br deriv*, m 182° (90% yield), *3,5-di I deriv*, m 227° (quant. yield) I and $COCl_2$ in PhMe, heated 4 5 hrs at 170°, give 75% of *2-chloropyridine*, b 168°. *N*-methyl 2 thiopyridone gives 50% of the Cl deriv *2 Chloroquinoline*, m 37–8°, is formed in 70% yields by the same method at 180° 2 Chloro-5-nitropyridine (II), m 107°, is obtained in nearly quant yield from *N* methyl 2 keto-5-nitropyridine, in 90% yield from the *N* Et deriv and in nearly quant yield from the *N* benzyl deriv *2,5-Dichloropyridine*, m 60° (40% yield), *2-chloro-5-bromo deriv*, *m* 71° (50% yield), *2-chloro-5-iodo deriv*, *m* 98° (60% yield), *2,3,5-tri Cl deriv*, m 49–50° (90% yield), *2 chloro 3,5-dibromo deriv*, m 43° (90% yield), *2 chloro-3,5-diiodo deriv*, m 72–3° (50% yield) II is obtained in 25% yield by the use of $SOCl_2$ C J. West

The preparation of 2,2′-bipyridyl by catalytic dehydrogenation of pyridine under pressure. J P Wibaut and H D Tjeenk Willink. *Rec trav chim* 50, 287–90 (1931) —In the course of expts on the action of $NH_3$ on pyridine at 300° under pressure and in the presence of dehydrogenation catalysts (cf *C A* 23, 5184) the formation of 2,2′-bipyridyl together with 2-aminopyridine was observed The formation of 2,2′-bipyridyl by pyrogenic decompn of pyridine was already noticed by Meyer (*C A* 15, 3845) while Thate observed the formation of this compd. on heating pyridine under *high pressure at 500° The reaction temp. may therefore be lowered by suitable de*hydrogenation catalysts and it was now found that both the Ni-$Al_2O_3$ catalysts described by Zelinskii and Kommarevski (*C A*. 18, 2885) give good results The prepn of 2,2′-bipyridyl may be carried out also by the method of Hein and Retter (*C A* 23, 143), by heating pyridine with anhyd $FeCl_3$ at 300°. The method described in the present paper, however, gives better results, a yield of 14–20% (relative to the pyridine which was used up) being obtained on heating 300 g pyridine with 30 g catalyst at 320–5° for 5–6 hrs. The catalyst can be used only once. W and W recommend using the catalyst described by Z and K (*loc. cit*, p 669 of original), which is much more easily prepd than the catalyst described on p 667 and gives about the same results On carrying out the same expt without the catalyst, no trace of 2,2′-bipyridyl is obtained C. F v. D

The catalytic synthesis of phenylated pyridines from aldehydes and ketones with ammonia. A E Chichibabin and D I. Orochko *J Russ Phys-Chem Soc* 62, 1201–6(1930), cf *C A* 18, 2495—BzH (I) and PhCH CHCHO (II) react with AcH and $NH_3$ *at 305–10° with alumina or kaolin catalyst to give a mixt. of α phenylpyridine* (III) and *γ-phenylpyridine* (IV), I with AcMe and AcCH CHPh (V) with AcMe give *α,α′-dimethyl-γ phenylpyridine* (VI) I and II with AcH and $NH_3$ in sealed tubes at 150–220° give only tar and no $C_5H_5N$ derivs The alumina catalyst was prepd by pptg a boiling $Al_2(SO_4)_3$ soln with $NH_4OH$, washing, drying and heating the product slightly The kaolin should be of dense structure, low in Fe and of glistening rather than greasy fracture. The syntheses are carried out in a porcelain tube 100 cm long and 16 mm in diam, filled up to 50 cm. with catalyst In the prepn of III and IV from I and II the following procedure was used· Add 10% HCl to the reaction mixt. consisting of an oily and an aq layer, ext. the neutral products with $Et_2O$, add $NaNO_2$ to the residue, decomp the nitroso derivs with NaOH, dissolve the free bases in $Et_2O$, dry, evap. the

$Et_2O$ and fractionate Fraction A, b 270 80°, yielded some IV by spontaneous crystn which was recrystd twice from petr ether The combined mother liquors were evapd to remove the solvent and again fractionally distd The distillate was dissolved in EtOH from which III and IV were isolated as picrates, and recrystd from boiling AcMe. Fraction B, b 285–340°, yielded a small quantity of IV isolated through the picrate The yield of III from I was 3 5%, from II, 1% of IV from I, 11%, from II, 19% The procedure for the prepn of VI follows The reaction mixt was acidified with 15% HCl, the neutral products were extd with $Et_2O$, and the residue was cooled for 2 hrs Sepn of crystals and a viscous oil followed The crystals are sol in EtOH and AcMe, insol in PhH and $Et_2O$ Upon addn of AcOEt to the EtOH soln to slight turbidity the HCl salt of VI was obtained and recrystd from boiling $H_2O$ The acid mother liquors were made alk and extd with $Et_2O$ After drying and evapg the $Et_2O$, the free base was fractionated The fraction b 280–95° was treated with 15% HCl in EtOH, and AcOEt added Recovery of VI from the combined HCl salts with recrystn from petr ether gave a product m 62–63 5° The yield of VI from I was 13%, from V, 15 5%

LEWIS W BUTZ

The hydrogenation of pyridine with hydrogen under pressure by the Bergius process. H THATE *Rec trav chim* 50, 77–90(1931) —Since pyridine occurs in coal tar, while it is not present in the tar produced from coal hydrogenated with H under pressure by the Bergius process (Heyn and Dunkel, *Brennstoff Chem* 7, 208(1926); cf *C A*. 20, 2738, 3071 Tropsch and Tat Nedden, *C A* 19, 2739, Bergius, *C A* 22, 1027, 15, 3390 *Z angew Chem* 37, 400(1924), Bube, *C A* 15, 3198) the question arose as to how pyridine behaves when submitted to this treatment The only N compds so far hydrogenated under pressure are carbazole, which is quite stable (Ipat'ev and Orlov, *C A* 23, 3697 Spilker and Zerke *C A* 21, 166), quinoline, which was converted into $NH_3$ and a mixt of hydrocarbons, b 80–150° (I and O, *loc cit*), aniline, which gave benzene and $NH_3$ (I and O, *loc cit*) The hydrogenation of pyridine with H under pressure was carried out in a rotating Fe autoclave as described by Bowen and Nash (*C A* 20, 2241), the temp being raised to 500° and the initial pressure being 50–100 atm the heating was continued for 1–5 hrs The gases obtained consisted of a mixt of $CH_4$, $C_2H_6$ $C_2H_2$ $C_4H_{10}$, $C_2H_4$, $C_4H_8$, $C_4H_6$ (cf Tropsch and Dittrich, *C A* 19, 2793), the residue was first acidified and distd with steam and gave pentane, b 40°, BuCN, b 125–50°, a colorless liquid hydrocarbon $C_{14}H_{14}$, which however, is only present when Al or Fe chlorides are used as a catalyst, and a mixt of high boiling nitriles, b 220–60°. Finally, this soln was distd with steam after the addn of alkali and then gave $AmNH_2$, unchanged pyridine homologs of piperidine, $\alpha,\alpha'$-bipyridyl and $\alpha\gamma$-bipyridyl In the mouth of the manometer connection $NH_4CN$ was deposited in the form of white platelets, further, a deposit of C was noticed Modification of the expts gave the following results (*a*) heating with H under 50 atm at 500° for 1 hr, hydrocarbons 10%, amines and nitriles 2 5%, (*b*) under 50 atm at 500° for 4 hrs, hydrocarbons 29%, nitriles and amines 2 5%, (*c*) heating under 100 atm at 500° for 1 hr, hydrocarbons 25%, nitriles 4–6% amines very little Pyridine was also heated at 500° under its own vapor pressure or in N or CO, with and without Al or ferric chloride as a catalyst, but no change was observed except for the formation of a trace of $\alpha,\alpha'$ bipyridyl From these expts the conclusion was drawn that the mechanism of the hydrogenation of pyridine under high pressure is similar to the berginization of aromatic hydrocarbons and that hydrogenation precedes the cracking process It thus follows that piperidine must be formed in the first stages of the process and as a matter of fact the same products were obtained by the berginization of piperidine In the original paper the hydrogenation of pyridine in general and the berginization of several classes of org compds are discussed briefly

C F VAN DUIN

Interaction of sulfonates and sulfonamides with piperidine. FRANK BELL *J Chem Soc* 1931, 609 15 —Turner and coworkers (*C A* 23, 2957, 24, 4006) have shown that *aryl sulfonates can be very neatly severed* by piperidine according to the general equation $ROSO_2R' + HNC_5H_{10} = ROH + C_5H_{10}NSO_2R'$ It is now found that, although this type of reaction occurs with the mononitrophenyl sulfonates, with 2,4 $(O_2N)_2C_6H_3SO_2C_6H_4Me$-*p* the nuclear link is severed, and 2',4'-dinitro-1-phenylpiperidine results 2 4 $(O_2N)_2C_6H_3OH$ gives a *piperidine salt*, bright yellow, m about 85° and a *pyridine salt*, golden yellow, m about 85° 2',4'-Dinitro-1-phenylpyridinium *p*-toluenesulfonate is recovered unchanged after soln in AcOH but reacts vigorously with piperidine, giving 2 4 $(O_2N)_2C_6H_3NH_2$ 2 $O_2NC_6H_3SO_2C_6H_4Me$ has no tendency to form a pyridinium compd even when boiled with $C_5H_5N$ for several hrs Picric acid and piperidine, boiled 1 hr, give a piperidine compd., orange, m about 135°, of piperidine picrate, m 150°, the picrate was recovered unchanged after boiling with *p*-$MeC_6H_4SO_3$-

Cl for 2 hrs A soln of mol amts of picric acid and *p*-$MeC_6H_4SO_2Cl$ after 12 hrs gives *picrylpyridinium p-toluenesulfonate* (I), pale yellow, m 197° (decompn), the $Me_2CO$ mother liquor contained picrylpyridinium picrate (II) I dissolves easily in cold AcOH but $H_2O$ ppts. II. The warm aq soln of I deposits II on cooling II in EtOH HCl gives picrylpyridinium chloride and picryl chloride I undergoes vigorous reaction with piperidine but no definite product was isolated II evolves $C_5H_5N$ with warm NaOH and when boiled with AcOH gives pyridine picrate 4′ Nitro-4 *p*-toluenesulfonoxybiphenyl, the 3,4′-dinitro deriv., di *p*- and *p*-toluenesulfon *p*′-nitroanilide and di-*p*-toluenesulfon-*o*′ nitroanilide are recovered unchanged after boiling with $C_5H_5N$. 3-bromo-5,4′-dinitro-4-hydroxybiphenyl gives only an unstable red $C_5H_5N$ salt, which decomps in the air and immediately in AcOH 3 5 4 trinitro-4 hydroxybiphenyl gives a red *$C_5H_5N$ salt*, m 198° *p*-Toluenesulfon *p*′ nitroanilide gives a bright yellow *piperidine salt*, m 138° The di *p*-toluenesulfone deriv gives a thick liquid, contg the *p*-toluenesulfone deriv and *p*-toluenesulfonylpiperidine, m 103° 3-O-$NC_6H_4N(SO_2C_7H_7)SO_2C_6H_4NO_2$-*m*, on soln in piperidine, gives *m* O-$NC_6H_4NHSO_2C_6H_4NO_2$ and $C_5H_{10}NSO_2C_7H_7$ 2,4 (O-N)-$C_6H_3N_2HSO_2C_7H_7$ (III) and *p*-$MeC_6H_4SO_2Cl$ in $C_5H_5N$ give *di p-toluenesulfon-2,4-dinitroanilide*, m 217° soln in piperidine gives *p*-toluenesulfonylpiperidine (IV) and III. *3,5-Dinitro-4-di p-toluenesulfoamidobiphenyl*, m 249°, this is decomped by piperidine, giving IV. *3,5-Dibromo-4 p-toluenesulfoamidobiphenyl*, m 196°. C. J. West

The synthesis of α-hydroxy derivatives of quinoline. A. E. Chichibabin and A. I. Kursanova *J. Russ. Phys.-Chem. Soc.* 62, 1211–16(1930).—α-Toluquinoline (I), β-toluquinoline (II), α-naphthoquinoline (III), and β naphthoquinoline (IV) react with dry, fused KOH at 250–60° to give the corresponding α-OH derivs. (carbostyrils) and $H_2$. Isoquinoline (V) reacts at 220° I (6.7 g.) gave 3.1 g. *α-methylcarbostyril* (VI), m. 219–20° The reaction time was 3 hrs. and increasing the time to 9 hrs. did not increase the yield II (8 g.) and 8.6 g. KOH reacted 5 hrs. to give 3.3 g. *β-methylcarbostyril* (VII), m. 232–3° IV (13.6 g.) and 10.6 g. KOH reacted at 265° (9 hrs.), then at 270–80° (5 hrs.), to give 7.3 g. *β naphthocarbostyril* (VIII), slightly yellow, m. 285–6° VIII is difficultly sol. in $H_2O$, sol. in cold AcOH, EtOH and $CHCl_3$. III (8.7 g.) and 10 g. KOH, reacted at 270–80° for 3.5 hrs., gave 5.1 g. *α-naphthocarbostyril* (IX), m. 252–3°, sol. in EtOH, $CHCl_3$, AcOEt, cold AcOH, insol. in $Et_2O$, PhH and petroleum ether V (2 g.) and 4.7 g. KOH after 4.5 hrs. gave 1.4 g. *isocarbostyril*, m. 209–10° Oxidation of VI and VII with alk. $KMnO_4$ gave the corresponding *methylisatin* and *oxalylmethylanthranilic acid* Similar oxidation of IX gave only a small amt. of a red ppt. which is not colored violet by alkali Lewis W. Butz

Beckmann rearrangement with quinoline compounds. Komonu Matsumura and Chusaburo Sone *J. Am. Chem. Soc.* 53, 1493–6(1931).—*5-Benzoyl-8-hydroxyquinoline oxime* (I) and $SOCl_2$ in Et O give the *anilide* (II), yellowish white with silky luster, m. 211–2° (*sulfate*, yellow, decomps. 211–3°), of 8-hydroxyquinoline-5-carboxylic acid (III), egg-yellow, m. 273° (Lippmann and Fleissner, *Ber.* 19, 2467(1886), obtained this acid from 8-hydroxyquinoline, $CCl_4$ and KOH in EtOH) the HCl salt m. 259° (decompn.) and deposits the free base on pouring into $H_2O$ *Ba salt*, yellow needles crystg with 5.5 mols. of $H_2O$, *Ac deriv.*, light yellow, decomps. 312°, *Me ether*, yellow, m. 225–6° (decompn.) I and concd. $H_2SO_4$, heated at 100° for 1 hr., give a sulfonated II, yellowish white, m. above 300°, gives a green color with $FeCl_3$ and a red color with *p*-$ClN_3C_6H_4CO_2H$, hydrolyzes with 20% HCl gives III. The Beckmann rearrangement of 5-acetyl-8-hydroxyquinoline oxime with $SOCl_2$ or concd. $H_2SO_4$ gives 5-acetamido-8-hydroxyquinoline, m. 217–8° C. J. West

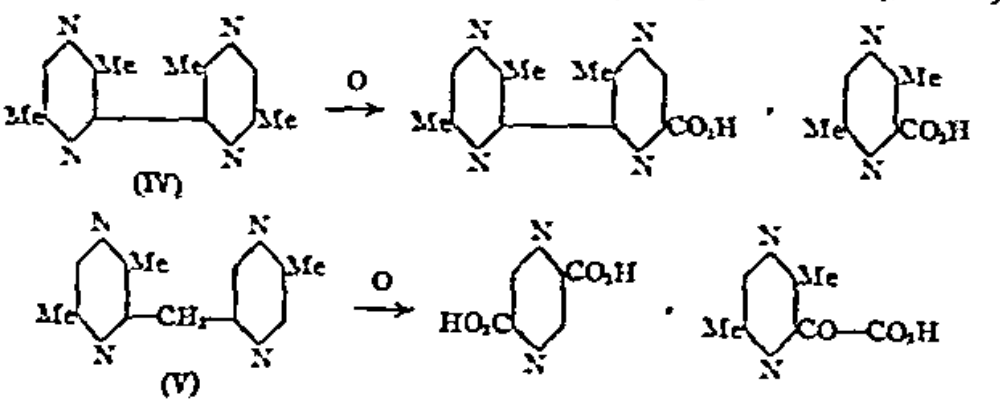
Condensation between formaldehyde and monoketones. I. Condensation of 5-acetyl-8-hydroxyquinoline with aldehydes. Konomu Matsumura and Chusaburo Sone. *J. Am. Chem. Soc.* 53, 1490–2(1930).—5-Acetyl-8-hydroxyquinoline (I) and 40% HCHO (contg. an appreciable amt. of a ppt. of paraformaldehyde), refluxed 2 hrs., give *α-methylenebis-5-acetyl-8-hydroxyquinoline* (II), m. above 315°, $FeCl_3$ gives a green color. *HCl salt*, yellow needles, does not m. 300°. *monoxime*, m. 295–300° (decompn.) Warming II, $Ac_2O$ and AcONa on the $H_2O$ bath 2.5 hrs. gives *α-methylenebis-5-acetyl-8-acetoxyquinoline*, m. 234–5° I yields a *Bz deriv.*, m. 168°, with HCHO this gives *α-methylenebis-5-acetyl-8-benzoyloxyquinoline*, m. above 315° I and piperonal in dil. NaOH EtOH give *5-piperonylidene-5-acetyl-8 hydroxyquinoline*, yellow, m. 178–9°. BzMe and HCHO, with or without $C_5H_5N$, do not give a condensation product, thus the presence of an $NH_2$ group in the mol. may serve to facilitate the condensation. C. J. West

Reduction of nitrosophenol by iron and hydrochloric acid. Konomu Matsumura and Chusaburo Sone. *J. Am. Chem. Soc.* 53, 1406–8(1931).—5-Acetyl-8-hydroxy-

quinol ne and $NaNO_2$ in AcOH and $H_2O$ at 0° give the *7-NO deriv* (I), yellowish brown, decomps 190–5°, $FeCl_3$ gives a light brown color, reduction of I with $SnCl_2$ and HCl-AcOH gives a very small yield (0 7 g. from 2.5 g I) of the *7-$NH_2$ deriv*, light yellow, m. 148–9° (decompn.), *picrate*, orange, decomps. 201–22°; *HCl salt*, orange, sinters 145°. Reduction of 3 75 g of I with Fe and dil. HCl gives 3.25 g of the *HCl salt*, lemon yellow, m 280–305° (decompn.), *of 5-acetyl-7,8-dihydroquinoline*, m. 235–6°, pptn. from dil. HCl soln. gives deep red prisms, m. 241–2° (decompn.), the colorless form crystallizes with 1 5 mols $H_2O$, $FeCl_3$ gives a deep green color, *oxime*, red, decomps. 215–20°; *di 1c deriv*, m 121–2°. 5-Nitroso-8-hydroxyquinoline (2.85 g.), reduced with Fe and HCl gives 2.85 g of the *HCl salt*, orange, of *5,8-dihydroxyquinoline*, m. 181–3°; *sulfate*, orange, decomps 250° Reduction of 2 g *p*-$ONC_6H_4OH$ gives 1 g *p*-$C_6H_4(OH)_2$ and 0 02 g *p*-$H_2NC_6H_4OH$ *p*-$O_2NC_6H_4OH$ (2.8 g.) and Fe in HCl give 0 45 g. *p*-$C_6H_4(OH)_2$ and 0 90 g of *p*-$H_2NC_6H_4OH$, *o*-$O_2NC_6H_4OH$ (2.8 g.) gives 1 65 g. *o*-$H_2NC_6H_4OH$ but no other product. C. J West

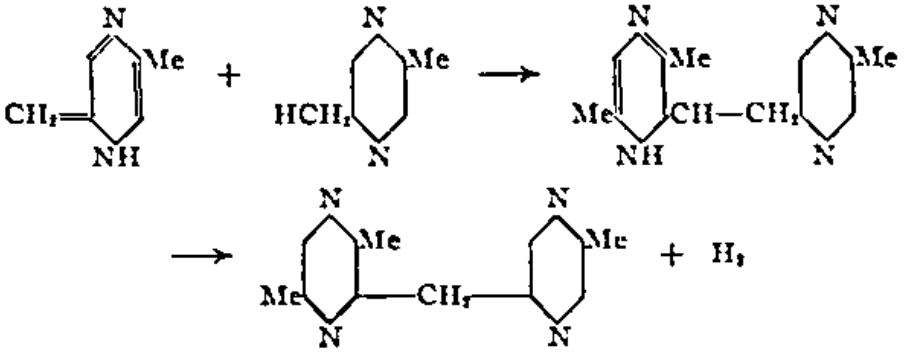
Pseudo bases. II. Equilibria and rate of change of tautomeric bases in the pyrazine series. The effect of conjugation. John G Aston *J Am Chem Soc* 53, 1448–70(1931); cf *C A* 25, 516.—The conductivities of 1,2,5-trimethylpyrazinium hydroxide (I) and 1,2,2 3,5-pentamethyld.hydropyrazinium hydroxide (II) have been measured at 25° Their $\Lambda/\Lambda_0$ values are the same at equiv. concns. and almost the same as those of LiIO₃. The disappearance of strong base from the mixt. of I and NaOH has been found to take place by 2 reactions. One reaction takes place at a rate proportional to the square of the concn. of pyrazinium ion and the first power of the HO-ion concn. and the other at a rate proportional to the squares of the concn of both of these ions, when allowance is made for a salt effect according to the Brönsted theory. The same primary equil. between the quaternary base and the pseudo base hypothesized in both cases is shown to be inappreciably in favor of the pseudo base Evidence is brought out to show that the final product is the ether of the pseudo base. The similarity between these reactions and those of pseudo bases in the pyridine and quinoline series is discussed. The equil. between II and 1,2,2,5,5-pentamethyl-6-hydroxytetrahydropyrazine has been found to be in favor of the latter The equil. is established at a rate too rapid to measure even at 0° The basic dissocn. const. of the equil mixt. is $K_b < 10^{-4}$ The equil. between 1,2,2,3,5,5,6-heptamethyldihydropyraziniun hydroxide and 1,2,2,3,5,5-hexamethyl-6-methylenetetrahydropyrazine is established at an unmeasurable rate at 25° The over-all base strength of the system is $K_b = 4 \times 10^{-4}$. A decompn. takes place at a rate proportional to the 1st power of the concns. of the pyrazinium and HO ions The rate of formation of the pseudo base is hypothesized as the controlling step in this reaction. The soly of 5-phenyl 10-methylacridinium hydroxide has been found to be $1 \times 10^{-4}$ mol./L at room temp and solns. of the base appear to be highly ionized. The initial high value of the cond. on mixing 5-phenyl-10-methylacridinium chloride and NaOH is shown to be due to supersatn. The significance of the results is discussed in the light of ring conjugation, which seems to be the detg factor in the quaternary base-pseudo base equil. C. J West

The action of sodium amide on 2,5-dimethylpyrazine. A. E Chichibabin and M. N Shchukina. *J Russ Phys-Chem Soc* 62, 1183–99(1930).—Amination of *2,5-dimethylpyrazine* (I) proceeds very slowly with $NaNH_2$. Only with strong heating in solvents is an evolution of $H_2$ observed, and a small quantity of *3-amino-2,5-dimethyl-*



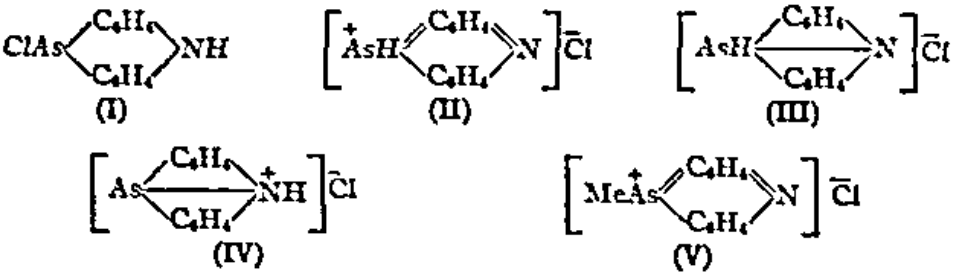

*pyrazine* (II) isolated. Most of the I is recovered unchanged. When the solvent is omitted, higher mol. products are obtained, the reaction takes place at lower temps.

and no $H_2$ is evolved Under these conditions were isolated from the reaction mixt. some unchanged I, a small quantity of *dimethylpiperazine* (III), and 2 cryst bases of the same empirical compn (IV), m 68°, and (V), m 135° The structures were detd by oxidation with $KMnO_4$ In the formation of the homologous bipyrazyls, polymerization to tetramethylbipyrazyl occurs first, as is shown by the blue color of the salts formed by adding acids As in the case of the analogous biquinolyls the color is destroyed by atm. $O_2$ The formation of V has no analogy in the pyridine and quinoline series. It probably arises according to the following mechanism, involving the tautomeric form of I:



Some of the $H_2$ evidently goes to reduce I to III. The $NaNH_2$ either serves to produce the tautomer of I or else brings about the formation of intermediary addn products to the pyrazine nucleus. In solvents, *e. g.*, xylene above 145°, II was obtained in 10% yield and I was recovered to the extent of 80%. II, recrystd from PhH, formed colorless needles, m 111°, $b_{18}$ 119°, sol in $H_2O$, EtOH, $Et_2O$, $CHCl_3$, PhH and PhMe Bz deriv., m 109° In 1 expt without solvent, 20 g I and 14.5 g $NaNH_2$ gave after $Et_2O$ extn of the reaction products (4 hrs on the $H_2O$ bath) a red oil This was fractionated, giving a low boiling fraction consisting of I and II, and 8 g of a mixt of IV and V, $b_{16}$ 160–75°. Further fractionation and crystn from EtOH gave IV, sol in EtOH, and V, sol only in boiling EtOH. IV was recrystd from petr ether as colorless needles, m 67.5–68.5°, $b_{16}$ 167°, easily sol in $H_2O$, EtOH, $Et_2O$, PhH, and $CHCl_3$, difficultly sol in cold petr. ether The aq soln is alk to litmus The soln in strong HCl or $H_2SO_4$ is bright red The $HgCl_2$ compd was obtained as yellow prisms, m 184° (decompn.) V crystd from EtOH in long, colorless needles, m 135°, $b_5$ 156–7°. It dissolves less easily in cold $H_2O$, EtOH, $Et_2O$, PhH and ligroin than IV, but is easily sol in $CHCl_3$ V gives no color with acids, and is neutral to litmus The $HgCl_2$ compd m 224° (decompn.), and the $AgNO_3$ compd m 253° (decompn.). LEWIS W. BUTZ

The constitution of phenarsazine chloride. C P A KAPPELMEIER *Rec trav chim* 50, 44–50(1931).—Previously K showed (*C A* 24, 2438) that the formulation of the reaction product of $AsCl_3$ and $NHPh_2$ as 10-chloro-5,10-dihydrophenarsazine (I) is not in accordance with the salt like properties and the color of this substance, the formula II, which gives an adequate account of these properties, was therefore preferred. Gibson and Johnson (*C A* 25, 107), however, prefer a formulation as a salt but with a bridge between the As and N atoms (III) and (IV) and it is now pointed out that a decision on this point cannot be obtained from the synthesis, the sudden formation of a colored compd at the end of the reaction pointing to an intramol change. K. does not agree with G and J either on the question whether the color is to be ascribed to a ter- or to a quinquevalent As atom, whereas G and J ascribe the color to the tervalent



As atom, K. holds the opinion that tervalent as well as quinquevalent As compds. may be colored or colorless, examples of both cases being known. The easy formation of colorless *N*-acyl derivs., which, according to G. and J., points to the existence or easy forma-

tion of an NH group is explained by K by primary addn to the N atom followed by splitting off of HCl The *o*-quinonoid formulation is preferred by K in view of the greater reactivity of the compd as compared with $Ph_2AsCl$ moreover, in analogous compds., such as anthracene and acridine, the *o*-quinonoid formulation (von Auwers, *C A* **14**, 3250 **19**, 2054) has been preferred in recent years to the bridged formula For the compd obtained by Wieland and Rheinheimer (*C A* **15**, 2633) from $AsCl_3$ and $Ph_2NMe$, the formula V is proposed The whole subject is discussed in detail in the original paper, to which reference must be made for details C F VAN DUIN

Derivatives of the arsenic analog of 9,10-dihydroacridine. I. WM GUMP AND HUGO STOLTZENBERG *J Am Chem Soc* **53**, 1428-32(1931) —*o* $H_2NC_6H_4CH_2Ph$ (37 g.) and $As_2O_3$ in the Bart reaction give 16 g. *of diphenylmethane-o-arsonic acid*, m 161 2° dehydration by heating 10 g acid in 40 cc. concd $H_2SO_4$ 5 min on the $H_2O$ bath and pouring into 500 cc $H_2O$ gives quant. *acridarsinic acid*, $C_6H_4\langle^{CH_2}_{AsO_2H}\rangle C_6H_4$, m 235–6° reduction of 10 g with $SO_2$ and HCl gives 9 g *10-chloro-9,10-dihydro acridarsine* yellow, m 114–5°, when dusted in the air in the smallest amts., it causes severe burning of the face, the lips and the tongue, in addn to this, the tervalent As strongly irritates the mucous surfaces of the bronchial organs. C. J WEST

The γ-triazines. Synthesis of two aralkylaminothioltriazines. A OSTROGOVICH AND V GALEA *Atti accad Lincei* **12**, 162-5(1930).—Benzylaminothioltriazine, $PhCH_2C\underline{N\,C(NH_2)\,N\,C(SH)\,N}$, is prepd like its isomers, the tolylaminothioltriazines (cf. *C A* **25**, 705), by condensation with heating Recrystd from dil. EtOH, it m 270–1° It is sol in alkalies and $NH_4OH$, from the latter, salts of the heavy metals readily ppt., such as the Ag and Cu salts It is also sol in mineral acids, and gives a *picrate*, yellow, m 187–8°. This compd of all the γ-triazines prepd gave a $N_2$ analysis which agreed most closely to the theoretical, *i. e.*, 21.68% vs. 21.92% calcd Styrylaminothioltriazine is prepd best by condensing the reactants *cold*, and m 284–5°; yield, very low It has not been possible to prep a Ag salt of this compd., but the Cu salt may *be obtained from $NH_4OH$ soln by addn of $CuSO_4$ and AcOH, or even by addn* of Fehling soln. The picrate m 221–2° A W CONTIERI

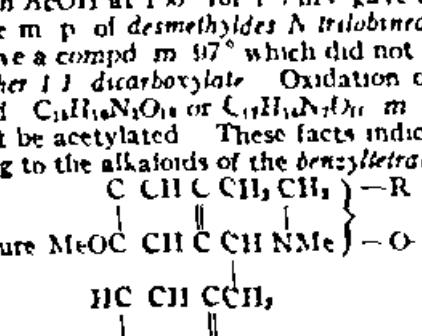
Oxonitine THOMAS A HENRY AND THOMAS M SHARP *J Chem Soc.* 1931, 581–2.—Oxonitine obtained by decompn of aconitine permanganate with $H_2SO_4$, m 277° (decompn.) $[\alpha]_D^{15}$ −48.18° ($CHCl_3$, *c* 0.4048), gives figures on analysis agreeing best with the formula $C_{31}H_{39}O_{12}N$, the loss of the 3 C and 6 H atoms are accounted for by the loss of AcH and the Me group attached to N C. J WEST

Yohimbine. II. F MENDLIK AND J P WIBAUT *Rec trav chim* **50**, 91–111 (1931), cf. *C A* **23**, 1905.—Previously M and W found that yohimbine can be *dehydrogenated by means of Se* (*C. A* **23**, 1905), *in the present communication the* compds. formed in this reaction are investigated more fully The expts. were carried out with yohimbine, which had been purified especially by Hoffman La Roche Hahn and Schuch (*C. A* **24**, 5039), however, communicate that com. preps of yohimbine always contain isoyohimbine and, therefore, it is not certain that a chemically pure compd has been used An intimate mixt. of 40 g yohimbine and 30 g Se was heated for 30 mins at 300°, cooled down pulverized, mixed with an equal amt. of pure sand and first extd. with benzene for 30 min in a Soxhlet app and then with EtOH until the latter showed no fluorescence The benzene ext. on cooling gave *yobirine*, $C_{11}H_{12}N_2$, m 217°, after several crystns. from EtOH although the compd itself is colorless, the salts and the methiodide, which show a blue fluorescence, are yellow, all these compds are optically inactive After sepn of the yobirine, the benzene soln was concd to a sirup from which *dihydroyobirine*, m 170°, was obtained in colorless crystals by the addn of hot EtOH The alc ext gave the *ketoyobirine* $C_{20}H_{16}ON_2$, in yellow crystals, m. 328° giving in EtOH and AcOH solns. characterized by a bluish green fluorescence Probably ketoyobirine contains a CO group between 2 rings, for it does not react with $PhNHNH_2$ or $NH_2OH$ The dehydrogenation of diacetylyohimbine gives only yobirine and dihydroyobirine, not even a trace of ketoyobirine being obtained From 40 g yohimbine were obtained 8 g yobirine, 7 g dihydroyobirine and 1.5 g ketoyobirine On methylating yobirine a yellow methosulfate was obtained, which, on boiling with alkali gave a yellow compd $C_{21}H_{18}ON_2$, m 192.5° which, from its insoly in $H_2O$, did not consist of the quaternary $NH_4$ base, but was formed most probably by simultaneous reduction and oxidation, such as is known to occur with quinolinium and acridinium bases On melting 1 g ketoyobirine with 5 g KOH at 345–50°, 2 compds. are obtained,

one may be isolated by extn of the aq soln of the reaction mixt. to which $NH_4Cl$ has been added, with ether it m 258°, dissolves in hot concd HCl as well as in concd KOH, but could not be investigated further, only the formula was established as $C_{11}H_{11}O_2N$. The alk soln was then acidified and again extd with ether after evapn of the latter a residue was obtained, which, on sublimation, gave pure *hemellitylic acid*, m. 142–4°. An authentic specimen of the latter acid was synthesized according to the method of Scholl (*Ber* 32, 3492(1900) 36, 10, 329(1903)) from *o*-xylene, Hg fulminate and $AlCl_3$; in this way a mixture of 2,3 and 3,4 $Me{\cdot}C_6H_3CN$ was obtained, which was saponif. to the mixt. of the corresponding acids The latter were converted into the Ca salts, which were first sepd by the lower solv of the Ca salt of $3,4\text{-}Me_2C_6H_3CO_2H$ and then gave a soln which, on boiling gave a ppt. of the pure Ca salt of hemellitylic acid, the solv of which *decreases* at higher temps Further investigations were carried out on the dimethylindole obtained by Barger and Field (*C A* 9, 2888) on heating yohimboaic acid with soda lime which was not identical with any of the dimethyl or ethylindoles then known The odor of this indole deriv resembling that of scatole, 3 dimethylindoles were synthesized from EtCHO and the 3 tolylhydrazines according to Fischer's method *p*-tolylhydrazine gave in this way *3,5-dimethylindole*, m 74.5–5° (*picrate*, m 179–80° (cf Arbuzov and Tschwinsky *C A* 4, 3218)) and *o*-tolylhydrazine, *3,7-dimethylindole*, b 281.2 (*picrate*, m 142–3 ) *m* Tolylhydrazine can give the 3,4- or the 3,6-$Me_2$ compd the 3,6-compd being obtained in the case of the *m*-phenetidine (Kermack, Perkin and Robinson, *C A* 16, 98), it is assumed that the dimethylindole obtained, m 116–7° (picrate, m 179–80 ) is the 3,6-deriv None of these compds. is, however, identical with the indole deriv obtained from yohimbine The possible structures of yohimbine are fully discussed in the original paper in view of the many uncertainties and the hypothetical character of several assumptions, the original paper is to be consulted in this respect. C. F VAN DUIN

Alkaloids of Sinomenium and Cocculus. XXXI. Trilobine and homotrilobine. H KONDO AND M TOMITA *J Pharm Soc Japan* 50, 1035–59(1930), German abstr 127–9, cf *C A* 21, 2090 24, 5301–2.—In the previous paper K and T proposed the formula, $C_{17}H_{13}(NMe)(OMe)(—O—)_2$ and $C_{18}H_{15}(NMe)(OMe)(—O—)_2$, for *trilobine* (I) and *homotrilobine* (II), resp The present paper deals with the study of the properties of I and II. Oxidation of I with $KMnO_4$ gave a dibasic acid, $C_{17}H_{14}O_8$ (III) (*des-N-trilobinedicarboxylic acid*), m 302°, which did not depress the m. p of the *4 methoxy-3,4'-diphenyl ether-1,1'-dicarboxylic acid*, m 303–5°, of K. and Yano (*C A* 23, 4475) (III was previously described as $C_{18}H_{14}O_8$, m 288°) III on boiling with HBr in AcOH gave *des N-desmethyltrilobinedicarboxylic acid*, $C_{16}H_{12}O_8$ (IV), m 180–1°, which did not depress the m p of *4 hydroxy-3,4'-diphenyl ether 1,1'-dicarboxylic acid*, m 280–5° (IV was previously reported as *des N-desmethyltrilobinedicarboxylic acid*, m 278–9°). Methylation of IV with $Me_2SO_4$ gave a compd m. 302° which did not depress the m. p. of III. III when treated with $CH_2N_2$ gave a compd. m 93–5° which did not depress the m p. of *di Me 4-methoxy-3,4'-diphenyl ether 1,1'-dicarboxylate* (m 97°) Acetylation of IV gave a compd., $C_{16}H_{11}O_8COMe$, m 234° Alk. fusion of III gave *p*-$HOC_6H_4CO_2H$ (m 213°) and protocatechuic acid (m 196°) *Desmethyltrilobine* (cf K. and Y., *loc cit.*) when treated with $CH_2N_2$ gave *monomethyltrilobine I*, $C_{17}H_{13}NO_2(OMe)_2$, m 150°, $[\alpha]_D^{14}$ 245.3° When treated with $Me_2SO_4$ in alk. soln. followed by KI gave *monomethyltrilobine-MeI*, $C_{17}H_{13}NO_2MeI$, decomps. 259° *Monomethyltrilobine-Me$_2$SO$_4$* when treated with KOH at 100° gave *monomethyltrilobinemethinemethine*, $C_{19}H_{17}NO_3$ (VI), m. 106°. *HCl salt* decomps. 260°, methin MeI (VII), m 257–8° Oxidation of VI with $KMnO_4$ gave $C_{11}H_{12}O_4$, m. 305–8°, which did not depress the m p of III. VII when treated with alc. KOH gave $Me_2N$, $C_{18}H_{11}O_3$, m above 300°, and $C_{17}H_{13}O_4H{\cdot}O$, m. 192–5°. *Trilobine-Me$_2$SO$_4$* (prepd by treating I (5 g.) with $Me_2SO_4$ (5 g.) in $CHCl_3$) when treated with KOH (25 g.) gave VI, m 106°. *HCl salt*, decomps 259°. *methin MeI* (VII), m. 259–60°. On treating with KOH VII gave $C_{17}H_{13}O_4H{\cdot}O$ (VIII), m. 192°, and $Me_2N$. Oxidation of VIII with $KMnO_4$ gave III. Methylation of VIII with $Me_2SO_4$ gave $C_{17}H_{12}O_2(OMe)_2$, m 90–100°. *Trilobine-MeI* (IX) when treated with KOH for two hrs. gave *trilobinemethylmethin* (X), $C_{19}H_{15}NO_4$, m 191°. On treating with MeI X gave *trilobinemethinmethin-MeI* (XI), m. 206–7° When treated with KOH XI gave $C_{18}H_{11}O_3$ (?), m. 105°, $Me_2N$, and $C_{18}H_{11}O_3H_2O$, decomps. 214° (*Ac deriv*, $C_{22}H_{20}O_7$, m. above 300°) X or *trilobine-MeCl* when reduced with Na-Hg gave *dihydrotrilobinemethylmethin* (XII), $C_{19}H_{17}NO_4$, m. 98°, $[\alpha]_D^{13}$ 195.7° On treating with MeI XII gave VII (m. 259°) which gave when reduced with Na-Hg *tetrahydro-des N-trilobine*, $C_{18}H_{16}O_4H_2O$, m. 206°, $[\alpha]_D^{13}$ 126.3° (in $CHCl_3$); *Ac deriv*, decomps. 144–7°, $[\alpha]_D^{13}$ 58.7°. Oxidation of II with $KMnO_4$ gave III. *Homotrilobine-MeI* when treated with alc. KOH gave *homo-*

*trilobinemethylmethin* $C_{21}H_{23}NO_3$, m 115° *HCl salt* decomps 265°. *Homotrilobinemethylmethin Me I* (prepd as before) when treated with KOH gave *des N-homotrilobine* (XIII) $C_{19}H_{21}O_3$, m 385–8° Oxidation of XIII with $KMnO_4$ gave a compd (XIV) which did not depress the m p of *des N trilobinedicarboxylic acid* (m 300°) XIV when *treated with* HBr in AcOH at 150° for 1 5 hrs gave a compd (XV), m 270–81° which did not depress the m p of *desmethyldes N trilobinedicarboxylic acid* Methylation of XV with $CH_2N_2$ gave a *compd* m 97° which did not depress the m p of *di Me 4-methoxy 3 4-diphenyl ether 1 1 dicarboxylate* Oxidation of I, II and VI with concd $HNO_3$ each gave a compd $C_{19}H_{18}N_2O_{10}$ or $C_{19}H_{19}N_3O_{11}$ m 272°, contains 1 OMe and 2 C O groups, and cannot be acetylated These facts indicate that I and II, like *tetrandrine* or *daurscine* belong to the alkaloids of the *benzyltetrahydroisoquinoline type* K. and T suggest the structure



for I (R = Me) and II (R = Et)

(II)

The position of R and the nature of —O— linkage are not clear This is under further investigation P I. NAKAMURA

**Cannabis indica resin. II.** ROBERT S CAHN *J Chem Soc* 1931, 630–8. cf *C A* 24, 4015.—The $Et_2O$ ext. of hashish of Eastern Mediterranean origin (*400 g*, 33%) on distn according to Wood, Spivey and Easterfield (*J Chem Soc* 69, 539(1896)) gives 90–100 g of atm distillate, the portion non volatile in steam $b_{18}$ 150–270°, 147–56 g vacuum distillate, 90–130 g undistillable pitch, the 2nd fraction gives 1 4–2 0 g of hydrocarbon (I), 35–42 g, $b_{18}$ 190–250°, 95–110 g $b_{18}$ 250–85° (II) and 5–15 g residue The *fraction* II simulated a pure substance, 75% of which $b_{18}$ 263–8° but it was impossible to eliminate the head and tail fractions The green resin from the LtOH ext. of *Cannabis indica of Indian origin* gave *similar results on distn* Portions of all fractions except that volatile in steam were separately heated at 200° for 4 5 hrs in an atm of $CO_2$ but showed no evidence of *polymerization* The *hashish resin yielded only about 5% to* alkali and the green resin even less II and AcCl in dry $C_5H_5N$ give 27–8.4% of acetyl cannabinol (III), m 75°, substitution of quinoline for $C_5H_5N$ greatly reduced the yield of III, refluxing 3 g of II with $Ac_2O$ and AcONa for 1 hr gives only 0 1 g cryst III after but not before crystals for seeding became available III was unchanged by refluxing with $Ac_2O$ addn of fused $ZnCl_2$ caused decompn, bromination and nitration take place readily but cryst. derivs. have not been obtained The only residues after sepn of the cryst III are much more mobile than II, reacetylation with AcCl and $C_5H_5N$ gave no further yield of cryst material Oxidation of the higher boiling fraction with $HNO_3$ gave *nitrocannabinolactone* (*0 2 g m 170–7°, from 110 g of residues*) By heating 20 g III with 6 4 g KOH in 120 cc 90% EtOH for 2 hrs, gives 90% of cannabinol (IV), $b_{18}$ 263–4° $Ac_2O$ gives quant *III* Nitration of *II* (*17 7 g*) and of pure *IV* (5 g) gives the tri $NO_2$ deriv (V) (19 5 g and 3 3 g, resp) which, once recrystd, never m above 150°, a purified specimen m 158°, still contained an appreciable amt of lower nitration products or other impurities, this is similar to the product of W, S and E, except that the Ag salt was slowly decompd by EtOH and the Na salt appeared to exist in a bright orange and a paler yellow form, the former passing into the latter in contact with $H_2O$ slowly in the cold, rapidly on heating Analyses of III indicate the formula $C_{21}H_{22}O_4Ac$, of the $NO_2$ deriv, $C_{21}H_{22}O_4(NO_2)_2$ V as the Ag salt and MeI give 95 5% of the *Me ether* (VI), pale greenish yellow, m 150°, in MeOH only 35% of the ether is formed, 60% of V being recovered VI *is unchanged after being refluxed with* EtOH-concd HCl and boiled 2 min with concd $HNO_3$, *it was unaffected by III* under Zeisel conditions but is hydrolyzed under the *conditions* for the detn of NMe When its soln in $C_5H_5N$ or piperidine is heated on the water bath, it rapidly assumes the red dish orange color of solns of V salts. V *and* $PhSO_2Cl$ in dry $C_5H_5N$ give *benzenesulfonyl trinitrocannabinol* m 196–7° stable to acids but very readily hydrolyzed by NaOH or $C_5H_5N$ The *hydrocarbon* I, $C_{21}H_{44}$, m 63°, it appears highly probable that the main constituent is nonacosane but some other substance is also present. C J W.

*Barbaloin.* Á GERECS. *Magyar Chem Folyóirat* 36, 121–8, 137–42(1930).—Léger (cf *C A* 11, 2454, 2599) stated that barbaloin is a glucoside of aloe-emodin and *d* arabinose in which, to account for the reducing capacity of barbaloin, the point of union could not be the 1st C atom of *d* arabinose However, the presence of a free aldehyde sugar group could not be proved by expts and the glucoside linking could not be split in any way Léger's statement is *therefore* incorrect. S S DE FINÁLY

Plant pigments. XXIX. The symmetrical lycopin formula. Perhydrolycopin. P. KARRER, A HELFENSTEIN, B PIEPER AND A WETTSTEIN. *Helv. Chim. Acta* 14, 435–8(1931); cf. *C. A.* 25, 520.—The recently proposed sym structure for lycopin has received further confirmation by $O_2$ treatment of the hydrocarbon, which yields 80% of the theoretical amt. of acetone, detd iodimetrically. Squalene, for which a related structure has been suggested, on similar treatment yields 90% of the acetone expected. Complete hydrogenation of lycopin should, therefore, yield the $C_{40}H_{82}$, previously prepd by a Wurtz reaction from dihydrophytyl bromide. A comparison of the substances resulting from these 2 indicated sources proved the validity of this supposition. The hydrocarbon is 2,6,10,14,19,23,27,31-octamethyldotriacontane. G. ALBERT HILL.

Allomerization of chlorophyll. J. B. CONANT, S. E. KAMERLING AND C. C. STEELE. *J. Am. Chem. Soc.* 53, 1615–6(1931).—Facts are presented which indicate that allomerization of chlorophyll is dehydrogenation brought about by the O of the air. C. J. WEST.

Ergostenol chloroacetate. MERRILL C. HART AND FREDERICK W. HEYL. *J. Am. Chem. Soc.* 53, 1413–6(1931).—α Ergostenol, prepd by the catalytic reduction of ergosterol acetate in AcOH with Pt oxide as a catalyst, contains small quantities of *allo* α-ergostanol. Ergostenol chloroacetate is very largely α-ergostenol chloroacetate with smaller quantities of the chloroacetates of β ergostenol and of *allo* α-ergostanol. Ergostenol and $ClCH_2COCl$ form a small quantity of an *addn. product*, $C_{31}H_{49}O_2Cl_3$, m. 129–30°, $[\alpha]_D$ 8.7°. Ergostenol chloroacetate forms neither a bromide nor a peroxide nor does it react with $KMnO_4$. Upon reduction evidence of some degree of isomerization is found in the increased yield of the reduction product, *allo* α ergostanol. C. J. WEST.

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Azo-chromophore (BLUMBERGER) 25. The reactions of olefins with $H_2SO_4$ (ORMANDY, CRAVEN) 22. Compounds of hexamethylenetetramine with certain salts of Ag and other metals and the influence of anionic volume on the capacity for association by the central positive atom (RAY, GUPTA) 6. The behavior of polypeptides built up of glycine and alanine toward polypeptidases and *N* alkali (ABDERHALDEN, VON EHRENWALL) 11A. Methylglyoxylacetic acid and its dismutation by *Bacillus coli* (VEIBEL) 11A. The electrolysis of salts of *n* butyric acid (FICHTER, BÜRGIN) 4. An x ray study of mannitol (MCCREA) 2. The physical identity of enantiomers (CAMPBELL, GARROW) 2. Sulfonation (Ger. pat. 519,046) 18.

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HACKH, INGO W. D. Structure Symbols of Organic Compounds. Philadelphia: P. Blakiston's Son & Co., Inc. 139 pp. $2.50.

HELLER, G. Über Isatin, Isatyd, Dioxindol und Indophenin. Stuttgart: F. Enke. About 145 pp. About M. 12.70.

HOUBEN, J., AND FISCHER, WALTER. Das Anthracen und die Anthrachinone mit den zugehörigen vielkernigen Systemen. Leipzig: Georg Thieme. 890 pp. M. 85, bound, M. 90.

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Butadiene hydrocarbons. I. G. FARBENIND. A.-G. Fr. 696,706, June 6, 1930. Butadiene hydrocarbons are prepd by cracking higher hydrocarbons such as mineral oils, gas oils, benzine fractions and tar oils, sepg. the butadienes and transforming the other products resulting from the cracking into compds. such as acetone, AcH, $C_6H_6$, etc., which are then used for the production of butadiene hydrocarbons. Cf. *C. A.* 25, 525.

Distillation products of polymeric hydrocarbons. HENRY ARIAS. Fr. 696,812, Sept. 20, 1929. Polymeric hydrocarbons such as balata, gutta-percha, gayule, rubber, Borneo gum, etc., are distd. to obtain isoprene and substitutes for linseed oil and turpentine oil.

Absorption of olefins. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 695,707, May 15, 1930. Olefins contg. 3 or more C atoms and one or more double bonds in the mol. or their polymerization products are absorbed by strong acids in the presence of catalysts composed of one or more of the following metals, Fe, Cu, Co, Ni, Ag or metals of the Pt group or compds. of any of these metals.

Absorbing olefins with sulfuric acid. H. E. BUC (to Standard Oil Development Co.). Brit. 340,098, Nov. 15, 1928. Fr. 684,567 (*C. A.* 24, 5305).

Absorbing double-bonded hydrocarbons in sulfuric acid. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 339,592, Aug. 6, 1929. Cyclic hydrocarbons having one double bond in a non aromatic nucleus, such as cyclohexene, are absorbed in

or combined with $H_2SO_4$ in the presence of catalysts such as those described in Brit 323,748 (*C A* 24, 824) Brit 336,603 (*C A* 25, 1813), Brit 336,604 (*C A* 25, 1813) and Brit 336,633 (*C A* 25, 1813) and the products may be hydrolyzed, distd or otherwise treated for the production of esters ales or ethers An example is given of the use of cyclohexene and final production of cyclohexanol

Recovery of liquids from gelatinized materials. I G Farbenind A G Brit 339,610 July 10 1929 Neutral org liquids which have been solidified by reaction in them between $NH_3$ or other base and abietic or pimaric acid as described in Brit 340,575 (following abs) are recovered by pressing the solid against a filter which may be assocd with a purifier for the liquid (among which latter porous products may be used as described in Brit 340,575) Numerous details and examples are given, and among the uses to which the process may be applied is the expression of volatile combustible liquid such as pentane ether acetone or the like into the intake manifold of an internal combustion engine to facilitate starting of the engine

Gelatinizing organic liquids to facilitate storage, transport, etc I G Farbenind A G Brit 340,575 Neutral org liquids such as cyclohexane benzene and its homologs benzine and other paraffine hydrocarbon materials EtOAc ether, $CCl_4$, $CHCl_3$, $C_2HCl_3$ or acetone etc are gelatinized by forming in them a voluminous "framework" by the action of a base such as $NH_3$ on abietic or pimaric acid in the material to be gelatinized The liquids can be recovered by pressing by heating or by passing a current of gases over the material Several examples are given Cf *C A* 25, 2136

Putting up organic liquids in powder form. Chem Fab von Heyden A G Ger 519,448 Nov 24, 1929 Org water sol liquids or semi liquids are mixed with water-sol salts which have become porous on account of loss of water of crystn The org liquid and the salt must be chemically inert to one another Thus, pyridine 10 may be mixed with anhyd $Na_2CO_3$ 30 parts

Nitrogenous derivatives of paraffins. I G Farbenind A-G Brit 339,962, Sept 11, 1929 Halogenated paraffins contg more then 8 C atoms are treated with aq or alc $NH_3$ or an $NH_3$-yielding agent such as $(NH_4)_2CO_3$ or urea and pressure and catalysts such as Cu or a Cu compd may be used to assist the reaction The halogen atoms are in part replaced by amino groups and in part split off with formation of double bonds while others remain in the mol When alc solns are used, the alc may enter into the reaction with production of ether groups Various examples are given.

Alcoholates. Alexander Wacker Ges für elektrochem Ind G. m. b H (Paul Halbig and Felix Kaufler inventors) Ger 519,443, Jan 22, 1928 Alkali metal compds of monohydric ales contg more than 3 C atoms in the mol are prepd. by distg an excess of the alc with alkali metal hydroxide until the production of alcoholate is completed Examples are given

Aromatic aldehydes. I G Farbenind A G (Georg Kalischer, Heinz Scheyer and Karl Keller, inventors) Ger 519,444, Feb 26, 1927 Addn to 514,415 (*C A* 25, 1536) The method of Ger 514,415 is used to introduce the aldehyde group into aromatic hydrocarbons contg a mobile H atom Thus, an anthracenealdehyde can be prepd by warming $C_{14}H_{10}$ with a mixt of formylmethylaniline and $POCl_3$ to about 80° Cf *C A* 25, 710

Aromatic hydroxyaldehydes. J D Riedel-E de Haën A G. Ger 517,539 Feb 18, 1927 Aromatic *o* and *p*-hydroxyaldehydes are prepd by oxidizing the alkali compds of the corresponding propenyl derivs in presence of excess of $PhNO_2$ Thus, the *m*-ethyl ether of 1,2 dihydroxy-4 propenylbenzene is treated with NaOH and dried The Na salt is then treated with excess of $PhNO_2$ at 120–125° The $PhNH_2$ and azobenzene formed is blown out with steam and the excess $PhNO_2$ removed Pptn by HCl gives the *m* ethyl ether of protocatechualdehyde Further examples are given Cf *C A* 25, 522

Aldehyde bases Carl Mannich Fr 696,637, June 4, 1930 $CH_2O$ and primary or secondary aliphatic amines are condensed with aldehydes of the general formula $R \diagdown R' \diagup CHCHO$ or their compds giving rise to such aldehydes, in which R is an alkyl radical, R′ an alkyl radical or H, or R and R′ together represent a hydroaromatic ring Examples are given of the prepn of $\alpha,\alpha$-dimethyl $\beta$-dimethylamino- ($b_{11}$ 82°), $\alpha\alpha$ dimethyl $\beta$ diethylamino- (b 175–177°)-, $\alpha$ isopropyl $\beta$ dimethylamino-propionic aldehyde ($b_{21}$ 66–68°) and others.

Ketones. Rheinische Kampfer-Fabrik G m b H Fr 696,653, June 4, 1930 Ketones are prepd by passing secondary ales in vapor form at 120–300° and in the presence of steam over dehydrogenating catalysts Examples are given of the prepn.

of menthone, cyclohexanone, camphor and acetophenone from menthol, cyclohexanol isoborneol and methylphenylcarbinol, resp

Carbocyclic ketones. Soc. anon M Naef & Cie Ger 519,446, Dec. 7, 1926 Addn to 441,273 See Brit 263,153 (*C A* 22, 91)

Esters. Commercial Solvents Corp Fr 696,496, May 17, 1930 Fatty acids are recovered from dild solns from esterification reactions by extg the acid from the aq soln by means of the alc which is used for the subsequent esterification

Ethanol esters Holzverkohlungs Industrie A G Fr 696,361, May 31 1930 Esters of EtOH are made by introducing, directly or after sepn of impurities such as aldehydes, the mixt of alc and steam coming from the distn of wort and acids (particularly AcOH) in a column system where esterification is effected The ester and alc in excess are sepd and the alc returned to the system A suitable app is described

Ethers of 1,2,3,4-tetrahydro-6-naphthylmethyl alcohol. I G Farbenind A-G (*Gustav Reddelien and Hans Lange, inventors*) Ger 521,033, July 30, 1929 Addn to 516,280 (*C A* 25, 1841) These are prepd by the action of aliphatic or aromatic alcs or alcoholates on 6-chloromethyl 1 2 3,4 tetrahydronaphthalene, which is prepd from tetrahydronaphthalene by the method of Ger 508,890 (*C A* 25, 716) Examples are given of the prepn of the Me, Et and benzyl ethers $b_{11}$ 133–4°, 141–3°, and 214–5°, resp

Nitriles. I G Farbenind A G (Heinrich Hopff, inventor) Ger 517,760 Dec 16, 1928 Benzotrichloride or its substitution products is caused to react on amides of monobasic unsatd or satd acids Catalyzers may be present Thus, benzotrichloride and acetamide are heated to 150–160° to give $CH_3CN$ more $ZnCl_2$ may be present as a catalyzer Several further examples are given

Replacing the amino group by the thiocyano group in organic compounds. Richard Kuhn and Ernst Lichenberger Swiss 143,015, Oct 30, 1928 Amines of aliphatic or aromatic compds are diazotized and the N atom of the diazo group split off in the presence of a concd soln of thiocyanate In the example, *o* toluidine is diazotized and the resulting soln treated with a satd soln of NaCNS or $NH_4CNS$ to give *o* thiocyanotoluene as a yellow oil, $b_{11}$ 120°

Trithionates of secondary amines. I G Farbenind A-G (Hans Lecher, Theodor Weigel and Max Wittner, inventors) Ger 517,995, Oct. 27, 1927 These are obtained by treating *N* monothio derivs of secondary amines (obtained from the amine by the action of $SCl_2$) with aq $H_2SO_3$ Thus, *N*-thiodiethylamine and $H_2SO_3$ give *the trithionate* m 148° *Further examples are given.*

*N*-Substitution products of 2,6-diaminonaphthalene. I G Farbenind A G (Richard Herz and Wilhelm Hechtenberg, inventors) Ger 517,996, Sept 14, 1928 6-Arylamino-2 hydroxynaphthalene-3-carboxylic acid is treated with aminohydroxy compds. of the $C_6H_6$ series in the presence of sulfite soln. Thus, 6-phenylamino-2-hydroxynaphthalene-3 carboxylic acid, *p*-aminophenol and bisulfite soln. are heated in a reflux condenser to give 2-(4′ hydroxyphenylamino)-6-phenylaminonaphthalene, m. 205° Further examples are given

Haloalkoxybenzanthrones. Scottish Dyes, Ltd Ger 516,535, Jan 27, 1926. See Brit 256,281 (*C A* 21, 2989)

Decomposition of castor oil. Maurice Devaux and René Sornet Fr. 696,237, Sept 6, 1929 Castor oil is decomposed to give a high yield of enanthaldehyde and undecylenic acid without loss of enanthaldehyde and without risk of solidification of the residual oil, by stirring the oil, heated to about 300–320°, by means of dry or superheated steam or by hot inert gases or both, which carry off the condensable gaseous products

*Aromatic halogen derivatives.* I G Farbenind A-G Fr 695,477, May 12, 1930 Aromatic condensation products contg a halogenated Me group besides an alkoxy or alkylthio group are prepd by the reaction of $CH_2O$ and hydracids such as HCl on aromatic alkoxy or alkylthio compds, resp A large no of new compds can be formed from the products as the halogen in the Me group enters easily into reaction

Vinyl halides. I G Farbenind A-G Brit 339,727, Dec 7, 1928 *In effecting* reaction between gaseous halogen hydrides and $C_2H_2$ at about 180°, a catalyst is used consisting of active C from which the activating agent has been removed, or an active C prepd by use of $H_3PO_4$ and still contg the $H_3PO_4$.

Basic bismuth salts of organic mercury compounds. I G Farbenind A-G Brit. 339,760, Nov 15, 1929 Examples are given of the formation of reaction products from Bi nitrate and mercurisalicylallylamide-*O* acetic acid, 4-mercuriallyoxy-3 acetylaminobenzene 1 arsonic acid, 3,4-mercurythiobenzimidazole-1-arsonic acid, 3,4-

mercurythiobenzimidazole 1-carboxylic acid 1,2 mercurythiobenzimidazole-4 sulfonic acid and *m* mercuryallylthioureabenzoic acid (and the manuf of various of these initial Hg compds also is described)

**Metal carbamates** I G Farbenind A G Fr 696,374, June 2, 1930 Finely divided metallic oxides preferably in the dry state, are treated by $NH_2COONH_4$, advantageously with heat The production of the Zn and Ca compds is described Cf. C A 25, 1842

**Allyl alcohol derivatives.** Schering Kahlbaum A.-G Brit. 339,882, Feb 23, 1929 Condensation products of glycerol monohalohydrins with aliphatic ketones such as acetone are distd over alk media such as caustic lime or in the presence of an org base such as quinoline or diethylaniline to split off halogen hydride and form corresponding derivs of α hydroxyallylalc The same products also can be obtained from compds of aliphatic ketones with other mono-esters of glycerol such as the benzene- or toluene sulfonate An example is given of the production of the acetone compd of α oxyallyl alc from the acetone compd of glycerol α-chlorohydrin.

**Anthraquinone derivatives** Imperial Chemical Industries, Ltd. Fr 696,611, June 3 1930 Halogenated phthalic acids or their salts or anhydrides are condensed with phenols in the presence of $H_2SO_4$ and with or without $H_3BO_3$ The halogen atoms in the products obtained may be hydrolyzed or replaced by OH groups Examples given include the prepn of 5 6-dichloro 2,6,7 trichloro- and 6,7-dichloro-quinizarin

**Benzanthrone derivatives** I G Farbenind A G (Willy Eichholz, inventor) Ger 521 032 Mar 13, 1928 Addn to 501,083 (C A 24, 4791) Benzanthrone derivs substituted in the 2-position with a group $—CH_2R_1$, where $R_1$ is H or an alkyl, aryl or other indifferent group, are prepd by the action of alk. sapong agents on benzanthrone derivs substituted in the 2 position with a group $—SCH(R_1)COR$, where $R_1$ is an alkyl, aryl, aralkyl or cycloalkyl group Thus 2 methylbenzanthrone can be prepd by heating acetonyl 2 benzanthronyl sulfide with KOH at 125–130°. Other examples are given also Cf C A 25, 2438

**Isatin derivatives** I G Farbenind A.-G (Karl Thiess, Ernst Runne, Karl Moldaenke and Theodor Meissner, inventors) Ger 519,139, Jan 31, 1926 Addn to 451,856 Isatin derivs trisubstituted in the benzene ring are prepd. by halogenating 6,7- or 4,7 disubstituted isatins or their bisulfite compds. The treatment of 4 (or 6)-halo-7-alkylisatins is excluded Examples are given of the prepn of *4,7-dimethyl 5-chloroisatin*, m 277–9°, *4 methyl 5-chloro 7 methoxyisatin*, m 251–3°, *4,5-dichloro 7-methoxyisatin*, m 274–5°, and *4,7-dimethyl-5 bromoisatin*, m 290–2°.

**Lupinane derivatives** Karl Winterfeld and Fritz Holschneider. Ger. 521,454 Mar 26, 1930 Bromolupinane cyanamide is prepd by treating lupinane, $(C_{11}H_{19})N$, with CNBr Dibromolupinane cyanamide is prepd similarly from lupinine, $(C_{11}H_{21}ON)$ Examples are given

**Naphthimidazole derivatives** I G Farbenind A G (Wilhelm Neelmeier and Wilhelm Meiser, inventors) Ger 519,052, July 24, 1928 Hydroxy-1′,8′ naphthoylenenaphthimidazoles and their derivs are prepd. by fusing with alkali the 1′,8′-naphthoylenenaphthimidazole sulfonic acids obtained by condensing naphthalic anhydride or its derivs with *o*-naphthylenediaminesulfonic acids Examples are given

**Pyridine derivatives.** I G Farbenind A.-G Fr 696,425, April 10, 1930 *N* Methyl compds of the pyridine series are prepd by the reaction of MeCl on bases of the pyridine series or its homologs, advantageously below 200° and with or without pressure and with or without catalysts, such as a chloride of Cu or Fe, and diluents such as water, ether, $C_6H_6$, benzine, tetralin or decalin Examples are given including the prepn of the *N* methyl chloride of α- and γ picoline, chloropicoline and β methoxypyridine

**Quinoline derivatives.** I G Farbenind A G Fr 696 438, April 25, 1930 *Bz* Nitro-*Py*-chloromethylquinoline and its derivs are prepd by treating *Py*-chloromethylquinoline or its derivs with nitrating agents Examples are given of the nitration of the 2,4 dichloro- 2-chloro-4 methyl and 4-chloro-2,8-dimethyl-quinoline. Cf C A 25, 966

**Sterol derivatives.** Bruno Rewald Ger 520,077, Aug 29, 1928 Sterol monophosphates are prepd by warming ethereal solns of sterols with $P_2O_5$. Examples are given of the prepn of the cholesteryl and sitosteryl esters

**Thioamino compounds.** Imperial Chemical Industries, Ltd Ger 519,449, Mar 30, 1930 See Brit 331,016 (C A 24, 5765)

**Condensation products from resorcinol, etc.** J D. Riedel-E de Haën A.-G Ger 521,458, Oct 30, 1928 Resorcinol is heated with acids of the formula $(CH_2)_n(COOH)_2$, where *n* is more than 2, in the presence of a condensing agent, *e g*, $ZnCl_2$

Ketonic acids of the formula (1)(3)$(HO)_2C_6H_2CO(CH_2)_nCOOH(4)$ are thus obtained, together with (1) benzeins of the formula $\overline{O\,C(O)\,(CH_2)_n\,C\,C\,CH\,CH\,C(OH)\,CH\,C}$-$\overline{O\,C\,CH\,C(OH)\,CH\,CH\,C}$, when $n$ is 3–5, or (2) diketones of the formula $(HO)_2C_6H_2CO(CH_2)_nCOC_6H_2(OH)_2$, when $n$ is more than 5. The ketonic acids can be sepd. from the other products with $Na_2CO_3$ soln., and can be reduced to acids of the formula $(HO)_2C_6H_2(CH_2)_nCOOH$. Homologs of these products can be obtained by starting from C alkyl resorcinols or from alkyl derivs. of the aliphatic acids. In an example, resorcinol (2 mols.) and adipic acid (1 mol.), heated to 110° with $ZnCl_2$ for 3 hrs., with stirring, yield a benzein and $(HO)_2C_6H_2CO(CH_2)_4COOH$, m. 169°, which is reducible to $(HO)_2C_6H_2(CH_2)_4COOH$, m. 92°. Examples of the prepn. of the following compds. are also given: $(HO)_2C_6H_2CO(CH_2)_2COOH$, m. 126–7°, $(HO)_2C_6H_2(CH_2)_2COOH$, $(HO)_2C_6H_2CO(CH_2)_3COOH$, m. 141°, $(HO)_2C_6H_2CO(CH_2)_4COC_6H_2(OH)_2$, m. 186–7°, $(HO)_2C_6H_2CO(CH_2)_5COOH$, m. 122°, and $(HO)_2C_6H_2CO(CH_2)_5COC_6H_2(OH)_2$, m. 170°.

**Colored condensation products.** I. G. Farbenind. A.-G. (Hans Grotowsky, inventor). Ger. 519,051, June 7, 1928. Addn. to 514,121 (*C. A.* **25**, 1084). In the process of Ger. 514,121, the 1-phenyl-3-methyl-5-pyrazolone is replaced by other pyrazolones or by other heterocyclic compds. having a reactive $CH_2$ group, *e. g.*, barbituric acid, rhodanic acid, sulfazone or indoxyl. Such of the products as contain COOH or $SO_3H$ groups may be used as *wool dyes*; others are useful as *intermediates for dyes and drugs*. Examples are given. Cf. *C. A.* **24**, 6030.

**Reduction products of indoxyls.** I. G. Farbenind. A.-G. (Curt Schumann, Eduard Mönch and Bruno Christ, inventors). Ger. 516,676, Sept. 9, 1928. Addn. to 515,544. The method of 515,544 (*C. A.* **25**, 2139) for producing *N*-acetyldihydroindoxyl or *N*-acetyldihydroindole is modified by treating indoxyl with H in presence of catalyzers, instead of *N*-acylated indoxyl. The $p_H$ value should be between the limits 7–9.5. Examples are given.

**Lead salts of 2-nitroresorcinol.** Imperial Chemical Industries, Ltd. Ger. 521,457, Feb. 2, 1929. See Brit. 312,052 (*C. A.* **24**, 967) and 328,277 (*C. A.* **24**, 5499).

**Triphenylstibine sulfides and selenides.** Ludwig Kaufmann. Ger. 520,306, June 11, 1927. Triphenylstibine or its homologs or derivs. are heated with S or Se, in the presence or absence of a solvent, to a temp. above the m. p. of the substituted stibine. The reaction may be promoted by addn. of a catalyst such as glycerol or cholesterol, and also by actinic rays.

**Thiuram monosulfides.** I. G. Farbenind. A.-G. (Ludwig Orthner, inventor). Ger. 519,445, Feb. 16, 1930. Metal salts of *N*-disubstituted dithiocarbamic acids (2 mols.) are caused to react with $COCl_2$ (1 mol.). An example is given.

**Esters of phosphoric acid.** I. G. Farbenind. A.-G. Ger. 517,538, July 1, 1927. Triesters of $H_3PO_4$ and aliphatic or hydroaromatic alcs. are prepd. by treating the alcs. with $POCl_3$ and a solvent in the presence of sufficient amine to combine with the HCl produced. Thus, a cooled mixt. of isopropyl alc. is mixed with pyridine and $C_6H_6$, and added to $POCl_3$. Pyridine-HCl sepd. out and can be filtered off leaving a 95% yield of triisopropyl phosphate. Further examples describe the prepn. of tributyl and tricyclohexyl phosphate.

**Acid chlorides of aminonaphtholsulfonic acids.** I. G. Farbenind. A.-G. (Hugo Schweitzer and Karl Burr, inventors). Ger. 516,678, Oct. 27, 1928. Acid chlorides of 2-amino-5-hydroxynaphthalene-7-sulfonic acid and 2-amino-8-hydroxynaphthalene-6-sulfonic acid, which contain a substituent in the amino group, are prepd. by treating them with $ClSO_3H$. Thus, 2-acetylamino-5-hydroxynaphthalene-7-sulfonic acid is treated with $ClSO_3H$ with cooling to give 2-acetylamino-5-hydroxynaphthalene-7-sulfonyl chloride. Further examples are given.

**Aliphatic acids.** Herbert Langwell. Fr. 695,721, May 16, 1930. In the manuf. of aliphatic acids and other products obtained by the fermentation of suitable substances such as cellulosic materials, the acid is neutralized as it is formed by $NH_3$ which is afterwards liberated by decompn. of the salt by a non-volatile base.

**Fatty acid derivatives.** I. G. Farbenind. A.-G. Brit. 310,011, Sept. 11, 1929. The polyhalogenated fatty acids prepd. as described in Brit. 306,623 (*C. A.*, **25**, 1842) which contain over 8 C atoms and over 2 halogen atoms in their mol. are treated with aq. or alc. solns. of the fixed caustic alkalies or with aq. solns. of weakly alk. reaction such as $NH_3$, $Na_2CO_3$, Na phosphate, NaOAc, $NH_4$ formate or urea. Halogen atoms are at least partially removed, forming compds. with double bonds and may be replaced

wholly or partly by OH groups When caustic alkalies are used in the reaction, the products are sol in alkali and yield salts which are *cleansing and emulsifying agents* When weak alkalies are employed the products are insol in alkalies, and on boiling with NaOH polymerization occurs with possible esterification of the carboxy group, and elastic rubber like products are produced. Numerous examples are given

Higher fatty acid derivatives containing sulfur I G Farbenind A G Brit 340,012 Sept 11, 1929 Solns of sulfides or polysulfides are caused to react on polyhalogenated fatty acids contg more than 8 C atoms in the mol or their esters or amides or conversion products still contg halogen obtained as described in Brit 339,675 (cf following abstr ) or Brit 340,011 (preceding abstr ) The halogens are in part replaced by mercapto and hydroxy groups and in part are split off with formation of double bonds The reaction may be effected under pressure, and the products yield salts on being salted out which are typical sulfonated soaps. Various examples are given in volving the treatment of trichloropalmitic acid, hexachlorostearic acid, tetrachloroöleic acid and similar derivs. Cf *C A* 25, 712

Fatty acid derivatives containing nitrogen. I G Farbenind A G Brit 339,675, Sept 11, 1929 Halogenated fatty acids contg more than 8 C atoms in the mol and which may contain hydroxy groups and be satd or unsatd are treated with solns of $NH_3$ in org solvents such as MeOH, EtOH, BuOH or acetone, and Cu or a Cu compd may be used as catalyst and pressure employed to facilitate the reaction Carboxamides are first formed and in part esters, when alcs are present The halogen atoms are gradually replaced by amino groups and may also be split off with formation of double bonds Examples are given of the treatment of hexachlororicinoleic acid, tetrachlororicinoleic acid, hexachlorostearic acid and a chlorinated linoleic acid.

Reducing nitroarylarsonic acids. Carl Oechslin (to Etablissements Poulenc Freres) U S 1,798,030, March 24 Aminobenzenearsonic acids are produced by reducing a nitrobenzenearsonic acid compd such as *p*-hydroxy-*m* nitrobenzenearsonic acid with Zn in an aq soln of a caustic alkali at temps of 40–70°, removing excess Zn, neutralizing the soln and sepg the pptd aminobenzenearsonic acid

Concentrating acetic acid Soc des produits chim de Clamecy and Ernest Charles. Fr 676,803, Sept 18, 1929 AcOH in aq soln is concd by using 2 solvents, A and B, for the AcOH A permits extn of AcOH from water, this solvent being slightly sol in water and dissolving only slight quantities of water B is insol in A and can dissolve the AcOH in A and give by distn a concd AcOH. Solvent A may be $C_6H_4$ xylene, $CCl_4$ or a mixt. of these with $CHCl_3$, PhOH, castor oil or $PhNO_2$ B may be $H_2SO_4$, $H_3PO_4$, a mixt of these or a concd soln of $CaCl_2$

*p*-Sulfobenzoylbenzoic acid Scottish Dyes, Ltd Ger 516,674, Dec. 1, 1926 4'-Halogen 2 benzoylbenzoic acid or its salts is treated with a neutral or acid soln of sulfite above 100° A small quantity of Cu salt may be added Thus, Na 4'-chlorobenzoyl 2 benzoate is mixed with $Na_2SO_3$ and water in an autoclave and heated under pressure to about 180° After some hours, the contents of the autoclave are filtered, and 4'-sulfobenzoyl 2 benzoic acid can be obtained from the filtrate A yield of 95–100% is obtained A further example is given

*N*-Methyl- and *N* ethyl-5,5-alkylphenylbarbituric acids. I G Farbenind A-G Brit 339,037, Aug 14, 1929 Compds of this class are prepd by treating alkylphenylmalonic or -cyanoacetic esters or their derivs such as esters, amides, amide-acid esters, chlorides and nitriles, with *N* methyl or *N*-ethyl urea or its derivs. such as *N*-methyl or *N*-ethyl thioureas, guanidines and isothiourea ethers, together with other customary treatments The same products can also be prepd by methylating or ethylating 5-phenyl or 5,5-alkylphenylbarbituric acids, or by alkylating a *N*-methyl or *N*-ethyl 5 phenylbarbituric acid, or by first alkylating a deriv of the latter compd and then converting it into the desired acid Examples are given of the production of *N*-methyl and *N*-ethyl-5,5-phenylethylbarbituric acids, and *N*-methyl 5,5-phenylmethylbarbituric acid, and mention is also made of *N* methyl-5,5-phenylpropylbarbituric acid

Sulfonic acids of 1-ω-aminomethylnaphthalene I G Farbenind A G (Wilhelm Herzberg and Hans Lange, inventors) Ger 472,823, Mar 25, 1927 See U S 1,785,955 (*C A* 25, 524)

Sulfur derivatives of fatty acids I G Farbenind A G Fr 696,560, June 2, 1930 Derivs of higher fatty acids contg S are made by the reaction of solns of sulfides or polysulfides on polyhalogen fatty acids and their derivs, if necessary with heat and pressure and with or without catalysts Examples are given of the treatment of hexachlororicinoleic acid (cf Fr 678,856, *C A* 24, 3517), heptachlorostearic acid, etc. The products are very reactive and are used for the prepn of new products

Aliphatic anhydrides. Henry Dreyfus Fr 695,969, May 22, 1930 Aliphatic

acids, particularly AcOH at 350–700°, are decompd in the presence of a catalyst deposited or spread on an asbestos support. The catalysts described in Fr 613,841, 634,167 (*C A* 22, 3892), 667,553 (*C A* 24, 1124), 667,500 (*C A*. 24, 1124) and 674,988 (*C A* 24, 2759) can be used Cf *C A* 25, 1538.

Aliphatic anhydrides. C F Boehringer & Soehne G m b H Fr 696,530, May 26, 1930 Aliphatic anhydrides and AcH are prepd by dissocg with heat, in the presence of catalysts, the products of the action of the corresponding fatty acids or their salts on α,α'-dichlorodiethyl ether Examples are given of the production of $Ac_2O$ and propionic anhydride using $ZnCl_2$ or $SnCl_2$ as catalyst

Acetic anhydride. C F Boehringer & Soehne G m b H Fr 696,154, May 27, 1930 $Ac_2O$ is prepd by submitting AcOH to a pyrogenic decompn in the presence of a catalyst presenting an incomplete development of its surface, *e g*, a gel of $SiO_2$ or $Al_2O_3$ having an incomplete development of its surface The porosity of the surface of the catalyst can be reduced by the action of $NH_3$ or HCl or by introducing C into the pores of the catalyst, or by heating it to a temp at which it begins to agglutinate

Acetic anhydride. Imperial Chemical Industries Ltd Fr 696,711, June 6, 1930 $Ac_2O$ is prepd by a pyrogenic treatment of AcOH followed by a sepn of the $Ac_2O$ by means of a solid absorbent such as wood charcoal

Benzoic anhydride I G Farbenind A G Ger 520,153 Aug 30, 1928. Two mols. of benzoyl chloride are caused to react with 1 mol of $H_2O$, better yields are obtained by completing the reaction at 260–280° A catalyst, *e g*, a metal or a chloride of P, may be present Examples are given

Acetylene. Dennis A Brading (one-third to Mayme Brading). U S. 1,797,400 March 24 Solid carbon is passed in finely divided state in an angular direction past an elec. arc in an atm of separately introduced H App is described.

Ethylene. N V de Bataafsche Petroleum Maatschappij Fr 696,561, June 2, 1930 Ethylene is absorbed in strong acids in the presence of catalysts contg one or more metals or compds of the Pt group in a finely divided state and preferably disposed on a support, or compds. of Cu, Fe, Co or Ni which if insol are solubilized by bubbling CO or NO through the liquid or if sol are converted into complex compds by means of CO or NO.

Alcohols from olefins. N V de Bataafsche Petroleum Maatschappij Fr. 695,849, May 19, 1930 See 335,551 (*C A* 25, 1536)

Methanol synthesis. Wm J Edmonds and Leonard A Stengel (to Commercial Solvents Corp) U S 1,797,569, March 24 In effecting catalytic reaction of H with C oxides, substantially pure H is first circulated over a catalyst such as oxides of Zn and Cr and there is then added to the circulating gas a mixt. of H and C oxides in proportions required to produce MeOH and effect continuance of the reaction under suitable pressure.

Butanol and higher alcohols. N V de Bataafsche Petroleum Maatschappij Fr 695,765, May 16, 1930 See Brit. 336,811 (*C A* 25, 1844)

Amino alcohols. Helmut Legerlotz Fr 695,675, May 15, 1930. Aromatic amino alcs. and their derivs. of the type $XOC_6H_4CH(OH)CHYNRR'$, in which X, Y and R denote an atom of H, a univalent hydrocarbon group or an acyl group and R' a univalent hydrocarbon group, are prepd. by the reaction of H under ordinary or increased pressure on the corresponding ketonic compds. as a soln of the base or its salts in an appropriate solvent such as water, EtOH or MeOH and in the presence of a catalyst such as metals of the Pt group, Ni, etc.

Ethylene glycol. Albert Maier Fr 697,171, June 10, 1930. Polyalcs., particularly ethylene glycol, are prepd by sapong org esters, preferably acetates, isolated after prepn in known manner from appropriate halogenated hydrocarbons, by water in excess, under pressure, at temps. above the b p

Acetaldehyde from acetylene. Consortium für elektrochemische Industrie G m b H (Erich Baum and Martin Mugdan, inventors) Ger. 517,893, July 16, 1914 $CH_2O$ is formed by the action of a hot soln of 6 to 35% $H_2SO_4$ on $C_2H_2$ in the presence of Hg compds as catalyzers The $C_2H_2$ is circulated in excess through the app, the proportion of absorbed $C_2H_2$ to unabsorbed $C_2H_2$ being kept so that no material alteration of temp occurs during the reaction. Agents to absorb or polymerize the formed $CH_2O$ are present. An example is given Cf *C A* 25, 2441.

Monoethanolamine dinitrate. Dynamit A G vorm Alfred Nobel & Co (Phokion Naûom and R. von Sommerfeld inventors) Ger 514,955, Dec. 6, 1929. A soln. of monoethanolamine or monoethanolamine mononitrate in concd $HNO_3$ is introduced into alc. with cooling Examples are given stating that 76–90% yields are obtained

Monoethanolamine dinitrate. Dynamit A G vorm Alfred Nobel & Co (Hokuon Nauom and Robert von Sommerfeld, inventors) Ger 517,832, Apr 12, 1930 Addn to 514,955 (preceding abstr.) $NH_2C_2H_4OH$ is dissolved in excess of concd $HNO_3$ and the excess acid distd off *in vacuo* The residue is added to alc. or alc.-ether mixt with cooling, to ppt the dinitrate. Examples are given in which 88 and 97% yields are claimed

Hexamethylenetetramine. S Karpen & Bros. Ger 521,476 April 21, 1927 A mixt of $(CH_2)_6N_4$ and $NH_4Cl$, such as is obtained by reacting $CH_2Cl_2$ with $NH_3$, is sepd into its components by extn with a satd soln of $NH_4Cl$ $(CH_2)_6N_4$ is ppted from the ext by means of $NH_3$, and washed with a concd soln of $NH_3$ The extn with $NH_4Cl$ soln is effected in a series of containers, the ext from one batch of mixt being passed to the container for the next batch

Hexamethylenetetramine S Karpen & Bros. Ger 521,475, Oct 29, 1925. See Brit 240,416 (*C A* 21, 414)

Oxidizing tetrahydronaphthalene J D Riedel-E de Haën A G (Ludwig Hess and Simon Felser inventors). Ger 520,201, Apr 21, 1925 α-Ketotetrahydronaphthalene and other oxidation products of tetrahydronaphthalene are prepd by treating the latter at a temp below 130° with O or gases contg O, preferably in the presence of a catalyst, *e g*, a salt or oxide of Mn or Cu. Examples are given

1-Alkoxybenzene-3-thioglycol-4-carboxylic amide I G Farbenind A G. (Norbert Steiger, Erwin Hoffa and Hans Heyna, inventors). Ger 516,904, Apr 13, 1927 Addn. to 514,505 (*C A* 25, 2156) The method of 514,505, is used for the prepn of the above, using 1-alkoxybenzene-4-cyano-3-sulfonyl chloride as the starting material This is treated with a metallic reducing agent in the presence of a strong mineral acid and an indifferent org solvent, and condensing the resulting 1-alkoxybenzene-4-carboxylic amide-3 mercaptan with $ClCH_2COOH$ In an example, 1-methoxybenzene-4-cyanobenzene-3-sulfonyl chloride is reduced by Zn dust and HCl to give the corresponding mercaptan which is then treated with $CH_2ClCOOH$ to give 1-methoxybenzene-3 thioglycol-4-carboxylic amide, m. 208° A further example is given.

Oils containing cineole. Rheinische Kampfer-Fabrik G m b H Fr 696,424 Apr 9, 1930 Ger 519,447, Apr 16, 1929 Mixts of oils contg cineole are prepd by treating terpinol hydrate, terpinol, terpineol or like compds which have the same empirical compn as cineole, or a higher water content, at temps. below 80° with dehydrating agents such as $H_2SO_4$, $H_3PO_4$, sulfonic acids, etc. The mixt. of oils can be extd by indifferent agents such as $CHCl_3$, PhMe, etc.

Camphor. I G Farbenind A.-G (Otto Schmidt, inventor) Ger 520,224, June 25 1927 Camphor is prepd by treating borneols at a raised temp. with mixts of dehydrogenating catalysts with metal oxides other than alkali or alk. earth oxides Thus, vaporized borneol and isoborneol can be passed at 350° over a contact mass prepd by heating a mixt. of $NiCO_3$ and MnO in H.

Menthol. Hans Jordan (to Schering Kahlbaum A.-G.) U S. 1,797,612, March 24 See Ger 512,719 (*C A* 25, 1260) and 514,594 (*C A* 25, 2157)

Inactive menthol Rheinische Kampfer Fabrik G m b H (Karl Schöllkopf, inventor) Ger 516,651, Oct 11, 1922 Addn to 489,819 (*C A*, 24, 2145) The racemic liquid mixt of isomeric menthol is sepd. by direct treatment with H under pressure in the presence of catalyzers. In the example, the liquid mixt is heated to 200° with H under a pressure of 5–30 atm in an autoclave, in the presence of a Ni catalyzer The catalyzer is removed by distn or filtration and the inactive menthol (of higher m. p.) is sepd by freezing and centrifuging Mixts of thymol isomers can be sepd by the same method

Acrolein Schering-Kahlbaum A G Fr 695,931, May 21, 1930 Acrolein is made from glycerol using as catalysts salts of acids having at least 3 acid functions or mixts. of these salts Examples are given of the use of phosphates of Fe and La

Polyglucosans. Karl Freudenberg and Burckhardt Helferich Ger 521,340, July 14, 1929 Mono- or di saccharides are treated with practically anhyd HF. Examples are given

Morpholines. Imperial Chemical Industries Ltd Ger 520,156, July 6, 1928. See Brit 298,336 (*C A* 23, 2723)

Styrenes and polymers. The Naugatuck Chemical Co Fr 695,575 May 14 1930 A halogenated alkylbenzene and an org base such as pyridine are heated together under a pressure not above normal Examples are given Fr 695,576 describes the prepn of compact non friable polymers of styrenes by heating the styrene at atm pressure in soln., in the presence of a substance chosen from among a group contg alkali hydroxides, alkali salts, org bases and water Cf *C A* 25, 1538.

# 11—BIOLOGICAL CHEMISTRY

PAUL E HOWE

## A—GENERAL

FRANK P UNDERHILL

The solubility of phosphatides. BRUNO REWALD *Allgem Öl Fettztg* 27, 363–4(1930).—After fresh egg yolk was extd. with acetone, it was found that the ext was richer in lecithin than the residue The solv of the lecithin is probably due to the complex mixt. of acetone, egg oil, lecithin and water For a true estn. of lecithin, the acetone ext. must be analyzed for P as well as the alc. ext. of the residue W F BOLLENS

Temperature and life and death. A T CAMERON *Trans Roy Soc Can* 24, Sec V, 53–93 1930.—A review A T C.

Action of proteolytic enzymes on crystalline insulin. A F CHARLES AND D A SCOTT *Trans Roy Soc Can* 24, Sect. V, 95–9(1930).—Cryst insulin cannot be broken down into a simpler physiol active substance by the proteolytic action of pepsin or trypsin. A. T CAMERON

Studies in cholam diastase. I. Electrodialysis and electroösmosis of cholam diastase D NARAYANAMURTI AND ROLAND V NORRIS. *Proc 15th Indian Sci Congr* 1928, 166.—By electrodialysis cholam malt diastase can be purified and considerably increased in activity The ash and protein contents are much reduced by this method. An attempt was made to test the two-enzyme theory of diastase by electroösmotic expts. *Preliminary expts. conducted in a 5-celled app indicate some evidence in favor* of the theory, the ratio, liquefaction power and saccharification power being different in the different fractions. E J C

Kinetics of diastatic action. D NARAYANAMURTI AND ROLAND V NORRIS. *Proc 15th Indian Sci Congr* 1928, 166.—In expts. on the hydrolysis of potato, rice and cholam starches and oyster glycogen by cholam diastase, glycogen, in agreement with other observers, is found to be the most resistant. E J. C.

The behavior of polypeptides built up of glycine and alanine toward polypeptidases and normal alkali. EMIL ABDERHALDEN AND ELLA VON FIRNENWALL *Fermentforschung* 12, 376–410(1931).—Evidence thus far obtained seems to indicate that the simple amino acids, glycine and alanine, *do not occur successively but alternately in the peptide* chains of proteins. Polypeptides built up exclusively of glycine are more or less resistant to trypsin kinase and erepsin, depending on the length of the chain. Di- and tri-peptides of alanine are amenable to erepsin but not to trypsin kinase, and longer chains have not yet been tested. The present paper deals with polypeptides in which there is an alternation of glycine and alanine The usual method of synthesis was employed, and a no of the peptides were converted into the PhNCO, β-$C_{10}H_7SO_2$ and Bz derivs The products were subjected to the hydrolytic action of erepsin, trypsin-kinase and *N* NaOH Chloroacetyl-*d*-alanine (I) ⟶ glycyl-*d*-alanine (II), $[\alpha]_D^{20}$ −42° ($NH_4Cl$ double salt, $[\alpha]_D^{20}$ −9.4°) ⟶ *d-α-bromopropionylglycyl-d-alanine*, decompg 192°, ⟶ *d-alanylglycyl-d-alanine* (III), decompg above 259°, ⟶ *chloroacetyl-d-alanylglycyl-d-alanine* (IV), sinters 191°, ⟶ *glycyl-d-alanylglycyl-d-alanine* (V), browns 231°. *dl-Alanylglycine* (VI) ⟶ *chloroacetyl-dl-alanylglycine* (VII), decompg 180–7°, ⟶ *glycyl-dl-alanylglycine* (VIII), m. 243°, ⟶ *dl-α-bromopropionylglycyl-dl-alanylglycine* (IX), decompg 183°, ⟶ *dl-alanylglycyl-dl-alanylglycine* (X), decompg 260°. II ⟶ *chloroacetylglycyl-d-alanine* (XI), m. 157°, ⟶ *glycylglycyl-d-alanine* (XII), browns 215°, ⟶ *dl-α-bromopropionylglycylglycyl-d-alanine* (XIII), m. 166–9°, ⟶ *dl-alanylglycylglycyl-d-alanine* (XIV), m. 203°. Similar syntheses through the amino acid chlorides also were undertaken, but with poorer yields. I + $PCl_5$ ⟶ *chloroacetyl-d-alanyl chloride* (XV) + II ⟶ V. $NH_4$ salt of I in $Et_2O$ + $POCl_3$ ⟶ XV + II ⟶ V. II in AcCl + $PCl_5$ ⟶ XV + II ⟶ V. *d*-Alanine ⟶ *d*-alanyl chloride + II ⟶ III ⟶ IV, $[\alpha]_D^{20}$ −119°, ⟶ V. The Bz deriv of V m. 174°, the PhNCO deriv. of: II m. 151°, III m. 148°, V m. 178° (decompn.), VI m. 203°, VIII decomposes 208°, X m. 144°, XII m. 176° (decompn.), XIV m. 162°, the β-$C_{10}H_7SO_2$ deriv of III m. 182° (decompn.), V decomps. 215°, VI m. 175°, VIII m. 213° (decompn.), X sinters 202°, XII sinters 222°, browns 245°, XIV decomposes above 257°; the di-β-$C_{10}H_7SO_2$ deriv of II decomposes 250°. Cu salts were prepd. from II, III and V and their optical rotations detd with a quartz-Hg lamp The 2 dipeptides II and VI were hydrolyzed at practically the same rate by *N* NaOH at 37°, and the tripeptides III, VIII and XII at different rates; the last was hydrolyzed the most

centrifuge it is necessary to know the partial sp. vol. A graphic method is described which is an extension of the method of Lewis and Randall for the calcn. of partial molar vol. from pycnometric data. N. A. LANGE

Studies in iodized casein. I. Preparation of iodized casein. SHIGEKI MASUI *Acta Schol. Med. Univ. Imp. Kanto* 13, 254–70(1931).—To obtain iodized casein with the max. content of I, M. treated an alk. soln. of casein with a soln. of $I_2$-KI in NaOH, $Na_2CO_3$, $KHCO_3$ and $NaHCO_3$ solns. at 0, 18, 35–40, 60–65 and 80–85°. The iodized casein was dissolved in an excess of NaOH and ppted. with $NaHSO_3$ and $H_2SO_4$. It was purified by ppts. and dried with the aid of alc. and ether. The final product was tested for protein reaction and I content. The KI and $Na_2CO_3$ method at 18–40° proved most appropriate for M.'s purpose. II. The behavior of iodized casein toward proteolytic enzymes. *Ibid.* 271–83.—The iodized casein was hydrolyzed by pepsin, trypsin and tissue proteases; afterward half of its I could be ppted. by $AgNO_3$. III. The behavior of iodized casein in the dog. *Ibid.* 284–6.—When the iodized casein was fed to dogs, (2.9–6.9)% of the I was recovered in the urine in the form of inorg. iodides. Org. compds. contg. I, if present in the urine, were so scarce that they could not be isolated. B. S. LEVINE

The lipoids with a special review of the newer developments in lipoid research. HUGO MAGNUS. *Ergeb. Physiol.* 31, 165–355(1931).—A review. C. M. M.

Potential differences across natural membranes separating unlike salt solutions. S. C. BROOKS, A. C. GIESE AND R. J. GIESE. *J. Exptl. Biol.* 8, 124–32(1931).—When the lower epidermis of the bulb scale of the onion is used as a membrane to sep. 0.1*M* and 0.01*M* solns. of KCl, NaCl or LiCl a transient p. d. occurs. The magnitude decreases in the order K > Na > Li. The p. d. of 0.1*M*–0.01*M* $CaCl_2$ is small and opposite in sign. If the epidermis seps. like concns. of K, Na and Li a low potential arises. When K salts with different anions are used in the cells, little p. d. is observed. The epidermis seems to be a mosaic of anion and cation permeable areas. C. M. M.

The arginase law and the formation of urea in the autolysis of the liver of vertebrates. A. CLEMENTI. *Boll. soc. ital. biol. sper.* 5, 1142–4 1930).—The aim was to see whether a close parallelism existed between the presence of arginase in the liver and the formation of urea during the autolysis of the liver of various classes of vertebrates. Only in the liver of those vertebrates in which arginase is absent (birds, Ophidiidae) was there a const. and defin. te lack of urea, whereas in the liver of those vertebrates in which arginase is present (mammals, Chelonidae, amphibians, fishes), urea was formed during the autolysis. These results indicate that in the absence of the "arginine-arginase" system, the formation of urea in the liver does not take place, a fact, which supports the hypothesis that the formation of urea in the autolysis of liver is basically bound to the "arginine-arginase" system and not to other factors. PETER MASUCCI

Biochemical investigations on the cerebrospinal lipoids. GISELDA LEANCALANI AND RENATA SOCAL. *Arch. fisiol.* 28, 282–8(1930). *Physiol. Abstracts* 15, 593, cf. *C. A.* 24, 4071.—The influence of species, age and alimentation on the cerebrospinal lipoids has been studied. A. D. MEYER

The optical alterability of bilirubin solutions. EMILIO BROCART. *Arch. fisiol.* 28, 452–60(1930), cf. *C. A.* 24, 3235.—The changes (fading) are due to O, light, $p_H$ and enzymes. It is never observed in pure solns. A. E. MAYER

The catalase in human blood in its relation to the season. MARIO RIGONI. *Arch. fisiol.* 28, 462–9(1930).—The catalase content in the blood has a max. in spring and in fall. The temp. is not the only influencing factor. A. E. MAYER

The presence of urease in the human gastric mucosa. MARIO RIGONI. *Arch. ital. biol.* 84, 74–8(1931), cf. *C. A.* 24, 2787.—Urease is found in the human gastric mucosa where it is supposed its function is to liberate $NH_3$ which is changed to $NH_4Cl$ in the blood and serves as the material out of which HCl is then produced by the gastric glands. S. MORGULIS

Biological oxidoreduction. H. VON EULER AND R. NILSSON. *Skand. Arch. Physiol.* 59, 201–16(1930).—The transformation of polysaccharide and hexose to hexose diphosphate ester in buffered mixts. is discussed and the role played in this process by the coferment is pointed out, as well as the effect of adding AcH to the system. The possible action of coferment in the synthesis of higher carbohydrates is considered. The carbohydrate stored by yeast living on galactose has been studied specially and it was found that it probably yields Robison's ester on hydrolysis. S. MORGULIS

Reciprocal relationship between cholesterol and some protein fractions. V. N. NEKRITOV. *Biochem. Z.* 232, 50–7(1931).—A certain portion of the cholesterol of normal horse and dog plasma is firmly bound to the globulin fraction and to a part of the fibrin. A similar combination has been found in certain fractions of hen egg pro-

tein and in a part of the horse serum fractions precipitable by tungstic acid after preliminary removal of the globulin and albumin fractions Cholesterol forms a less firm combination with the albumins, a portion of the fibrin, of the egg protein and of the same horse serum fractions S. MORGULIS

Behavior of phosphate buffer mixtures with different cations. S M NEUSCHLOSS AND R PÉREZ IBÁÑEZ *Biochem Z* 232, 106–22(1931) —It is shown that the classical formula does not correctly express the H-ion concn of phosphate mixtures, and a different formula is suggested which reproduces more closely the exptl values In mixts of $NH_4H_2PO_4$ and $(NH_4)_2HPO_4$ the $p_H$ is always less than in corresponding mixts of the K salts This difference is due, for one thing, to the diminished activity of the $HPO_4^{--}$ ions in the presence of $NH_4$ ions and secondly, to the hydrolysis which $NH_4H_2PO_4$ undergoes in relatively alk solns A buffer equation is proposed which gives satisfactory results with mixts of the $NH_4$ salts The difference between the $p_H$ of K or $NH_4$ phosphate mixts increases with rising concn of the phosphate or with the addn of NaCl to the mixts The osmotic pressure and conductivity factors of $(NH_4)_2HPO_4$ are less than those of $K_2HPO_4$ of the same concn S MORGULIS

Further studies on amylosyntheases S NISHIMURA *Biochem Z* 232, 150–61 (1931), cf *C A* 25, 2149 —The higher dextrins can be synthesized enzymically, the synthetic product being more easily hydrolyzed by malt amylase than the simple dextrins from which the higher form was synthesized The more highly the dextrins are polymerized, the closer does their hydrolysis resemble that of starch S M

The absorption spectrum of bilirubin in chloroform, alcohol and alkalies. LUDWIG HEILMEYER *Biochem Z* 232, 229–39(1931) —Bilirubin in soln in $CHCl_3$ or in EtOH shows a very definite absorption band with a max at 450 $\mu\mu$, diminishing continually from this point even into the ultra violet range of the spectrum In alkali bilirubin manifests continuous absorption in the visible range, but the absorption curve cannot actually be detd on account of the extreme instability of the alk soln This is due not to an oxidative alteration of the bilirubin but simply to the alk solvent S M

Glucoseoxidase. IV. Glucoseoxidase from Aspergillus niger. Behavior toward disaccharides (maltoseoxidase), glucuronic acid and ethyl alcohol, experiments with methylene blue and monoiodoacetic acid. D MÜLLER *Biochem Z* 232, 123–31 (1931), cf *C A* 24, 2769 —Prepns of glucoseoxidase do not act on lactose, but they do affect sucrose, the glucose formed from its hydrolysis being oxidized to glucuronic acid When the enzyme prepn is heated for 30 min at 70° the sucrase is destroyed but not the glucoseoxidase, and it no longer acts upon the sucrose The effect upon maltose is direct, the maltose actually being oxidized by the prepn, but this is due not to the glucoseoxidase but to a different enzyme, maltoseoxidase, which is more thermostable than the former and oxidizes maltose with atmospheric $O_2$ to a non reducing substance Glucoseoxidase does not act either upon glucuronic acid or EtOH, its oxidative function being apparently limited to compds with the same configuration on the C atoms 1 and 6 as in glucose $CH_2ICO_2H$ injures the activity of the glucoseoxidase much less than that of zymase Prepns of glucoseoxidase contain only malic acid dehydrase, as they promote the reduction of methylene blue only by malic acid This reductase action is inhibited by glucose, fructose, glucuronic acid, etc S M.

*Methylglyoxalylacetic acid and its dismutation by Bacillus coli.* STIG VESTIN. *Biochem Z* 232, 435–41(1931) —Evidence is brought forward to show that *B coli* accomplishes almost quantitatively the dismutation of methylglyoxalylacetic acid to *d α hydroxyglutaric acid This is an asym biosynthesis, since exclusively the* dextrorotatory acid, in a practically pure condition, appears S MORGULIS

Comment on Lustig's paper—"Studies on the concentration of pepsin and chemistry of its action." I A SMORODINTZEV AND A N ADOVA *Biochem Z* 224, 471–3 (1930) —It is shown that Lustig's results (*C A*. 24, 636) do not contradict, but on the contrary corroborate, the previous findings of S and A S MORGULIS

*The order of death of organisms larger than bacteria.* OTTO RAHN. *J. Gen Physiol* 14, 315–37(1931), cf *C A* 24, 2489, 3530 —In a previous publication, R. showed that the logarithmic order of death of bacteria can be accounted for by assuming the presence of some very unstable mols so essential for reproduction that the inactivation of a single one of these mols prevents cell reproduction and makes the cell appear dead according to the standard method of counting bacteria In the present paper the motile alga, *Chalmydomonas*, is the only one of the larger organisms dealt with which has a logarithmic order of death. Probably more than 1 mol must be destroyed to kill a yeast cell The following cells or organisms give curves (log of survivors plotted against time) which suggest that the no. of essential reacting mols is

1/6 *N* alkali The diazo reagent is about 1/6 *N* acid because of HCl On mixing equal vols of the 2 a weakly acid soln is obtained buffered by $NaH_2PO_4$ The method was tested with a standard bilirubin soln in chloroform with 1 0 to 0 1 cc of the bilirubin soln Ninety six % alc. was added to make each vol 10 cc and to this 2 5 cc of the phosphate buffered diazo reagent was added The color produced from each was read in a Duboscq colorimeter against a standard contg 0 05 mg bilirubin A graph from the results shows a strict linear proportionality between the amt of bilirubin present and the amt of color produced from it by the diazo reagent For routine work in examg serum for bilirubin to 1 cc of serum is added 0 5 cc of diazo reagent and 2 8 cc of 96% alc., giving a dilu of approx 1 in 4 It is preferable to express the concn of bilirubin in the serum as mg per 100 cc HARRIET F. HOLMES

A method for the cataphoresis of biological materials. F C SMITH AND J MARRACK *Brit J Exptl Path* 11, 492–4(1930).—An app for the cataphoresis of biol materials is described It was designed to afford (1) a continuous path of buffer soln for the current passing between the electrodes, so that no agar bridges need be employed, (2) uniformity of the bore of the tube connecting the vessels contg the electrodes, so that the potential gradient across the moving boundary can be easily measured, (3) ease of filling and forming a sharp boundary with small vols (2 or 3 cc.) of the suspensions to be tested, (4) ability to withdraw the whole sample should it be needed for other investigations, (5) a method of obtaining small samples during cataphoresis without disturbing the boundary, so that the effect of the reversal of polarity could be studied when the boundary is invisible (*e g*, virus suspensions), (6) ease of washing out with cleaning fluids HARRIET F. HOLMES

Studies on the biochemistry of sulfur. IV. Colorimetric estimation of cystine in casein by means of the β naphthoquinone reaction. M X SULLIVAN *U S Pub Health Repts Suppl* No 78, 13 pp (1929), cf *C. A.* 20, 2086, 23, 3941, 4445.—*Procedure for the hydrolyzate*.—Various amts of casein from 1 to 10 g have been hydrolyzed The 5 g samples are best, in general, since the final vol of soln prepd for colorimetric work is sufficient to give several tests and to allow comparison with the Okuda (cf *C A* 18, 2014, 3013, 3400, 20, 1094, 1252) and the Folin-Looney methods (cf *C A.* 16, 1790) The 5 g of casein and 15 to 20 cc. of 20% HCl are put into a small acetylation flask, fitted with a ground glass reflux The flask is then placed in a crisco bath, the heating started and hydrolysis run for 6 hrs , the count begins at the time the bath reaches 125° The inside temp of the hydrolyzate runs about 106°. The black mixt is poured out into a 100 cc. beaker, and, by washing with distd water, made to about a 10% acid The combined mixt. is decolorized by warming with purified (acid extd ) decolorizing C, 2 g in case norite is used, as was S 's practice, or, better, 0 3 g carboraffin, which is now his practice The mixt. is filtered on a small Buchner funnel, and the residue on the paper is extd with 15 cc of hot *N* HCl and then washed with 15 cc. of cold *N* acid The combined filtrates are neutralized with 5 *N* NaOH added dropwise with stirring until the $p_H$ is about 3 5 (that is, yellow to thymol blue) and made to 50 cc by means of 0 1 *N* HCl With small amts of material, only 1 g of casein has been used The sample is mixed with 5 cc of 20% HCl and put into the oil bath and hydrolyzed 6 hrs The mixt is poured out and, by washing with distd. water, made to 10 cc , decolorized, neutralized and brought to about 25 cc with 0 1 *N* HCl, and the colorimetric detn made as soon as possible. Later, work with 1 g samples, with and without the formation of humin, will be reported *Colorimetric estn*.—To 5 cc. of the neutralized hydrolyzate, brought to a definite vol and with the temp of the soln not under 20°, add (*A*) 2 cc of 5% aq NaCN, mix, and wait 10 min ; then add (*B*) 1 cc. of 0 5% aq sodium 1,2-naphthoquinone-4-sulfonate and mix by shaking for 10 min ; next add (*C*) 5 cc. 10% $Na_2SO_3$ in 0 5 *N* NaOH, mix, let stand 30 min , add (*D*) 2 cc. 5 *N* NaOH, mix and finally add (*E*) 1 cc. of a 2% $Na_2S_2O_4$ in 0 5 *N* NaOH Compare with 5 cc of a cystine standard, 100 to 200 p p m in 0 1 *N* HCl, similarly treated The standard and unknown should be close together in colorimetric reading On adding the $Na_2S_2O_4$ the brown red color developed in the cystine-contg soln is changed to a more vivid red, if cystine is present to the extent of 100 p p m or over Weaker solns tend toward orange Other substances in protein hydrolyzates may show color in the first stages of the reaction, but this color in the absence of cystine or cysteine is discharged to yellow by the hyposulfite When the standard was pure cystine directly dissolved in 0 1 *N* HCl, the cystine content of casein purified by heating with dil $CH_3COOH$ was found to be 0 28% (uncorrected for moisture or ash) When the standard was cystine put through the same procedure of heat treatment with decolorizing agent, neutralizing, etc., that the casein went through, the cystine content of the casein was found to approximate 0.30% (uncorrected for moisture and ash). Crude casein and casein

ifferent treatments were found to vary greatly The loss of cystine in the ordi- ocedure of hydrolyzing decolorizing, etc., is mainly in the use of decolorizing The formation of the dark colored humin, acid sol and acid insol, was checked ucting the hydrolysis in a reducing atm such as furnished by $SnCl_2$ and $TiCl_3$ ems more useful for the prevention of humin, since it can be pptd out by neu- on The findings with Ti are slightly higher than without its use; but pend- study of the effects of high salt content, traces of Ti, etc., on the color develop- hese findings are left open to future interpretation There are 39 references literature IX. Estimation of cysteine in the presence of glutathione. M IVAN AND WALTER C HESS *U S Pub Health Repts* 46, 390–3(1931), cf 5, 2470 —Meldrum and Dixon (cf *C A* 24, 5315) found that the Sullivan for cysteine (cf *C A* 20, 2686) was markedly inhibited by the presence thione in the proportion of 9 0 mg of glutathione to 1 0 mg of cysteine If ivan procedure detailed in a later paper (cf *C A* 23, 3941) had been followed author they would have found that reduced glutathione in the proportion g to 1 0 mg of cysteine has no inhibiting effect on the estn of cysteine. To each soln and standard add 1 cc. of a freshly prepd aq soln of NaCN, shake, 1 1 cc of a freshly prepd 0 5% aq soln of sodium 1,2-naphthoquinone-4 sul- shake at 1 sec ), add 5 cc. of 10–20% soln of anhyd $Na_2SO_3$ in 0 5 *N* NaOH, l and wait min at about 20° A reddish brown color appears. Then add a 2% soln of $Na_2S_2O_4$ in 0 5 *N* NaOH The brown red color in the presence ine is convert l into a purer red The reaction is given by no other compd not even thione or cysteine amine or even isocysteine. Even at the S mg of glut ne to 1 0 mg of cysteine, the colorimetric reading of the 1 0 the mixt was when matched against 1 0 mg of cysteine similarly treated at 20 Higher lutathione content calls for more naphthoquinone When to tathione cysteine mixt 36 mg to 1 and to standard cysteine soln 1 0 mg in 5 1 *N* HCl there were added 1 cc of 1% aq NaCN and 1 cc. of a 1% soln. of the oquinone followed by the regular $Na_2SO_3$ in the 0 5 *N* NaOH and then after color development by 1 cc. of the $Na_2S_2O_4$ in 0 5 *N* NaOH, no inhibition oc-

For glutathione cysteine mixt 100 to 1 the following procedure is recom- d To 5 cc. of the mixt and standard add 1 cc of 1% aq NaCN, 2 cc. of 1% aq a 1,2 naphthoquinone-4 sulfonate, followed by 5 cc. of 10% $Na_2SO_3$ in *N* NaOH fter 30 min standing, by 1 cc. of a 2% soln of $Na_2S_2O_4$ in *N* NaOH J. A. K.

A semi-micromethod for the rapid and complete analysis of human milk. MICHAEL ORSKI AND A LESPAGNOL. *Bull soc chim biol* 12, 1195–1211(1930) —Details en for the detn of total solids and Cl on 1 cc., casein and reducing value on 2 se of $K_2HgI_4$ pptn, and fat and sugars on 1 cc. after silicotungstic pptn and ith ether (Bang method) C. G KING

determined carbon and glucidic carbon in normal urine. PAUL FLEURY AND AMBERT. *Bull soc chim. biol.* 12, 1255–68(1930).—See *C. A.* 25, 1862. C. G KING

ethods of determining bile salts in bile and duodenal juice. L. CUNY. *Bull m biol* 12, 1298–1318(1930), cf *C. A* 25, 1862–3 —A crit discussion is given of ls in general use C. G. KING

e quantitative limits of the Gerhardt and Legal reactions for the estimation of compounds. ADOLF PSCUDERO *Rev facultad ciene quim* (*Univ La Plata*) 7, 7–52(1930) —Legal's reaction as applied to urine is pos when acetone or diacetic ceeds 0.25 g per 1000 cc. The reaction of Gerhardt is pos. when diacetic acid 0.2 g per 1000 B. S. LEVINE

e preparation of a secretin concentrate. A. C. IVY, G KLOSTER, G. E. DREW- D H C. LUETH. *Am J. Physiol.* 95, 35–9(1930) —An improved method which ble, rapid and relatively inexpensive is described. The NaCl ppt. (*C. A.* 24, s extd with alc. at a concn. of 70–85%, which dissolves about 50 to 75% of the . The exts. are evapd to dryness over a water bath with addn. of water oc- lly to prevent inactivation of secretin The residue is suspended in water and id for 10 to 12 hrs. Then NaOH is added to $p_H$ 5 3 to 5 7 when max floccula- curs. To the clear filtrate add enough 20% trichloroacetic acid to give 5% in the mix and let stand 4 to 12 hrs in a cold place, centrifuge and wash the ith anhyd, aldehyde-free acetone and ether. The av. effective dose of the ppt g is 0 7 mg It contains 1 dose of cholecystokinin for 7 to 10 doses of secretin ot. from the isoelec. pptn contains secretin which can be extd by 0 4% HCl, with $CCl_3CO_2H$ at 5% concn, sepd by the centrifuge and washed with acetone

and ether This prepn is free from cholecystokinin Its effective dose per dog is 0 61 mg J F. Lyman

Cardiac output in normal men. I Starr, Jr., and L. H Collins, Jr *Am J Physiol* 96, 228–42(1931) —Expts on the fundamental assumptions of the improved Ftl method for the detn of cardiac output were repeated with results that give greater confidence in the method The cardiac output under various conditions was detd J F. Lyman

The measurement of the red-cell volume. E Ponder and G Saslow *J. Physiol* 70, 18–37(1930) —This is a colorimetric method requiring about 35 cc of blood and giving results agreeing closely with those calcd from cell measurements Some values obtained by the method for man, rabbit and sheep, resp., are: 87, 58 and 30 $\mu^3$ The refractometric method of measuring red-cell vol led to erroneous results J F. L

Measurement of red-cell volume. II. Alterations in cell volume in solutions of various tonicities. E Ponder and G Saslow *J Physiol* 70, 169–81(1930) —The addn to rabbit blood and plasma of NaCl or glucose, of which $\Delta$ is approx the same as that of rabbit plasma (i. e., 1.2 g NaCl per 100 g water), does not alter the mean vol of the red cells The cell vol increases in hypotonic solns of NaCl and plasma approx as would be expected on the assumptions that the red cells are simple osmometers contg 33% $H_2O$ by vol In hypotonic media, produced by the addition of KCl or glucose, the swelling is greater than can be accounted for in this way The cell vol does not decrease in hypertonic media, produced by the addn of NaCl, KCl or glucose, but rather it steadily increases as time goes on, indicating that the added substances penetrate into the cell Crenation is not necessarily associated with a decrease in red cell vol, but is regarded as a failure of the cell to maintain its shape J F Lyman

Recording of respiration of small animals. G Enders *J. Physiol* 70, 218–20 (1930) —The app consists of a small covered box in which the animal is fastened, the animal breathes outside air through a breathing mask and an arrangement of valves Changes in the vol. of the animal, due to breathing, are traced by the corresponding movements of a recording pen J F. Lyman

The carbon dioxide of the mixed venous blood of men. W. F. Hamilton, M C Spradlin and H. G Saam, Jr *J. Physiol* 70, 244–52(1930) —There is no valid evidence in the exptl work reported in this paper that rebreathed air comes to equil with mixed venous blood; hence there is doubt as to the justification for using any of the indirect applications of the principle of Fick in detg. the circulation rate in man J F. Lyman

A method of ultra-filtration in vivo A Geiger *J Physiol* 71, 111–20(1931) — A specially constructed ultra filter is joined to an artery or vein; the blood circulates continuously through the app., and returns to the same blood vessel The filter membranes are of collodion, and under negative pressure at their outer faces The blood in passing through the app retains its natural velocity, pressure and gas tension a choice of membranes, filtrates contg. crystalloids only or a plasma which contains the whole or a part of its proteins may be obtained J F. Lyman

The measurement of the circulation rate in man by the acetylene method. A Grollman Proc. Physiol Soc., *J. Physiol* 70, xxxix(1930), cf *C. A* 24, 5050 — $C_2H_2$ is sufficiently sol in blood and can be detd very easily by alk $Hg(CN)_2$, making it possible to complete a detn of the cardiac output in less than 1 hr The cardiac output of normal young individuals is a function of the surface area, hence it is predictable with a high degree of accuracy J F Lyman

Development and present status of some problems and the goal of vital staining Josef Gicklhorn *Ergeb Physiol* 31, 388–420(1931) —A review C M M

A clinical method for the quantitative determination of pancreatic enzymes in duodenal contents. Edward Hollander *J. Lab Clin Med* 16, 460–5(1931) —The activity of the steapsin and trypsin present in the duodenal contents may be estd from a detn of the length of time required for the neutralization of 1 cc of 0 1 *N* NaOH by the fatty or amino acids formed by the action of 1 cc of duodenal contents upon olive oil or gelatin, resp The time required is *normally 5 min* The amylopsin activity may be estd from a detn of the amt of substrate required to reduce 5 cc of Benedict's quant sugar reagent after the action of 1 cc of duodenal contents upon sol starch The reduction normally requires 1 9 cc or less A decrease in the activity of the enzymes is usually assocd with disease of the gall bladder E R M

$p_H$ Values in routine urinalysis O B Pratt and H O Swartout *J Lab Clin Med* 16, 471–5(1931) —Misleading values for urinary $p_H$ may be the result of dietary changes or medication before and during collection periods, or of detg the $p_H$ of a single specimen rather than a collection over a 24 hr. period For colorimetric

detns, deeply colored urines should be dild more than those that are slightly colored
E. R. MAIN

A simplification of the Osgood-Haskins hemoglobin method. EDWIN E OSGOOD AND HOWARD D HASKINS *J Lab Clin Med* 16, 482–6(1931); cf *C A* 17, 3517.—A soln. of acid hematin may be used as a standard in place of the permanent standards prepd from inorg salts E R MAIN

A rapid method for determination of the sedimentation rate of the red cells with results in health and disease. HOWARD D HASKINS FRANK E TROTSMAN, EDWIN E OSGOOD AND ALBERT MATHIEU *J Lab Clin Med* 16, 487–94(1931)—A method is described for use with oxalated blood in which the sedimentation rate may be expressed as the max settling in a 15 min period The rate is normally 5 mm. but may become increased in pneumonia, acute inflammations and infections, acute rheumatic fever, infectious arthritis and malignancy E R MAIN

The determination of blood proteins by a direct micro Kjeldahl method. ROGER S HUBBARD *J Lab Clin Med* 16, 500–3(1931)—A micro Kjeldahl method is described which is adapted to the detn of total N and the N of the protein fractions of the blood The digested material is nesslerized directly Pptn. of the Nessler's reagent is prevented by the use of Rochelle salt. E R MAIN

A note on the Gunther-Greenberg method for determining inorganic phosphorus on the filtrate from calcium analysis. RUTH P BOLTON *J Lab Clin Med* 16, 503–4 (1931), cf. *C A* 23, 3942.—The inorg P content of the filtrates from Ca analyses may be detd by the Benedict-Theis method (*C A* 18, 3398), as well as by the Fiske-Subbarow method E R MAIN

The use of the interferometer for serum protein and protein fraction determinations. WM J DIECKMANN *J Lab Clin Med* 16, 513–9(1931)—Methods are described for the detn of serum protein, fibrin and the albumin-globulin ratio by means of the interferometer. E R MAIN

Determination of cholesterol in blood plasma and serum. J C FORBES. *J Lab Clin Med* 16, 520–1(1931)—A modification of Bloor's method is described in which the cholesterol is extd. in the presence of Doucil (a com prepn for softening water) No application of heat is required E R MAIN

Phenol test for urinary albumin. WM B CLAPP AND BENJAMIN COHEN *New Engl. J. Med* 203, 1237–8(1930)—A method is described for the detection of albumin in the urine in which a ring test is obtained with a soln of $C_6H_5OH$ The reagent is prepd by treating a satd aq soln of $C_6H_5OH$ with sufficient glycerol to adjust the sp gr. to 1 045 Albumin present in the urine may be detected in a concn of 0 004%.
E. R. MAIN

Bilirubin liver-function test. I. Modification of the method. I. R JANKELSON AND S. L. GARGILL. *New Engl. J Med* 204, 547–9(1931)—A liver-function test may be carried out by detn of the concn of bilirubin in the blood at 5-min and 3-hr. intervals following intravenous injections of bilirubin. It is rapidly excreted through the liver in normal individuals but is definitely retained in diffuse disease of the liver.
E. R. MAIN

Separation of the male sex hormone from the female hormone, menformone. E. DINGEMANSE, J FREUD, S KOBER, E LAQUEUR, A. LUCIS AND A W. P. MÜNCH. *Biochem. Z.* 231, 1–5(1931)—Menformone behaves somewhat like an acid and in a diphasic system, benzene-alk. 70% alc., it passes almost quantitatively into the latter phase In extg the male hormone from male urine it is found to proceed more rapidly in a weakly alk medium. The method of sepn. depends upon extg with benzene 2 portions of the urine, one made alk., the other acid S MORGULIS

The use of colloidal zirconic acid as a protein precipitant. JÓZEF ERDÖS AND JÁNOS SÜRÜ *Biochem Z* 231, 6–12(1931)—Powd $ZrCl_4$ is rubbed up well with 4–5 times its wt. of anhyd AcOH and dried on a sand bath The residue is digested for several hrs with warm $H_2O$ and the turbid soln is filtered. The filtrate is evapd at 60°, the residue is moistened with $H_2O$ and the evapn repeated until no more AcOH fumes are given off The dry residue is rubbed up with a little $H_2O$ and is placed in a vacuum desiccator contg KOH sticks The resulting $Zr(OH)_2$ is practically free from Cl or AcOH and can be used in 5% soln. for deproteinizing serum plasma or protein solns.
S. MORGULIS

Methodical contributions. XIII. Determination of ferric ions, ferrous ions and of organically bound iron in biological material. L PINCUSSEN AND W ROMAN *Biochem Z.* 231, 54–8(1931)—A g of fresh organ is quickly weighed and is finely rubbed up with sand in an ice-cold mortar The material is washed twice with 5 cc. 20% $H_2SO_4$ into a centrifuge tube contg a little paraffin. In case of blood, 1 cc. of fresh blood

is measured under paraffin oil and treated with 5 cc 20% $H_2SO_4$. The mixt is left for 3 hrs during which it is frequently stirred, and is sharply centrifuged. The supernatant fluid is quantitatively removed and is titrated with $TiCl_3$, KSCN being used. The ferrous ions are oxidized with $HNO_3$ and after driving off the $HNO_3$ excess the titration is repeated. The difference between the first and second titration measures the amt. of ferrous ions present. To det the organically bound Fe the residue is transferred from the centrifuge tube to a Kjeldahl flask by dissolving it carefully in $HNO_3$. The material is ashed by boiling with $HNO_3$-$H_2O_2$, the excess of reagents being driven off. The residue dissolved in dil $H_2SO_4$ is titrated with $TiCl_3$, giving the total ferric ion content and the organically bound Fe is calcd by difference. The $TiCl_3$ soln is prepd by boiling 2 cc. of com $TiCl_3$ with 4 cc. concd HCl to drive off $H_2S$ and dilg to 300 cc. The soln is kept in a container with a special automatic buret attachment (figured in the text) designed for titrating in a current of $N_2$ or $CO_2$ under complete exclusion of air. The $TiCl_3$ soln is standardized against a known $FeCl_3$ soln contg 10 mg $Fe^{+++}$ in 1 cc. To 0.1 cc. of this soln are added dil $H_2SO_4$ and a few drops of 15% KSCN and the mixt. is titrated until the color disappears. S. Morgulis

Studies on cholesterol metabolism. I. A gravimetric method for the determination of free and combined cholesterol in small amounts of blood. Rudolf Mancke *Biochem. Z.* 231, 103–9(1931).—The extn is carried out by pouring 2.5 cc. serum in a fine stream into a 50 cc. vol flask contg 30 cc of a mixt of 3 parts abs. alc. and 1 part abs. ether. Under const. stirring the flask is submerged in a boiling water bath and is removed as soon as the contents begin to boil. After cooling the vol is made up with the alc.-ether mixt. and the material is filtered. Twenty cc. of the filtrate (in 2 portions) is cautiously evapd in a test tube, the temp being gradually raised to 90° to boil off the alc. until there is only 2 cc. of soln. In case the material is turbid, it should be shaken with 10 cc. ether, filtered, washed and again evapd to 2 cc. To the still hot soln. 1 cc. of hot 1% digitonin in 90% alc is added and after 1 hr the ppt is collected in a filter tube (Jena filter G 154, No. 1). The ppt is washed with ice-cooled acetone, and the filter is dried at 100° and weighed, 1/4 of the pptd compd being cholesterol. For the total cholesterol detn 10 cc. of the original filtrate in 2 portions is boiled down to 3 cc. in a 8-cc. round bottom flask provided with a reflux condenser. To this is added 3 drops 80% KOH, and the material is saponified 6 hrs. over a water bath. The alc. soap soln is neutralized with a few drops of alc satd with gaseous HCl (phenolphthalein is used as indicator), mixed with 3 cc. abs. ether and the pptd KCl is filtered off. The ppt is washed with abs. ether, the combined filtrates being condensed to 2 cc. The pptn with digitonin and weighing are made as before. The difference between the 2 detns. gives the cholesterol esters. S. Morgulis

Method of metabolism studies in tissue cultures. I. Respiratory measurements in tissue cultures. Rolf Meiff *Biochem. Z.* 231, 247–52(1931).—The Carrel tissue culture flask is adapted for the detn of respiration by means of a specially constructed manometer inserted into the flask. II. Weight determination on single tissue cultures. Increase in weight and area. *Ibid* 253–9.—A method is discussed for measuring the wt. of a tissue culture after the removal of the plasma coagulum. These studies show that the increase in surface must be due partly to cellular migration. In rapidly growing fibroblast cultures the daily lactic acid production is 2½ times the dry wt. and in slowly growing cultures 3 times the dry wt. S. Morgulis

Determination of urobilin and urobilinogen with the Zeiss step photometer. L. Heilmeyer and W. Krebs *Biochem. Z.* 231, 393–8(1931).—The Zeiss step photometer has been employed to det urobilin and urobilinogen in urine and feces according to Terwen's procedure. This yielded greater precision, especially with small urobilin concns., and dispenses with the need for a comparison soln. which also saves much time in carrying out the detn. S. Morgulis

An apparatus for the rapid, accurate analysis of the gases in a respiration chamber. Thorne M. Carpenter, Robert C. Lee and Anna E. Finnerty. *Wiss. Arch. Landw. Abt. B Tierernähr. Tierzucht* 4, 1–20(1930).—The app described by Carpenter, Fox and Sereque (*C. A.* 23, 4718) has been provided with a bellows to circulate the pyrogallic acid soln., thus reducing the time required for the analysis. The app is described, and directions are given for its use. W. Gordon Rose

Micro chloride determination in blood. J. A. Filedt Kok. *Arch. néerland. physiol.* 16, 132–5(1931).—Dil the blood with an equal vol of $H_2O$; to 0.2 cc. add 1 cc. $H_2O$ plus 0.4 cc. of 10% sulfosalicylic acid, shake thoroughly and centrifuge. To 0.8 cc. of filtrate add 1 drop of Na nitroprusside and then titrate with 1/40 *N* $Hg(NO_3)_2$. A correction is made according to the tables of Kolthoff and Bak for the quantity of $Hg(NO_3)_2$ in excess necessary for the formation of the turbidity. M. H. Soule

Determination of calcium in blood. CH O GUILLAUMIN *J pharm chim* [8], 13, 65–76(1931) —Detn is made of *total* Ca in plasma or serum regardless of the mode of physico-chem combinations of Ca in the plasma Precautions in taking samples are discussed, and the technic of detg Ca in plasma is given in detail S W.

Dichlorofluorescein as an adsorption indicator for the estimation of chlorides in the blood. A F OSTERBERG *Proc Staff Meetings Mayo Clinic* 5, 300(1930) —Plasma or serum, 2 cc , is added, with shaking, to 7 cc acetone contained in a centrifuge tube graduated a t10 cc The vol is made accurately to 10 cc , the tube is then stoppered, shaken well and the blood proteins are thrown down in the centrifuge Five cc. of the acetone soln corresponding to 1 cc of plasma is pipetted into a small Erlenmeyer flask, and to this is added 0 25 cc of the indicator soln prepd as described by Kolthoff, Lauer and Sunde The soln is then titrated with $N/3540$ soln of $AgNO_3$ until the end point is reached This manifests itself by the pptn of brick-red silver dichlorofluorescein on the silver halide ppt One cc $AgNO_3$ soln is equiv to 1 mg Cl This method checks closely with the Wilson and Ball procedure, the maximal difference being 1 6%

R C WILLSON

Determination of traces of Hg (STOCK, LUX) 7

Centrifugal blood-separating apparatus for serum plants. CECIL E MITCHUM S 1,797,876, March 24 Structural features

## C—BACTERIOLOGY

CHARLES B MORREY

Variability of the diphtheria bacillus. M A KUSHNARYEV *Z Immunitäts* 68, 210–7(1930) —The addn of minute quantities of $MnSO_4$, $ZnSO_4$, LiCl and $NaNH_4HPO_4$ to the medium enhances the growth of diphtheria bacilli and causes a dissocn of the original strain into toxigenic and atoxigenic forms, as well as the production of coccus-like forms H EAGLE

Microflora of processed cheese. J CSISZÁR *Kísérlet Közlemények* 33, 391–401 (1930) —Processed cheese contains chiefly lactic acid bacteria (streptococci and lactobacilli) and very often anaerobic butyric acid-producing organisms, accompanied by aerobic spore-forming bacilli (*B. mesentericus* and *subtilis*), indifferent, heat resistant cocci and bacilli, molds and yeasts and sometimes *Act odorifera* The variety of the flora and the no of bacteria depend on the raw cheese, on the time and temp of melting and finally on the age of the processed cheese The germ content averaged 19,500,000; the highest no was 310,400,000 per g of cheese Two samples were found to be sterile. Heating to 65–80° for 5–25 min decreased the no of germs by 99 9–100%; processed cheese is thus quasi pasteurized The germ content of ready-made cheeses increased from 5–27,000 to 1,800,000–258,900,000 organisms in 40 days S S DE FINÁLY

Bactericidal action of "Rohchloramin" and "Streuchloramin." N KERBLER *Mezögazdasgái Kutatások* 2, 319–24(1929) —The action is about the same as that of $HgCl_2$ A 0 1% soln of "Rohchloramin" proved to be effective "Streuchloramin" killed in less than 5 min : *B. abortus* inf. Bang, *B. gallinarum*, *B. coli*, *B cholerae gallinarum*, *B erysipelatis suis* and *B suipestifer;* within 20 min. it killed *Staphylococcus pyog. aureus* Spores of *B anthracis* were killed in 60 min S. S. DE FINÁLY

Observations on the value of a copper sulfate tellurite medium for the isolation of diphtheria bacilli. V D ALLISON *Brit J. Exptl Path* 11, 244–8(1930) —Tables are given to compare the results obtained in the isolation of *Corynebacterium diphtheriae* and diphtheroid bacilli from nasal, throat and ear swabs, with Douglas's medium and the copper sulfate tellurite serum agar medium of V. D Allison and Ayling (*C. A.* 23, 3949). The results show a well-marked difference in the percentage of organisms isolated on the 2 media, the differences in all cases being in favor of the $CuSO_4$ medium This medium consists of 2% nutrient agar to which is added 10% of trypsinized horse serum, 0 02% of K tellurite and 0 05% of $CuSO_4$ The trypsinized serum enhances the growth of the diphtheria bacilli, while the K tellurite darkens the colonies and gives them a characteristic appearance The growth of staphylococci, streptococci, pneumococci and *Micrococcus catarrhalis* is completely prevented by the presence in the medium of the small quantity of $CuSO_4$, which also inhibits completely the spread of *B. proteus* The nutrient agar should not be more acid than $p_H$ 8 0 previous to the addn of trypsinized tellurite serum and $CuSO_4$, as it is impossible to measure the $p_H$ with indicators after the $CuSO_4$ has been added HARRIET F. HOLMES

Virulence of hemolytic streptococci. II. The influence of oxygen on the maintenance of virulence in broth cultures. E W TODD *Brit J. Exptl Path* 11, 469–79

(1930), cf C A 25, 1273.—Virulent hemolytic streptococci maintain their virulence after subcultivation in aerated broth and they change to the mat attenuated form after subculture in anaerobic broth The effect of aeration is increased if peroxide accumulation is prevented by catalase Mat attenuated cultures are not reverted to the virulent form by subcultivation in aerated catalase broth III The influence of oxygen on the restoration of virulence to mat attenuated cultures *Ibid* 480–8.—The increase of virulence which occurs when mat attenuated cultures of hemolytic streptococci are subcultured in 50% normal horse serum is dependent on the O tension of the serum The optimum condition for increasing virulence is the highest O tension which can be obtained without peroxide formation The effect of normal serum on virulence appears to depend on its O-carrying capacity HARRIET F HOLMES

Investigations of the biologic, serologic and colloid-chemical behavior of the paratyphus bacillus under changed living conditions. W D SUTLIFF *Arch Hyg* 104, 239–54(1930).—Continued cultivation of the paratyphus bacillus upon agar contg 0.15% phenol or 3–5% NaCl appears to produce changes in colony form and reductions in acid flocculability, cataphoresis, tendency to be pptd by $HgCl_2$ and capillarity. E R MAIN

Bacteriology of nauseous and bitter tasting milk (CSISZÁR) 12. Syntheses of antiseptic derivatives of indan 1,3 dione WALKER *et al.*) 10. The correlation of the oxidation of certain phenols and of dimethyl *p* phenylenediamine by bacterial suspensions (HAPPOLD) 10.

## D—BOTANY

THOMAS G PHILLIPS

The pigment of Vellela spirans and Fiona marina BENJAMIN KROTT *Biol Bull* 60, 120–2(1931).—The pigment consists, apparently, of a complex protein combination There are as yet, no data as to its true structure FREDERICK G GERMUTH

Recent advances in science plant physiology J C. WALTER STILES *Science Progress* 25, 500–4 1931) A review of recent work on photosynthesis J S H.

The composition of some green forage and fertilizing plants. F HASELHOFF, F HAUN AND W ELBERT *Landw Vers Sta* 110, 268–83(1930).—Analyses of several varieties of clover show that the amt of N in the part of the plant above ground is much higher than that in the roots JOHN R HILL

The ether extract of white leaves of cabbage. III. The unsaponifiable matters. JUNICHI OZAKI *J Agr Chem Soc Japan* 6, 773–82(1930), cf *C A* 25, 984.—The oil of white leaves of cabbage was sapond. and extd with ether The ether ext was washed with water The waxy substance appeared between the ether and water layers It was crystd from acetone, m. 81.5–2°, sol in $CHCl_3$ It shows no sterol reactions Analysis of the cryst substance and of its oxime were made It is presumed to be palmitone From the mother liquid of palmitone an amorphous ppt was obtained It m. 68° and is sol in alc. and acetone It coincides with *n* hentriacontane O presumes the following changes Palmitic acid —(condensation)→ palmitone —(reduction)→ hentriacontane From the ether ext of the unsaponifiable matters a kind of phytosterol was isolated Carotene and xanthophyll appear to be present Y KIHARA

The saponin of soy bean II YISUKE SUMIKI *J Agr Chem Soc Japan* 6, 783–90, *Bull Agr Chem Soc Japan* 6, 49–51(1930) cf *C A* 24, 3813.—The Na salt of the saponin (decompg at 259–60°) was prepd as hexagonal plates by neutralization with NaOH from a 70% alc. soln of free saponin The hemolytic power of soy-bean saponin was observed in a concn of 1/2000 and that of the Na salt in a concn of 1/50,000 Merck's saponin (from the root of *Saponaria*) shows hemolytic power in a concn of 1/50 000 The toxic power of soy bean saponin (free and the Na salt) is very weak for pigeons while Merck s saponin is very toxic Y KIHARA

The chlorophyll content of the leaves of rice plant. KENKICHI SATO *J Sci Agr Soc (Japan)* No 326, 24–36(1931).—Willstatter s colorimetric method for the detn of chlorophyll was used The chlorophyll content does not vary greatly with the species It increased rapidly in the earlier stage of the growth, reached a max in July and then decreased gradually The greater the growth rate of the plant the greater the pigment content The amt of fertilizers seems to be approx proportional to the chlorophyll content Deficiency of N significantly inhibits the formation of chlorophyll, while that of K or P inhibits it less or negligibly Y KIHARA

The relation of the various physiological changes of plants and their vegetation periods to pigment formation II. Assimilation rate and anthocyanin synthesis in

Abutilon avicennae. HIROSI KOSAKA. *J Dept Agr Kyushu Imp Univ* 3, No. 2, 29–45(1931), cf *C A* 24, 2159–60.—Anthocyanin synthesis in stems and leaves of *Abutilon avicennae* is parallel to the content of assimilation products and in inverse relation to the rate of growth H. R. KRAYBILL

Culture and nutritional physiology of the genus Pilobolus. EGON BEHSA *Sitzb Akad Wiss Wien*, Abt. I, 139, 355–71(1930).—*Pilobolus kleinii* and *Sphaerosporus* can be cultivated easily upon horse-manure-decoction agar. Despite favorable culture conditions and frequent transplantations some of the mold cultures die, the reasons for this are not known. Content of the horse-manure-decoction-agar favors the mold growth. Metabolic expts. upon pure cultures proved that the materials used as sources for N are divisible into (*a*) favorable peptone, albumin, leucine, asparagine, (*b*) barely sufficient casein, glycocoll, alanine, glutamine, (*c*) insufficient urea, glucosamine, $NH_4$ salts. Materials used as sources of C are divisible into (*a*) those favoring development of growth to the point of sporangia formation xylan, gum arabic, arabinose, galactose, (*b*) those impeding or arresting the micellar development. starches, inulin, fructose, glucose, saccharose, lactose, mannitol. Boiled wheat straw, with or without peptone, or its exts. forms a favorable medium, pectins, from the cortex of apples, are not favorable. Nuclein and Liebig's beef ext. favor the mold development. This would indicate that nucleic acid contains pentosan and that split products of nuclein occur in the beef ext. The pos. phloroglucinol-HCl reaction appears to substantiate such an assumption. *P sphaerosporus* differs from *P kleinii* Tiegh only in its manner of germination, but not in its process of metabolism. It is possible that *P heterosporus* Palla, found only on cow manure, behaves differently as regards its nutritional physiology. B. S. LEVINE

A preliminary report upon the results of field experiments with substituted products for sugar beets. J. PAILER. *Listy Cukrovar* 49, 390(1931).—A criticism is given of the study in which 40 expts. with sugar beets are compared with 30 expts. with edible carrots. *P* considers the statistical analysis used as inadequate. FRANK MARESH

The evaluation of the roots of fodder beets for eugenic purposes. K. KOČNAR, J. HAMPL AND VL. ŠMERDA. *Sborník Čsl Akad Zemědělské* 6, 95(1930), *Listy Cukrovar* 49, No. 26, Rozhledy 22.—Chem. analysis was found of little value in studying eugenic expts. with fodder beets, polarization did not give the true sucrose content, for inversion occurs readily, and the content of invertase is increased, the refractometric detn. can be used only for roots of the same dimensions and variety in order to have comparable results. The beets are mashed, weighed and digested with hot water; the *n* is then read and the sucrose content computed. The margin of error is ±1%, but the results are more accurate than with a polarimeter. The distribution of sol. nutritional elements varies in the same species and is altered by the shape of the root, removal of greens, depth of root in the ground and accessory rows. The instructions for cutting cylinders for sugar detns. from sugar beets do not hold for fodder beets, and a trial detn. of the distribution of sugar must be made on each variety before making dependable analyses for the whole plot. The superficial strata were richer in sugar than the inner ones. FRANK MARESH

Formation of the anthocyanic pigment in the etiolated plants of buckwheat and wheat. ST. JONESCO. *Compt. rend.* 192, 438–40(1931).—Using the same method of extn. of pigment (*C. A.* 17, 792; 22, 102) J. studied exts. of buckwheat and wheat to det. whether they contain a substance, similar to that obtained from *Ampelopsis heterophylla*, which can be transformed into an anthocyanin. From buckwheat, a chromogen is obtained as a yellow powder which, when hydrolyzed, forms galactose, when the chromogen is oxidized or dissolved in alc. and heated with HCl, a cerise-red cryst. pigment is obtained which shows the reactions characteristic of a natural anthocyanidine. From wheat, the chromogen is a yellow powder, sol. in water, not sol. in alc., has a sweet odor, reduces Fehlings soln. and hydrolyzes to form arabinose. Oxidation of the chromogen with $Ba_2O_2$ or $MnO_2$ in $H_2SO_4$ soln. forms a violet red pigment characteristic of the natural pigment of wheat plants. N. M. NAYLOR

The presence of allantoinase in a number of fungi. A. BRUNEL. *Compt. rend.* 192, 442–4(1931).—In 67 different fungi, a study was made of the enzyme which changes allantoin to allantoic acid. The allantoic acid is recognized by its products of hydrolysis, glyoxylic acid and urea; or by the formation of the Ag allantoate. The enzyme action is tested as follows. The macerated vegetable tissue is extd. with glycerol and water. The ext. is added to a medium contg. allantoin, basic $NH_4$ carbonate and a few drops of chloroform. After 12 hrs. of digestion, the mixt. is made acid and heated to 100°. The product is tested for glyoxylic acid by noting a red coloration in the

presence of phenylhydrazine and $K_4FeCN_6$, it is tested for urea by the addn. of methyle xanthydrol which forms a ppt. of xanthylurea. N. M. Naylor

The accumulation of electrolytes. II. Suggestions as to the nature of accumulation in Valonia. W. J. V. Osterhout. *J. Gen. Physiol.* 14, 583-90 (1931). —In a living cell like that of the marine *V. macrophysa* K probably enters chiefly as KOH, the thermodynamic potential of which is greater outside than within. The energy necessary to produce the accumulation of K inside the cell is furnished by metabolism, whereby a weak org. acid, HA, is produced in the cell. HA is exchanged for HCl of the external soln. (or A for Cl) and this results in a continual maintenance of HCl at $p_H$ 5.5, whereas the $p_H$ of the sea water is about 8. KOH diffuses in to neutralize the acid within the cell, and hence KCl accumulates in the cell sap. Na enters more slowly and does not reach an internal concn. as high as that of K. Cell penetration is chiefly in ionic form. The system is not in equil. but depends upon the continual expenditure of energy to produce acid within the cell. III. Behavior of sodium, potassium and ammonium in Valonia. A. G. Jacques and W. J. V. Osterhout. *Ibid* 591-14. —When 0.001 *M* $NH_4Cl$ is added to sea water containing cells of *V. macrophysa*, undissocd. $NH_3$ or $NH_4OH$ penetrates rapidly, increasing the internal $p_H$ value so that the thermodynamic potential of KOH becomes greater inside than outside the cell. K therefore leaves the cell, but NaOH continues to pass in because its outside thermodynamic potential is greater than the inside potential. $NH_4Cl$ accumulates in the cell, reaching a much higher concn. inside than in the outside soln. After entering, $NH_3$ probably combines with a weak org. acid produced in the cell. The anion of this acid is exchanged for Cl of the sea water (or the org. acid is exchanged for HCl). Methods are described. C. H. Richardson

Aluminum content of plants, chiefly food plants. Gabriel Bertrand and Georgette Levy. *Compt. rend.* 192, 825-9 (1931). —The plant is ashed and Al detd. gravimetrically as Al phosphate, the details of analyses not being given. The Al content passes through a max. during the first period of the growth of the plants. Of the values given, expressed as mg. Al per kg. dry weight, are young carrot 30, old carrot 22, potatoes 76, onion 56, apple 13, tomato 25, apricot 10, peach 14, maize 5, white rice 14, coffee 46, Elaeis 74, tea 85, Ceylon tea 465, rhubarb 166. Green leaves are rich in Al. Al may play some part in plant synthesis. D. S. Searle

A study of twenty-three octyl alcohols on growth of *Lupinus* seedlings. David I. Macht. *Am. J. Botany* 17, 572-8 (1930), cf. *C. A.* 24, 5884. —Twenty three isomeric octyl alcs. were found to have different degrees of toxicity for *Lupinus albus* seedlings. A definite difference in toxicity was found between the primary, secondary and tertiary octyl alcohols, the primary being the most toxic and the tertiary being the least toxic. Differences in toxicity between the individual members of each group were also noted. Combinations of the various octyl alcs. exhibited synergistic effects. The results of the investigation emphasize the importance of employing pure chemicals in pharmacol. research. J. J. Skinner

The use of carbon dioxide for prolonging the life of cut flowers, with special reference to roses. Norwood C. Thornton. *Am. J. Botany* 17, 614-9 (1930). cf. *C. A.* 25, 504.—$CO_2$ treatment was effective in prolonging the life of cut roses when they were stored for 3 to 7 days at 38° and at 50° in a concn. of $CO_2$ between 5 and 20%, when they were subjected to an alternated $CO_2$-air treatment for 3, 8 or 14 days. $CO_2$ retarded the opening of rose buds. This effect was more pronounced as the concn. of $CO_2$ was increased. $CO_2$ treatment appeared to be more effective for flowers in the bud stage than for those which were already open. J. J. Skinner

The taxonomic and climatic distribution of oil and starch in seeds in relation to the physical and chemical properties of both substances. James B. Mcllvaine. *Am. J. Botany* 17, 662(1930), cf. *C. A.* 24, 4077. —Oil is more abundant than starch in seeds and in the seed embryos and albumens. In the seeds of temperate plant families starch is present less frequently than in the seeds of tropical plant families. The large proportion of oil in the seeds of tropical and temperate plants may indicate its function as a protection against rapid temperature changes in accordance with its heat cond. which is lower than that of starch. The larger proportion of oil to starch in the seeds of temperate plants is in agreement with the greater fuel value of oil. J. J. S.

Sucrose and starch in potatoes treated with chemicals that break the rest period. F. E. Denny. *Am. J. Botany* 17, 806-37(1930). cf. *C. A.* 24, 399. —Freshly harvested potatoes were treated with $CH_2ClCH_2OH$, NaSCN and thiourea, the concns. of the chemicals being decreased from the optimum by steps to form a graded series. Press-juices from the treated potatoes obtained from the various lots at a subsequent interval, usually 4-7 days before sprouting became visible, were compared with juices from the

checks with reference to sugar content Sucrose was found to be higher in the treated than in the check lots and to give a graded series of values corresponding to the series of concns of chemicals used in treating the potatoes The reducing-sugar values did not form such a series, and no consistent effect of the treatments in either increasing or decreasing the reducing-sugar content was found When samples were taken at intervals of 24, 48 and 72 hrs after treatment it was found that the time after treatment at which the sucrose content of the treated lots became higher than that of the checks differed in different expts from 24 to 72 hrs Samples of entire tissue which had been dried, powdered and analyzed for starch showed that concns of chemicals favorable for breaking the dormancy of the sprouts caused decreases in the starch
J J Skinner

Light and permeability of protoplasm. V V Leepshkin *Am J Botany* 17, 953–70(1930) —The influence of light upon the permeability of protoplasm for aniline dyes was investigated The permeability was measured according to the amt of dye accumulated in the cell sap of *Elodea* leaves, detd by a colorimetric method especially worked out for *Elodea* The difference in absorption of dyes by plant cells in light and in the dark is caused by the change of permeability of protoplasm The absorptive power of the cell sap and the adsorption of dye on the cell walls or in dead protoplasm *are not changed by light dead cells absorb dyes with the same speed in light as in the* dark The max amt of dye absorbed by the cell does not depend upon the illumination The solns of dyes fade in light, and must be changed during the expt or flow through the vessels contg the object If this condition is fulfilled, the permeability of protoplasm is found to be greater in light to all dyes which penetrate protoplasm and do not absorb violet rays The increase of permeability is observed only in the leaves or their parts which are illuminated The increase of permeability does not spread from the cells affected by light even to neighboring cells J J Skinner

The swelling of citrus fruits. Howard S Reed *Am J Botany* 17, 971 82 (1930) —*The structure of citrus fruits presents certain unique problems pertaining* to water absorption and conductance since the fibrovascular system is mainly restricted to the mesocarp Orange and lemon fruits absorbed water and various solns with resulting increase in vol Both acid and base were absorbed, but with lemons the latter produced somewhat greater swelling than the acid Oranges in $CuSO_4$ solns swelled promptly and showed no reversibility Solns of compds which coagulate pectins caused incipient swelling, but it was followed by shrinkage The translocation of liquids appears to depend upon their passage through the layers of hydrophilic colloids on the walls of the mesocarp cells and only to a small degree upon the participation of living cells J J Skinner

A microchemical study of soy beans during germination. Floyd W von Ohlen *Am. J. Botany* 18, 30–49(1931) —The cotyledons of mature Manchu soy-bean seeds contain a large amt of protein oil, some nonreducing sugar and a small quantity of starch Transformation and translocation of these reserve foods were followed microchemically *during the germination and growth of soy-bean seedlings in darkness During* germination the first changes found were the appearance of reducing sugar, an increase of starch in the hypocotyl, appearance of starch in the root cap and an increase of starch in the cotyledons During the first 3 days of germination there was a large accumulation of starch in the apex of the hypocotyl, and of reducing sugar in the base of the hypocotyl and root The amt of starch in the cotyledons increased until the 5th day and then remained nearly const until the 9th day, after which there was a rapid decrease It disappeared from the palisade last The starch disappeared from the different parts of the seedling in the following order: root, hypocotyl, epicotyl and cotyledons Reducing sugar disappeared from the seedling in the same order, but 2 days later, except in the cotyledons where only a slight test for it was obtained Nonreducing sugar was not detected in the hypocotyl, plumule and cotyledons after the 3rd, 4th and 7th days, respectively Asparagine appeared in the hypocotyl on the 3rd day. It gradually increased during the development of the seedling, until on the 29th day *it was abundant in the hypocotyl, and fair amts occurred in the* base of the root and epicotyl Asparagine was not detected in the plumule or cotyledons or at the root tip The depletion of the oil of the cotyledons began at the base and progressed toward the opposite end There was a gradual change of the organically bound P and Mg of the cotyledons to the inorganically bound Although both inorganically bound P and Mg moved quite rapidly toward the growing points, they gradually increased in amt in the cotyledons K moved out of the cotyledons more rapidly than did P and Mg J J. Skinner

Studies on the sensitivity of Mimosa pudica. II. The effect of animal anesthetics

and certain other compounds upon sensitive sensitivity. RAYMOND H. WALLACE. *Am. J. Botany* 18, 215–35(1931).—In expts. with *Mimosa pudica* concns. of ether vapor from 13 to 25% prevented the movement of leaflets and petioles in 10–45 min. after exposure. The leaflets regained their sensitivity within a few min. after removal from the ether vapor, but a period of 2 or more hrs. was required for the primary petioles to become normal. $CHCl_3$ vapor in concns. of 2.5% or greater was lethal and lower concns. caused injury after long exposures. A concn. of 3% $CHCl_3$ vapor reduced the angle of movement of the primary petiole less than 40%. Chloroform vapor of a wide range of concns. induced a strong characteristic response in the leaflets and petioles of *Mimosa*. $CCl_4$ induced a reaction very similar to that of chloroform. The physiologically significant range of concns. was similar to that of chloroform. *Mimosa* plants retained their sensitivity 1–4 hrs. in very high concns. of $N_2O$ and ethylene. Concns. of approx. 100% acetylene made the plants insensitive, while 90% made them only partially insensitive, and 95% seemed to have little or no effect. Repeated anesthetization with ether, or repeated exposures to $N_2O$, ethylene and acetylene had no harmful effects on the plants. A 10% concn. of $CO_2$ made the plants completely insensitive in 10 min. Longer exposures caused serious injury or death. MeOH and EtOH seem to have only a slight effect upon sensitivity; the former decreases it slightly and the latter increases it slightly. The different compds. tested affected the position of the petiole in various ways. Some caused an elevation, some a depression and some seemed to be without effect.

J. J. SKINNER

The natural coloring matter of raw silk fiber of the domestic cocoon. II. Xanthophyll of mulberry leaves as a source of yellow cocoon xanthophyll. MASAMI ONO. *J. Agr. Chem. Soc. Japan* 6, 1103–8(1930); *Bull. Agr. Chem. Soc. Japan* 6, 104–5(1930). cf. *C. A.* 24, 3554.—Fresh mulberry leaves were finely chopped and soaked in 5 l. of 90% EtOH and digested with 90% EtOH under 15 lbs. pressure for ½ hr. The treatment was repeated. All the alc. ext. of the chloroplast pigments was concd. and ether was added. After concn. and sapon. with KOH methanol soln., the ether soln. was washed with water to remove K chlorophyllines. The ether soln. was dehydrated by anhyd. $Na_2SO_4$ and evapd. to dryness. 600 cc. of petroleum ether (b. 40–60°) was added. Xanthophyll was pptd. It was recryst. from boiling MeOH. The yield was 0.165 g. from 1 kg. of leaves. It was identified with xanthophyll (m. 175°) from the domestic yellow cocoon. The origin of xanthophyll of the domestic yellow cocoon may be that of the mulberry leaves.

Y. KIHARA

Botany chemistry and pharmacodynamics of *Tabebuia ocraceis* (LORENTZ, HASSL) 17. Plant pigments (KARRER, *et al.*) 10.

OVERLOW, MERRILL W. The Principles of Plant Biochemistry. Part I. New York: The Macmillan Co. 335 pp. About $4.50.

## E—NUTRITION

PHILIP B. HAWK

Carotene from lettuce and its relation to vitamin A. H. S. OLCOTT AND H. A. MATTILL. *Proc. Soc. Exptl. Biol. Med.* 28, 240–1(1930).—Carotene was obtained from a MeOH soln. of the unsaponifiable fraction of the lipoids of lettuce. After recrystn. from petroleum ether the m. p. was 179.5–180°. The yield from approx. 150 kg. of lettuce was 200 mg. On long standing at room temp. or on heating for 24 hrs. at 105° the hexagonal crystals assumed an isometric form, they bleached without change in wt. and lost their physiol. activity. Carotene is best preserved in Et laurate contg. 0.1% hydroquinone. Vitamin-A-deficient rats were cured of xerophthalmia and their growth increment was restored by daily doses of 0.005 mg. of carotene. C. V. B.

Hematopoietic function in avitaminosis. IV. Further studies of vitamin A deficiency. BARNETT SURE, M. C. KIK AND DOROTHY J. WALKER. *Proc. Soc. Exptl. Biol. Med.* 28, 405–6 (1931). cf. *C. A.* 23, 4724.—The red-cell count, the hemoglobin concn. and the differential leucocyte count of the rat remained unchanged during the development of, and the recovery from, the severe ophthalmia and loss of body wt. associated with vitamin A deficiency. V. Vitamin D deficiency. BARNETT SURE AND M. C. KIK. *Ibid.* 406–8.—The hematopoietic function was unaffected by vitamin D deficiency induced in the rat by feeding the Steenbock Black ration No. 2965.

C. V. BAILEY

Mineral metabolism in infancy. III. The substitution of cow milk for human milk in infant feeding. S. V. TELFER. *Glasgow Med. J.* 113, 283–84(1930). cf. *C. A.* 24, 4809.—The changes in retention value and mode of excretion of the mineral elements

when whole cow milk is substituted for human milk have been studied by metabolic expts The proportion of the total mineral intake retained is reduced although the actual quantity of bone-forming elements is substantially increased while that of Fe is diminished On cow milk the intake of Ca, Mg and P is 4 times greater than on human and the increased retention is due to the larger quantities available for adsorption and fixation by the growing tissues The fat intake is less effectively utilized than in natural feeding because of increased soap formation in the intestines The concn of fat and mineral constituents is increased, the rise in the percentage of fat being due to combined fatty acids The fecal wt and the output of phosphoric acid by the urine are greater than on human milk These changes depend mainly on the differences in mineral compn of the 2 milks RACHEL BROWN

The local calcification of tissue after subcutaneous administration of irradiated ergosterol. TH v BRAND AND F HOLTZ *Z physiol Chem* 195, 241–7(1931) —Daily subcutaneous injections of soy-bean oil and of non-irradiated ergosterol over a period of several weeks caused abscesses at the site of injection but no local calcification in the rats Irradiated ergosterol, on the other hand, produced local calcification in the subcutaneous tissue Calcification in the kidneys was much less with subcutaneous than with oral administration of the same dosage The same effect was obtained with prepns in which vitamin D had been destroyed by heating It is due to the specific action of a calcinosis factor previously discussed (cf Holtz and Schreiber, *C A* 24, 5799) A W DOX

Experimental production of xerophthalmia and keratomalacia by the feeding of bread. I ABELIN *Arch exptl Path Pharmakol* 155, 46–50(1930) H EAGLE

The isolation and the chemical and phys cal nature of vitamin A. HANS SEEL AND F DANNMEYER *Strahlentherapie* 39, 449–51(1931) —The authors isolated vitamin A from the whale-liver oil, which has 10 times more vitamin A than cod liver oil and compared its physical and chemical properties with those of a substance obtained by careful oxidation of cholesterol On careful oxidation of cholesterol, a different product is obtained from the well-known crystallized oxidation products of cholesterol, which showed a distinct vitamin A action The identity of the natural and the synthetic vitamin A was demonstrated by the authors in the following way (1) Both are amorphous masses of honey-like consistency (2) Both will give the usual cholesterol reaction (3) Both will give the Rosenheim and Drummond reaction of vitamin A with $SbCl_3$ in a very intense degree (4) They show almost identical absorption of ultraviolet light. (5) The natural vitamin A shows an antixerophthalmic and a growth-promoting effect in a dose of 0 0001 mg The synthetic product shows similar effect, but only up to a dose of 0 1 mg This would indicate that on oxidation of cholesterol only a part of the cholesterol has been transformed into vitamin A. There is no doubt that vitamin A also possesses a sterol character F. R GREENBAUM

Alcohol solubility of the antidermatitis, more heat-stable vitamin $B_2$ constituent of the vitamin B complex. HARRIETTE CHICK AND ALICE MARY COPPING *Biochem J* 24, 1744–7(1930) —The addn of 56% alc. to a soln of vitamin $B_2$ at $p_H$ 1 5 (prepd from brewer's yeast) gave an inactive ppt, and the filtrate was $^1/_3$ as active as the original material With 70% alc., a filtrate was obtained that was completely inactive At $p_H$ 3 2 the filtrate was inactive when 56% alc was used BENJAMIN HARROW

Egg white as a source of the antidermatitis vitamin $B_2$. HARRIETTE CHICK, ALICE MARY COPPING AND MARGARET HONORA ROSCOE *Biochem J* 24, 1748–53 (1930) —Egg white (from hen eggs) contains no vitamin $B_1$ but is rich in vitamin $B_2$ By removing the coagulable proteins, a rich ext of vitamin $B_2$ may be obtained. BENJAMIN HARROW

*Distribution of the vitamin B complex. I. Leafy vegetables* MARGARET HONORA ROSCOE *Biochem J* 24, 1754–63(1930) —Watercress, lettuce, spinach and cabbage (dry weights) have a content of $B_1$ and $B_2$ about $^1/_4$ that of dried brewer's yeast Their content of $B_1$ is lower than that of wheat germ or ox-liver and higher than that of egg yolk or ox muscle Their $B_2$ content is lower than that of ox liver, equal to that of milk, ox muscle or egg yolk and higher than that of the pulses or cereals $B_1$ is more concd in dark-green leaves than in the paler ones On the whole, the vegetables tested were richer in $B_1$ than in $B_2$ BENJAMIN HARROW

Composite nature of the water-soluble vitamin B. *III.* Dietary factors in addition to the antineuritic vitamin $B_1$ and the antidermatitis vitamin $B_2$. HARRIETTE CHICK AND ALICE MARY COPPING *Biochem J.* 24, 1764–79(1930), cf *C A.* 24, 5801 —Yeast and watery yeast extracts contain, in addition to vitamins $B_1$ and $B_2$ another dietary factor ("factor Y") which withstands prolonged heating in alkaline solution B H.

Biological values of proteins. I. *A method for measuring the nitrogenous ex-*

change of rats for the purpose of determining the biological value of proteins. HARRIETTE CHICK AND MARGARET HOYORA ROSCOE *Biochem J* 24, 1780–2(1930).—The av. daily nitrogenous balance sheet is detd on a diet contg a definite amt. of the protein to be examd. Two adult male rats (about 250 g) were placed in each cage, and detns made of the total N ingested and of that excreted in the urine and feces, during a period of 4–5 days. To det. the biol. value of the protein, one dets. the min. quantity of nitrogen ($M$) which must be absorbed to compensate the daily nitrogenous expenditure ($E$) on a N free diet. The biol. value is $100 \times E/N$. II. *Biological value of purified caseinogen and the influence of vitamin $B_2$ upon biological values, determined by the balance sheet method.* MARGARET AVERY, BOAS FIRSEN *Ibid* 1794–1804.—If purified casein was used and the B vitamins were added to the diet in the form of concentrates, the biol. value of casein was found to be 45—much lower than that found by previous workers. BENJAMIN HARROW

*Heart block in pigeons—curative factor.* CYRIL WM. CARTER. *Biochem J* 24, 1811–9(1930).—Whole wheat and yeast contain a factor essential for the nutrition of the pigeon the absence of which from polished rice leads to heart block. B. H.

A quantitative comparison of the curative activity of torulin (vitamin $B_1$) upon the adult pigeon and the adult white rat. HENRY W. KINNERSLEY, RUDOLF A. PETERS AND VERA READER *Biochem J* 24, 1829–3(1930).—The $B_1$ factor for pigeons and rats is identical. The dose of $B_1$ required by each animal is about the same. B. H.

*Curative activity of the antineuritic vitamin of rice.* BARD C. P. JANSEN, HENRY W. KINNERSLEY, RUDOLF A. PETERS AND VERA READER *Biochem J*, 24, 1824–6(1930).—Using the Jansen and Donath rice vitamin crystals (*Proc. Akad. Wetensch. Amsterdam* 29, 1390(1926); cf. *C. A.* 21, 2150), the authors find the following activity (curative tests) per day dose of vitamin: pigeon 0.007 mg. by injection, 0.060 mg. by mouth; rat 0.005 mg. This is a higher activity than that obtained for torulin concentrates. BENJAMIN HARROW

Assay of vitamin $B_2$. VERA READER *Biochem J* 24, 1827–31(1930); cf. *C. A.* 24, 402.—Rats are deprived of the alkali labile vitamins $B_1$ and $B_3$ until polyneuritis occurs (3–4 weeks). The addn. of $B_1$ cures polyneuritis, but does not restore weight. The animal remains in a weak condition with swollen red paws, spastic gait, loss of coordination, etc.—apparently because of lack of $B_2$. BENJAMIN HARROW

Maintenance nutrition in the adult pigeon and its relation to torulin (vitamin $B_1$). I. CYRIL W. CARTER, HENRY W. KINNERSLEY AND RUDOLF A. PETERS *Biochem J* 24, 1832–43(1930).—$B_1$ from yeast will not give maintenance nutrition in pigeons unless supplemented by some undefined factor. II. *Ibid* 1844–51.—Three B factors are necessary for nutrition in the pigeon. The factor which supplements $B_1$ is present in 50% alc. exts. of the charcoal process for concg. $B_2$ (*C. A.* 24, 2771) and also in alkalized marmite. It is not identical with $B_2$, $B_3$ or $B_4$ and can be termed $B_5$. B. H.

Relation of hydrogen-ion concentration to the precipitation of purified torulin yeast vitamin B by phosphotungstic acid. HENRY W. KINNERSLEY AND RUDOLF A. PETERS. *Biochem J* 24, 1850–63(1930).—By the use of fractional ppts. by phosphotungstic acid at varying $p_H$ values, $B_2$ concentrate with an effective action at 0.012 mg. is obtained. BENJAMIN HARROW

Reaction of antimony trichloride with cod-liver oil and its unsaponifiable fraction. ERNEST L. SMITH AND VIOLET HAILEY *Biochem J* 24, 1942–51(1930).—The unsaponifiable fraction gives with $SbCl_3$ in $CHCl_3$ a blue color proportional to its content. This fraction can be completely extd. with $Et_2O$, AcOEt, $CHCl_3$ or light petroleum. BENJAMIN HARROW

*Some contributing factors to the degenerative diseases, with special consideration of the role of dental focal infections and seasonal tides in defensive vitamins.* WESTON A. PRICE. *Dental Cosmos* 72, 1049–60, 1119–31(1930).—A study of the relationship between focal infections, dental caries and the vitamin content of the diet. JOSEPH S. HEPBURN

*Metabolism of carbohydrates.* BERNARD F. BADANES. *Dental Cosmos* 73, 49–56(1931).—A review with bibliography. JOSEPH S. HEPBURN

*Diet and dentition.* WALTER H. FOOS. *Dental Cosmos* 73, 349–52(1931).—A review devoted chiefly to the influence of the vitamins on the teeth. JOSEPH S. HEPBURN

*Studies, in the rat, of susceptibility to dental caries. I. Bacteriological and nutritional factors.* THEODOR ROSEBURY AND MAXWELL KARSHAN. *J. Dental Research* 11, 121–35(1931).—Three synthetic rations, (*a*) low in Ca, (*b*) vitamin D-free, (*c*) vitamin-C free, were fed to young rats. Each ration was fed both with and without the addn. of human oral lactobacilli. Dental caries did not develop in any of the expti.

animals, even though organisms similar to *Lactobacillus acidophilus* occur normally in the rat mouth A bibliography of 26 references is appended J S. H.

Pathological changes in the teeth of rats produced by synthetic diets. Theodor Rosebury and Maxwell Karshan *J Dental Research* 11, 137-48(1931) —A synthetic ration low in Ca and free from vitamin D, produced in rat teeth histological changes ascribable to deficient calcification The odontogenic zone was unusually broad in the dentine of both molars and incisors, large calcified globules appeared in the body of the dentine The odontoblasts, the pulps, the enamel of the molars and the fully formed enamel of the incisors appeared normal, but the youngest enamel of the incisors and the ameloblasts appeared deformed The staining quality of the alveolar bone was affected Changes, similar in certain respects to those of latent scurvy in guinea pig teeth, were produced in the pulps and dentine of rat molars by a synthetic vitamin C free ration, and by other synthetic diets in which a supply of vitamin C was given daily as orange juice, the sp cause of these changes was not as certained, but apparently was not a deficiency of vitamin C Joseph S Hepburn

Relation between vitamin C and some phases of reproduction in the guinea pig. Marianne Goettsch *Am J Physiol* 95, 64-70(1930) —Female guinea pigs, gradually deprived of vitamin C, continued the estrous rhythm until they began to lose wt. Male guinea pigs, deprived of vitamin C, probably as a result of general vigor, lose the ability to sire litters, although motile sperms are present J F Lyman

Physiology of exercise IV. Exercise and basal metabolism in dogs. A H Steinhaus and T A Jenkins *Am J Physiol* 95, 202-9(1930) —Conclusion Exercise is without effect on basal metabolism The high degree of relaxation which is acquired by the trained animal may explain why it is possible to have muscle hypertrophy without an increased metabolic rate J F Lyman

The physiology of vitamins. XIV. The effect of administration of large amounts of water on the time required for development of the anorexia characteristic of a deficiency of the vitamin-B complex. G R Cowgill, H A Rosenberg and J Rogoff *Am J Physiol* 95, 537-41(1930), cf *C A* 24, 4537 —Large vols of fluid given by mouth to dogs subsisting on vitamin B-free diets shortened by about one half the time of appearance of the anorexia characteristic of starvation for the vitamin B complex The hypothesis that the symptoms of lack of vitamin B are due to an accumulation of abnormal intermediary metabolites is unsupported by these expts J F Lyman

Metabolism in pregnancy. IV. The nitrogen metabolism. A W Rowe, Dorothy Gallivan and Helen Matthews *Am J Physiol* 95, 592-600(1930), cf *C. A.* 18, 3644 —Urinary N during pregnancy is lowered, urea N diminishes, $NH_4$, uric acid and undetermined N compds of the urine increase In the first few months after delivery the same general picture persists, except that uric acid elimination returns to normal Non protein N, urea and residual N of the blood are all lower during pregnancy than at an equal non pregnant nutritional level J. F. Lyman

The effect of intravenous and intraperitoneal injections of irradiated ergosterol. C. I. Reed and E A Thacker *Am J. Physiol* 96, 21-7(1931) —Irradiated ergosterol, administered to dogs intravenously or intraperitoneally, is more effective than comparable doses by mouth. Toxicity and hypercalcemia are not parallel; hence the toxic factor may be something other than the vitamin D factor. There was no const effect of the irradiated ergosterol dosage on the concn of inorg P of the blood. J. F. Lyman

The metabolism in pregnancy. V. The carbohydrate metabolism. A W Rowe, Dorothy E. Gallivan and Helen Matthews *Am. J Physiol* 96, 94-100(1931) —*Glucosuria is a common finding during the course of normal pregnancy. Lactosuria* supervenes within a few days of delivery and may continue throughout the period of lactation or even beyond Blood sugars are at low normal or slightly subnormal levels throughout pregnancy The tolerance limit of 40 g of galactose for the adult female declines to 20 g during pregnancy, and sinks after delivery for 2 weeks or more to 10 g With the cessation of lactation, or even before, the normal tolerance of 40 g is regained VI. The respiratory metabolism and acid elimination. *Ibid* 101-11 —Pregnancy produces an increase in basal metabolism during the last 24 weeks of 13% more than that predicted from the change in wt *Following delivery there is* a downward trend of significant proportions which reaches a min value somewhere between the 3d and 5th week and then rapidly rises to normal Alveolar $CO_2$ values indicate acid intoxication. Such a condition cannot be demonstrated with certainty, although there are minor evidences of possible acid retention VII. The blood morphology. A W. Rowe *Ibid* 112-4 —*Hemoglobin shows a relative and abs depression* of moderate

degree during normal pregnancy There is a moderate secondary anemia with lowered color index J F. LYMAN

Differential response of male and female ring doves to metabolism measurement at higher and lower temperatures. O RIDDLE GUINEVERE CHRISTMAN AND F G BENEDICT *Am J Physiol* 95, 111–20(1930).—With an increase of external temp from 20° to 30° the metabolism of male ring doves increased 28.1% and of females 20.3%. The differential response of the normal metabolism of the sexes to temp is of consequence not only in metabolism studies, but in growth, vitamin and nutritional research. J. F. LYMAN

The relation between anorexia, anhydremia and gastric atony in dogs deprived of water W B ROSE C J STUCKY, L B MENDEL AND G R COWGILL. *Am J Physiol* 96, 132–8(1931).—Dogs fed an artificial ration complete in every respect were deprived of water for 6-day periods. A moderate increase in blood concn with an increase in the hemoglobin value of less than 20% was assocd with a definite decrease in the motor activity of the empty stomach and partial or complete loss of appetite When atony of the stomach was recorded, there was a complete loss of appetite Since anhydremia is a systemic disturbance other organs, particularly muscles, may fail to function with optimum efficiency in the presence of a moderate degree of anhydremia. J. F LYMAN

Diet in relation to reproduction and lactation. III. P D WILKINSON AND V E. NELSON *Am J Physiol* 96, 139–45(1931).—Rats grew at a normal rate with 10, 20, 40 and 73.3% of cooked dried soy bean as the only source of vitamin B and G Reproduction was normal on the lower levels of soy bean, but on the higher levels the rats were not so prolific. Satisfactory lactation was not obtained on any level of soy bean feeding unless a further supplement was added. When the soy bean made up 15% of the ration, liver from hogs and cattle and hog kidney, added to the diet, gave very marked improvement in lactation Hog pancreas and beef pancreas, brain and heart gave some improvement while hog lung and spleen and beef thymus gave no appreciable improvement. The galactagog factor was destroyed in liver by drying for 12 hrs. in air at 120° Ether ext. of liver possessed no galactagog properties. J F. L.

Metabolic studies during pregnancy and menstruation. IRENE SANDIFORD, THEODORA WHEELER AND W W BOOTHBY *Am J Physiol* 96, 191–202(1931).—There is a gradual increase in the total heat production during pregnancy, amounting at term to 25%, and probably all accounted for by the added metabolism of the fetus, placenta and accessory structures. On an adequate protein intake of over 85 g per day there is a pos. N balance varying between 0.5 and 1.1 g daily There is no evidence that the fetus grows at the expense of the mother's tissue if the diet is adequate N retention results in a slight decrease in the % of total N eliminated in the urine as urea. There is also a slight increase in the uric acid and ammo acid N, an increase in creatine and no change in the creatinine eliminated until the ninth month when there is a sudden increase Urinary $NH_4$ increases slightly There are no significant changes in the inorg substances eliminated nor any changes in the chemistry of the blood The mean value of 336 basal detns. of the heat production on a normal woman between 34 and 41 years of age is 33.1 ± 0.06 Cal per sq m J F LYMAN

Composition of a new diet for the study of B avitaminosis, a diet relatively poor in carbohydrate and rich in fat. MME L. RANDOIN AND R. LECOQ *Compt rend* 192, 444–7(1931).—Basing their work on previous expts. (*C. A.* 17, 1494; 18, 1322), R and L. show the influence upon the development of polyneuritis in pigeons due to the feeding of a variety of carbohydrates and glucosides as a certain percentage of the diet. The compn of the diet is purified casein 8, purified fibrin 8, ovalbumin 8, butter fat 8, lard 18, carbohydrate 35, Osborne and Mendel salt mixt. 5, agar agar 8, filter paper 2. Comparative tests were made on diets differing only in the nature of the natural or purified carbohydrate, the following being used glucose, levulose, maltose, saccharose, dextrin, corn starch, galactose, lactose and potato starch All the pigeons submitted to this diet contg glucose, levulose, maltose, saccharose or dextrin showed satisfactory temp., digestion and food absorption up to 20–30 days when acute polyneuritis and death occurred On the diets contg lactose, galactose and the starches, the onset of polyneuritis was delayed N. M NAYLOR

A direct quantitative relationship between vitamin A in corn and the number of genes for yellow pigmentation P C. MANGELSDORF AND G S. FRAPS. *Science* 73, 241–2(1931).—Yellow corn is known to be much richer in vitamin A than white corn, and a similar assocn. between A and carotenoid pigments has been discovered in many other plant materials Inheritance of seed color in corn follows definite Mendelian ratios resulting in the production of four classes of seeds, *e. g.*, white, pale yellow, dilute

yellow and deep yellow, representing 0, 1, 2 or 3 genes for yellow pigment. Corn with these 4 genetic factors was bred and the seed was fed to rats in an appropriate diet. The following av units of vitamin A per g were found in seed grown in 2 different years when tested for A by the method of Sherman and Munsell (*C. A.* 19, 2517): 0 genes for yellow, 0.05 unit, 1 gene for yellow, 2.25 units, 2 genes for yellow, 5.00 units; 3 genes for yellow, 7.50 units. The results show (1) that a white-seeded variety of corn with little or no vitamin A in the endosperm is capable of forming A in its seeds if the genes for yellow pigmentation are introduced, (2) that there is a direct quant relationship between the no. of genes for pigmentation in the cells of the endosperm and the amt. of A in the seed. Each gene for yellow pigmentation causes the formation of approx. 2.5 units of A per g. of seed. The genes for yellow pigmentation are directly, or indirectly, responsible for the formation of A, with the production of carotenoid pigments as an intermediate step. This is the first case in which a direct relationship between different doses of the same gene and their chem. effect has been definitely established. It is improbable that this gene functions as an enzyme, as the total reaction resulting from enzyme activity is seldom related to the concn. of the enzyme. Each gene for yellow pigmentation, however, seems to govern the formation of a definite quantity of A. The straight line relationship between no. of genes and amts. of A is indicative of a direct chem. relationship between the genes and some other substance which is present in the endosperm of both white-seeded and yellow-seeded varieties of corn. C. H. Richardson

**Liver extracts as a source of vitamins B and G.** W. D. Salmon and N. B. Guerrant. *Science* 73, 243–4(1931).—*Early investigations of the distribution of vitamins* showed that the livers of animals were a good source of vitamin B (vitamin G + B). The present expts. were made primarily to det. whether com. liver exts. afforded a good source of vitamin G for further concn. of the active factor. Growth studies on *rats fed an appropriate diet in which various amts. of liver ext. were added indicated* that the liver exts. are an excellent source of vitamin G, 0.10 g. per day furnishing sufficient of this factor for normal growth of a rat for a period of 9 weeks. Liver ext. is not such a good source of vitamin B. The ext. tested apparently contains 4–5 times as much G, *but only about* ¹/₄ *as much B as a sample of brewer's yeast. The vitamin* B content of the ext. compared favorably with that of pure dry baker's yeast. C. H. Richardson

**Vitamins in sugar-cane juice and in some cane-juice products.** E. M. Nelson and D. Breese Jones. *J. Agr. Research* 41, 749–59(1930).—*Sugar-cane juice is a poor* source of vitamin B. The juice from the upper portions of cane stalks is richer in this vitamin than juice from the lower portions. Juice obtained from bagasse by using high pressure is richer in vitamin B than ordinary cane juice. Sugar-cane juice contains a *small* amt. of vitamin A *but little, if any,* vitamin D. Cane sirup, Louisiana and Porto Rico blackstrap molasses and cane cream, products made from sugar-cane juice, are devoid of demonstrable quantities of vitamin B. W. H. Ross

**The calcifying and toxic action of large doses of irradiated ergosterol in animals. Attempt to separate the two actions.** H. Simonnet and G. Tanret. *Compt. rend.* 192, 586–8(1931), cf. *C. A.* 25, 156.—The calcifying and toxic principles of irradiated ergosterol are resistant to oxidation and hydrogenation. Certain rabbits exhibit great ergosterol resistance, living several months, while other rabbits on the same dose die in a few days. Death resulted in 15–25 days on daily feeding of 20 mg. ergosterol irradiated 45 min. If irradiated ergosterol is administered in large doses 4 days a week, followed by 3 days rest, too rapid calcification is avoided, and a rabbit may live several *months instead of a few weeks. The feeding 4 days a week of 0.2 g. of KI with 20 mg.* ergosterol inhibited calcification and maintained a healthy condition in rabbits, while the omission of KI caused death in a rabbit in 228 days with intense calcification. Feeding 0.1–0.2 g. of irradiated ergosterol produced death in 6–8 days without appreciable calcification. This indicates that a toxic factor other than calcification exists and massive doses may kill the animal before any calcifying action appears. D. S. Searle

Chemical analysis and vitamin B determination in unpolished rice grains kept in tightly closed vessels (Kondo, Okamura) 12.

*Handbuch der biologischen Arbeitsmethoden.* Edited by Emil Abderhalden. Abt. 4, Tl. 14 (Lfg. 344). Wilhelm Plücker. Tabellen- und Rechenbuch für Nahrungsmittelchemiker. Berlin: Urban & Schwarzenberg. 231 pp. M. 20, bound, M. 22.

McLester, James S. Nutrition and Diet in Health and Disease. 2nd ed. Philadelphia: W. B. Saunders Co. 891 pp. $8.50.

determining the rate at which a salt may penetrate the enamel. HENRY KLEIN *J Dental Research* 10, 727–31(1930), cf *C A* 24, 5343.—The cond changes in a tooth were followed by means of a cond app in which a vacuum tube amplifier was substituted for the usual telephone. The velocity with which a salt penetrated the enamel depended on the existing osmotic gradient, and was relatively slow in the canine tooth of the dog; thus 1.0 *N* KCl soln required 8 hrs., and 0.1 *N* KCl soln 24 hrs. J. S. H.

Basal metabolism. JOSEPH S. HEPBURN AND HARRY M. EBERHARD *Hahnemannian Monthly* 65, 850–63(1930).—The theory and the technic of the basal metabolic rate detn. are considered, and an account is given of the clinical application of this test in gastrointestinal and related diseases. JOSEPH S. HEPBURN

Observations on certain physiological processes of the marmot. II. Respiration. G. ENDRES AND H. TAYLOR *Proc. Roy. Soc.* (London) *B107*, 231–40(1930).—$CO_2$ produced little increase in either the rate, the depth or the minute vol. of respiration of both hibernating and normal marmots, unless the $CO_2$ content of the inspired air exceeded 5%. Higher concns. of $CO_2$ augmented the respiration, more markedly in normal (awake) marmots than in those hibernating. III. Oxygen saturation of the arterial blood. G. ENDRES. *Ibid.* 241–5.—In 2 hibernating marmots, the $O_2$ satn. of arterial blood ranged between 93.5 and 96.4%. The temp. coeff. of the $O_2$ equil. of the erythrocytes was 1.8 on exposure to a partial pressure of 40 mm. $CO_2$, and 2.7 at a $p_H$ of approx. 7.76. IV. Blood sugar. *Ibid.* 245–6.—Blood was obtained by cardiac puncture. During hibernation the blood sugar of 5 marmots ranged between 0.071 and 0.096%, during summer, its range in 3 marmots was between 0.97 (a misprint for 0.097?) and 0.162%. JOSEPH S. HEPBURN

Isolation by cataphoresis of two different oxyhemoglobins from the blood of some animals. ALEXANDER GEIGER *Proc. Roy. Soc.* (London) B107, 368–80(1931).—Two different oxyhemoglobins have been isolated from blood of the ox, sheep, ass, dog and man. They are best sepd. by electrodialysis followed by cataphoresis, and differ with respect to the O dissocn. curve. JOSEPH S. HEPBURN

Relation between the anterior pituitary body and the gonads. III. Fractionation and dilution of ovary-stimulating extracts. MARGARET HILL AND A. S. PARKES *Proc. Roy. Soc.* (London) B107, 455–63(1931), cf *C A* 24, 5819.—Two types of reaction, (*a*) *follicular luteinization and formation of atretic corpora lutea without ovulation*, and (*b*) normal follicular maturation and ovulation, were produced in mice, rats, rabbits and ferrets by saline suspensions of pituitary tissue, alk. ext. of the anterior lobe of ox *pituitary, and exts. prepd. from the urine of pregnancy. Extensive dilu. expts. with* the urine exts. indicated that the 2 reactions could not be ascribed to the activity of a single hormone producing different responses at different concns. Some evidence of sepn. *of the luteinizing and the maturing activity was obtained by alc. fractionation of urine* exts. Material sol. in 50% alc. was predominatingly luteinizing, that sol. in 30% alc. mainly produced follicular maturation. JOSEPH S. HEPBURN

*Regulation of the ovarian cycle.* MARGARET HILL. *Science Progress* 25, 449–64 (1931).—A comprehensive survey of the evidence that the hormone of the anterior pituitary body actually controls the ovarian cycle. JOSEPH S. HEPBURN

*Influence of alteration in the vegetative system on the phosphorus metabolism.* KÄTHE HESSE *Z. klin. Med.* 111, 729–41(1929).—In a series of metabolic balance expts., made in part on human beings and in part on dogs, it was shown that ergot amine and acetylcholine decreased both the $P_2O_5$ and the org. P content of the urine and both the inorg. P and the total acid sol. P content of the blood, while atropine and ephetonine had the reverse effect. No distinct influence was exerted on the Ca content of the urine, its vol. or its acidity. A relationship was thus found between the P metabolism and the functioning of the vegetative nervous system. J. S. H.

Biochemistry in relation to intelligence. H. D. POWERS *Science* 73, 316(1931).—Blood tests from a group of normal adults and one of idiots showed the Ca content within normal range in all cases. The phosphate content in the normal group ranged between 3.25 mg. and 8 mg. per 100 cc. blood, usually below 5.88 mg. and averaged 4.36 mg. The idiots had a high phosphate content, 5.98–12.45 mg., averaging 8.95 mg. per 100 cc. There was no reciprocal relation between the quantities of Ca and phosphate. MARY E. LEAR

The iodine content of animal organs. K. SCHARRER *Tierernähr.* 1, 563–77 (1930).—A review. F. J. G. DE LEEUW

Problems of tropical physiology. W. BORCHARDT. *Ergeb. Physiol.* 31, 96–131 (1931), cf *C A* 25, 1885.—A review. C. M. McCAY

Physical-chemical equilibria of the blood. MAX HOCHREIN. *Ergeb. Physiol.* 31, 421–506(1931), cf *C A* 24, 2779.—A review. C. M. McCAY

Nutrition and metabolism of the cells of the eye. F P Fischer *Ergeb. Physiol.* 31, 707-90(1931) —A review C. M McCay

Recent developments in the field of iron metabolism. W Lintzel. *Ergeb Physiol* 31, 844-90(1931) cf *C. A* 24, 2103, 3823 —A review C. M McCay

The inhibiting power of plasma from old animals on the growth of tissue culture. Gino Bergami and G Fachini *Boll soc ital biol sper.* 5, 1073-5(1930) —Under the exptl conditions used and within the limits of accuracy of the method, the inhibiting action of plasma from old animals on the growth of tissue culture *in vitro* has been confirmed The transplanting of the testicle of a young animal to an old animal reduces the inhibiting action of the plasma from the old animal, without causing it to disappear in its entirety When the testicular tissue has been completely absorbed, the inhibiting action of the plasma returns to normal Peter Mastbaum

The presence of an estrus-producing substance in the male sexual gland. M Marro and B Frattini *Boll soc ital biol sper* 5, 1065-8(1930) —Five kg testicular glands was macerated in acidified water and pptd repeatedly with salts of heavy metals at the isoelec. point. Five mg of a cryst. substance was obtained which showed morphological characteristics identical with the pure follicular hormone. The needle-shaped crystals grouped themselves in the form of a tree, they were sol. in alc. and ether and somewhat less sol in water The cryst. substance in aq soln in doses corresponding to 250-500 g of fresh gland was injected during a period of 3 days into 4 castrated rats. The animals were killed on the 5th day The results were all pos.; all the prepns. showed the 4 phases of the development of vesicular activity Cross injections were then made the activity of the testicular cryst. substance was tested on spayed female rats and the activity of cryst. folliculin on castrated male rats. All the female animals presented the typical estrus reaction, and all the male animals treated for 4 consecutive days with 5 units of folliculin gave typical pos. seminal vesicle tests. The hypothesis is advanced that the 2 hormones are either identical or have certain physiol properties in common Peter Mastbaum

The total sulfur content in human blood. Serafino Dezani *Biochim. terap sper* 18, 34-7(1931) —In 20 individuals, the highest value of S in blood was 2314 g per l the lowest 1648 g and the av 1928. A. E. Meyer

The internal secretion of the thyroid gland and the development of the plumage in pigeons. I. Regeneration and moulting in hyperthyroidism. W Th. Lakhovsky and N Kosarina *Biol Zentr* 51, 81-104(1931) —In pigeons fed with thyroid substance, the regeneration of removed feathers takes place in a shorter time. Moulting could be induced Changes in the thyroid gland of the birds were observed, presenting a transition to hypofunction A. E. Meyer

Lehrbuch der allgemeinen Physiologie. Edited by Ernst Gellhorn Leipzig: Georg Thieme 741 pp M 47, half leather, M 49.50.

Pfeiffer, August Die Sekretionsmechanismen der Niere. Berlin Walter de Gruyter & Co 235 pp. M 16 bound M 17.50

Zondek, Bernhard Die Hormone des Ovariums und des Hypophysenvorderlappens. Untersuchungen zur Biologie und Klinik d weibl Genitalfunktion. Mit einem Anhang Die hormonale Schwangerschaftsreaktion aus d Harn bei Mensch und Tier Berlin J Springer 343 pp M 38 linen, M 40.60

## G—PATHOLOGY

H. Gideon Wells

The iodine content of the blood of patients suffering from cancer. F S. Fowweather *Brit J Exptl Path* 11, 400-7(1930) —The claim has been made that the blood of patients suffering from cancer always contains notably less I than that of healthy persons By use of the method of Leitch and Henderson (*C. A* 21, 2339) the I content of the blood was detd in 12 normal individuals and in 24 cancer patients In the normal cases the results obtained varied from 3.6 to 5.1 γ (γ = one-millionth of a g per 100 cc.) Out of 24 cancer cases exam'd only 11 show values below what may be considered as normal This failure to find a const. assocn between low blood I and cancer is definite evidence against the view that I deficiency is a cause of cancer While there may perhaps be a tendency toward lowered blood I in cancer, there is at least as much justification for assuming that the reduction is the result of the cancerous condition as there is for assuming it to be the cause of such a condition Further, since in rather less than half of the cases exam'd was any reduction of blood I indicated, the detn. of blood I as a diagnostic test for the presence of malignant disease can have no value whatever Harriet F. Holmes

A study of the blood pigment in obstructive jaundice, with observations on the van den Bergh reaction. W J Griffiths and G Kaye *Brit J Exptl Path* 11, 441-6 (1930), cf *C A* 25, 720.—Direct reaction human serum and the serum of rabbits after bile-duct ligation resemble in their properties a soln. in serum of the "direct-reaction" pigment shown to be present in bile. Human indirect reaction serum resembles in its properties a suspension in serum of pure bilirubin. The "direct reaction" pigment yields a diazo reaction over a wide range of $p_H$ vals., when the $p_H$ of the mixt. after addn. of the reagent lies between 1.2 and 5.0 approx., on the other hand, the pigment of indirect reaction serum, like bilirubin, yields no prompt direct reaction until the final $p_H$ of the reaction mixt. is adjusted to about 6.0 by addn. of alkali to the serum before mixing with diazo reagent. Harriet F Holmes

Normal flocculating H- and granulating O-agglutinins for Bacillus typhosus in sera of different species. W A Timmerman *Brit J Exptl Path* 11, 447-55 1930.—Normal agglutinins for *B typhosus* in sera of man, guinea pig, rabbit, horse, sheep, goat and buffalo can be of the finely granulating O-type and the coarse flocculating H-type. It appears that in man and ruminants normal H-agglutinins occur more frequently than normal O-agglutinins, contrary to what has been observed in horses and rabbits. Sera of guinea pigs show the lowest content of normal typhoid agglutinins. In the ascending scale sera of rabbits and man follow, reaching to horses and ruminants at the apex. After electroösmotic fractionation of the serum, both types of normal agglutinins for *B typhosus* are found in the euglobulin fraction exclusively. Harriet F Holmes

The response of grain-fed pigeons to substances effective in pernicious anemia. J M. Vaughan, G L. Muller and L. Zetzel. *Brit J Exptl Path* 11, 456-68(1930).—The group of anemias characterized by megaloblastic hyperplasia must be regarded as due to the deficiency of some substance or substances essential for the normal function of the bone marrow. The bone marrow of the healthy grain fed pigeon is likewise characterized by the predominance of megaloblastic tissue. Such pigeons were used therefore as testing material for various substances capable of relieving conditions in man, assocd. with megaloblastic bone marrow. The oral or intravenous administration of liver prepns. effective in anemia produced a consistent pronounced response of the reticulocytes and 2 subfractions prepd. from it which had received clinical tests also caused a similar response. Beefsteak was as effective as potent liver prepns. in causing a rise of the reticulocytes. No reticulocyte response was obtained to a liver prepn. which was inert for pernicious anemia, a liver ext., in which the active principle had been destroyed, vitamin B 1 and 2, histamine, NaCl and casein. Substances capable of influencing the reticulocyte level are without effect on the total red blood-cell count. The grain-fed pigeon may perhaps suffer from a mild dietary deficiency, which is possibly a factor of importance in permitting its bone marrow to respond to certain substances. Harriet F. Holmes

Diphtheria toxin-antitoxin floccules. F C. Smith and J Marrack. *Brit J Exptl Path* 11, 494-502(1930).—The expts. described give further support to the authors' contentions that diphtheria antitoxin consists of slightly modified pseudoglobulin mols., and forms the greater part of toxin-antitoxin floccules. There is no evidence that acid or base-binding groups are involved in the flocculation process, or that any appreciable amt. of heat is evolved. The amt. of protein in the flocculates obtained from a balanced mixt. of diphtheria toxin and antitoxin is unaffected by the addn. of non-specific proteins, even when a special antitoxin soln., of which 1.3 was pptd. in the flocculates, was used. Diphtheria antitoxin (horse serum) is pptd. by an antiserum to horse pseudoglobulin, the ppt. so formed combines with diphtheria toxin. No change of H-ion concn. occurred when purified and concd. toxin combined with a concd. and specially pure antitoxin soln. The isoelec. point of diphtheria toxin antitoxin flocculates lies between $p_H$ 5.1 and 5.6. The heat of reaction of diphtheria toxin and antitoxin is not of the order found by Bayne-Jones (*C. A.* 19, 3109). H. F. Holmes

The concentration of the protective substance in antipoliomyelitis serum. W. T. J. Morgan and R. W. Fairbrother. *Brit J. Exptl Path.* 11, 512-22(1930).—From the exptl. results obtained with the immune serum from one horse immunized with living poliomyelitis virus, it would appear that the protein pptd. at a relatively low concn. of $(NH_4)_2SO_4$ is uniformly much more potent in antiviral action per unit weight of protein than that pptd at higher concns. of this salt; and in conformity with this result the protein thrown out of soln. by dialysis of the immune serum, and the serum protein that is insol. in satd. NaCl soln., have been shown to possess potent antiviral properties. The evidence indicates that in this serum there was a general distribution of the antibody throughout the serum proteins, since carefully fractionated prepns.

a the pseudoglobulin and albumin possess definite although slight properties for neutralizing virus HARRIET F HOLMES

The appearance and development of certain antibodies in horses immunized with diphtheria anatoxin A BESSEMANS, G RAMON AND F DUPOTTER *Arch intern med exptl* 5, 505–55(1930) —A Schick pos horse immunized with diphtheria anatoxin developed a max antitoxin titer more rapidly but produced a smaller quantity of antitoxin than a Schick neg horse No agglutinins for the diphtheria bacillus were formed The max concn of complement fixation antibodies was reached rapidly, but was maintained for only a short period Complement fixation cannot be used as an index of the degree of immunity since there appears to be no correlation between the production of antitoxin and fixation antibodies F R MAIN

The role of serum globulins in the Wassermann reaction S T WALTON *J Lab Clin Med* 16, 451–9(1931) —Normal human serum or solns of serum globulins obtained by salt pptn and dialysis appear to increase hemolysis in the complement titration of the Kolmer Wassermann procedure The addn of a small quantity of normal human serum to the tubes employed in the titration of the complement allows for the affinity which the serum proteins may have for complement and makes possible a more delicate adjustment of the hemolytic system F R MAIN

The influence of *p*H on the Sachs-Georgy reaction S SITKAKOWSKI AND J MELAK *Med Dissertationes Warsoviensis* 13, 111–24(1931) —See C A 25, 730 T H RIDER

GRAFE E Die Krankheiten des Stoffwechsels und ihre Behandlung Berlin J Springer 519 pp M 29 60

SCHMITT WILLY Technik, Klinik und Theorie der Kolloidreaktionen der Rückenmarkflüssigkeit Dresden T Steinkopff About 200 pp About M 15 bound, about M 16 70

## H—PHARMACOLOGY

A N RICHARDS

The physicochemical properties of tissues in relation to the normal state and the pathological state of the organism VII. The action of certain amino acids on tar carcinoma of mice F VLÈS AND A DE COULON *Arch phys biol* 7, 183–206(1930); cf C A 24, 2501–2 5867 —Various amino acids were injected into mice in which tar carcinoma had been produced In the first series of expts. 13 mice received the following combinations of amino acids aspartic acid *l* leucine, glycine, *dl* proline, *l*-cystine and *dl* alanine in equal quantities and in equimol quantities Then a mixt. of *dl* proline and *l* cystine in equimol quantities and one of equal quantities of *dl* proline, *l*-cystine and *dl* alanine were given and finally aspartic acid was used alone In the great majority of cases an improvement was noticeable As this series served only for orientation, 3 more series were studied, each one with 10 mice. These received equal quantities of *dl* proline and *l*-cystine and equimol quantities of *dl* alanine, *dl*-proline and *l*-cystine. In no case did aggravation of the cancer occur, in a great number of cases improvement was noted The improvement was strictly regression of the histologic type Proline and cystine are undoubtedly of fundamental importance in this action The favorable influence of *l*-cystine and *dl* proline as well as of *dl*-alanine is attributed to the fact that their isoelec. points lie within a certain range F R G

Use of phenobarbital in infant feeding ORVILLE HARBOTH *Arch Pediatrics* 48, 53–60(1931) —Phenobarbital in doses of 1/8 to 1/4 grain at intervals of 4 or more hrs has been administered to 76 infants between the ages of 1 week and 8 months for periods of 1 to 6 months No cumulative or deleterious effects, mental or physical, resulted. Phenobarbital is safe and effective for the control of infantile vomiting, and more satisfactory than atropine JOSEPH S HEPBURN

Biological estimation of some cardiotonic glucosides ouabain, digitalin, scillarenes and cymarin JEANNE LÉVY AND RAYMOND CAHEN *Bull sci pharmacol* 38, 23–37, 85–108(1931) —The method of Hatcher Magnus on the dog was used for the comparison of samples of the cardiotonics Three samples of ouabain proved to be equiv if referred to the anhyd substance or to crystals with $9H_2O$ The min lethal dose is given for the following compds ouabain with $9H_2O$ (anhyd product shows $[\alpha]_D = -30.6°$), 0.173 mg per kg animal, g strophanthin of 20.07% $H_2O$ ($[\alpha]_D = -28.88°$), 0.1725, ouabain U S P X with an av of 11.1% $H_2O$ ($[\alpha]_D = -30.6°$), 0.1585 mg, equiv to 0.178 of the crystd compd The international standard of strophanthin of $9H_2O$ has 0.173 mg and the original contg 19.94% $H_2O$ has the value 0.1705. For tincture of strophanthus, used in a dilu of 1:100, it is between 0.0.04285 and 0.0047575 g

strophanthus, the activity of 1 cc. corresponding to 3.50–3.97 mg. ouabain standard. The min. lethal dose of digitalin Nativelle is 1.69, of digitoxin Merck 1.75, of digitaligenin 7.1 mg., of scillarene A (tested in 0.04% soln.) 0.353, scillarene B 0.167, com. scillarene C 0.288, tincture of squill 0.214 cc. (equiv. to 42.8 mg. of squill) and of cymarine 0.2302.
A. E. MEYER

Diphenyl ether series. III. Derivatives of the local anesthetic type (SUTER, OBERG) 10. *N*-Methyl *N* phenylalkylaminoalkyl benzoates and *p* aminobenzoates (COPE, MCELVAIN) 10. Synthesis of some new thiazole amines containing the catechol group (OLIN, JOHNSON) 10. Synthesis of local anesthetics (KOLLER) 17. New derivatives of *p*-arsanilic acid (MORGAN, WALTON) 10.

HANDOVSKY, HANS. Pharmakologie, in ihrer modernen Problemstellungen. Dresden: T. Steinkopff. About 200 pp. About M. 14, bound, about M. 15.50.

MOUVEYRAT, J. Contribution à l'étude du traitement de la syphilis par le bismuth et l'arsenic. Étude de nouveaux dérivés. Paris: Le François. 178 pp. F. 25.

## I—ZOOLOGY

R. A. GORTNER

A method for determining basal metabolism of fishes. MAZIE ADKINS. *Proc. Soc. Exptl. Biol. Med.* 28, 259–63(1930).—A technic is described whereby fish can be kept at a fairly const. rate of metabolism while undergoing physiol. experimentation.
C. V. B.

The role of bacteria in the nutrition of protozoa. J. MURRAY LUCK, GRACE SHEETS AND JOHN O. THOMAS. *Quart. Rev. Biol.* 6, 47–58(1931).—A review with extensive bibliography.
J. B. BROWN

Evidence from the effects of potassium cyanide for linkage between polar growth, electric potentials and cell oxidation on Obelia. HILDA F. ROSENE AND E. J. LUND. *Pub. Puget Sound Biol. Sta.* 7, 337–44(1930).—The growth of isolated internodes of the hydroid, *Obelia*, can be reversibly inhibited by cyanide. The effect is similar to the effect of HCN on cell oxidation and elec. potentials in the stem. An appropriate application of cyanide tends to reverse the polar sequence of growth of individual internodes. The effect of the KCN in a quant. way corresponds to the effect of an elec. current on growth. The continuous application of KCN will decrease the rate of growth, the magnitude of this depression being greater in young tissue. Additional evidence is presented for the quant. linkage between mechanisms of cell oxidations, bioelec. currents and the mechanisms of growth.
C. R. FELLERS

Investigations on the physicochemical properties of the hemocyanins of the octopus and of the horse-shoe crab. JEAN ROCHE. *Arch. phys. biol.* 7, 207–20(1930).—No difference was found between the physicochem. properties of the natural hemocyanins and their decompn. products deprived of Cu by treatment with dil. acids. It is therefore not necessary to admit the presence of a special (prosthetic) group like the hematin in hemoglobin. The opinion of Heinze that hemocyanin is a Cu proteinate is probably nearer the truth. The isoelec. point of the hemocyanin of the octopus is $p_H$ 4.8 which is close to that of the crab, the lobster and the shrimp. The hemocyanin of the horse-shoe crab, however, has an isoelec. point of $p_H$ 6.2–6.4.
F. R. G.

Metabolic changes associated with pigmentary effector activity and pituitary removal in Xenopus laevis. I. Respiratory exchange. ENID CHARLES. *Proc. Roy. Soc.* (London) B107, 486–503(1931).—The rate of respiratory exchange in the amphibian *Xenopus laevis* in air increases with a rise in the external temp., the O consumption per unit surface decreases as the body wt. increases. Females apparently have a lower respiratory rate than males. The respiratory rate is higher in unanesthetized eyeless animals than in eyed animals, and is lower in animals kept in total darkness prior to experimentation than in those kept in the light. Partial or total hypophysectomy considerably decreases the rate of respiratory exchange, this effect is more marked on the pulmonary rate than on the dermal rate. Hypophysectomy increases the R. Q. The rate of O absorption is from 2.5 to 3 times greater by way of the lungs than by way of the skin. II. Calcium and magnesium content of the serum. *Ibid.* 504–10.—The serum Ca and serum Mg were higher in females than in males and were not influenced definitely by pigmentary effector activity. Removal of either the anterior lobe or both lobes of the pituitary produced a persistent decrease in the Ca content of the serum.
JOSEPH S. HEPBURN

Osmotic changes in some marine animals. R. MARGARIA. *Proc. Roy. Soc.* (London) B107, 606–24(1931).—In the crabs, *Maia squinado*, *Portunus depurator* and

(1929)), or from treatment for 48 hrs with 1% $HgCl_2$, 2% cresol, 5% phenol or 5% I suspensoid Merck Acid or alkali was almost without effect K. V THIMANN

Change of vitality with age as based on the living unit of organism. I. Oxygen consumption in the daphnid, Simocephalus exspinosus. ARATA TERAO *Proc Imp Acad* (Tokyo) 7, 23-5(1931).—By use of the data of Obreshkove (*C. A* 25, 543), the following formula is obtained, $y = 65.855\ e^{0.112x}$, where $y$ represents the % rate of O consumption compared with the first instar young (size considered), $x$ age in days and $e$ base of Napierian logs C. J WEST

## 12—FOODS

F C BLANCK AND H A LEPPER

The reciprocal action between metal utensils and foodstuffs. II. A study of the biological value of metals J SCHWAIBOLD AND F FISCHLER *Biochem Z.* 232, 240-53(1931), cf *C A* 25, 1913.—The method of this investigation consists in studying the effect on frog tadpoles of being reared in dishes made from different materials No effect of any sort was observed with Al Expts with Zn dishes show that under the influence of the natural corrosion products of Zn the growth and development of the tadpoles may be completely inhibited, however, if the action is not too far gone the condition is reversible Expts with iron receptacles show that loading the tadpoles with corrosion products of this metal during the entire life span has had no deleterious effect and there is even some indication of a possible favorable action The expts with tin utensils were very few but they suggest that this metal is either without action or its effect upon the organism is very slight, in consequence of its poor soly and absorption into the organism Copper, in these tadpole expts, has shown a surprisingly serious effect, even very minute quantities of its corrosion products being so toxic that the animals invariably died in a short time S MORGULIS

The use of aluminum for kitchen utensils VICENTE COLOMBARO *Rev farm* (Buenos Aires) 73, 75-87(1931).—The quantity of Al dissolved from an Al container of 1400 cc capacity, when 1000 cc of substance was boiled for 1 hr., was detd In 100 g of substance the following values for Al (in mg.) were found distd $H_2O$ none, tap water 0.94, 7% AcOH 15.66, 0.25% tartaric acid 6.11, 3% citric acid 6.47, 4% NaCl soln 2.35, 4% NaCl and 7% AcOH 13.15 milk 1.69, olive oil 5, sugar soln 2, compote 0.54, tomato preserves 45.6, broth 1.2, and white wine 1.83 The present knowledge of the toxicity of Al does not permit conclusions concerning the innocuousness of its use in the kitchen A E MEYER

Cichorium intybus L. as food. I FLEISCHNER *Kisérlet Közlemények* 31, 253-9 (1928).—Its use and composition are discussed S S DE FINÁLY

Hungarian rye flours. Z DE SÁNDOR *Kisérlet Közlemények* 31, 470-9(1928).—Ryes showed 13.62-14.21% water, 1.58-1.69% ash, 1.60-1.69% total N, 3.36-3.66 acidity no and 9.12-9.63% albumins Flours from these ryes contained 10.80-13.96% water, 0.44-3.18% ash and 0.78-2.85% total N and had acid no 1.68-10.01 S S DE FINÁLY

Studies on improved Hungarian wheats. S GÖMÖRY AND L PAP *Mezögazdasági Kutatások* 2, 116-39(1929).—The $H_2O$ content was 9.21-10.61%; hl wt., 79.45-85.10 kg. No connection was found between hl wt., wt of 1000 grains and quality and quantity of gluten The best sample contained 56.5% gluten S S DE FINÁLY

Testing new wheat varieties. R C SHERWOOD *Cereal Chemistry* 8, 168-75 (1931).—Several new wheat varieties have appeared in recent years which have not been entirely acceptable to millers and chemists Marquis is a variety of spring wheat that has met with great favor, though it is frequently grown under conditions which result in low flour yield, poor color, high ash and small loaf vol Environmental conditions are liable to cause greater variations in water absorption than the differences between varieties grown under comparable conditions Kota wheat yields well under dry conditions, but lodges badly and is susceptible to smut Quality wheat is not equal to Marquis in baking properties Garnet yields large loaves with only fair texture and color Ceres is resistant to rust but susceptible to scab and smut Reliance, Supreme and Renard are not resistant to stem rust Minhardi and Minturki have winter hardiness Marquillo is a rust resistant variety, which seems to be better adapted to conditions in northern Minnesota than farther south L H. BAILEY

Apparatus to determine quality of wheat. K KONOPI *Mezogazdasági Kutatások* 3, 426-31(1930).—Wheat is ground to flour, then stored for 8-10 days and worked

into a pulp which is examined in a machine on the principle of Rejtö's pulp-examg app. Numbers obtained should be compared with data for standard wheat types
S S DE FINLY

Hygroscopicity of wheat. L. PAP *Mezogazdasagi Kutatasok* 3, 349–54(1930).—200 Hungarian and 86 other wheat samples were examd Two g of sample placed on a surface of 25 sq cm showed 1 23% change in water content after remaining there for 4 weeks The influence of hysteresis is excluded by producing a sample of 12–13% water content and keeping this hermetically sealed The change in water content averaged 0 45–0 41% Variations of hygroscopicity depend chiefly on climate Drying or moistening has no influence on hygroscopicity S S DE FINLY

Wheat and flour studies. XVIII. A study of the nature of the acid responsible for the increase in acidity which occurs in flours during storage. ARNOLD H. JOHNSON AND JESSE GREEN *Cereal Chemistry* 8, 134–45(1931) cf *C A* 25, 1506.—The H ion concns. of water exts of stored flours extd with ether were the same as those of the ext. of freshly milled flours The idea is expressed that ether-extractable acids are alone responsible for the changes in H-ion concn or in acidity (as measured by any method) which occur in flours during storage under proper conditions The acids removed from flour by extn with ether must, on the average, have rather long C chains, as their coeff of distribution between water and ether was of the order 0 014 to 1 Only relatively insignificant quantities of lactic acid can be present in flour L H B

Natural chlorine content of wheat flours. L. PAP *Kiserl Kozlemenyek* 31, 480–6(1928).—The Cl content was detd by dissolving flour or ground cereals in 20% $H_2SO_4$ and pptg Cl with $AgNO_3$ The amount of Cl varied between 0 0002 and 0 0738% in 32 Hungarian samples Chlorinated flour can be identified by detg the Cl content of a petrol-ether ext. The fat of untreated flours contained 2 5–3 5 parts Cl per million parts of flour, the fat of flours treated with Cl contained about 38% of the Cl used for the treatment. S S. DE FINLY

A study of some methods of examining flour with special reference to the effects of heat. I. Effect of heat on flour proteins. C. W HERD *Cereal Chemistry* 8, 1–23 (1931).—Kent Jones' viscosity curves in 1 10,000 auramine are confirmed, but it is shown that bacterial development and increase in acidity take place, and, therefore, no measurement is afforded of the proteolytic activity of the flour itself. Viscosity changes, however, may give a measurement of the resistance of the proteins to proteolytic attack. Incubation in $p_H$ 3 0 lactic acid did not completely inhibit bacterial growth, the viscosity curves are very different from those in water. Incubation in the presence of 1% $NH_4F$ soln. gave apparently no bacterial growth, the viscosity decrease in the untreated flour was less and the viscosity increase in the strongly heated flour was also less Viscosity acidity curves show interesting differences in the unheated and the strongly overheated flours, giving evidence of marked phys. changes in the flour proteins. Many of the well-known bactericidal substances were found to be insufficient for inhibiting the growth of bacteria in flour water suspensions. Various methods for the estn of glutenin gave fairly good agreement among one another The sum of the 3 fractions of proteins by recognized methods of analysis did not agree in many cases with the total protein figure detd directly on the flour; in good-grade flours the sum is usually lower than the total, whereas in the lower grade flours the sum is frequently higher than the total. Different salts have different peptizing effects on some of the flour proteins, a subsequent alc. extn. will vary according to the preliminary salt treatment, indicating increased resistance to peptization. Ultra-violet radiations do not apparently fulfill any useful purpose in cereal analysis. If a large proportion of the natural moisture of a flour be removed at a low temp and the heating then performed, the effects on the flour proteins will be produced but at a very much slower rate. II. Effects of heat on flour enzymes. *Ibid* 145–61.—The diminution in phosphatase activity observed by Berliner and Rüter (*Z ges. muhlenwesen* 4, 209–16(1928)) was not confirmed in flour heated for 10 hrs. at 180° F. or less. Proteoclastic activity of flour itself, as evidenced by amino N produced in an incubating ext., is of small value and can have little influence in a fermenting dough The addn. of 0.2 g. yeast to 100 cc. ext. increased the proteoclastic activity Heating may increase the resistance of proteins to enzymic attack. Catalase activity of flour suspensions is reduced by severe heating Confirmation is obtained that the change in H-ion concn. of a dough during fermentation is of small magnitude. It is suggested that the $p_H$ of the aqueous phase, however, may alter and thus affect the enzymic activity. If a large proportion of the natural moisture of a flour is removed at a low temp and then the heating performed, the enzymic activity appears to be inhibited at practically a normal rate.
L. H. BAILEY

A study of commercially milled flours dealing with protein and its relation to peptization and baking strength. R. H. Harris. *Cereal Chemistry* 8, 113–33(1931).—A series of 31 commercially milled flours of different baking strengths was baked and analyzed. The proteins of these flours were peptized by 0.5 *N* solns. of $MgSO_4$ and KBr. Two methods of baking were used: the basic method, employing flour, sugar, salt, yeast and water, and a method which included 1% malt and 0.001% $KBrO_3$ for the weaker flours, and 3% malt and 0.5% Arkady for the stronger flours in addn. to the basic formula. Total and nonpeptized protein gave very high relationships when correlated with loaf vol. and would appear to be equally useful as a means of forecasting baking strength for this series. The percentage of total protein peptized was less significantly related to loaf vol. than total or nonpeptized protein and would be of less value in predicting baking strength. Peptized protein did not appear to be of any great practical importance in its relation to baking strength. These conclusions are similar to those obtained in a previous study (*cf. C. A.* 25, 1596). A series of 20 mill stream flours was baked by the basic method and by a method which included 3% malt and 0.5% Arkady. These flours were analyzed and peptized by 0.5 *N* $MgSO_4$, KBr and KI. The results were considered in 2 groups: one comprising 12 millstreams which appeared to be of good baking quality and the other the whole group of 20 mill streams. The use of an improver method did not seem to be justified in evaluating the strength of millstream flours. Total protein is not a reliable index of baking strength when low grade millstreams are concerned. Nonpeptized protein is more significant in its relation to baking strength than total protein in millstream flours including the low-grade streams. The percentage of total protein peptized appears to be equal to, or better than, total protein or nonpeptized protein for purposes of predicting baking strength of millstream flours which include the lower grade streams. The "optimum coagulation" theory appears to be supported by the peptization data from the millstream flours.
L. H. Bailey

Effect of moisture content of flour on heat of imbibition developed during the mixing of bread dough. Emily Grewe. *Cereal Chemistry* 8, 162–5(1931).—The heat of imbibition of suspensions and bread doughs varies with the moisture content of the flour. Flours with moisture contents of 13.1 and 8.7% produced finished doughs which differed 3.3° in temp., a difference of sufficient magnitude to be important in bread making.
L. H. Bailey

The variability of loaf volume in experimental baking. Alan E. Treloar and R. K. Larmour. *Cereal Chemistry* 8, 95–113(1931).—A statistical study of factors that may cause variations in loaf vols. in expti. baking. "Molding personality" may be one cause of variation, and variation in molding technic may possibly be another cause. The absence of sugar from a dough of a standard flour resulted in loaves of approx. 1/6 lower vol., but of good texture. The variability of the replicates was, however, doubled. The addn. of 1 cc. of 0.1% $KBrO_3$ soln. to the mixt. in the absence of sugar increased the loaf vol., reduced the loaf wt. and reduced the variability of replicates. Range of temp. of the dough from 28° to 32° as it came from the mixer had no measurable effect upon the vol. of the loaves. At least 3 times the av. difference between duplicates should be taken as the min. difference to be regarded as significant between vols. of single loaves baked from different flours.
L. H. Bailey

The behavior of bread under the influence of some volatile substances. L. Karácsonyi. *Mezogazdasági Kutatások* 3, 192–7(1930).—Aldehydes, *i. e.*, HCHO, AcH, propionaldehyde, butyraldehyde, valeraldehyde, crotonaldehyde, BzH, salicylaldehyde, cinnamaldehyde and 2-furaldehyde, retarded staling of bread. The retarding action is proportional to the volatility and solv. in $H_2O$. Some aldehydes change the consistency of the crumb, others color it. Proteins chiefly are colored, starch and probably fat remain unchanged. Aldehydes cannot be removed from proteins as easily as from starches.
S. S. de Finály

Refrigeration in the bakery. A. R. Fayed. *Refrigerating Eng.* 21, 251–5(1931).—The applications of refrigeration and air conditioning to the baking industry are explained. The process of bread making in a standard plant is described in detail.
A. H. Johnson

The quantitative measurement of carbon dioxide evolved in and lost from simplified muffin batters. Isabel T. Noble and Evelyn G. Halliday. *Cereal Chemistry* 8, 165–7(1931).—Four types of baking powder were used in this study: tartrate, phosphate and 2 combination powders contg. different relative proportions of S. A. S. (Na Al sulfate) and phosphate. When combined with flour, fat and water into a smooth batter, all the types of baking powder evolved less $CO_2$ than when combined with water only. The difference was greater in the case of the tartrate than with the other powders.

All types of powders also evolved slightly more gas when water was used in prepg the batter than when milk was used The addn of sugar up to 0 8% of the ingredients did not have any consistent effect upon the evolution of gas Flour, fat, baking powder and water mixts lost between 1/3 and 2/3 as much $CO_2$ during their prepn as did the corresponding baking powder and water mixt When the tartrate and phosphate powders were used the batters lost more gas than when the combination powders were used L H Bailey

**Quality of Hungarian milks in 1928.** I Szanyi *Kis rlet Kozlem nyek* 32, 162–76 (1929) —Average values for 4148 samples of market milk from counties Moson, Vas and Zala were d 1 0310, dry matter 12 50% and fat 3 64% S S dr Finály

**Composition of Hungarian market milks.** I Szanyi *Kis rlet Közlemények* 31, 309 20(1928) The av of 1304 samples of market milks from counties Moson, Vas and Zala was d 1 0313 dry matter content 12 5% and fat content 3.77% S S dr Finály

**Composition of milk of Hungarian Kammwoll sheep.** J Csiszár *Kisérlet Kozlemenyek* 31, 287 94(1928) Dry matter averaged 20 11, fat 8 71, albumin 6 36, galactose 4 23 and ash 0 89% The ratio of casein to albumin averaged 1 1 74. The milk is very similar to that of Merino sheep in compn S S dr Finály

**Composition of milk of Hungarian Allgäuer cows.** I Szanyi *Kisérlet Közlemények* 31, 241 51(1928) The av of 739 samples was sp gr 1 0330, dry matter content 12 7% and fat content 3 3–3 5% *Ibid* 32, 99 111(1929) —The quantity of milk and its fat content show larger fluctuations than those of Simmenthal cows 3 1 to 26 3 l milk contg 2 5 to 5% fat was obtained per day and cow Morning milks contain less than 3.3% fat and therefore could only be sold after mixing with the evening milk S S dr Finály

**Some analyses of milk from Indian cows.** Th W J van Marle *Pharm. Tijdschr Nederland Indië* 7, 276–8(1930) —The milk from 55 cows of different breeds, of 5 stables in the neighborhood of Batavia, had an av sp gr of 1 0310, acid value 6 9, fat 4 0 (Gerber), milk sugar 4 51, Cl 97, albumin 3 7, f p 0 528, $n_D$ 1 3435 D R Koolhaas

**Seasonal changes of characteristics of milk fats of cows and of sheep.** A Faltin and G Debinszky *Kisérlet Közlemények* 33, 62 76(1930) —In the milk fat of cows the Reichert Meissl no varies between 22 56 and 31 71 with an av of 26 91 Its max. is reached in winter and the min in summer The butyric acid no of Kuhlmann-Grossfeld is 17 9 20 9 The xylene no of Raalte averages 18 27 The Polenske no varies from 1 8 to 5 8, it is about 6 to 8 times as much as the R.-M no, depending on the seasons Hungarian butters seem to contain more caprylic acid The milk fats of sheep show Reichert Meissl no 22 16 39 14, butyric acid no 15 77–21 04, Polenske no 2 2 6 0 Milk fats cannot be identified on the basis of these data S S dr Finály

**The effect of dilution on the titratable acidity of cow milk.** H H Sommer and Julps Menos *J Dairy Sci* 14, 136 55(1931) —Diln of the milk with $H_2O$ lowers the titratable acidity, diln with an equal vol of $H_2O$ causes an av decrease of 0 0211%, diln with 9 vols, 0 0623% In solns contg Ca and phosphates in amts representative of milk, pptn of $Ca_3(PO_4)_2$ will occur during titration with NaOH, increasing the titer A similar pptn must be expected in the titration of milk. The greater part of the diln effect is attributed to a decrease in the amt of $Ca_3(PO_4)_2$ pptd during the titration There are indications that a relationship of Ca to casein, similar to that of Ca to phosphates, is involved in the diln effect A lower $p_H$ was observed at the phenol phthalein end point in the titration of dild milk This is attributed to a "protein effect" on the indicator, while the rapid fading of the end point is due to the pptn of $Ca_3(PO_4)_2$ The fact that the titratable acidity of the coned milk is higher than calcd from the acidity of the original milk and the ratio of concn, in spite of the loss of $CO_2$, is attributed to the reverse of the same factors in the diln effect. The neutralization of milk or cream with lime of known alky does not lower the acidity to the calcd point because the increased Ca ion concn causes greater pptn. of $Ca_3(PO_4)_2$ in subsequent titration J C Jurrjens

**A test for the detection of milk unstable to heat.** Guy A. Ramsdell, Wm T. Johnson, Jr, and Frid R Evans *J Dairy Sci* 14, 93-106(1931) —A rapid test, also applicable to factory routine, for the detection of milk unstable to heat has been developed from the results obtained in making comparisons between heat stability values of the coned products and the pptg actions of numerous acids and salts on the whole milk samples when heated to the temp of boiling water The most satisfactory pptg. agent was found to be $KH_2PO_4$. The actual coagulation was brought about through

the combined action of the added acid salt and heat Data are also given showing the relationship between heat stability and min concn of phosphate soln necessary to produce initial coagulation when added to milk in the manner described in the test Milk that coagulates in the test is invariably of low heat resistance, as are also composites of this class In grading on the basis of the phosphate test the elimination of the phosphate positive milk often results in obtaining a milk of higher stability toward heat The phosphate no is defined and its relation to coagulation time shown There is no apparent relationship between *p*H and phosphate no Milks from single herds are reasonably const in phosphate no J C Jurrjens

**Data on the bacteriology of nauseous and bitter-tasting milk.** J Csiszár *Kisérlet Kozlemenyek* 33, 272–8(1930) —The bitter taste is caused by *Bact fluorescens*, the nauseous taste by *Micr pituitoparus* and *Bact aerogenes* The origin of such microorganisms is probably the wash water of bottles and machines S S de Finály

**Casein plastics—milk in industry.** Robert Dodd *The Times Trade and Eng Suppl* 28, No 664, 9(1931) —A review E M Symmes

**The effect of feeding menhaden fish oil on the secretion of milk and the composition of butter fat in the dairy cow.** J B Brown and T S. Sutton *J. Dairy Sci* 14, 125–35(1931) —The feeding of menhaden fish oil lowered milk production, the % and total butter fat After resumption of control diet recovery to normal took place slowly The characteristic highly unsatd acids of the menhaden oil passed into the butter fat in small quantities The analytical consts of the butter changed to those of a mixt of butter with menhaden oil Several specimens of normal butter have been shown to contain small quantities (0 3%) of a highly unsatd acid similar to arachidonic acid J C Jurrjens

**Why fat tests vary.** D H Bailey *Creamery and Milk Plant Monthly* 20, No 2, 72(1931) —The fat content of milk may vary because of breed of cattle, stage of lactation, health of the animals, time of milking, weather and season of freshening Excitement of the cows at milking time may also cause sudden variations in the fat content of the milk A H Johnson

**The feathering of evaporated milk in hot coffee.** Randall Whitaker *J. Dairy Sci* 14, 177–88(1931) —The feathering of evapd milk in hot coffee is promoted by (*a*) characteristics of the milk, especially the salt balance, (*b*) coffee which is coned., (*c*) prolonged extn of the coffee grounds, (*d*) the use of small quantities of milk in the coffee, (*e*) the slow, rather than fast, addn of milk An empirical feathering test was developed Examn of 52 cans of commercial evapd milk indicated that feathering in hot coffee is not a common defect of the milk now offered to the public J C J

**Iron content of liquid and reconstituted dry milk: a comparison.** Esther B Hardisty *Arch Pediatrics* 48, 108–16(1931) —A review of recent researches with a bibliography (12 references) Joseph S Hepburn

**Manufacture, microflora and chemical composition of "tarhó."** O Gratz. *Kisérlet Kozlemények* 33, 27–34(1930) —Tarhó is a kind of sour milk made in Hungary at 40–50° Its microflora consists chiefly of *Thermobact lactis* Orla Jensen and *Streptococcus thermophylus* Orla Jensen It is somewhat similar to yoghurt, etc Analyses give water 88 25 dry matter 11 75, fat 1 40, casein 3 99, albumin 0 14, albumose peptone 0 34, milk sugar 4 50, lactic acid 2 00, ale 0 37 and ash 0 85% S S de Finály

**Composition of creams from Miskolc and environment.** I Pásztor *Kisérlet Kozlemények* 32, 317–26(1929) —188 cream samples of Miskolc (Hungary) were analyzed They averaged 18–20% fat and 6 8–7 0% dry matter content S S de F

**Composition of Hungarian curds, butters and creams.** J Kupits. *Kisérlet Kozlemények* 32, 179–84(1929) —Water content of curds of Dunántul was 69–73% in 1927 and 68–73% in 1928, 56 and 35%, resp., of samples were adulterated Butters contained water 15 8–29.23 and 39%, resp., 71% of samples were found adulterated with water Creams contained fat 12 5–19 5 and 17 2%, resp., 23 7% were adulterated S S de Finály

**Ice-cream standards.** Wm C Geagley. *Ice Cream Trade J* 27, No 3, 34(1931)—The possibility is considered of standardizing ice cream in regard to fat, total solids, sucrose and various flavors and colors A H Johnson

**How temperatures should be used to insure quality ice cream.** H F Judkins. *Ice Cream Trade J* 27, No 2, 31–2(1931) —The manner in which temp affects ice-cream mix and ice cream in relation to the quality of the finished product is discussed Defects in quality caused mainly by improper temp are coarseness, iciness and sandiness A H Johnson

**The selection and use of flavor in making chocolate ice cream.** W. H Martin *Ice Cream Trade J.* 27, No 4, 39–41(1931) —Several com chocolate sirups were analyzed

and found to vary in their content of moisture, fat, starch, ash and sugar. The variations in these constituents of the com chocolate sirups had considerable influence on the properties of ice-cream mix and ice cream Ice creams prepd with cocoa or chocolate liquor were superior in flavor to those prepd. with the com chocolate sirups
A H JOHNSON

**What effect has pasteurization on the freezing of mix?** E L. REICKART. *Ice Cream Trade J* 27, No 2, 35(1931) —Pasteurization time and temp are shown to have considerable influence on the freezing and whipping properties of ice-cream mix
A. H JOHNSON

**Recent developments in refrigerating equipment.** R S WHEATON. *Creamery and Milk Plant Monthly* 20, No 4, 71(1931) — A review is given of the application to the dairy industry of developments in refrigerating research and equipment
A H JOHNSON

**Data on the composition of Hungarian butters.** I SZANYI *Kisérlet Közlemenyek* 31, 45-52(1928) —Twenty seven samples of Dunántul (Hungary) butter were analyzed in 1927 The water content averaged 14 4%, fat 83 6%, R M. no 26 26, I no 40 8 sapon no 216 2 and $[\alpha]_D$ 43 2
S S DE FINÁLY

**Data on the estimation of butter pastries.** Á MILLIG AND I KORPÁCZY *Kisérlet Kozlemenyek* 33, 349-58(1930) The estn of butter pastries on the basis of fat analysis is very difficult since the quantity of fat is very small and contamination by the fat of wheat flour and by the greasing oils of the distributing machines and baking plates may influence the results Nineteen different pastries were baked with various quantities (1–4%) of different fats and fat mixts The fat content on the basis of the dry material, *n*, I no., Reichert Meissl no and Polenske no were detd in the product The *n*s of butter, margarine, lard, coconut oil, table oil and wheat oil increased as a result of the baking The I no also increased except for table oil and wheat oil The Reichert Meissl and Polenske nos decreased in each case Expts were carried out to det how much greasing oil can get into the pastries 0 22% grease was taken up in case of very liberal greasing This amt in relation to about 1–2% butter content may influence very strongly the fat characteristics 352 butter and margarine pastries were examd by the Food Control Station of Budapest in 1928–29, and it is proposed that at least 5% butter should be prescribed for butter pastries The Reichert-Meissl no is the most important characteristic, but larger amts of fat are needed for its detn A new method is being worked out to make possible detns for 0 5–1 g fat S S DE F

**Bacillus amylobacter interferes with the manufacture of cheese from pasteurized milk.** O. GRATZ. *Kisérlet Kozlemények* 33, 260-8(1930) —The manuf. of Emmenthal cheese may be greatly interfered with by swelling if the milk is contaminated with anaerobic, gas producing, spore forming bacteria, since they and their spores are not killed by heating to 60° for 30 min Contaminated milk cannot be purified by pasteurization
S S DE FINÁLY

**The manufacture of processed cheeses. I. Change of water content during melting.** I. PÁSZTOR. *Kiserlet. Közlemények* 32, 492-4(1929) —The water content of Emmenthal cheese increased 8 8%, that of Romadour cheese 6 3%, during melting The av water content of first-class Emmenthal processed cheese is 42–46%; that of Romadour cheese, 50–55% **II. Controlling the hardness of processed cheeses.** *Ibid* 33, 268-71(1930) —The hardness is mainly influenced by the water content Citrate, citric acid and $Na_2HPO_4$ play only insignificant roles The hardness of processed cheese is greater than that of the original cheese if the water content is under 40%, it is about the same at 40–43% water content, and the product is soft cheese over 46% water content **III. Determination of $p_H$ of processed cheese by means of a quinhydrone electrode.** *Ibid* 307-16 —Dilu of a cheese soln greatly increases the $p_H$ value Cheese, therefore, should be mixed with only 1–2 parts water. Filtering is not necessary The potential is const for only 5–20 min after addn of the quinhydrone the detn should be made at once
S S DE FINÁLY

**Why stanniol paper turns black from processed cheeses.** I. PÁSZTOR. *Kisérlet. Kozlemények* 33, 316-24(1930) —Expts made with *Bac amylobacter, B putrificus* and with $H_2S$ water proved that $H_2S$ did not cause any blackening Investigations showed that the blackening has 2 phases: (1) Sn is dissolved under the influence of the chemicals used to produce processed cheese, *e g*, citrates. Soln is helped by air and higher temps; (2) Sn-Sb galvanic elements are formed and SnO produced by anodic oxidation causes the black color This process seems to take place at a higher $p_H$, mostly above 5 8
S S DE FINÁLY

**The specific gravity and water content of coagulated cheese. The object of subsequent stirring in the manufacture of Emmenthal cheeses.** K. VAS. *Kisérlet*

*Kozlemenyek* 33, 377–85(1930).—The detn of sp gr in salt soln is interfered with by diffusion. A mixt of $CHCl_3$ and $C_6H_6$ evaporates quickly. A mixt of paraffin oil and $CCl_4$ is very viscous and retains air bubbles. Rapid sp gr detns can be made with the hydrometer scales of Nicholson. Investigations proved that the sp gr increased (from 1.076 to 1.073) and the water content decreased (from 58.88 to 40.03%) during subsequent heating and stirring. The object of the subsequent stirring is not to dry the cheese, but to bring about such a phys. state that the excess whey could be filtered off the cheese particles. The measurement of sp gr is therefore not enough for the evaluation of coagulated cheese. S. S. DE FINÁLY

**Analytical microscopy of commercial egg albumin.** S. MENDELSOHN. *Chemist-Analyst* 20, No. 3, 4–5(1931).—Desiccated, com. egg white may contain dried milk, casein, starch, $H_3BO_3$ or $Na_2B_4O_7$. The turmeric test will detect borate and the I test starch. Examn. under the microscope will show, first, the amorphous particles of albumin as translucent, irregular masses bounded by rounded edges. A drop of clove oil will obliterate these outlines. Red, yellow, black or brownish particles will reveal the presence of coagulated residues. By heating over a low flame the albumin will be fixed and colored yellow by the clove oil. In the absence of coagulated albumin, any dried milk particles will be observed in bold relief in contrast to a nearly clear field. Comparison under the microscope with samples of known purity is advisable. W. T. H.

**Chemical analysis and vitamin B determination in unpolished rice grains kept in tightly closed vessels.** M. KONDO AND T. OKAMURA. *J. Sci. Agr. Soc.* (Japan) 1929, 183–204 (in German 205); cf. *C. A.* 23, 3493.—Rice kept 4 years in straw sacks showed marked decrease in the content of ash, fats and proteins, whereas rice kept 4 years in sealed tin cans filled with either $CO_2$ or air did not show any decrease in those constituents. The vitamin B content of the rice kept for 4 years in sealed tin cans was the same as that of rice half a year old. Unpolished rice kept in sealed tin cans is free from insect attack and keeps its germinating power with little change in its phys. and chem. nature even after several years. K. SHINOHARA

**The use of benzoic acid in chopped meat.** TJADEN. *Arch. Hyg.* 104, 184–96 (1930).—Prepns. contg. benzoic acid or Na benzoate can be used only with fresh meats since the prepns. do not remove evidences of decay nor inhibit bacterial growth already at its height. The addn. of the prepns. to fresh meat tends to prevent the development of bacteria and appears to be a harmless practice. E. R. MAIN

**Composition of Hungarian honeys in 1928.** J. STITZ. *Kisérlet. Közlemények* 32, 536–45(1929).—Thirty two samples from counties Baranya and Somogy showed an av. water content of 14–22.5%. Glucose and fructose contents were also detd. S. S. DE FINÁLY

**Albumin content of Hungarian honey.** J. STITZ. *Mezogazdasági Kutatások* 3, 25–8(1930).—Peptones and globulin were present and some albumin. Protamines, alc.-sol. albumins, histones, albumoses and albuminoids could not be detected. Diastase, invertase and catalase were present. There were traces of A, B and C vitamins. S. S. DE FINÁLY

**Studies of methods used to detect heated honeys.** G. H. VANSELL AND S. B. FREEBORN. *J. Econ. Entomol.* 23, 428–41(1930).—Heat produces chem. changes in extd. honey. Overheating renders the honey undesirable and it is often condemned by European importers. Methods used to detect heated honeys are based upon (1) destruction of diastatic activity and (2) the production of furfural derivs. from levulose by heating. If diastatic activity is absent and furfural derivs. are present in small amts., the honey is declared to be overheated. The *diastase test* is of doubtful value (*C. A.* 24, 898) because the diastase of honey is not a product of the metabolism of the bee but is derived from flower pollen. Some honeys are so lacking in pollen that they are deficient in diastase and would be rated as overheated. The Fiehe test as used in Germany for hydroxymethylfurfural is made as follows: grind 5 g. honey and dissolve in anhyd. $Et_2O$. Evap. the $Et_2O$ ext. at room temp. and moisten the residue with a freshly prepd. soln. of HCl (d. 1.19), 100 g. contg. 1 g. resorcinol. A strong cherry red color lasting at least 1 hr. indicates the presence of artificial invert sugar, a weak, quickly disappearing orange to pink color is considered to indicate overheating. Lampitt, Hughes and Rooke (*C. A.* 24, 1162) find that the Fiehe test is not positive until sufficient heat has been applied to the honey to change its color and flavor. V. and F. obtain the same results with freshly extd. honeys, but extd. honeys 1–3 yrs. old that have been allowed to crystallize give a positive Fiehe test (German method) before heat has been applied. When honey crystallizes the levulose concn. of material in soln. increases 40–60%, it is assumed that the acid content also increases. This

greater concn of levulose may account for the increased formation of furfural The increase in time to give the reaction depends somewhat upon the levulose dextrose ratio It may be hastened by increasing the acid concn even when the honey has not crystallized Conclusion The diastase and Liebe tests are not reliable tests for overheating unless the pollen count is taken into consideration If the pollen count is 3000 pollen grains or more per g honey and the diastase test is negative, the honey has been overheated C H Richardson

**Further observations on the deterioration and spoilage of honey in storage.** George I Marvin *J Econ Entomol* 23, 431–8(1930).—Fermentation of honey caused by sugar tolerant yeasts is one cause of its deterioration Granulation of honey offers conditions conducive to the growth of the yeasts The by products of fermentations which cause off flavor are $CO_2$ alc (which rarely exceeds 5%) and a non volatile acid Honey which is to be sold in small containers should be heated to 71° and sealed while hot, then cooled quickly It should be stored below 12° C H Richardson

**Freezing and melting points of fruits and vegetables.** Aubrey L Smith *Refrigerating Eng* 21, 272–3(1931) The f ps of the juices expressed from 10 fruits and 14 vegetables are given The lowest f p found was 28.40° F for grape juice and the highest f p was 31.82 F for lettuce juice A H Johnson

**Abnormalities in the composition of oranges.** P R v d R Coetzee *South African J Sci* 27, 310–6(1930); cf *C A* 24, 2208 To det the compn of a "normal" orange, analysis was made each week for 3 months of 24–30 oranges selected from different trees in the same orchard Detns were made for sol solid, sugar and acid Detns of d, were made and converted to sol solid (Cf *C A* 19, 1881; 23, 3487) As the fruit develops, sol solid and sugar content increase, while acidity decreases It was thought that oranges from different trees would not show large deviation from the mean values, but the results indicated a wide variation in the compn and hence the difficulty of obtaining a fruit of normal compn The oranges from 2 of the trees gave very different analyses from those of the other trees with respect to (1) rate of change of sol solids with time, and (2) av values for sol solids, sugar and acidity By using the method of analysis of variance by Fisher, it was shown that the data obtained on oranges from these 2 trees should be omitted because of the deviation from the mean values. The results show the importance of analysis of the oranges in order to eliminate trees bearing abnormal fruit and thus insure the uniformity of the crop N. M. N.

**Hungarian condensed tomato juices.** I Iványi. *Kísérlet Közlemények* 33, 82–8 (1930).—*Samples in 1928 contained 14–31% dry matter, in 1929 15–35% dry matter,* with an av. of 24–25%. 50–61% of this consisted of invert sugar and 4.6–5.9% of oxalic acid Hungarian juices are not salted or oiled artificially. S S de Tináy

**The analysis of ground coffee, in connection with the requirement of the Dutch food law.** W F Donath *Pharm Tijdschr Nederland-Indië* 7, 310–2(1930).—Several samples of ground coffee with good chem consts were shown by microscopic examn after boiling with $HNO_3$ and then with KOH to be roasted Indian corn The most adulterated coffee had the highest ext, but the requirement of a max ext value does not insure purity Besides chem analysis, a microscopic examn should be required, for this the app of Ezedam is recommended D R Koolhaas

*Bleaching almonds.* A A Ramsay and G W. Norris. *Agr Gaz N. S Wales* 42, 153–4(1931).—Almonds off in color, but not stained black, were successfully bleached by immersing the nuts in 1% $H_2SO_3$ for 2–5 min., or in a 0.5% soln for 5–10 min., followed by drying the nuts in thin layers *Almonds badly stained (black at the base* of the nut) were successfully treated by the following methods: (*A*) The nuts were immersed for 20 min in chloride of lime (1 oz per gallon) acidified with AcOH, and after drying for 1 day were dipped in 1% $H_2SO_3$ for 5 min and again dried (*B*) Similar treatment to (*A*), but after drying the 2nd time the nuts were washed in several changes of water and dried as before (*C*) The nuts were immersed for 5 min in 1% $H_2SO_3$, dried for 1 day and spread out in thin layers They were washed with water and again dried, then dipped for 20 min in chloride of lime acidified with AcOH and dried as before K D Jacob

**Determination of essential oils in spices according to Griebel.** L. Benedek. *Kisérlet Közlemények* 33, 99–102(1930).—A modification of the method of Griebel (*C. A* 20, 3516) A 500-cc shaking cylinder with glass stopper is used instead of a separatory funnel Data agree to 0.1% S S de Tináy

**Experiences on the quality of powdered pepper.** I Horváth. *Kisérlet Közlemények* 32, 546–54(1929).—Contents of ash, sand, sandless ash, crude fibers and $CaCO_3$ and microscopic examn. were used as the basis of evaluation A modification of the

method permits extn with alc in 3 hrs instead of 30 hrs The ash content varied from 4 60 to 8 96%, sand 0 14 2 88%, alc ext 7 10 10 70% S S DE FINÁLY

**Capsaicin reaction and evaluation of paprika.** K FODOR *Kisérlet Közlemények* 33, 155–78(1930) —With NOCl, capsaicin gives a blue color in solns of acetone, of ether or of chloroform and gives a green color in oil solns This reaction can be used for the detn of capsaicin in paprika Shake 2 g dry paprika with 10 cc. acetone, then centrifuge and filter Treat 5 g of filtrate with 0 45 g coned HCl and 0 1 g $NH_4VO_3$ The color must be detd within 20–30 sec., as troublesome reactions take place Another method is an ether ext is made according to the method of Rozsényi and the ext is dropped in a soln of NOCl, Evaluation of paprika should be made on the following basis (1) color and taste, (2) microscopic examn., (3) content of capsaicin, (4) content of sand and ash and (5) ether ext S S DE FINÁLY

**Rapid determination of ether extract of paprika.** I HORVÁTH *Kisérlet Közlemények* 33, 102–5(1930) —A modification of the method of Domötör (*C. A.* 23, 4979) Shaking is done with a machine for 1 min and sedimentation is hastened by centrifuging for 15 min The method is quite as reliable as that of Rozsényi, which is now in use S S DE FINÁLY

**Composition and use of "Old Hickory Smoked Salt."** O. VÁRGA *Kisérlet. Közlemények* 33, 197–200(1930) —The product of a factory at Cincinnati, Ohio, was examd It consisted of water 0 1, NaCl 98 5, $Na_2SO_4$ 0 4, sand 0 1 and org matter 0 9% The taste of the product made with this salt was not so good as that made by actual smoking The drying of the product required 4 days, during which microorganisms multiplied Cocci and yeasts belonging to the genus *Torula* were found, further rod like bacteria were in the flesh near the bones Expts made in a large smokehouse showed that such salt mixts cannot quite substitute for actual smoking S S DE FINÁLY

**Possible uses for plant lecithin.** G HENTZE *Z. Ernähr.* 1, 53–61(1931) —Corn lecithin obtained by the Bollmann method (*C. A.* 17, 3234) from soy beans consists of 60 lecithin and 40% fat. The plant product has the same chem and phys. properties as that from eggs and is cheaper It is possible to use this soy lecithin in place of egg yolk in baking Five tablespoonfuls of a 20% soln correspond to 1 egg F F G

**Composition and forage value of Sudan grass hay.** A ZAITSCHEK AND L. DÖRNER *Kisérlet Közlemények* 31, 336–9(1928) —The compn., digestibility and starch values of Sudan grass hay were not less than those of other Hungarian grasses The digestible albumin content was as high as that of first-class hays S S DE FINÁLY

**Quality of alfalfa hay in relation to curing practice.** T. A KIESSELBACH AND ARTHUR ANDERSON U S Dept Agr., *Tech. Bull* 235, 25 pp (1931) —Approx 75% of the protein of alfalfa is in the leaves, hence N conservation in the curing process is concerned principally in leaf conservation Field expts in Neb showed that the more rapidly the hay can be cured, the better will be the quality The internal moisture of alfalfa stems is lost by direct evapn through the stem epidermis rather than by bleeding at the cut end or by continued transpiration after cutting Turning or scattering the windrows of semi-cured alfalfa had little or no effect on color, leafiness or protein content. In a poultry feeding comparison, field-cured and artificially dried alfalfa hays showed no significant differences in *vitamin A content* C R FELLERS

**The conservation of fodder.** ALOIS KROCZEK. *Listy Cukrovar.* 49, 290–4(1931) —Beet greens were ensiled and deposited in ground pits The tightest packing did not exclude the presence of air, which leads to the formation of AcOH Increase in temp increased the butyric acid content Four regions in the country were selected for the storage, only one expt. was highly successful The beet greens in this instance were deposited in pits very rapidly and without interruptions so that the exposure to air was very short Beet greens stored in concrete silos showed 1 7% lactic acid, beet greens from ground pits, 0 7% Very small quantities of butyric acid formed in silage from concrete silos In cases where the beet greens were exposed to air during a prolonged harvest, the AcOH increased to 1 8% in concrete silos FRANK MARESH

**The use of denatured sugar, molasses, molasses-fodder and sugared cossettes in agriculture** K ŠANDERA *Listy Cukrovar* 49, 302(1931) —The feeding expts at Rostock, Germany, are reviewed briefly FRANK MARESH

**Mahua waste as food for milch cattle.** K. HABIB HASAN AND S R. BHATE. *Proc. 15th Indian Sci. Congr.* 1928, 48–9 —Mahua flowers after fermentation and distn. are fed to milch cattle in India Feeding expts to det. their food value, their effect on the health of the animals and the quality of milk gave on the whole favorable results E J C.

**Manufacture and quality of Hungarian fish meal.** K. LUKÁCS. *Természettud Kozlony* 63, 115–20(1931) —Fish caught in Lake Balaton are dried in a vacuum at about 50° and ground to a meal contg about 8% moisture, 6–8% fat, 3% calcium phosphate and 62 to 68% raw albumin The meal can be used as forage without extg. the fat. S S DE FINÁLY

**Forage value of washed and dried beets with leaves.** V KURELEC. *Kisérlet. Közlemények* 33, 229–33(1930) —Digestibility of forage is greatly increased by a previous washing and drying of beets Data of metabolism are given on the basis of expts with 2 sheep S S DE FINÁLY

**An interpretation of the feeding standards for growing dairy cattle.** J. B. FITCH AND R H LUSH *J Dairy Sci* 14, 116–24(1931) —The Morrison standard for growing dairy animals can be readily used in the majority of exptl trials A table is presented that enables this standard to be interpreted more quickly J C JURRJENS

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Microflora of processed cheese (CSISZÁR) 11C. New applications of low-temperature freezing (ZUMBRO) 13. The evaluation of the roots of fodder beets for eugenic purposes (KOČHAR, *et al*) 11D Al content of plants, chiefly food plants (BERTRAND, LÉVY) 11D. Apparatus for grading tea (Brit pat 339,758) 1. Spark-discharge apparatus for generating a bleaching gas for flour (Ger pat 521,360) 4.

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**"Cereal coffee."** H OHLHAVER. Brit. 339,821, Jan. 2, 1930. The cereal used is caused to undergo "self fermentation" during soaking, and is then roasted. Wheat may be soaked for 20 hrs in cold water or for 8–10 hrs in water at a temp of 25°

**Pipe-system heater for preheating milk before filtering, etc.** RALPH B. BAGBY. U S 1,797,312, March 24 Structural features

**Apparatus for treatment of fruit with volatile agents such as sulfur dioxide.** FREDERIC A EUSTIS (to Virginia Fruit Fumigating Co) U. S 1,797,680, March 24 Structural features

**Apparatus for treating food products (as in sterilizing milk) by direct contact with steam.** GEORGE GRINDROD (to Grindrod Process Corp.) U. S. 1,797,769, March 24. Structural features of app with steam jets for direct injection of steam into the material treated U S 1,798,120 relates to a similar treatment for sterilizing various food products, some of which, such as ice cream mixts and gelatin solns, may be coned after sterilization to a hydrated jelly like condition App is described Cf. *C A*. 24, 4101.

**Treating citrus fruits to prevent stem-end rot and blue-mold rot, etc.** HARRY R. FULTON and JOHN J BOWMAN U S 1,797,572, March 24 An aq soln. of Na aluminate (suitably of about 3% strength) is used at a temp. such as that commonly used for washing fruit, and the fruit is allowed to remain in contact with the soln for 1–10 min and then sprayed to remove most or all of the adhering soln. U. S 1,797,573 relates to the similar use of a Mn sulfate soln

**Margarine, etc.** EINAR LANGFELDT and INTERNATIONALE GRADIN A.-G. Fr. 696,506, May 20, 1930 In processes for the manuf. of margarine, artificial creams or other emulsions rich in fats, the milk or other aq soln. is submitted to a pasteurization at temps between 50° and 90°, preferably about 65°, in the presence of $CO_2$, the liquid being heated to pasteurization temp after absorption of the $CO_2$ or the liquid heated to pasteurization temp is submitted to the action of gaseous $CO_2$ by bubbling, by agitation or by contact with thin layers of the liquid

**Smoking meat and fish.** THE ATLANTIC COAST FISHERIES Co Ger. 520,193, Mar 28, 1929 See Brit 309,405 (*C A* 24, 668).

**Analytical apparatus for washing out starch from flour.** "MIAG" MÜHLENBAU UND INDUSTRIE A.-G Ger 519,370, Oct. 18, 1929.

**Dough ingredients for bread, etc.** A. D. BLANK, H. A. KOHMAN and A. SCHULTZ (to Standard Brands, Inc) Brit. 340,072, Oct. 22, 1928 A prepn. suitable for use in making leavened products without making a sponge comprises a material of acid reaction such as $H_3PO_4$ or Ca acid phosphate, an $NH_4$ salt such as the chloride or phosphate, an oxidizing salt such as $KBrO_3$ or $KIO_3$, an enzymatic agent such as papain, pepsin, Taka diastase or a diastatically active malt ext, and soda for neutralizing acidity during baking These ingredients may be mixed with a diluent such as flour to facilitate uniform distribution with the dough materials.

**Flavoring agent for confectionery.** Deutsche Gold und Silber-Scheideanstalt vorm Roessler Fr 696,872, June 10, 1930. A flavoring material, particularly for confectionery, is made by the reaction of salts of glutaminic acid, *e. g.*, Na glutaminate, with appropriate org. acids such as HCOOH, if necessary in the presence of solvents.

**Drying fruits, etc.** Brinch & Speir Fr 696,910, April 15, 1930. The vitamins are preserved in dried fruits, vegetables etc., by treating the fruit, etc., with acids and salts before drying, *e. g.* with $H_3PO_4$ and NaCl.

**Confectionery cream.** Willy Britschi Swiss 143,006, Feb. 20, 1930. A stable confectionery cream consists of a hot concd. soln. of sugar, grape sugar, eggs and vegetable fat. Harmless aromatic and coloring agents may be added.

**Flue-gas heated roller driers for the manufacture of potato flakes.** Bernhard Schmidt Ger. 517,717, May 5, 1928.

**Radioactivated foods.** Georg Senftner Fr. 695,729, May 16, 1930. Sugar crystd. from radioactive water is added to the usual ingredients and finished in the usual manner.

**Cheese.** Jean M. Dagand Fr. 695,760, May 16, 1930. Cheese is made by curdling milk, breaking it up into a large no. of particles, stirring, heating and afterward placing it in a mold to drain and finally pressing.

**Table salt.** Jean A. Allégre Fr. 695,565, May 14, 1930. A mixt. of NaCl and Mg salts suitable for table use is made by adding a water absorbing substance which tends to adhere to the Mg salt and render it deliquescent, whereby the mixt. does not become damp on exposure to the air. $MgSO_4$ is preferably used, but $Na_2SO_4$ may be used.

**Testing milk.** N. Gerber Co. m. b. H. Ger. 518,978, Aug. 27, 1929. Addn. to 516,423 (*C. A.* 25, 1922). The method of Ger. 516,423 is modified by adding a peroxide to the indicator employed. The test described in the prior patent is thus combined with the detection of colostrum through the evolution of gas due to its content of catalase.

## 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**Research in industry—what it is and what it is not—application of knowledge of scientific principles to commercial production.** P. Dunsheath *Electrician* 106, 543–5 (1931).—A discussion emphasizing the need of responsibility and of definite conclusions. W. H. B.

**What's patentable in industrial and chemical engineering?** Charles W. Riviss *Ind. Eng. Chem.* 23, 589–8(1931). G. G.

**Cheaper power for the chemical industry.** W. S. Johnston *Ind. Eng. Chem.* 23, 474–6(1931).—A description of the facilities for the generation of steam and electricity possessed by 2 modern plants. B. A. Soule.

**Electricity and the plastic industry insulating materials.** Wm. D. Owen *The Times Trade and Eng. Suppl.* 28, No. 664, 22–3(1931).—Examples, with illustrations, are given. E. M. Symmes.

**The Bakelite Corporation.** L. V. Redman and A. V. H. Mory *Ind. Eng. Chem.* 23, 595–7(1931). G. G.

**Water as absorption material.** L. Piatti *Kunststoffe* 20, 2–5(1930).—A discussion of absorption by water of various materials including alc., cresol and acetone both in liquid and vaporous phases, with vapor pressure and boiling curves of binary mixts., *e. g.*, EtOH $H_2O$ and acetone water. The literature is reviewed. B. H.

**Evaporation of water by hot dry air.** R. H. Newton and T. C. Lloyd *Ind. Eng. Chem.* 23, 530–2(1931).—Graphs show the relative importance of water flow, air flow and air temp. Water flow was found to be the most important variable. L. A. Pridgeon.

**Drying by spraying in the chemical industries.** W. Kühles. *Chem. Rundschau Mitteleuropa u. Balkan* 6, No. 14, 100–1(1929).—Liquid is sprayed and dried very quickly with warm air. The solvent evaps. instantly. The app. is described. S. S. de F.

**Chemical industry of Bulgaria.** E. Petzall. *Chem. Rundschau Mitteleuropa u. Balkan* 6, No. 14, 91–3(1929).—General review with numerical and statistical data. S. S. de Finály.

**A general algebraic and graphical calculation of the technical work-processes with**

mixtures of two substances. A Weise. *Z ges Kälte-Ind* 38, 17–20, 33–37(1931) — The method is applied to the absorption refrigeration process F D Rossini

Study of methods of determining moisture in sand. S H Grap and R H Johnson *Proc Am Soc Testing Materials* 30, Pt I, 578–9(1930) —Thirteen different methods were studied For total moisture it was found that the oven drying method was most accurate, the gasoline distn method 2nd and drying to const weight with denatured alc 3rd In simplicity of operation the distn method is 1st oven drying 2nd and the alc method 3rd From the standpoint of equipment needed the alc method is 1st and the oven method and the distn method are about equal For surface moisture only, the sp gr method with $ZnCl_2$, $MgSO_4$, $CaCl_2$ and NaCl rank in the order named The A S T M flask is more accurate than the sp gr method with NaCl The colorimetric methods using a weak acid soln of $CuSO_4$ are more accurate than the elec method, but not accurate enough for general use In simplicity the sp gr and A S T M flask methods are about equal The alc method is adapted for use where app for the distn. or oven method is not available To det the point at which the sand is surface dry, the Pearson glass jar method is most simple and is satisfactory enough for control work Everything considered the tests appear to favor the A S T M flask The various methods are briefly described H C Parish

Standardized sieving methods. Alan Probert *Eng Mining J* 131, 311–2 (1931) — Lack of uniformity in sieving data has always handicapped milling operations ' A method is described which promises consistent, reliable results and easy and rapid manipulation W H B

Economics of recovering by-product carbon dioxide. C L Jones. *Ind Eng Chem* 23, 519–23(1931) —The evaluation of by product $CO_2$ as a raw material for the manuf of solid $CO_2$ is governed by the following factors purity, pressure, location, seasonal value, safety factor and time value R D Rumbacher

Analyses of smoke gases. Karl Wollin. *Die Gasmaske* 3, 1–5(Feb., 1931) — In connection with the development of gas masks suitable for firemen a large no of smokes likely to be met in fighting fires were analyzed for their gas contents Some smoke samples were prepd under lab conditions and others were taken from industrial plants and actual fires Air mixed with blast furnace gas varied in CO content from about 1% to about 33%, the latter being practically pure blast furnace gas Smokes from cellar fires varied in CO content from 0.04 to 0.4%, in $CO_2$ content from 0.05 to 3.4%, and in $O_2$ content from 17 to 21%. Smokes from roof fires varied in CO content from a trace to 0.2%, in $CO_2$ content from 0.1 to 2.7%, and in $O_2$ content from 17.7 to 20.7% Smokes from miscellaneous fires varied in CO content from 0.01 to 1.4%, in $CO_2$ from 0.0 to 10.1%, and in $O_2$ from 9.9 to 20.8% There was, of course, a wide variation in the compn of smokes produced under exptl conditions A. L Kibler

Poison gases in industry and in fires. E Smolczyk. *Die Gasmaske* 3, 9–12 (Feb., 1931).—A discussion from the standpoint of the protection of firemen. A. L. Kibler

Furfural as an industrial poison and its determination in air. I. M. Korenman and J B Resnik. *Arch Hyg* 104, 344–56(1930) —The presence of small concns of furfural in the air may be detected by the red coloration produced upon strips of paper treated with a reagent consisting of a mixt. of equal vols of $C_6H_5NH_2$ and 80% AcOH A quant estn may be made by passing the air through $H_2O$ contg the reagent and comparing the resulting color with that produced by a known concn of furfural E. R Main

Antifreeze methanol hazard. Max Trumper. *International Clinics* [41], 1, 85–9 (1931) —From a crit. study of the literature, the conclusion is drawn that "a max permissible concn of methanol for this new use in the radiators of automobiles should be established, such concn being detd by thorough studies made with reference to all types of persons likely to be exposed to its vapors The general public should not constitute an exptl lab for the testing out of a hazard new for the sake of a new industry." A bibliography is appended Joseph S Hepburn

Methanol antifreeze and methanol poisoning. W. P. Yant, H. H Schrenk and R. R. Sayers *Ind. Eng Chem* 23, 551–5(1931) —A status report on an investigation to det the hazards accompanying the use of methanol as an antifreeze Expts limited to breathing of vapors and absorption of liquid through the skin indicate that there is no hazard to health from the reasonable use of methanol for antifreeze purposes. Warning agents to protect against the use of methanol for beverage purposes are recommended A. L. Kibler

**Ocular hygiene in industry.** V. Dr Lieva. *Folia Med.* 11, 290–2(1930). *Bull. Hyg.* 6, 20–1(1931). A brief description of interest to ophthalmologists in industry. Effect of lighting, certain irritating gases from chem. factories, dust from metal or stone, intoxication from Hg, P, nitrobenzene and As are described. The preventive aspect is barely touched. GEORGE R. GREENBANK

**Commercial and war gases and the chemistry of protection against them.** J. Erdos. *Chem. Rundschau Mitteleuropa u. Balkan* 7, No. 15, 28–33(1930).—A detailed account of different noxious gases, of methods of preventing their toxic action and of the compn. of gas mask filters. S. S. DE FINLAY

**Behavior of the catalyst in the canister of the carbon monoxide gas mask.** G. Stampi and J. R. Bancert. *Z. ges. Schuss Sprengst. Wes.* 26, 24–6(1931).—Gas mask canisters for all gases except CO depend upon the principle of phys. or chem. sorption and their useful life is detd. by the amt. of gas absorbed. In the CO mask, however, the amt. of CO absorbed plays an insignificant part in its useful life, which depends in large measure upon the other foreign gases in the atm. It is especially sensitive to moisture and for this reason must contain a very efficient drying agent. S. and B. describe the behavior of the CO canister when other poison gases, both alone and in addn. to CO are present in the air. With an air flow of 30 l. per min. and a toxic concn. of 1 vol. %, the amts. of toxic gases in g. taken up by the Drager CO canister and the breakpoints in min. are as follows: phosgene 3.4 g., 27 min., $Cl_2$ 7.2 g., 81 min., HCN, 3.3 g., 98 min. $SO_2$ 18.5 g., 232 min. $H_2S$, 19.9 g., 467 min., $NH_3$ 2.3 g., 108 min. $CCl_4$ 8 g., 41 min. $C_6H_6$ 10 g., 103 min. The effect of other gases in addn. to CO was detd. by passing a continuous air flow of 30 l. per min. through the canister. During the first hr. of the tests CO and another toxic gas were added to the air stream. These were then omitted for ½ hr. and added again for another hr., etc. The concn. of CO was 0.5 vol. %, while the concn. of the other gas used varied. The relative humidity was 30% in all cases but one, when 90% was used. The breakpoints for the second toxic gas were detd. and the points of max. allowable concn. in the exit gas for CO. The results are shown by curves from which the following points are taken:

| Second gas added | Breakpoint for second gas, total hrs. | Max. allowable concn. CO, total hrs. |
|---|---|---|
| None | | 60 |
| 0.05 vol. % $H_2S$ | 15.5 | 24 |
| 0.026 vol. % HCN | 10.75 | 19 |
| 0.031 vol. % $SO_2$ | 21 | 15.5 |
| 0.015 vol. % $Cl_2$ | 13.5 | 14 |
| * None, but with 90% relative humidity | | 11 |

The catalyst (Hopcalite) is poisoned to an equal extent by the following parts of the gases named: $Cl_2$ 10, $SO_2$ 23, HCN 25, $H_2S$ 58, $H_2O$ vapor 150 (drying agent present). Concns. shown on curves are 10 times those shown in the text and are probably in error. A. L. KIBLER

**Misleading propaganda on refrigerants.** J. B. Critchell. *Refrigerating Eng.* 21, 269–71(1931).—C. replies to a report of the committee on poisonous gases of the American Medical Association in which the use of methyl chloride as a refrigerant is discussed. A. H. JOHNSON

**New applications of low-temperature freezing.** Frank Zumbro. *Refrigerating Eng.* 21, 253–64(1931).—The application of the quick freezing process to *peaches* and *ice cream* is discussed. Temps. between −15° and −35° F. have been found suitable, but in general the more rapidly the peaches can be frozen or the ice cream hardened the more satisfactory will be the results. The refrigerant used for obtaining the low temp. is usually $CO_2$. However, by combining an $NH_3$ and a $CO_2$ cycle, a combination is obtained whereby the very high pressures commonly used in $CO_2$ plants are eliminated. A. H. JOHNSON

**Problems of insulation.** F. Moll. *Korrosion u. Metallschutz* 7, No. 2, 39–41(1931).—Insulation of metals against the access of moisture by means of impregnated cellulose fibers has not proved entirely successful in that the fiber in spite of impregnation picks up water. Cables are found pitted because of corrosion due to the presence of water. The absorption of water by the fibers is attributed to the presence of a unimol. layer of water on the crystal faces at the intermol. boundaries. The presence of this layer is indicated in that the quantity of water absorbed by a unit quantity of cellulose when exposed to a humid atm. corresponds exactly to the quantity of water estd. from the dimensions of the mols. and the assumption of a unimol. water layer. B. E. ROSTHEIL

Cable and other insulators. RUDOLF DITMAR. *Kolloid-Z* 54, 355-7(1931) — Patent review ARTHUR FLEISCHER

Electrical materials commonly used—paper (HRASCH) 23. Determination of $NH_3$ in refrigerator brines (GIBBS) 7. Radiation pyrometry (FORGE) 2. Mechanical refrigeration in the sugar industry (DOMENTSEY) 28.

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RASSOW B. AND LOESCHE A. Jahresbericht über die Leistungen der chemischen Technologie für das Jahr 1930. Abt. I. Unorganischer Teil. 76th year. Leipzig: J. A. Barth. 781 pp. M. 46, bound, M. 49.

Estimating the hygroscopicity of materials in factories and warehouses. THOMA & CO. Swiss 142,491, Nov. 23, 1929. A sample of the material being manufd. or stored, *e. g.*, cotton, is tested in a balance, and from these data the hygroscopicity of the treated material is detd.

Heating processes. ALLGEMEINE ELEKTRIZITÄTS-GES. Ger. 521,139, July 23, 1925. Heat is conveyed to smelting furnaces, welding app., etc., by passing a di- or poly-atomic gas, preferably H through an elec. arc or other heating means capable of dissociating a substantial part of the gas, and leading the gas to the app. to be heated, where the atoms recombine to mols., with liberation of heat. Addnl. details are given and app. is described.

Catalytic reactions. ALFRED REIS. Fr. 696,131, May 26, 1930. In org. catalytic reactions, the contact masses are in intimate contact with heat-conducting metallic surfaces which are placed in the contact chamber parallel to the direction of flow of the gas.

Electrothermal reactions. BUFFALO ELECTRIC FURNACE CORP. Fr. 697,108, June 5, 1930. Reactions of solid powders at high temps. are carried out by passing the materials through a hollow electrode from the end opposite to the arc in a furnace. The electrode is maintained at a high temp. so that the reaction is complete before the materials reach the end of the electrode.

Separating gas mixtures. AMERICAN SMELTING & REFINING CO. Fr. 697,055, June 2, 1930. A mixt. of gases, such as gases from metallurgical app., is dried and sepd. by passing the mixt. through an adsorbent material satd. with one of the constituent elements and allowing the water contained in the mixt. to replace the constitutive element in question in the adsorbent material. An app. is described. *Cf. C. A.* 25, 2105.

Separating gases by liquefaction. ARTHUR SELIGMANN. Ger. 520,287, Feb. 20, 1930. A method and app. are described for removing residues of liquefied gas from the plant when the latter is shut down.

Removing phosphine from gases. SOC. D'ÉTUDES SCIENTIFIQUES & D'ENTREPRISES INDUSTRIELLES. Fr. 696,512, May 21, 1930. $PH_3$ is removed from gases contg. it in small quantities, *e. g.*, H obtained by the reaction at high temp. and pressure of P with water, by treating the gas at a high temp. with O or an oxidizing gas. If air is used in suitable amt. a gas contg. H and N in the proportions for *making* $NH_3$ may be obtained.

Recovering inflammable solvents. JEAN H. BRÉGEAT. Ger. 520,076, Aug. 28, 1928. Vaporized inflammable solvents are condensed by bringing the vapors into direct contact with blocks of compressed $CO_2$ snow. The gaseous $CO_2$ thus liberated acts as a protective gas against fire.

Colloidal solutions. HANNS STAMMREICH and WILHELM NOTHER. Ger. 521,203, Dec. 25, 1927. In prepg. colloidal solns. with the use of protective colloids, the ma-

terial to be colloidized and the protective colloid are produced simultaneously from one soln or liquid Thus, a colloidal soln of AgCl and $SiO_2$ may be prepd by adding HCl to a soln of $AgNO_3$ and water glass, or an organosol of Ag and C may be prepd by passing an arc through a suspension of a Ag salt in paraffin, or through paraffin between Ag electrodes

**Stabilization of solutions, emulsions and suspensions by lignin derivatives.** CHAS F CROSS and ALF ENGELSTAD Ger 516,566, Sept 18, 1926 See Brit 263,620 (*C A*. 22, 162)

**Automatically controlling density or character of solutions or mixtures by differences in their light transmission.** WM A DARRAH U S reissue 18,005, March 24 A beam of light passed successively through the material to be controlled and a standard may serve to *control dye solns* operations such as *bleaching and filtering of sugar solutions* or regulation of the *d of wood pulp aq mixts* Numerous details and elec features are described This pat is a reissue of the original pat. No 1,746,525, issued Feb 11 1930

**Purification of liquids by distillation** GEORGES L. GARDEL Fr 695,266, May 7, 1930 The mass of liquid to be purified is first heated to a temp near the lowest b p of the components and an inert gas or dry steam is introduced under high pressure The gas is adsorbed and by expansion produces a lowering of the temp while at the same time carrying over the mols A suitable app is described

**Liquefying chlorine** KREBS & CO., G M B H Ger 514,070, April 6, 1929 The condenser comprises a no of practically horizontal tubes arranged one above another and connected at the ends by vertical mains The gas is supplied at about the middle of one main, and the liquefied Cl is collected at the bottom of the other main, the unliquefied impurities escaping up the outflow main

**Removing liquid from gelatinous colloid emulsions.** WILFRED S ROTHERA, STANLEY BLYTHEN and H R GILLESPIE (Kurt Ripper, inventor) Ger 517,734, July 28, 1923 For producing hardened objects, emulsion colloid is set in molds permeable to heat, and formed of porous walls which allow passage of the liquid, but not of the colloid The molds may be heated Cf *C A* 19, 1464

**Separating mixtures of liquids** N.-V DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Fr 696,324, May 30, 1930 A liquid mixt is sepd into its constituents or groups of constituents by submitting the mixt to the action of 2 liquids circulating in countercurrent and which are very insol in one another, these auxiliary liquids being so chosen that the constituents or group of constituents are divided between them in different proportions The auxiliary liquids have preferably different sp wts and one of the liquids may be miscible with the mixt to be sepd

**Separating mixtures of materials of various degrees of granularity by sedimentation.** *CHEMISCHES LABORATORIUM FÜR TONINDUSTRIE UND TONINDUSTRIE ZEITUNG H* SEYER & E CRAMER G M B H Ger 517,980, July 26, 1929 Details of the heating and agitating of the sedimentation liquid, and of the app., are given

**Lixiviating materials** GEORG WEISHEIT Ger 517,920, June 23, 1927. App for lixiviating materials, especially ores contg nitrates or chlorides under heat and pressure, is described Countercurrents of lixiviating liquid are forced through the heated material

**Substances in uniform particles.** I G FARBENIND A.-G Fr. 696 096, May 26, 1930 Fusible org or inorg substances are transformed into particles of uniform size by dividing the fused substances at a temp near the solidification pt by means of rotating disks or centrifuges, regulating the speed of rotation so that spherical particles are obtained and solidifying by cooling with a gas or liquid

**Pulverizing vegetable matter.** SOC ANON POUR L'IND CHIM A BALE Swiss 143,521, Apr 11, 1928 The method is similar to those of 128 855 and 139,324 (*C A* 25, 776), *i e*, the temp is lowered to cause the material to congeal, after which it is pulverized This method facilitates good extn

**Drying crystalline or other materials** GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G Brit 340,057, Oct 8, 1928 Materials which may be in cryst dust like, granular or lump form or in blocks or other shaped masses are dried by making them resistances in the circuit of a high frequency elec current, and the drying may be assisted by a stream of gas

**Refrigerators.** SIEMENS-SCHUCKERTWERKE A.-G Fr 696,118, May 26, 1930 In an absorption refrigerator, a working agent is used which boils at atm pressure in the neighborhood of 100° and the m p of which is below the evapg temp entering into account for the production of cold A soln of ethyl isoamyl ether in paraffin oil or a soln of toluene in quinoline may be used

**Refrigerating agents.** Compagnie française pour l'exploitation des procédés Thomson Houston Fr 695,806, May 20, 1930 HCOOMe is used as a cooling agent, particularly in refrigerators

**Refrigerating agents.** Frigidaire Corp Fr 696,546, May 28, 1930 An absorbent material for refrigerating agents is composed of a mixt of a solid (such as $SrCl_2$) capable of forming a chem combination with the refrigerating agent and $LiNO_3$, the latter being 4–10% preferably 5%, of the total mixt and being in the liquid state under working conditions

**Foam prevention during refrigerating.** A Borsig G m b H (Gustav Jansen, inventor) Ger 520,120 July 11, 1929 Foaming of the brine is prevented by addn of oil

**Heat insulation.** Paul E Klopsteg (to Central Scientific Co) U S 1,707,265, March 24 Heat resisting walls suitable for still jackets, etc, comprise a molded thick porous layer of heat insulating material such as diatomaceous earth 75, hydrated lime 12.5 and asbestos fiber 12.5% and a molded facing layer of dense heat resisting material such as diatomaceous earth 75 and portland cement 25%, the 2 layers being molded one on the other and having about the same coeff of expansion

**Protection and heat insulation of iron tubes.** Rudolf Hirschler Ger 521,077, Nov 16, 1927 The tubes are thinly coated with nitrocellulose or like cellulosic material, dipped in a hot bath of asphalt bitumen or tar, and then rolled under pressure in powd asbestos, talc or kieselguhr

**Electric insulating compositions.** I G Farbenind A G. (Max Hagedorn, inventor) Ger 519,457, Sept 27, 1927 The compns consist of (or) contain cellulose esters of higher fatty acids, or mixed esters or ether esters contg higher fatty acid radicals

**Thermal insulation for electrolytic cells.** James N Smith (to Westinghouse Elec. & Mfg Co) U S 1,707,374 March 24 Structural features

**Impregnating fibrous insulation, etc.** Standard Telephones & Cables, Ltd, T R Scott and T N Riley Brit 330,911, Sept 18, 1929 In operations such as the manuf of high tension cables, elec condensers, etc, the insulation is dried and exhausted, and, before impregnation, residual air is replaced by the vapor of a substance which vaporizes under the temp and low pressure conditions prevailing in the impregnating vessel and which is condensed to a liquid or solid under the conditions of temp and pressure in service The lead sheathing of a cable may serve as the impregnating vessel and preferably the substance used is such as to condense during impregnation Among the materials which may be impregnated are paper, textile materials, fiber boards, asbestos and wood, and as impregnating substances there may be used, hydrocarbon oil with or without resins, tars, bitumens, resins and synthetic resins in soln, cellulose acetate solns, S, paraffin, ceresin, beeswax, halogenated waxes such as chlorinated naphthalene and petroleum jellies Methylnaphthalene and biphenyl also may be used They are stated to reduce the dielec losses in the finished cable Numerous details of procedure are described, and substances of high sp inductive capacity such as glycol or ethylene glycol may be used in condenser manuf

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Developments in western municipal water-supply practice.** Harry N. Jenks. *Eng News Record 106, 418–40(1931)*—Consideration of existing supplies from distant mountain watersheds leads to the conclusion that it may be less expensive and more reliable to filter the water than to provide the increasingly elaborate watershed protection now demanded Practically all mountain sources, through either natural or artificial causes, are becoming less desirable in regard to quality and in recent years the water from practically every source, even under apparently ideal conditions of mountain catchment area, has been subjected to some form of treatment In California, the most striking development is the reclamation of water from municipal sewage and storm water drainage. Some of the salient characteristics of western municipal water supplies and comparative cost statistics are tabulated R. E Thompson

**Ground water in eastern and central Montana.** Eugene S Perry. *Mont. Bur. Mines and Geol Mem* No 2(1931)—A report on the occurrence of artesian water in Montana, the effect of geological structure upon this occurrence, and the chem compn. of various types of ground water Curtis L. Wilson

**Operating conditions at Elbe Waterworks and pretreatment of Altona ground water supply** LICHTHEIM *Gas u Wasserfach* 74, 237–44(1931) —A description of the pumping plant and rapid filter is given with special reference to difficulties encountered in the very cold January of 1929 Acidified ($H_2SO_4$) clay suspensions are added to water before rapid filtration to improve filtration The deep wells are described and illustrated R. W RYAN

**Oberhaus water works with quick filter plant and infiltration plant for augmenting ground water** HEINRICH KRING *Gas u Wasserfach* 74, 193–9(1931) —Costs of operation are given for filter and infiltration plants and details of operations Illustrated R. W. RYAN

**Chemical and physicochemical investigation of the sulfur-bearing mineral waters of St. George in Angarano. (Bassano del Grappa)** G BRAGAGNOLO *Ann chim applicata* 21, 12–26(1931) —An extensive examn of these waters was made indicating the presence of 2 3 cc of $H_2S$ per l of water at 0° with 0 08 g solids (mostly Ca and $Mg(HCO_3)_2$ The therapeutic value of the waters was not investigated A W C

**Gravity water-supply in Franklin, Tenn.** PARK MARSHALL. *Am City* 42, No 3, 7(1930) —Well water brought 12 miles and stored in a reservoir and in an elevated tank is chlorinated C H BADGER

**Automatic chlorination of a gravity water-supply.** PERCY R. SANDERS *Am City* 42, No 3, 94–5(1930), cf *C A* 24, 1445, 5397 C H BADGER

**The chlorine-binding capacity and the potassium permanganate requirement of water and sewage.** E BARTH *Arch Hyg* 104, 318–29(1930) —Addns of urea and sugar increase the Cl no of boiled tap water, but do not affect the Cl requirement Both are increased to a greater degree by the addn of ferrous salts or nitrites than by ferric salts or nitrates Cl in a concn of 1 mg per l has a marked bactericidal effect on tap water, the bacteria requiring less Cl than an equal wt of org substance A concn of 20 mg per l is required to produce a marked decrease in the bacterial count of sewage E R MAIN

**The analysis of water.** V MADĚRA *Chem Listy* 25, 13–14(1931) —A critical review of analytical methods used in $H_2O$ analysis FRANK MARESH

**Improved water sample bottle.** Ross L. LAYBOURN *Am J Pub. Health* 21, 419–20(1931) —Glass stoppered, metal capped bottles of a type which can be purchased from a physician s supply house are used J A KENNEDY

**Mixing basins—time of mixing** JOHN R BAYLIS *Water Works and Sewerage* 77, 279(1930) —Mixing periods in filtration plants vary from 3 to 90 min but generally the mixing time in newer plants is 30 to 60 min Factors that influence time of floc formation are quantity of coagulant, time of mixing, temp , violence of agitation and character of water C C RUCHHOFT

**Odor and taste control at Charleston, W. Va.** LAWSON HAYNES *Water Works and Sewerage* 77, 266(1930) —See *C A* 25, 1308 C. C RUCHHOFT

**The Kempton Park Primary Filters of the Metropolitan Water Board.** S WALKER *Water & Water Eng* 32, 562–7(1930) —A general description of the construction of the plant EDWARD S HOPKINS

**Prechlorination of filters.** JOHN F. KINGSLEY *Water Works and Sewerage* 77, 194–5(1930) —Prechlorination of the raw water at Newburgh, N Y , has accomplished several beneficial results without any significant increase in cost of operation Pre chlorination eliminates short filter runs reduces the size and the number of the mud balls eliminates surface cracks and wall cracks in the sand bed and removes the color more readily without increasing the coagulant dose High velocity washes are not necessary when water is prechlorinated C C RUCHHOFT

**Washing rapid sand filters.** ANON *Public Works* 61, 49–51(1930) —Studies were made over a period of 2 years at the Detroit Experimental Filter Plant Shrinkage of filter sand bed and other attendant filter troubles were overcome by removing the coating from the sand grains and the mud accumulation from the beds By washing the filters at a sufficient rate to obtain 50% or more expansion of the sand coating and shrinkage were prevented permanently A method for cleaning dirty filters is presented It requires the use of NaOH and hosing with a $^1/_2$-inch nozzle. A sand-expansion index for the filter wash is recommended to supplant the generally used index of rate of wash water rise C C RUCHHOFT

**Cold-weather troubles in filtration.** C T HOUGH *Water Works and Sewerage* 74, 260(1930) —See *C A* 25, 1308 C C. RUCHHOFT

**Factors influencing the toughness of coagulated matter.** JOHN R BAYLIS *Water Works and Sewerage* 77, 184–8(1930) —Microörganisms have the greatest influence in shortening filter runs Gelatinous ppts of org origin influence the strength of coagu-

lated matter Increase of temp increases the strength but it is not desirable to increase the temp of the water Changes in chem treatment may produce a stronger flocculation The flocculated turbidity must be very low in the water going to the filter beds when the temp is low to prevent flocculated matter from passing the beds, unless there is something in the water that adds toughness to the flocculated matter C C RUCHHOFT

**Ferric iron coagulation in a plant of unique design.** ALEXANDER POTTER AND WM I KLEIN *Water Works Eng* 83, 949–50, 970–3(1930) —The treatment given at the Westchester Joint Water Works No 1 is described in detail (cf *C A* 24, 5902) The best coagulating results are obtained by mixing not in excess of 10% of the theoretical required amt of dry Cl₂ gas with the iron sulfate soln and applying to the prechlorinated raw water The superiority of ferric iron coagulant over $Al_2(SO_4)_3$ coagulant for this particular water is that ferric iron gives a heavy floc formation with quicker settling, even with low temp and over a wider range of $p_H$, resulting in better plant operation Also in *J Am Water Works Assoc* 23, 719 27(1931) C H BADGER

**Sterilization of water mains.** ELAN P STEWART *Water Works and Sewerage* 77, 191(1930) —Whenever water mains are repaired or new pipes installed liquid chlorine is used to sterilize the section of the main that may possibly have become contaminated Portable chlorinators have proved satisfactory for this work C C R

**Chemical and biological study of deposits on the interior of water pipes.** R. KOLKWITZ AND E BEGER *Gas u Wasserfach* 74, 267 8(1931) —Wood, glass and metal plates were exposed to tap water by means of a special device The plates were then examined microscopically, permitting a convenient biol analysis of the water similar to that obtained by sieving The nature of pipe deposits is discussed R W R

**Conditioning refinery water.** SIDNEY BORN *Natl Petroleum News* 23, No 6, 52–3, 56–7, *No 7* 55 57, 58 60, 61 99 *No 8*, 51 1 56 57, *No 9*, 65–8, 70 *No 10*, 49–50, 52, No 11 70–1(1931) —The following topics are discussed impurities found in natural waters methods and app for testing for hardness alky, causticity, acidity, salt and total dissolved solids the benzidine method for detg sulfates in water, limits of hardness, alky permissible in general purpose waters definition of $p_H$ value, chem reactions involved in water treatment, boiler feed water, loss of heating efficiency due to scale, removal of scale-forming materials, foaming and priming, embrittlement prevention, zeolite treating chemistry of process, operating precautions, construction and operation of soda lime water softeners, intermittent and continuous types, hot and cold processes reduction of scale forming materials; prevention of corrosion, comparison of zeolite and chem type softeners, choosing the softener, boiler compds, water for cooling and condensing drinking water at industrial plants and oil camps, filtration Cl violet ray and ozone treatment, water for treating purposes R W KELLY

**How contamination from pump packing was checked.** ARTHUR F. MELLEN. *Water Works Eng* 83, 1040–3(1930), cf *C. A* 24, 4879 C. H BADGER

**Maintaining chemical balance to resist corrosion and its applications to a recent development in lime-water softening.** CHARLES P. HOOVER W Va Univ. Eng Expt. Sta., *Tech Bull* No 3, 17-24(1930) —See *C A* 24, 3583 G. G

**Maintaining chemical balance to resist corrosion.** CHARLES P. HOOVER *Water Works and Sewerage* 77, 287(1930) —Remedies for preventing corrosion are (1) Water should be preheated to drive off oxygen (2) It should contain 30–50 p p m of alkalies in excess of that required to soften it. The higher the $p_H$ the smaller the amount of iron dissolved (3) Water can be passed through a bed of scrap iron or filings (4) Pipes may be coated with zinc, cement or tar (5) Twenty p. p. m of sodium silicate is sufficient to stop corrosive action almost entirely (6) Water may be so treated that it will deposit an impervious film on the inside of a pipe This film prevents direct contact with iron The film can be built up by satg the water with $CaCO_3$ C. C RUCHHOFT

**Corrosion and conservation of underground structures.** P. J. RICHARDS. *J. Am Water Works Assoc.* 23, 529–33(1931).—See *C. A.* 25, 1609 H. G

**Correcting corrosive water at institution.** G M RIDENOUR. *Public Works* 61, 122-3(1930) —A New Jersey state institution reports a persistent and serious case of corrosive water The water supply is secured from a 260 foot well driven in yellow sand, blue sand and clay Analysis at the well gave: $p_H$ 5 5, $CO_2$ acidity 14 0 p p m, total alky as bicarbonate 10 0 p p m, dissolved O 2 00 p. p. m and hardness 22 p p m The tap water analysis gave, in addn to the above, 4 9 p p. m of ferric iron Installation of a deaerator reduced the acidity to 2 0 p p m and increased the $p_H$ to 6 2, but failed to check the corrosive action The VanHeuser marble test was used to det.

a point of equil between the carbonate, bicarbonate and $CO_2$ such that a slight coating of carbonate would be deposited on pipe surfaces and thus serve as a protection from O or acids Lime was applied at the pump suction in sufficient quantities to maintain a *p*H of 7.7 to 8.0 This treatment resulted in a $CO_2$ acidity of 0.2 p. p. m., a bicarbonate alky of 43 p. p. m. and an occasional carbonate alky up to 8 p. p. m. Conditions were markedly improved after 2 months of the lime treatment Approx 30 lb. of lime is used per 100,000 gallons of water C. C. RUCHHOFT

**Some recent developments in boiler-water treatment.** A. W. CHAPMAN. *Fuel in Science & Practice* 10, 64(1931).—The disadvantages of boiler scale, its formation and prevention are reviewed D. A. REYNOLDS

**Ways of representing analytical results of the examination of boiler feed water.** J. LEICK *Z. angew. Chem.* 44, 100–2(1931).—A general article comparing the methods of expressing the quant. results of water analysis RUSSELL C. ERB

**Industrial sewage disposal.** S. JACKSON AND W. GARNER *Ind. Chemist* 7, 76–9, 101–4, 166–8(1931).—A review E. H.

**The present trend in sewerage and sewage-disposal practice.** W. W. HORNER *J. Eng. Club St. Louis* 10, No. 9, 12 pp. (1930). E. I. S.

**Future possibilities in sewage disposal.** H. C. SHENTON. *Surveyor* 79, 381(1931).—An ideal system would consist of a preliminary settling tank, activated sludge tanks in one or two stages, digestion tanks for mixed sludge, arrangements for heating and mixing sludge keeping the temp. at 75–80°, covered sludge-drying beds, and a power plant driven by the gas evolved A. L. ELDER

**Sewage-disposal works of Plainfield, N. J.** JOHN R. DOWNES. *Water Works and Sewerage* 77, 189–91(1930).—This plant is designed to treat 4 m. g. d. There are 6 Imhoff tanks, 2 sprinkling filters, 1 final settling tank and 5 sludge-drying beds. Provisions are also made for partial aeration of the sedimentation tank effluent in which Cl is used for odor control C. C. RUCHHOFT

**Sewage treatment at Lake City, Fla.** ANON. *Public Works* 61, 110(1930).—Lake City, Florida with a population 3000 and an av. daily flow of 100 gallons per capita per day has recently constructed a sewage treatment plant having the following units: preliminary bar screen, a primary clarifier, pump house with wet and dry well, dosing tank, sprinkling filter, sludge digestion tank, secondary clarifier and sludge-drying bed. Provision is also made for pre- or post-chlorination of sewage C. C. R.

**Los Angeles successfully reclaims sewage for replenishment of underground water supplies.** C. WILSON *West. Construction News* 5, 473–4(1930).—Discussion of sewage-disposal conditions in southern California with special reference to the program of water reclamation studies initiated by the Los Angeles Dept. of Water and Power E. I. S.

**Sewage screening—experience with disk-type screens at Rochester, N. Y.** WILLIAM A. RYAN *Am. City* 42, No. 3, 101–2(1930).—Sewage treatment was begun in 1915. The city is now served by 4 plants. The largest, the Irondequoit plant, built in 1916, was designed to treat a normal dry weather sewage flow of 24 m. g. d. The flow, since then, has increased to almost 60 m. g. d. without causing the operating difficulties usually experienced. This is attributed to the fine screening installation. The primary purpose of these screens is not to remove the solids which will settle out in the Imhoff tanks but to prevent the floating solids from entering these units or being discharged under storm flow conditions into Lake Ontario. The addn. of 2 new disk type screens in 1929, making a total of 6, now permits handling a rate of 180 m. g. d. without by passing crude sewage into the lake. A feature of the new screens is the variable speed transmission unit whereby the lineal travel of the screen may be varied instantly from 7 to 27 ft. per min. to meet existing flow conditions. The equipment of the plant is listed. The effluent is discharged through a 66 in. steel conduit and submerged outlet 7000 ft. offshore into the lake C. H. BADGER

**Plans for sewage reclamation in the Los Angeles metropolitan area.** R. F. GOUDEY *Eng. News-Record* 106, 443–6(1931).—See C. *A.* 25, 1928 R. E. THOMPSON

**Sewage treatment in Germany.** SENTENAC AND FONTAINE *Ann. ponts et chaussees Pt. Tech.* 100, No. 3, 266–97(1930).—Notes on an inspection and study trip with special reference to the methods and equipment observed in Berlin and in the Ruhr District E. I. S.

**Sewage purification by dilution and the limit of putrescibility.** H. BACH *Tech. Gemeindeblatt* 34, 29(1931).—The amount of water needed for dilu. depends on the strength of raw sewage. This factor varies greatly in different countries. The ratio of material in soln. to that in suspension is an important factor A. L. ELDER

**Some experiments on the treatment of a sewage containing wool-scouring refuse.**

C C Bretnham *Surveyor* 79, 335(1931).—The sewage of Bradford contains large quantities of wool scouring liquor. Raw effluents have analyses such as: total solids 42,000 p. p. m., grease 7900 p. p. m., alky. to methyl orange 31,200. Good purification was obtained by neutralization of the alky. and mixing gently with a little fresh sludge, settling and filtering at $p_H$ 6.0. A. L. Elder

**The question of gas formation in city sewers.** Kehr and Müller *Tech. Gemeindeblatt* 33, 303-9(1931).—Cases of explosions in sewers are cited. The amts. of $C_2H_2$, CO, etc. needed to produce explosive mixts. are given as well as the toxic concns. Discussions of methods of testing for explosive and poisonous gases in sewers are shown. A. L. Elder

**Purification of brewery sewage by the activated-sludge process.** M. Alt. *Tech. Gemeindeblatt* 33, 291-5, 309-12(1930). The activated sludge process was a satisfactory method for treating brewery waste mixed with other sewage. The $p_H$ needed to be controlled. A. L. Elder

**Influence of seeding material on sludge digestion.** C. I. Kiefer and Herman Kratz, Jr. *Eng. News-Record* 106, 474-8(1931). The following conclusions are drawn from lab. expts. conducted at the Baltimore sewage works. (1) Each g. of volatile matter destroyed or lost, as detd. by present day testing methods, will be converted into about 750 to 800 cc. of $CH_4$ and 1200 to 1300 cc. of total gas. Each g. of raw volatile matter digested will produce about 600 cc. of $CH_4$ and 800 cc. of total gas. (2) Sludge that is several years old serves just as well for seeding purposes as sludge that has just reached a digested condition. (3) Partly digested sludge, even though it contains as much as 65-70% volatile matter, becomes digested within about 60 days when 2% daily addns. of raw material are made, and within 70-80 days when 6% of raw sludge is added daily. When raw sludge, in place of digested or partly digested sludge, is used, 150 days are required to obtain ripe material in the case of 2% addns. Where 6% addns. were made, a digested sludge was never obtained. (4) The sludges receiving 2% addns. were slightly better digested than those to which 6% was added. The difference, however, was not great. It is believed that 6% addns. are about the max. which can be made and still produce a sludge with good drainability, free from odors. (5) Data obtained indicate that certain ether-sol. materials digest rapidly within 10-15 days. There is present, however, ether-sol. matter that digests at a slow rate. R. E. Thomson

**Stream pollution by textile wastes.** Robert Weston. *Public Works* 61, 110 (1930).—See *C. A.* 24, 450. C. C. Ruchhoft

**The effect of certain poisons upon mosquito larvae.** Martin Fronisher, Jr., and Raymond C. Shannon. *Am. J. Hyg.* 13, 611-22(1931).—Full grown larvae of *Aedes aegypti*, *Ae. taeniorhynchus* and *Culex quinquefasciatus* were not injured by relatively high concns. of KCN, but weak solns. of I (1 part per million) were fatal. Newly hatched larvae were much more susceptible. The toxicity of Br was practically the same, while that of Cl was less. Because of the thickly sclerotized cuticle the pupae were more resistant to the halogens. In concns. toxic to larvae I or Br cannot be tasted but their employment in drinking water is questioned. In cisterns, tanks, still water, etc. the larvae are readily destroyed. G. H. W. Lucas

**Olean City (N. Y.) epidemic of typhoid fever in 1928.** Archibald S. Dean. *Am. J. Pub. Health* 21, 390-402(1931).—This is a report of an epidemic of 218 cases due to a break in the submerged suction pipeline from a well in the Allegheny River and insufficient chlorination of the water. There were 25 deaths. (Cf. *N. Y. S. Dept. of Health Repts.* 49, 104-12 (1928)). In Jan. and Feb. there were over 1000 cases of gastro-enteritis and during Aug. and Sept. over 5000 cases. Olean derives its water from 2 sources: *Olean Creek and South Olean wells*. The former was free from *B. coli*. The latter supply came from 12 or more 6" and 8" tubular wells sunk about 72' deep in the low ground on the north side of the river and from a large open collection and suction well on the south bank of the river. Two of the tubular wells had become submerged within recent years by changes in the course of the river. Water from these wells passed by screw joint iron suction pipes across the river bed to the collection and suction well. After chlorination, instituted by a device which operated by remote control when the elec. pump was started, the water was forced into the distribution system. Raw sewage from nearly half the city entered the river and its tributary above the wells. No daily or regular tests for residual Cl were made. Nine of 16 samples exam'd. in July, Aug. and Sept. gave presumptive tests for *B. coli*. Considerable epidemiological data are given. Details on the cost of this epidemic are given. J. A. Kennedy

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Trisodium phosphate [as water softener and boiler compound] (Snell) 18.

Purifying water. JOSEF MUCHKA Fr 695,550, May 14, 1930 In the purification of water by electromagnetic radiations, the modification in optical properties—color, absorption power, reflection, refraction, polarizing effects, etc.,—are used as an indication of the actual state of the water to be treated and the progress of the treatment is controlled automatically on the basis of the modification produced

Sterilizing water. JOSEF MUCHKA Fr 696,342, May 31, 1930 The dechlorination of chlorinated water by means of activated charcoal, etc., is combined with a sterilization of the charcoal by submitting the charcoal during dechlorination to the transposition or stirring used for sand filters

Apparatus for rapid filtration of water. HENRY A DESRUMAUX. Fr 696,882, May 19, 1930

Distillation plant for crude water. AKT GES BROWN, BOVERI & CIE Swiss 143 480, Nov 8, 1929

Apparatus for deaerating water, etc WM S ELLIOTT U S 1,797,405, March 24 Structural features

Acid removal from water. OSCAR RITSCHEL Fr 695,754, May 16, 1930 Waters are deacidified by fixation of their free or semi free $CO_2$ by passing them through a filtering mass composed of broken or calcined natural $MgCO_3$ or dolomite.

Softening water I KRÜGER A/S Fr 695,965, May 22, 1930 Water to be completely or partially softened is treated with pptg agents and then brought in contact with granular or subdivided material, which is preferably of a similar chem compn to the substance to be pptd, *e. g.*, marble or limestone, whereby pptn is accelerated

Softening water with base-exchange material. UNITED WATER SOFTENERS, LTD., R T PEMBERTON and H S LAWRENCE Brit 340,091, Nov 7, 1929 To regenerate base-exchange material (in an *app* various details of which are described), a rigid rod or cartridge of salt is inserted into a tube or pipe and water is passed through the latter to dissolve the salt and carry it to the base-exchange material *Cf C A*, 24, 5907

Apparatus for softening water with base-exchange materials. GUY S APELDORN U S 1,797,708-9, March 24 Structural features

Scale preventing. OSCAR RITSCHEL Fr 695,753, May 16, 1930. The formation of scale in boilers, etc., is prevented by adding to the feed water a neutral salt of $NH_4$ such as $(NH_4)_2SO_4$ or $(NH_4)_2SO_3$ which only decomposes into $NH_4OH$ and free acids after the heating of the water This acid afterward seps from a part of the bicarbonates the large amt of $CO_2$ necessary to maintain the Ca bicarbonates contained in the water

Sewage treatment. WILLEM RUDOLFS (to National Aluminate Corp.) U S 1,797,879, March 24 Sol Fe salts such as $FeCl_3$ or $Fe_2(SO_4)_3$ or $FeSO_4$ are added in the proportion of 3 5 to 5 0 p p m., in order to facilitate sedimentation Use of Mn, Ni and Co salts is also mentioned

Clarifying apparatus for waste water. DEUTSCHE ABWASSER REINIGUNGS-GES. M B H (Otto Mohr, inventor) Ger 521,427, Mar 7, 1930

Apparatus for removing scum and sediment separately from waste waters. WILHELM RADERMACHER and CLEMENS DELKESKAMP Ger 505,204, Aug 11, 1925

Furnace (with superposed horizontal conveyors) for drying garbage, etc. JOHN H FENELER U S 1,797,335, March 24 Structural features.

Septic tank. CECIL H RYMAL (one half to George R. Gregory). U. S 1,797,697, March 24

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J J SKINNER AND M S ANDERSON

Recent advances in science: pedology. G W ROBINSON *Science Progress* 25, 595–602(1931), cf C. *A* 24, 2822.—A review of recent work on soil chemistry.

JOSEPH S HEPBURN

Chemical-agricultural studies on Italian soils. F ROGAI *Boll ist super agra rio Pisa* 6, 493–503(1930).—The chem analyses of 61 soils of Tuscany are given

G A BRAVO

Soils of the eastern township of Quebec. R R MCKIBBIN AND L I. PUGSLEY MacDonald College, McGill Univ., *Tech Bull* No 6, 3–64(1930).—All soils in this region have a high percentage of org matter concd in the surface layer They also have relatively low Ca and P contents and a low nitrate N content throughout the growing seasons Three main kinds of soil are found heavily podsolized, brown forest and muck swamp soils The podsol and brown forest soils have high CaO require-

ments and low $p_H$ values The subsoils of the podsol soils are in most cases better supplied with Ca, Mg and sesquioxide bases than are the surface soils The forest crops from a large section of this area should be of great value, while the muck swamp tracts should prove highly fertile if they could be drained J R ADAMS

**The podsolic process in soils.** T J DUNNEWALD *J Am Soc Agron* 23, 259–65 (1931) —An attempt is made to follow some of the details of the podsolic process on a lab scale The results from this method indicate that org matter is not concerned in the podsolic accumulation of $SiO_2$ but is concerned in the translocation of bases and sesquioxides Extn of the bases and formation of acid conditions appear to be necessary preliminaries to the deposition of $Fe_2O_3$ and $Al_2O_3$ in the subsoil The rapid removal of bases from timbered soil as compared to grass soil is shown, and the slower removal of sesquioxide as compared to the rapid removal of bases is brought out Available P seems to be lost more rapidly into the subsoil of grass soils than is the case with timbered soils J R ADAMS

**Some characteristics of an eroded soil.** G W MUSGRAVE AND HENRY DUNLAVY *J Am Soc Agron* 23, 245–52(1931) —A relatively slight degree of erosion has a marked downward effect upon the yield of cotton A phys study of the soil across the area indicated a downward trend of the moisture and of the relative $H_2O$-holding capacity of the soil loss of org matter, decline in amt of colloids and moisture equiv and a lower percentage of clay on the eroded portions of the slope as compared with the uneroded sections J R ADAMS

**An extension program for the control of soil erosion in Nebraska.** P H STEWART *J Am Soc Agron* 23, 253–8(1931) —The use of legume crops to maintain the org matter content of the soil is emphasized for Nebraska conditions J R ADAMS

**A laboratory study of the field percolation rates of soils.** C S SLATER AND H. G BYERS U S Dept Agr, *Tech Bull* 232, 1 23(1931) —A description is given of an auger which was devised to obtain undisturbed cores of soil from the field The prepn of the sample for the percolation expts and the exptl procedure for measuring the rate of percolation are fully described There is a considerable degree of correlation between the rates of percolation obtained on field cores and on the corresponding lab-packed samples for most of the surface soils studied and a marked lack of correlation for the subsoils The percentages of silt these soils contain, the suspension percentage and the percolation ratio have been found to represent the same order The suspension percentage and the percolation ratio are valuable criteria of relative field permeability The field-percolation rate of a soil is governed more by the water passage-ways it contains than by the character or vol of the pore space of the soil mass. The ratios for erosion and for the permeability of soils show that these properties are inversely proportional in terms of the factors of the percolation ratio J. R. ADAMS

**The seasonal changes of some biological factors of forest soils.** DÁNIEL FEHÉR. *Matematik és Természettud Értesitö* 47, 617–41 (in German 642–51), *Math Naturw Ber Ungarn* 37, 51–80(1930), cf *C A* 23, 3044 —Forest soil contains most humus in September, caused by fallen leaves The least humus was found in May. Max humus content and $p_H$ are correlated Their minima do not agree The humus content of the soil of a black pine forest is greater than that of acacia forests. Black pine should therefore be preferred in reforesting sandy soils in bad condition S S DE FINÁLY

**The chemical composition of soils of the Hungarian Great Plain.** S ARANY. *Mezögazdasági Kutatások* 2, 557–68(1929) —Thirty g dry soil is moistened with distd $H_2O$ so as to form a pulp The amount of $H_2O$ multiplied by 100 and divided by the wt of soil yields a ratio no averaging 38–40 for light soils, less than 30 for sandy soils, more than 40 for heavy soils and more than 50 for clay soils The $p_H$ varied between 5 0 and 7 3 Active acidity (*i e*, $p_H$ detd in *N* KCl soln or titrated as exchange acidity) does not play a great role The use of slowly decomposing lime fertilizers seems to be preferable S S DE FINÁLY

**Data on the composition of soils of the Hungarian Great Plain.** II. S ARANY, G BUJK AND J GIDRÓ *Mezögazdasági Kutatasok* 3, 317–33(1930) —Plant-food content of soils was examd Total N was found in considerable amounts Surface layers contained 66 to 435 5 mg, first subsoil (15–55 cm deep) 46–267 mg, and layers 45–75 resp (55–85 cm deep) 20–172 mg Total $P_2O_5$ content varied from 55 to 247 mg $P_2O_5$ soluble in citric acid moved from 0 6 to 82 mg, $K_2O$ soluble in citric acid between 2–36 mg $CaCO_3$ content and $p_H$ values of the cultivated layers are very varying The upmost level lacked lime in each case. S S DE FINÁLY

**Universal apparatus for field investigations of soils.** J. DI GLÉRIA *Kisérlet*

*Közlemények* 31, 295–9(1929).—A detailed description is given of a combined Wheatstone bridge and potentiometer S. S. DE FINALY

**A large sand culture apparatus.** FRANK M. EATON *Soil Science* 31, 235–41 (1931).—A sand culture app. is described whereby 50 gals. of nutrient soln. may be used without discarding any portion of it. It is suitable for making cond. tests at frequent intervals in order to follow changes in concn. M. S. ANDERSON

**Microanalytical determination of silica in aqueous extracts of soil.** A. NÉMEC, J. LANIC AND A. KOPROVÁ *Z. anal. Chem.* 83, 425–45(1931).—The previously described colorimetric methods for detg. $SiO_2$ were tested, particularly with respect to manipulative details desirable for $SiO_2$ in concns. likely to occur in ext. of soil. A method was worked out which is suitable for detg. such quantities of $SiO_2$ in the presence of as much $PO_4^{---}$ and $Fe^{+++}$ as is likely to occur in the soil ext. To the soln. contg. 0.5–0.7 mg. of $SiO_2$ in 30 cc. add 5 cc. of 1% citric acid soln. and 5 cc. of molybdate reagent (50 g. $NH_4$ molybdate dissolved in water, treated with 30 cc. of concd. $H_2SO_4$ and dild. to 1 l.). Shake well and after 5 min. add 7 cc. of 4% $H_2SO_4$ (by vol.) and 2 cc. of 1% $NaVO_3$ soln. Then treat with 2 cc. of 5% $Na_2S_2O_4$ soln., and after allowing 15 min. for reduction to take place, add 35 cc. of alk. glycerol soln., (600 cc. of 10% $Na_2CO_3$ and 100 cc. of glycerol) and dil. to exactly 100 cc. After 2 hrs. compare the blue color with standards in a colorimeter. The presence of Fe, Ca, Mg, Al, As and P does not interfere if the directions are followed carefully. Good results can also be obtained if King's method is modified as follows. To the soln. contg. 0.1–1.0 mg. of $SiO_2$ in a 100 cc. measuring flask, add 3 cc. of 10% AcOH and 3 cc. of 10% molybdate soln. Shake well, allow to stand 5 min. and then add 2 cc. of a reagent made by dissolving 0.5 g. of hydroquinone in 100 cc. of 20% $Na_2S_2O_4$ soln. After 0.5 hr. dil. with 10 cc. of 10% $Na_2CO_3$ soln., dil. with water to 100 and compare the color with that of standards. W. T. H.

**The relation between buffer power and saturation capacity of the soils.** R. NICCORINI (WITH F. BAGNOLI) *Boll. ist. super. agrario Pisa* 6, 201–23(1930).—The buffer power against the bases of a soil increases with the increase of the absorbing (or satn.) capacity of the colloidal matters contained in the soil, while the buffer power against the acids increases with the increase of the carbonate content of the soil. G. A. B.

**Reliability of the quinhydrone method in the determination of $p_H$ values of soils.** G. HAROS *Mezőgazdasági Kutatások* 3, 189–90(1930).—The time curve can be shortened by use of a Pt electrode which was previously glowed out and put into distd. water for 1–2 min. Such electrodes show const. potentials in 5 sec. which remains for 10–15 min. Results by this method agree well with those obtained with the Haber-Klemensiewicz cell. Colorimetric $p_H$ detns. often show large divergences. S. S. DE FINALY

**Hydrogen-ion concentration, aluminum concentration in the soil solution and percentage base saturation as factors affecting plant growth and acid soils.** W. H. PIERRE *Soil Science* 31, 183–207(1931).—A greenhouse study was made of influence of growing crops on $p_H$, Al concn. and degree of satn. of soils formed under different climatic conditions. Each was brought to different degrees of acidity by appropriate lime or acid treatments. The crit. $p_H$ for growth of crops varied considerably with different soils. Analyses of displaced soil solns. showed but little Al even in those from the acid soils. The concn. of Al in different soils of like $p_H$ varied considerably. There was some correlation between concn. of Al in the displaced soil soln. and growth of corn on acid soils, but there was less correlation between Al concn. and yield of sorghum and barley. No relation was found between the amt. of phosphate in the soil soln. and the concn. of Al at which plant injury developed. The concn. of Ca bore no relation to plant injury. Some correlation was found between the ratio of K to Ca in the soil soln. and plant injury. This ratio varied considerably for different soils at similar $p_H$ values. Concn. of Mn showed no relation to plant injury from soil acidity. Soils varied considerably in their percentage base satn. at similar $p_H$ values. Good correlation was found between percentage base satn. of acid soils and plant injury. The proportions of the various bases present in the exchange complex are thought to be a factor affecting plant growth on acid soils. M. S. ANDERSON

**Temperature effects on the exchange acidity of lowland and swamp soils, especially the effect on the amount of acid ferrous iron.** K. KAWAMURA *J. Sci. Agr. Soc.* (Japan) 1928, 1–20(in English 21).—Acid soils were treated with normal KCl soln. at varying temps. (4°, 16°, 26° and 36°), and the titratable acidities and the amts. of Al and Fe in the exts. were detd. quantitatively. The acidity found agreed very well in every case with that calcd. from the amts. of Al and Fe, an indication that the acidity was produced by base exchange. The lowland and swamp soils, (peat soils and rice-

field soils), which contained more or less org matter, produced a considerable amt of $FeCl_3$ in the KCl extn., and the amt increased at a marked rate as the treating temp. rose. Org. (arid) soil, however, did not liberate any Fe in the soln. In most cases with all soils, the amt. of $AlCl_3$ produced decreased to a certain extent with the rise of temp. At the same time the sought titratable acidity decreased also, because the $AlCl_3$ generally played a greater part in the acidity than did the $FeCl_3$. The influence of the treating temp. is explained as follows. (1) As shown in the expt. with $Al^{+++}$ and $Fe^{+++}$ humates prepd. from peat and cane sugar, the base exchange of the ferrous *humate is markedly accelerated by rise of temp.*, whereas that of Al humate is somewhat *hindered*. (2) *The higher the treating temp. the greater the amt.* of $FeCl_3$ produced by the side reaction between $AlCl_3$ formed by base exchange and FeO originally present in the soil. This part of the $AlCl_3$ is changed to an insol. form, as illustrated by the reactions between the soil and dil. $AlCl_3$ solns. K. Shinohara

**Practical methods of alkali soil reclamation applied on the Hungarian Great Plain.** S. Arany. *Mezogazdasagi Kutatasok* 4, 11-21(1931). A general description is given of 3 methods. (1) liming, (2) covering the surface with a calcareous marly subsoil and (3) covering and mixing the surface layers with drift sand. S. S. de Finály

**Data on the liming of Hungarian soils and on the magnesium content of alkali soils.** S. Arany. *Mezogazdasagi Kutatasok* 2, 1-11(1929). Sandy soils of Nyirség showed neutral to weakly alk. reactions and some hydrolytic acidity. Careful liming is proposed and eventually the use of Thomas slag or Rhenania phosphate. Well water, soil water and most of the whole profile of alkali soils contained Mg. The quantity of water sol. Mg varies; that of Mg sol. in salt solns. is the same as in Californian alkali soils. S. S. de Finály

**Determination of small amounts of calcium carbonate in soils.** L. Dworák. *Kisérlet. Közlemények* 31, 174-81(1928). Ten and 20 g. of soils contg. no $Na_2CO_3$ are treated with *N* $NH_4Cl$ soln. and titrated with 0.1 *N* HCl. Percentage $CaCO_3$ equals $(2A/B)(B-A) + [(2A/B)-1](B-A) \times 0.005 \times 10$, where *A* means cc. of 0.1 *N* HCl used for titrations of 250 cc. soln. of 10 g. soil and *B* the same for 20 g. soil. The method gives good results. S. S. de Finály

**Reclamation experiments on Hungarian soils rich in lime and containing sodium carbonate.** J. Di Gléria. *Kisérlet. Közlem. nyek* 32, 252-80(1929).—The *p*H and phys. condition of soil bear a relation to the Ca ion concn. of the soil soln. Colloids coagulate perfectly only in soils with *p*H under 7.0. Coagulation by Ca salts was observed when the soil soln. contained at least 0.278 mg. equiv. Ca after treatment. Equiv. quantities of reclaiming agents do not show the same results. The least quantity is needed of $H_2SO_4$ and HCl, somewhat more of $AlCl_3$, $Al_2(SO_4)_3$, and yet more of Ca salts. Reclaiming agents should be completely washed out of reclaimed soil. $CaCO_3$ was ineffective with these soils. S. S. de Finály

**Problems of heavy metals in soil chemistry.** László de Putnoky. *Mezögazdasági Kutatások* 4, 59-65(1931).—The role of heavy metals in the animal products, soils and fertilizers is discussed. P. calls attention to the necessity of regulating the heavy metal content of the soils, especially that of sandy soils. Z. I. K.

**Comparison of the Dirks and Scheffer and the Mitscherlich methods for determining the phosphoric acid requirements of the soil.** Lasnero. *Das Superphosphat* 7, 61-2(1931).—In 225 comparative expts. with soils ranging from rich to very poor in $P_2O_5$, the 2 methods gave results that agreed in 222 cases. The poorest agreement was obtained on soils that were not deficient in $P_2O_5$. K. D. Jacob

**The significance of colorimetric methods for the determination of phosphoric acid in soils.** L. Pfaff. *Das Superphosphat* 7, 67-9(1931).—The Mo blue colorimetric and the Lorenz gravimetric methods were compared for the detn. of $P_2O_5$ in citric acid exts. of soils. The 2 methods were in good agreement when the $P_2O_5$ content did not exceed about 60 mg. per 100 g. of soil. With larger amts. of $P_2O_5$ the colorimetric method gives results that are too low. The presence of citric acid causes low results by the colorimetric method if the aliquot for analysis contains more than the equiv. of about 10 cc. of a 1% soln. of citric acid. If carried out under carefully controlled *conditions, the colorimetric method gives good results*, and because of the speed with which it may be carried out it is very desirable for use in the citric acid method for the routine detn. of the $P_2O_5$ requirements of soils. K. D. Jacob

**Changes in the availability of phosphorus in irrigated rice soils.** R. P. Bartholomew. *Soil Science* 31, 209-17(1931).—Studies were made under field conditions of the effect of irrigation upon *p*H and available phosphates in rice soils. The irrigation water contained considerable $Ca(HCO_3)_2$ and rendered the surface soils more alk. than the subsoils. When phosphate fertilizers were used, the irrigation water caused a decrease

in water sol inorg phosphate This action was due partially to reversion of the phosphates added Three months after irrigation, org water-sol P had increased, probably because of the activities of bacteria Phosphatic fertilizers are not recommended for rice in this region when calcareous water is used for irrigation M S ANDERSON

Effect of carbon on vegetation. III. R. PEROTTI AND C. FERRETTI *Boll ist super agrario Pisa* 6, 147–63(1930), cf *C A* 23, 5531.—Both animal and vegetable C are effective in rendering harmless the toxins produced by microörganisms and in activating the respiratory process A new *apparatus* is described for the detn of the respiratory activity of the soils The action of the C continues for one year after it has been added G A. BRAVO

Effect of carbon on tobacco culture. G BONUCCELLI AND V. CINI *Boll. ist super agrario Pisa* 6, 339–54(1930).—The expts described in the preceding abstr were made on tobacco If powd vegetable C is added to the soil, the crop is increased, and the leaves show greater burning capacity G A BRAVO

A total-carbon procedure [for soils]. ERIC WINTERS AND D. C WIMER *J. Am Soc Agron* 23, 280–5(1931).—This is a modification of the Winters and Smith method (cf *C A* 23, 5531) for the detn of total C, in which the loaded boat can be moved from the cool part of the tube to the center of the furnace after all the connections have been made and the O flow started, the active catalyst is in large enough quantity to insure oxidation even under extremely rapid flow of combustible gas The loaded boat is placed in that portion of the tube outside the furnace with an Fe "pusher" behind it The connections are all made and the O flow is started A solenoid which fits over the tube is then centered over the Fe "pusher," the circuit made and the boat is gradually pushed into the furnace This method of inserting the charge reduces the possibility of gas losses The percentage error in this method is ±0.55% J R ADAMS

The transformation of citric acid into acetone by the soil. R. NUCCORINI (with A FELICIANI) *Boll ist super. agrario Pisa* 6, 241–8(1930).—The decompn of citric acid and the formation of acetone by the soil take place in the presence of ferric salts and Fe-contg fertilizers (Thomas slag) This decompn is attributed to the presence of iron compds and also of other, unidentified compds (1-3%) Cf Dean and Dean (*C A* 24, 3588) G A BRAVO

A study of some soils for cotton from the Segou region made in the laboratory of the Alsace Potash Co. J FRANC DE FERRIÈRE AND E NATIER *Rev botan appl agr. trop* 11, 84–98(1931).—These soils along the Niger River vary from the coarse sand to the heavy clay type In order to obtain good yields all these soils require the addn of fertilizers high in $P_2O_5$ and $K_2O$ The fertilizers should also contain N, when they are to be used on the sandy soils The geological formation of these soils is discussed on the basis of their phys constitution J. R ADAMS

The effect of the soil reaction on beet yields. JORET *Compt.-rend acad agr France* 17, 129–32(1931).—In the heavy plateau soils the optimum soil reaction for beets should be between $p_H$ 7.2 and 7.5 On slightly acid soils the max yield is sometimes lowered as much as 10%, and this depressive effect can be increased by the addn of physiologically acid fertilizers The depressive effect of the acid reaction on the yield is somewhat corrected by the addn of $Ca(NO_3)_2$ to the soil J R ADAMS

Determination of nutrient requirement of soils by means of electrodialysis. J DI GLÉRIA *Mezogazdasági Kutatások* 3, 185–8(1930).—$P_2O_5$ and K data detd. by electrodialysis are always higher than those detd according to Neubauer Neubauer data did not show any regular connections with dialysis data Also $NO_3$ and $NO_2$ contents of soil can be detd by electrodialysis S S DE FINÁLY

The supply of plant nutrients in the soil determined by Neubauer's method and calculated by the static or Mitscherlich methods. CLAUSEN *Z. Pflanzenernahr., Düngung u Bodenk* B10, 145–55(1931).—Available P and K in soil of plots used for fertilizer expts for 8 years previously were extd by the rye-seedling method of Neubauer The indications are compared with results to be expected from the known addns in fertilizer and removal in crops (static), and also in some instances with results obtained by growing crops to maturity in pots (Mitscherlich) Available P by the Neubauer test was much less than expected except in plots fertilized without P Mitscherlich indications for P were usually in good agreement with the calcd P supply except on unlimed soil The Neubauer procedure seems to be a better indicator for available K than that of Mitscherlich, which always furnished lowest indications except on soils fertilized without K C J SCHOLLENBERGER

The "Pehameter" and its practical usefulness. R. HERRMAN *Z. Pflanzenernähr., Düngung u Bodenk* B10, 142–5(1931).—The "Pehameter" is an app intended for the

detn of soil $p_H$, it consists of a porcelain plate with a depression at one side, from which a narrow channel extends across the face On each side are small rectangles painted with ceramic colors red to blue, which indicate characteristic tints with the "Universal" indicator from $p_H$ 4 to 9 by single units A little soil is placed in the cavity, satd with indicator, and after a min a drop is led down the channel and its color compared with the standard Tests with 36 soils of known $p_H$, as detd by standard methods, gave approx correct indications in 11 cases, an error of 1 $p_H$ or less in a total of 23 cases and over 2 $p_H$ in 3 cases The largest errors were with moderately acid soils, $p_H$ 4 5–5 5, which were indicated to be neutral C J SCHOLLENBERGER

**New principles in determination of fertilizer requirement of soils. Importance of relative examinations.** L DWORÁK *Mezogazdasági Kutatások* 3, 355–9(1930) —Not only requirements but also possible and probable influence of fertilizers should be examd by simultaneous expts on untreated soils Also exptl failures are removed if relative data of unfertilized and fertilized soil are detd S S DE FINÁLY

**Determination of fertilizer requirements of soils.** J BECKER *Mezögazdasági Kutatások* 1, 65–91(1928) —Data on $P_2O_5$ and on K requirements obtained by means of the methods of Lemmermann Konig Hasenbaumer, Sigmond, Niklas and Neubauer agreed The citrate and Nebauer methods gave too low results on easily sol $P_2O_5$ in soils contg much carbonates Results by the method of Sigmond on total $P_2O_5$ were high on some soils K requirement was detd by a modification of Sigmond's method and agreed with results by the Neubauer method S S DE FINÁLY

**New method of illustrating the results of soil analysis** Z I KERTÉSZ AND J CSIKY *Mezogazdasági Kutatások* 2, 201–8(1929) —Data are shown as differently colored sectors of a circle Characteristics of soils can be seen at a glance S S DE FINÁLY

**The soil microbiology of the lower Val di Cecina.** O VERONA AND A. DEL TREDICI *Boll ist super agrario Pisa* 6, 71–102(1930) —The chem analyses of the soils are reported Two new species of bacteria were found *B danielii* and *B flavum nonliquefaciens* The seasonal bacterial activity, in regard to N circulation, is studied; this activity is defined by (1) ammonification power (mg of $NH_3$ produced from 1 l of soil), which is max in summer (2) nitrification power (mg $HNO_3$ produced), (3) denitrification power (time, in hrs., necessary for the disappearance of nitrates in the soils), which is very low in winter, (4) N-fixation, which is greater in spring and lower in the subsoil G A BRAVO

**The microbiological activity of Hungarian alkali soils.** DÁNIEL FEHÉR AND REZSÖ BOKOR *Matematik es Természettudományi Értesitö* 47, 270–319 (in German 320–36) (1930) —The alkali soil of Püspökladány has a special microflora with many ray like organisms Soil should also be reclaimed biologically Liming influences quantitatively the compn of the microflora Young forests should be helped by conserving the moisture content of the soil on reforesting The sp microflora of stall manure cannot live in alkali soils Aerobic N fixing microörganisms generally are absent in alkali soils. Decompn of cellulose goes on very slowly Respiration and $CO_2$ production are almost normal Alkali soils contain little N, little nitrite and nitrate Soils contg *Achillea* assocd with *Inula britannica* contain most nitrate N, nursery soils contained very little nitrate N The content in N decreases in the lower layers, and also the no of nitrifying bacteria Nitrification was much faster in soils contg 0.2% $Na_2CO_3$ on the addn of $(NH_4)_2SO_4$ or on inoculation with bacteria The ammonifying capacity of alkali soils having no $Na_2CO_3$ or contg less than 0.03% total salt is excellent S S DE F

**Investigations on the protozoal fauna of forest soils.** DÁNIEL FEHÉR AND LAJOS VARGA *Matematik es Természettudományi Értesito* 46, 235–71 (in German 272–6)(1929), *Math Naturw Ber Ungarn* 37, 81–110(1930) —The protozoa consist for the most part of amebae Two maxima occur in the periodic changes of protozoa numbers, one in Nov and Dec and the other in the beginning of summer The maxima are probably caused by soil humidity No definite correlations can be observed between the life activities of soil bacteria and soil protozoa No large difference was found in the protozoa fauna of conifer forests and that of leafy forests Forest soils seem to contain fewer protozoa than do soils of gardens and fields S S DE FINÁLY

**Experiments on the biological activity of soil protozoa.** L. DE TELEGDY KOVÁTS *Kisérlet Közlemények* 31, 223–31(1928) —Daily changes in the numbers of amebae and bacteria in good garden soil were investigated The data check for Hungarian soils the theory of Russel and Hutchinson Protozoa seem to have a stimulating effect on *Azotobacter* cultures *Azotobacter* cultures vitiated with *Colpidium* and *Paramecium* fixed more N than pure ones S S DE FINÁLY

**Electrophoretic measurements of the root-nodule bacteria of Leguminosae.** F.

ZUCKER *Mezogazdasági Kutatások* 3, 49-68(1930).—Representatives of the alfalfa, red clover pea bean soy bean, cowpea and lupine groups were studied The effect of the degree of dilu of cell suspension was detd from the electrophoretic velocity Velocities of dild solns are higher than those of concd solns Velocity is influenced by the gum or slime and acid by products of organisms Variations of velocities of different strains of groups of bacteria never exceed 2 microns per sec if 22.5 v is used. Various strains of *B radiobacter* showed different velocities which average about the same as those of nodule bacteria S S DE FINÁLY

**The influence of combined nitrogen on growth and nitrogen fixation by Azotobacter.** JAMES L FULLER AND LEO I RETTGER *Soil Science* 31, 219-34(1931).—*Azotobacter* is able to fix substantial quantities of free atm N when cultivated in a medium free from fixed N and in an atm free from $NH_3$ and $HNO_3$ A study is made of the influence of a large no of nitrogenous org compns. upon the fixation of N In general the more complex org compns except peptone, are not actively attacked by *Azotobacter* while the simpler ones including the lower amino acids are readily utilized Where an abundance of combined N in suitable form is present, very little atm N is fixed M S ANDERSON

**The germination of wheat in alkaline and in acid media.** GY. EPERJESSY *Mezőgazdasági Kutatások* 1, 95-111(1928).—Wheat types grown on alk soils endure NaOH and $Na_2CO_3$ more readily than do those accustomed to neutral or acid soils. The latter endure acids more readily Small amounts are stimulating $NaHCO_3$ is more toxic than $Na_2CO_3$ in the same concn $H_2SO_4$ is more toxic than $H_3PO_4$. The toxic action of $Na_2CO_3$ can be decreased with $CaSO_4$ and humus addn S. S DE F.

**Studies on root growth of wheat types accustomed to alkaline and acid soils. Determination of osmotic pressures of wheat.** GY EPERJESSY *Mezőgazdasági Kutatások* 2, 481-93(1929).—Root growth is better in $Na_2CO_3$ or $NaHCO_3$ solns. if wheat types accustomed to alk. soils are used Wheat accustomed to acid soils prefers acid media The osmotic pressure of improved wheat equalled 39.5, that of unimproved wheat 29.5 S. S. DE FINÁLY

**Yields of crude and assimilable nutrients obtained from meadows mowed twice and three times, after various fertilizer treatments.** H JANTZON AND W. KIRSCH Hess *Arch Landw., Abt B, Tierernähr Tierzucht* 1, 166-78(1930).—Plots of meadow land were fertilized with N, K and P, alone, and combinations of all 3, at the beginning of the expt. and after each cutting Total yields and yields of all constituents except crude protein were larger from the plots mowed twice during the summer, although there was no appreciable difference in the yields of assimilable nutrients, calcd on a starch basis W GORDON ROSE

**Effects of various plant foods on growth activities and development of oats.** C. K. MCCLELLAND *J Am Soc Agron* 23, 304-11(1931).—Under the given exptl conditions P generally seemed most beneficial in increasing the no of tillers, the no of heads at harvest, the no of spikelets per head, the yield and the size of the seed of oats. It also exerted a marked influence in causing early tillering and growth and a quick shading of the ground. N acted very similar to P in its effect upon tillering, no of heads at harvest, no of spikelets per head and yield K exerted no influence, unless one of restriction, on no of tillers and no of heads per plant at harvest and upon yield. Combined with N and P, it increased the size of seed, but the latter elements exerted better influence on the wts per bushel and upon general growth and development. J R A.

**The study of the black cotton soil under different fertilizer treatments.** R. D. REGE *Proc 15th Indian Sci Cong* 1928, 50-1.—Plot culture experiments with jowar were conducted under various treatments Conclusions (1) The Rab process (burning of cow dung on the plot) is not suitable to the tracts with low rainfall It leads to rapid increase in the nitrification, but the crop growth is not correspondingly increased This treatment also decreases the colloid content of the soil, especially in the first 4 inches, but this result is only short lived (2) Safflower cake produces the best effect There is not only vigorous growth of the plants, but this treatment leads also to early flowering and seeding Water logging of these plots for 2-3 days does not produce any bad effect on the crop (3) Wt. for wt., the effect of karanj cake is less than half that of the safflower cake The N content of the karanj is also about half that of the safflower, and the difference in the plant growth may be attributed to this (4) $(NH_4)_2SO_4$ produces as good an effect as safflower if buffered well with lime (5) The bad effect of water logging of the control soil is not found to be due to either increased $CO_2$ content in the soil or decreased soil aeration The nitrification in the soil is very little E J C.

**Fertilizing with carbon dioxide.** GY EPERJESSY *Természettud Közlony* 62,

630–5(1930) —Expts carried out in Germany by Reinau are described
S S DE FINÁLY

**Potassium and phosphorus fertilizer experiments with barley in Hungary during 1929.** J SURÁNYI *Kisérlet Közlemények* 33, 402–12(1930) —Use of both gave good results on medium heavy soils
S S DE FINÁLY

**Experiments with potassium-phosphoric acid fertilizers on beet barley in 1928.** J SURÁNYI *Kisérlet Közlemények* 32, 239–50(1929) —The use of both K and $P_2O_5$ fertilizers gave good results on Hungarian barleys Not only the quantity but also the quality of the barley crop was better
S S DE FINÁLY

**Phosphate-containing artificial fertilizers with respect to their raw materials.** L. SOLT *Chem Rundschau Mitteleuropa u Balkan* 6, No 14, 68–9, 76–80(1929) —A general review
S S DE FINÁLY

**Behavior of Rhenania phosphate in the soil.** L. DWORÁK *Kisérlet Közlemények* 32, 439–42(1929) —The soly of Rhenania phosphate added to loam and to sandy soils did not show any decrease in 5 months
S S DE FINÁLY

**Determination of phosphoric acid content of Rhenania phosphate.** S TANGL BOGSCHNÉ *Kisérlet Közlemények* 33, 200–2(1930) $P_2O_5$ is dissolved in Petermann's soln, and phosphoric acid is detd with ammonium molybdate according to Lorenz
S S DE FINÁLY

**Superphosphate enriched with ammonia.** S I VOLFKOVICH, L E BERLIN, I L HOFMAN AND A A IONAS *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 556–69 (1930) —Two kinds of raw phosphate were tried out in the prepn of ammoniated superphosphate by the use of $H_2SO_4$ and the phosphates of ammonia From Portland phosphate with mono ammonium phosphate and $H_2SO_4$ a product was obtained contg 21% $P_2O_5$, with 16.5% available, and 10% N The amt of $H_2SO_4$ used was 15% above that required by the stoichiometric equations, and its strength was diluted to 40% by the use of a 26% soln of $NH_4H_2PO_4$ When a mixt of mono and di ammonium phosphates was used, the product contained 22% $P_2O_5$, with 18% available, and 3% N The $H_2SO_4$ was also 15% above the stoichiometric and was diluted to 35% with 26% $NH_4H_2PO_4$ With $(NH_4)_2HPO_4$ alone the product contained 23% $P_2O_5$, with 19% available, and 5% N. The $H_2SO_4$ was 10% above stoichiometric, and it was diluted to 25% with a 26% soln $(NH_4)_2HPO_4$ For the Saratov phosphates triammonium phosphate (in liquid form) with $H_2SO_4$ was used, and the product obtained was 22–23% $P_2O_5$, with 20.5% available, and 10% N The optimum conditions were 100 parts (by weight) of phosphate for 80 parts of $(NH_4)_2PO_4$, for each unit weight of $(NH_4)_2PO_4$ 0.5 part of 60 Bé $H_2SO_4$ was used besides what is necessary to convert the raw phosphate into superphosphate By using a satd soln of $(NH_4)_2PO_4$ the product contained 18% $P_2O_5$, with 17% available, and 5% N The reagents used, were 100 parts of phosphate, 160 parts of the satd soln with 0.74 part of 60 Bé $H_2SO_4$ for each part of $(NH_4)_2PO_4$ besides what is necessary for the production of ordinary superphosphate The best product from the standpoint of phys conditions was obtained by the use of the mixt. of mono- and di ammonium phosphate Production on a semi factory scale is under way with the mixts mentioned
J S JOFFE

**Some fermentation characteristics of various strains of Rhizobium meliloti and Rhizobium japonicum.** R H WALKER AND P E BROWN. *Soil Science* 30, 219–29 (1930) —A study was made of the fermentative characteristics of 23 strains of *Rhizobium japonicum*. These organisms were grown in yeast water glucose and yeast water-galactose media The change in H ion concn was taken as a measure of fermentative ability The fermentative ability of a particular strain is comparatively const. *Different strains, however, show wide differences in fermentative ability.* Some strains of *meliloti* produced a distinctly alk reaction in the media, while others produced considerable acidity in media of the same compn The *japonicum* strains, as a rule, produced more alky than did the *meliloti* strains The *meliloti* strains fermented glucose and galactose with about the same results, while the *japonicum* showed more differences in this respect. The results indicate that fermentation tests under the condition followed would not serve to give a distinct sepn of these 2 species of legume bacteria
M S. ANDERSON

**Fermentations in a heterogeneous and discontinuous medium.** A. DEMOLON AND G BARBIER *Compt rend* 192, 514–5(1931) —In a sandy soil diffusion and migration are easy, but in a medium contg siliceous clay these phenomena are depressed
T. H RIDER

**A comparison of some nodule-forming and non-nodule-forming legumes for green manuring.** LEWIS T. LEONARD AND H R. REED *Soil Science* 30, 231–6(1930) — Legumes not bearing nodules are compared with legumes bearing nodules in green

manuring expts The indicator crops grown after plowing under the legumes show no decided difference in these 2 types of legumes as affecting total N, dry wt. and height
M S ANDERSON

Amount of manure necessary for vegetable growing F K CRANDALL AND T. E ODLAND Rhode Island Agr Expt Sta., *Bull* 225, 5–31(1930).—Field expts. conducted for 5 years included early beets spinach, carrots cauliflower and eggplants fertilized with various combinations of stable manure, green manure crops and com fertilizers Eggplants and cauliflower showed the greatest response to N, carrots were little affected. Spinach and cauliflower showed the greatest response to P Manure contg shavings was practically as effective as manure contg straw Manure increased crop yields when even moderate treatments of com fertilizers were used It is possible to substitute green manure and com fertilizer for a considerable part of the stable manure which is ordinarily applied to vegetable crops C R. FELLERS

Nitrogen loss and action of cold and hot manures. H. D MEYER, P OBST, F WILCZEWSKI AND W DIETRICH *Z Pflanzenernähr., Düngung u Bodenk* 10B, 121–36(1931) cf *Deut landw Presse* 56, 629–43(1929).—Cow manure solidly packed in tight pits was little changed in appearance and had a slight $NH_3$ odor when removed 4 months later Loosely packed manure was well rotted and without $NH_3$ odor The temp rose to 30° in the former case and to 55° in the latter case in 6 days Losses in dry matter and total N were 10 1 and 7.5% for cold and 9 1 and 15 1% for hot fermentation, resp Pot and plot expts did not furnish any conclusive evidence of superiority for manure stored by either method The relative value of different methods for storing manure can be detd only by long-continued field expts on a considerable scale C J SCHOLLENBERGER

The chemistry of artificial manure making and materials used. F ZUCKER AND L. DE TELEGDY KOVÁTS *Mezogazdasági Kutatások* 3, 198–205(1930).—Substances giving a slightly alk. reaction should be applied The conditions prescribed by Krantz for "Edelmist" manuf should be followed in order to obtain a well rotted stall manure
S. S DE FINÁLY

New experimental data on the composition of straw manures. L DE TELEGDY KOVÁTS. *Mezogazdasági Kutatások* 3, 243–50(1930).—The feasibility of artificial manure production was proved by expts. on a larger scale The principles of Krantz should be followed. Loss of N was 21%, that of $P_2O_5$ 14 7% and that of $K_2O$ 1 7% Artificial straw manure contained 4 4 1 7% N, 2 9–0.5% $P_2O_5$ and 2 1–0 6% $K_2O$
S S DE FINÁLY

Artificial stall manure. J BOCSÓ *Kiserlet Közlemények* 33, 1–15(1930).—Production of fertilizer from straw, cornstalks, leaves, etc. should be undertaken at first by aerobic fermentation, and later air must be shut off Natural manure should be mixed with the lower layers or natural manure juice should be sprayed on to inoculate the matter with bacteria. S S DE FINÁLY

Manufacture of artificial stall manure from straw. L DE TELEGDY KOVÁTS *Kiserlet Kozlemenyek* 31, 347–72(1928).—Straw was fermentated under aerobic conditions with addn. of (1) Adco powder, (2) a mixt. of nutrient salts and (3) P compds. and dung water The product in each case was similar to natural manure Anaerobic fermentation was not so effective As for biol factors, multiplication of thermophilic bacteria is the first stage, then follow molds and later bacteria. S S DE FINÁLY

Manufacture of artificial manure from peat. L KOTZMANN *Mezogazdasági Kutatások* 3, 334–8(1930).—The acid reaction of peat was neutralized with $CaCO_3$ and the mixt. was inoculated with natural stall manure $CaCN_2$ was added as nutrient, in quantity corresponding to 0 7% of the org dry matter content. The product after 4 months had better action in field expts than did natural manure. Loss of N amounted to 12%, that of $P_2O_5$ 3 1% and that of $K_2O$ 2 1% S S DE FINÁLY

Practical method of manufacturing "Edelmist". H GLATHE *Mezogazdasági Kutatások* 3, 376–9(1930).—Detailed prescription of method. S S DE FINÁLY

Spreading of "Edelmist" manufacture in Germany and observations on the quality of the product. H. GLATHE *Mezogazdasági Kutatások* 3, 463–9(1930).—Edelmist should be in piles for at least 3 months It contains more total N than does natural manure, and its $NH_3$ content is also higher than its content of water-sol. N Frequent moistening of completed stocks of Edelmist proved to be of great value.
S S. DE FINÁLY

Complete weed-eradicating fertilizers. JEAN DETERRE *Engrais* 46, 47–9 (1931).—A review is given of the work of Jaguenaud (*C A* 25, 1322) on complete weed-eradicating fertilizers, their use and advantages are stressed. J R. ADAMS

A review of methods for the evaluation of pyrethrum. C B Gnadinger *Soap* 7, 97–101, 117(1931) E. J. C.

The use of coal-tar products in spraying fruit trees. F Proffi *Zentr Bakt. Parasitenk*, Abt II, 83, 127–64(1931) John T. Myers

Pear mealy bugs and results of experiments for their control. F W Pettey and C J Joubert Union S Africa Dept Agr., *Sci Bull* 95, 23 pp (1930). cf. *C. A* 24, 5417.—Oil sprays give the best control of pear mealy bugs (*Pseudococcus maritimus* and *P gahani*) No more than 1 application of the usual winter spray of a dil'n contg about 4% actual oil of specifications ranging from 50 to 70% unsulfonatable residue and about 110 sec Saybolt viscosity can be applied with safety to pear trees in S African conditions Modern proprietary winter oil (petroleum oil) sprays generally possess these specifications No more than 2 or 3 summer oil sprays of a dil'n contg 0.8% actual oil with a max of 65 to 70 sec Saybolt viscosity and a min of 85% un sulfonatable residue should be applied, with or without nicotine sulfate or Pb arsenate, to pear trees in foliage until repeated tests over a no of years prove that the trees will tolerate more K D Jacob

Experiments with new methods for the control of codling moth in western districts of the Cape Province. I W Pettey and M C Mossop Union S Africa Dept Agr., *Sci Bull* 96, 50 pp (1930). cf *C A* 24, 2228, 3506.—The Reinette du Canada and Newtown varieties of apples are particularly susceptible to injury from repeated applications of 1% medium or light summer oil sprays Addn of summer oil to Pb arsenate sprays, particularly the heavier grades, retards somewhat the removal of the As spray residue, but this difficulty is minimized if Ca caseinate spreader is used and the oil-arsenate spray is applied at least 6 weeks before the fruit is harvested An artificial *cryolite*, used at the rate of 2 lb with 0.25 pint of fish oil in 40 gallons of water, applied through the season at intervals of 3 weeks, gave better results in codling moth control than a similar normal program of Pb arsenate only and seemed to have considerable effect in controlling mealy bugs on Kieffer pears Certain samples of cryolite caused severe foliage burning, while others did little damage Cu cyanide, 1 lb in 40 gallons, controlled the codling moth as well as Pb arsenate, but caused russetting of the pears A 7–10% soln of crude molasses, with or without the addn of yeast, was a satisfactory bait for use in codling moth traps Extensive data on the results of the investigations are tabulated K D Jacob

A preliminary note on the successful treatment of the jasmine bug (Antestia cruciata) by dusting calcium cyanide. Ramachandra Rao *Proc 15th Indian Sci Cong* 1928, 51–2.—Dusting with $Ca(CN)_2$ was found to have the effect of stupefying the bugs on the bushes and bringing them to the ground As a certain proportion of the bugs generally revived within a short time, these had to be hand-picked and destroyed by dropping them in kerosenated water E. J. C.

The onion maggot (Hylemyia antiqua) in Ohio, 1929. M P Jones *J Econ Entomol* 23, 394–8(1930).—This is a demonstration control project with Bordeaux-petroleum oil emulsion and com oil emulsions against the onion maggot About 45% increase in onion yield due to the spray is claimed An ingenious combination power sprayer and cultivator for onions is described C H. Richardson

Ecology of the microbe causing brown spots on tobacco leaves. A Gulyás *Kisérlet Közlemények* 33, 279–302(1930).—Spots are caused by an organism called *Alternaria brassicae* var *tabaci* by Preissecker Methods of prevention consist of treating seeds with a 0.2% soln of Germisan or a 0.25% soln., of Uspulum Plants in the warm beds should be sprayed weekly with 0.5–1% Bordeaux soln., and soil of warm beds must be disinfected with $CH_2O$ 3 weeks before sowing Ten to 12.5% $CH_2O$ soln should be used on 1 sq m area Soil should contain as much lime as required to show alk reaction S S. de Finály

Beet infections with Cercospora beticola Sacc. A Cierzanowski *Spisek vydany nákladem Rady Naczelnej Polskiego Przemyslu Cukrowniczego* 1927; *Listy Cukrovar* 49, No 22, *Rozhledy* 14.—*Cercospora beticola* occur sporadically decennially. Early beets were more subject to infection than later ones Plots of beets on which legumes were harvested previously were highly resistant to infection because of the high porosity and N content of the soil Fertilizing the beets with 0.3 of the annual $NaNO_3$ fertilizer during July, and fertilizing with P increased the resistance of the beets to infection Artificially infected or poorly developed seeds showed a greater incidence of infection in the field growths than did the controls C recommends soaking the beet seeds in dil HCHO before planting Frank Maresh

Influence of seed-preserving agents on the germinating activity. Árpád Szücs *Mezögazdasági Kulatások* 4, 24–8(1931).—$CuSO_4$ had a very bad influence on germi

nation activity Lime added to $CuSO_4$ decreased this influence $CuSO_4$ heated to dust and used as a powder had almost no bad influences on germination Its seed preserving action was quite good S S DE FINÁLY

Increase of action of copper salt solutions used as seed preservatives. S TERÉNYI *Chem Rundschau Mitteleuropa u Balkan* [16], 8, 1-3(1931) —The effective dosage is diminished to 25 80% of original value if Hg salts are added to Cu salts, *e g*, 0 25% $Cu(NO_3)_2$ and 0 005% $HgBr_2$ S S DE FINÁLY

Laboratory examination of "Germisan-Kurzbeizverfahren." SÁNDOR TERÉNYI *Kiserlet Kozlemenyek* 31, 332 5(1928) —The germinating power of wheat was not influenced by 0 5 0 75 1 and 1 5% solns of Germisan in the ratio of 6, 4, 3 and 2 l to 100 kg wheat Germisan killed the spores of wheat not very strongly infected (not more than 0 1% spores) quite well Field expts are under way S S DE F

Investigations on the seed-preserving influence of copper sulfate-mercuric chloride mixtures D RÉVY AND J TETIDEL *Kiserlet Kozlemények* 32, 299-304(1929) — The addn of $HgCl_2$ (equiv to 0 3 2 8% Hg) increased the influence of $CuSO_4$ in lengthening the period during which germination is possible The insecticidal and germicidal action will be investigated later S S DE FINÁLY

Sodium chlorate as a herbicide. ALBERT A HANSEN *Proc Indiana Acad Sci* 38, 139-42(1929) —$NaClO_3$ had previously been used to kill Canada thistle, field bindweed (*Convolvulus arvensis*) and quack grass The $NaClO_3$ is successfully used as a herbicide for poison ivy, buck brush (*Symphoricarpos symphoricarpos* L) and purple barberry (*Berberis vulgaris* L) Salt is applied in soln contg 1 lb per gallon The danger from fire is not great if proper precautions are taken H M STARK

Waste gas-cleaning material as weed destroyer ANON *Chem -Ztg* 55, 190-1 (1931) —Waste $NaClO_3$ from dye works has been used as a weed destroyer but is inconvenient because it must be spread at least twice a year The waste material from gas-cleaning plants contains a thiocyanate, which dissolves in rain water and penetrates the roots of the weeds The present price of $3 75 per ton is prohibitive, however CURTIS L WILSON

Prickly pear and its eradication. C R VAN DER MERWE Union S Africa Dept Agr, *Sci Bull* 93, 32 pp (1931) —Spraying with a soln of 3 lb $As_2O_3$ in 1 gallon of water kills all the young growth on old prickly pear trees and also trees up to approx 3 years old Spraying with a soln of 2 lb $As_2O_3$ in 1 gallon of water kills all of the above ground portion of the jointed cactus (*Opuntia aurantiaca*) but does not kill the underground bulbs or tubers Addn of NaCl to the sprays apparently has no effect on the results K D JACOB

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Determination of H ion concentration in soil examinations (HATOS, GOLL) 2. The effect of fertilization on the odor and flavor of cigar tobacco (COOLHAAS) 17. Chemical transformations caused by the decomposition of vegetable wastes (VINASSA DE REGNY) 8 Rotenone, the effective constituent of derris root (TAKEI, *et al*) 10. Artificial silk [by product fertilizer] (Ger pat 517,747) 23. Preserving bone material (Brit pat 340,010) 29.

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Agriculture and Live-Stock in India (*New journal*) Published bi monthly by the Imperial Council of Agricultural Research, Govt of India Central Publication Branch, P O Box 2078 Calcutta Vol 1, No 1 appeared Jan, 1931 Price, Rs 6 or 9s 9d per year

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Device for estimating the acidity of the soil. FRANZ SCHNURPFEIL and ALFONS FREISLEBEN Ger 519 368, Oct 6 1929

Fertilizers ARMOUR FERTILIZER WORKS Brit 340,120, Dec 11, 1928 Liquid anhyd $NH_3$ is added to fertilizer materials or mixts, at least one of which is acidic, in sufficient quantity substantially to neutralize the free acid of the materials This treatment *e g*, may be applied to a mixt of superphosphate, KCl or $K_2SO_4$, $(NH_4)_2SO_4$ and $NaNO_3$, with or without addn of org materials such as tankage or cottonseed meal Cf *C A* 24, 2538

Fertilizers. ODDA SMELTEVERK AKTIESELSKABET and E JOHNSON Brit 339,969, Nov 24, 1928 Compd fertilizers are obtained in processes in which the mother liquor, obtained after the crystn of $Ca(NO_3)_2$ from a soln of phosphate rock in $HNO_3$

as described in Brit 330,340 (C. A. 25, 2314), is neutralized with or caused to react with $NH_3$, urea, cyanamide or cyanamide salts such as Ca cyanamide, inorg. phosphates, compds. of $NH_3$ and $CO_2$, alkali carbonates, etc., so that after removal of water from the product a dry stable fertilizer is obtained. Other fertilizing substances may be added, and various details of procedure, app. used, etc., are given.

**Fertilizers.** Hubert Wittek. Ger. 517,503, Sept. 10, 1925. A non-corrosive non-powdering lime-nitrogen fertilizer is prepd. by forming an aq. soln. of the lime-nitrogen and then adding clear neutral oil while heating, or as vapor. The PhOH- and base-free fraction going over between 180–300° in a stone coal distn. is mentioned as a suitable oil.

**Fertilizers.** Gustav Hilger. Ger. 517,537, Jan. 15, 1928. App. for directly azotizing heated $CaC_2$ to produce CaNCN is described.

**Fertilizer.** Maschinenbau A.-G. vormals Buckau & Henkel. Ger. 517,551, Feb. 18, 1930. App. for working up animal matter such as flesh and bone is described.

**Fertilizer.** Firma Rudolf A. Hartmann. Ger. 517,970, Nov. 3, 1926. Animal, fish etc., waste is extd. with steam and the ext. pptd. with metal salts such as $Al_2(SO_4)_3$, $Fe_2(SO_4)_3$, etc., or quebrachotol or tanning ext. The product is used as a fertilizer.

**Fertilizer.** Emil Collet. Fr. 697,270, June 12, 1930. A granular fertilizer contg. $NH_4NO_3$ which retains its powd. state during storing is made by adding $CaCO_3$ or other non hygroscopic substance to the molten fertilizer, then adding a less amt. in powd. form to the granulated fertilizer.

**Fertilizers.** I. G. Farbenind. A.-G. Fr. 696,000, May 21, 1930. A fertilizer contg. urea and $Ca(NO_3)_2$ is made by melting or fritting together the components almost or completely free from water. A rotating furnace may be used.

**Fertilizers.** I. G. Farbenind. A.-G. Fr. 697,153, June 7, 1930. A salt contg. $(NH_4)_2SO_4$ and $NH_4NO_3$ in the mol. ratio of about 1 to 3 is crystd. and afterward mixed with addnl. substances to prevent the particles agglutinating, such as kieselguhr, KCl, $(NH_4)_2HPO_4$ or $(NH_4)_2SO_4$.

**Fertilizers.** Soc. d'Etudes chim. pour l'Ind. Fr. 696,874, June 10, 1930. K salts are intimately mixed with phosphates and the mixt. treated with suitable amts. of dil. mineral acids, such as $HNO_3$ or $H_3PO_4$. Cf. C. A. 25, 707.

**Fertilizers.** Soc. Vilain Frères. Fr. 696,900, April 11, 1930. Concd. Mg fertilizers are made by calcining to redness giobertite and like natural carbonates of Mg and then treating with an acid such as $HNO_3$, HCl, $H_2SO_4$ or $H_3PO_4$. Cf. C. A. 25, 1325.

**Fertilizers.** Soc. Vilain Frères. Fr. 697,067, June 3, 1930. A fertilizer is prepd. by the reaction of $H_3PO_4$ on MgO until complete soln. in an excess of $H_3PO_4$ is obtained, and then $NH_3$ is added until the excess of $H_3PO_4$ is neutralized. The clear liquid is decanted from the ppt. formed and used again. Fr. 697,068 describes the prepn. of a fertilizer by adding to the usual reagents for the prepn. of superphosphates MgO and $NH_3$, if desired in the form of a double sulfate, or MgO or a salt of Mg alone may be added. Cf. C. A. 24, 4116.

**Plant preservation.** Tesch & Stabenow Internationale Gas- für Schädlingsbekämpfung m. b. H. Ger. 517,632, Apr. 5, 1930. To avoid the risk of poisoning the plants themselves when using alkylene oxide-contg. gases as insecticides, fungicides, etc., these gases are brought into contact with a heat source to convert the alkylene oxide into aldehyde. Steam may also be formed by the heat source for mixing with the aldehydes.

**Insectifuges and insecticides.** Schering Kahlbaum A.-G. (Herbert Schotte and Karl Görnitz, inventors). Ger. 520,330, Nov. 15, 1925. Esters of thiocyanic acid are used, with or without the usual addns.

**Insecticides, etc.** Deutsche Gold- und Silber Scheideanstalt vormals Roessler. Ger. 517,631, July 21, 1925. Insecticides, etc., prepns. consisting mainly of HCN, have a sufficient amt. of chloropicrin present to ensure a warning odor.

**Insecticides.** Röhm & Haas Co. Fr. 696,326, May 30, 1930. An insecticide is composed of an aliphatic mono-thiocyanate, the org. group of which contains one or more neg. groups. Examples are given of the use of monothiocyanate of the mono-ethylether and the monobutylether of diethyleneglycol, the first in water and the second in kerosene. Other products are referred to.

**Insecticide, etc.** Arpad de Wiczwinsky. Fr. 695,393, May 10, 1930. Hydrogenation products of pyridine and its homologs, particularly piperidine, are used for the destruction of insects. Fr. 695,391 describes the use of furfurol or substances liberating furfurol in the organism such as furfuramide or the bisulfite compd. for destroying rodents.

**Insecticide.** Wm. Moore (to American Cyanamid Co.). U. S. 1,707,877, March

24 An insecticide which is suitable for killing plant lice comprises trimethyl chloroethyl ammonium chloride (suitably used as a spray with various other substances)

Fungicides for seeds. Chem Fab Ludwig Meyer Ger 521,235, June 28, 1925 The activity of known fungicides is enhanced by addn of a small quantity of I or its compds Cf *C A* 24, 5928

Fungicides for seeds. I G Farbenind A.-G (Max Bockmühl and Walter Persch, inventors) Ger 519,270, Apr 17, 1928 The addn. compds of Hg salts with aromatic compds having an unsatd side chain are used Suitable compds are obtainable from $Hg(OAc)_2$ or $HgCl_2$ and allyl phenols or *p* nitrophenyl allyl ether Cf *C A* 25, 1626

Fungicides for seeds I G Farbenind A G (Max Bockmühl, Walter Persch, Kaspar Haff and Robert Kramer, inventors) Ger 519,488, Apr 8, 1928 Mercurized thiophene and its homologs are used, *e g*, α thiophene mercury acetate

Destroying leaf-cutting ants Meinhard Jacoby Ger 516,595, Mar 23, 1929 A prepn giving off a gaseous or vaporous poison is used The example mentions a mixt of KCN, $NaHSO_4$ and water, acrolein or $H_2S$ may be added

Weed killer Chemische Fabrik Ludwig Meyer Fr 695,572, May 14, 1930 A weed killer is composed of a mixt of $CuSO_4$ with an alkali chloride or nitrate

## 16—THE FERMENTATION INDUSTRIES

C N Frey

František Duchâček. Jan Satava *Chem Listy* 25, 97–101(1931).—A short biography and bibliography of D 's contributions to fermentation are given P. M

Actualities and progress in the distilling industries. Emerich Stein *Chem Listy* 25, 128–35(1931).—The application of lab methods to distg industries, especially to those of Slovakia, is discussed Frank Maresh

Monograph and analyses of principal alcoholic extracts produced in this country (Mexico). Eugenio Alvarez *Rev quím* 6, No 8, 7–20(1931).—A states that there are many alc exts being manufactured by old and new methods The treatment of maguey by heating and pressing of the stalks and fermentation and distn of the juices is typical and is given in detail Other sources in addn to maguey are given The chemistry of the processes to which the juices are subjected is discussed The phys properties of the finished liquors, the *pharmaceutical uses* and the *chem analyses* are given John M Ladino

Continuous fermentation in the production of lactic acid. F O Whittier and L A Rogers *Ind Eng Chem* 23, 532–4(1931).—A method for continuous lactic acid fermentations of the lactose of sweet whey has been developed in the lab and has been adapted to commercial operation The use of a lactobacillus and a mycoderm gave a yield of 90% of the theoretical based on the lactose originally present C N Frey

The cause of the low yields of alcohol in the fermentation of Formosan cane molasses. I. N Taketomi and S Hanamura *J Soc Chem Ind, Japan* 30, 390–5 (1927), *Mem Faculty Sci Eng, Waseda Univ* 1930, No 7, 129.—Low yields of alc from the fermentation of Formosan molasses are attributed to an insufficient N supply for the growing yeast The yield of alc was increased from 82–83% to 97–98% of the theoretical yield by adding 0 1 g of $(NH_4)_2SO_4$ or $(NH_4)_2PO_4$ to 100 cc of the liquid to be fermented II N Taketomi and S Aritake *Ibid* 31, 856–60(1928), *Mem Faculty Sci Eng, Waseda Univ* 1930, No 7, 130–1.—The low yield of alc in the fermentation of Formosan molasses is due principally to the presence of glutose, which has reducing properties, and in some cases it is also due to the insufficiency of nitrogenous nutriment for the yeast L W T Cummings

Losses of water-soluble phosphoric acid by the clarification of molasses under acid conditions and heat. II. O Hummer *Brennerei Ztg* 47, 169(1930), cf *C A* 25, 1629.—The influence of the acidity of molasses upon the losses of $P_2O_5$ is described S J

Experiments with sprouting and regular rye of 1930 crop Staiger *Brennerei-Ztg* 48, 13(1931).—S shows that rye which sprouted slightly because of the weather conditions during harvesting could be processed in distilleries without malt S J

Use of corn sirup in the spirit industry. C Luckow *Brennerei Ztg* 48, 16–7 (1931) S J

Quality of Hungarian hops of 1929 crop I Iványi *Kísérlet Közlemények* 33,

238–9(1930).—Averages for 36 samples of hops are: water 7.20, ash 8.67, α-resin 3.42, β-resin 8.84, γ-resin 2.49 and bitter acids 12.26%. S. S. DE FINALY

Resin content and antiseptic value of Hungarian hops. I. IVÁNY. *Kísérlet. Közlemények* 32, 327–40(1929).—Average values for the 1928 crop are: water 6.55, ash 7.89, α-resin 4.12, β-resin 8.66, γ-resin 2.74 and bitter acids 12.78%. S. S. DE F.

Physicochemical investigation on the coloring materials of grapes and red wines. L. CASALE. *Ann. chim. applicata* 20, 559–66(1930).—The various colors in grapes and red wines are related to the $p_H$ value of the liquid, the coloring materials (enins) are amphoteric, the isoelec. pt. for the chloride is between $p_H$ 5.4 and 5.8. A. W. C.

Apparatus for the determination of fixed acidity in wines. P. BRUÈRE. *J. pharm. chim.* [8] 13, 77–81(1931).—Into a conical flask used as a steam generator, a test tube barely touching the surface of the water is fitted through a stopper. Through it another tube (*a*, connected with *b* inside the test tube) passes, conducting steam into the test tube through a stopper. The stopper also carries an exit tube bent at a right angle. Tube *a* has a lateral safety tube, and the end of *b* barely dips below the surface of the wine (5 cc.) put into the test tube, so as to avoid excessive foaming after the alc. is removed. The volatile acids are expelled after 25 min. heating, and the vol. is about doubled. The fixed acid is then detd. by phthaleinoscopy (cf. *C. A.* 24, 3193). Lactic acid (1.8 g. per l.) proved non-volatile since the blue color of water produced by 10 drops bromocresol green (0.04 g. per 100 cc. H₂O-alc., Clark) was not affected by vapors passing through it. With AcOH vapors, the color soon changed to green, then yellow. S. WALDBOTT

Determination of carbon dioxide in beer. J. BLOM AND B. KRAUSE. *Wochschr. Brau.* 47, 471–3(1930).—$CO_2$ is fixed by adding a 50% soln. of NaOH. An aliquot part is then acidified with $H_2SO_4$ to liberate the gas, which is carried by a current of air (free of $CO_2$) into 0.1 *N* $Ba(OH)_2$. The excess of $Ba(OH)_2$ is then detd. by titration. The method is described for taking samples from cask and bottle beer. The device used consists of a 10-cc. pipet with a suitable connection to a compressed air container, a tap and a steel point. A soft rubber stopper and clamp to hold the borer in position are auxiliary equipment. S. J.

The protein in beer. I. Kinds of nitrogenous substances in beer. S. AYAI. *J. Soc. Chem. Ind., Japan* 34, Suppl. binding, 72–4(1931).—Expts. were conducted to det. the amt. of total N (crude protein), protein and non-protein N in light-colored 2 months old and 2½-months old beer. Methods for each detn. are given. It was found that on aging the coagulative N and albumose N increased slightly, the peptone and amino N decreased. The amide N increased slightly. The peptone and polypeptide N comprise 40–43% of total N, albumose 24–27%, coagulative protein 15–17%, amide 9–10% and amino N 5–10%, calcd. as glycocoll. C. N. FREY

Composition of slop char. W. KILP. *Brennerei Ztg.* 47, 2–3(1930).—The compn. of slop char varies according to the compn. of molasses, the manner of processing and the method of combustion. Three different slop chars were analyzed and the $K_2O$ content was detd. Various results were found: 46–47 (beet molasses), 20.5 (cane molasses, yellow char), 15.5 (cane molasses, black char), expressed in percentages. S. J.

Phosphatide (lecithin) content of compressed yeast. DREWS. *Brennerei-Ztg.* 47, 210(1930).—Two yeast samples (74.5 and 69.4% moisture) were extd. with alc. Alc. exts. of 6.26 and 10.17% were obtained with a P content of 2.38 and 2.44, resp., corresponding to 60–62% phosphatides. Phosphatides of 60–62% purity were easily obtained without recrystn. The yeast is emphasized as a source of phosphatides. S. J.

Yeast fermentation. A consideration of the truth of the Arndt-Schulz rule. H. DANNENBERG. *Klin. Wochschr.* 10, 211–21(1931).—Quinine, phenol and $HgCl_2$ do not accelerate fermentation by yeast. H. EAGLE

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Manufacture of alcoholic motor fuel (DIETRICH) 21. Purification of brewery sewage by the activated sludge process (ALI) 14.

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Fermentation processes. DEUTSCHE HYDRIERWERKE A.-G. Fr. 698,035, May 31, 1930. In biochem. transformations by means of bacteria, e. g., the production of higher alcs. or org. acids, a preliminary fermentation is carried out in worts strongly diluted and with the addn. of an inoculating substance which may be already cultivated on carrier layers. The concn. of the wort is gradually increased by the addn. of worts of high concn. as soon as the fermentation process has reached its greatest intensity.

Fr 698,030 describes a fermentation process in which a bacteria culture is added to the wort at the culminating point of its physiol activity, the wort being poor in nutrients and adverse to the propagation of cells

**Alcohol** Soc anon des distilleries des Deux Sèvres Fr 696,775, Aug 1, 1929 Alc of a concn higher than that of the azeotropic alc water mixt is obtained directly from fermented wort or dil alc by combination of the ordinary continuous distn with a method using the principles of azeotropism The heat contained in the vapors from that part of the app where concn of the alc takes place is transmitted wholly and directly by the vapors to that part of the process where the operation is being carried out in the presence of a third substance, and alc of a concn higher than that of the azeotropic alc water mixt is obtained at a point where normally abs alc would be obtained if the transmission of heat was by means of a heat exchanger The alc obtained is afterward completely dehydrated by known means

**Purifying alcohol** Firma F Merck Fr 696,882, Jan 18, 1930 Crude alc is purified and dehydrated simultaneously by an azeotropic distn, with or without pressure No purification or elimination of impurities takes place between the dehydration of the crude alc and the rectification of the alc sepd from the product of the azeotropic distn except a sepn by decantation from the entraining liquid

**Making butyl alcohol and acetone by fermentation** Commercial Solvents Corp Ger 520,383, May 14, 1927 See U S 1,668,814 (*C A* 22, 2235)

**Acetone** Holzverkohlungs Industrie A G Fr 696,233, May 28, 1930 In the manuf of acetone by the action of steam on Ca acetate at high temps in the presence of catalysts such as O compds of heavy metals, the mixt of vapors liberated during the distn of worts is used directly or after sepn of impurities of high b p for the ketonization operation A suitable app is described Cf *C A* 23, 3235

**Tartaric compounds** André Montoussé Fr 697,179, June 10, 1930 Tartaric compds are extd from vinasses, which contain them for the greater part in the form of K bitartrate The vinasses are boiled in a certain amt of mother liquor, distilled and diluted and the remaining mass is poured into a fresh amt of mother liquor The temp is raised sufficiently to maintain the bitartrate in soln, while the insol compds are pptd The liquid is then decanted and crystd The mother liquor is neutralized for the following operation

**Distilling sulfite liquor spirit.** Zellstoffabrik Waldhof and Max Gade Ger 519,245, Apr 25, 1929 The first runnings, which contain the aldehyde fraction, are continuously or periodically returned to the vats in which a fresh wort is fermenting or is to be fermented The spirit obtained from a wort to which the first runnings have been added contains only the normal amt of aldehyde, the aldehyde in the runnings being eliminated in the fermentation

**Dealcoholizing wines, etc.** Marc G Coupeau and André L F Cornillac. Fr 696,773, Aug 16, 1929 Wines and other fermented fruit juices are dealcoholized by the Charentais process but at a low temp under high vacuum to cause no alteration of the various constituents and by fractional distn to collect separately the head and tail runnings, which are afterwards reincorporated in the liquid to the desired degree An app is described

**Wine and spirits.** Friedrich Faerber Ger 516,547, Oct 21, 1928. App for purifying mash is described

**Metal vat for wine, etc., fermentation processes.** Louis Granges Ger 516,549, July 19, 1927

**Filter plug for passing purified air and sulfur dioxide into wine casks.** K. Prillinger Brit 339,761, Nov 18, 1929 Filtering layers may comprise sponge impregnated with salicylic acid and $KMnO_4$ solns and wadding also impregnated with the same substances Various structural details are described

**Beers poor in alcohol.** Albrecht Haselbach Fr 695,591, May 14, 1930 Use is *made of a wort with almost double the usual amt of hops When fermentation is com*plete starch sirup, "capillaire" or bonbon sirup may be added

**Hops.** Gottfried Jakob Ger 516,548, Jan 23, 1929 Hops are first extd to give a tannin ext which is used in the manuf of mash or as a sprinkling agent The extd hops are then worked up with clear wort in the usual way By this method, the max use is made of the hop constituents

**Air heater for drying hops, etc** Vivian Elkington Ger 520,372, Nov 9, 1927 Corresponds to Brit. 285,153

**Yeast.** Aktiebolaget Separator Fr 696,094, May 26, 1930 Wort charged with yeast prepd in the usual manner is treated in a centrifuge with continuous evacua-

tion of the wort and of the yeast, which is again centrifuged in a bowl of comparatively large diam until relatively dry

Apparatus for washing yeast. Ernst Müller Ger 521,274, Sept. 27, 1928.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. Emery

The stabilization of medicinal wines. Domingos de Barros *Bol assoc brasil pharm* 11, 36–8(1930) Medicinal wines which are perfectly clear when freshly prepd often become turbid on standing because of the pptn of substances which remained in the supersatd soln To avoid this pptn it is advised to prep the wines by extg the vege table drugs with the wine itself as the solvent instead of using a stronger alc medium followed by dilu C. Abeledo

Researches on the combustibility of tobacco. IV. The combustibility in relation to the chemical composition of the leaves. R. Nuccorini (with G. Menna) *Boll ist super agrario Pisa* 6, 263–99(1930) In previous papers (*Ibid* 5, 401, 521 and 599 (1929)) an *app* for the detn of the combustibility of the various types of tobacco was proposed, and this value was studied in relation to the place of the leaves on the tree, and the soil fertilization In the present expts the leaves of Kentucky tobacco (cultivated near Pisa) were analyzed and it was found that the easily combustible leaves contained higher quantities of amide N citric, oxalic and pectic acids and $Fe_2O_3$, while those having lower burning capacity contained higher quantities of nitric, ammoniacal and nicotinic N, sugars, pentosans, fats and waxes. Na O, MgO, Cl, $SiO_2$, $SO_3$ and $P_2O_5$ There is no difference between the relative contents of CaO, $K_2O$ and malic acid G. A. Bravo

Preparation of extractum hydrastis fluidum and methods of analysis. Z. Csipke *Magyar Gyógyszerésztud Társaság Értesitoje* 5, 73–85(1929) —A report on the known methods of prepn and on the official detn of the alkaloid content in the drug and the ext. B. C. A.

Two types of arsphenamine. Reuben L. Larsen *Am. J. Syphilis* 15, 50–7 (1931) —Not only chem., phys and biological tests, but clinical reports indicate that 2 types of arsphenamine are made, a methylated and a nonmethylated type. Clinical reports check the biological tests in assigning more toxicity to the methylated than to the nonmethylated type. B. C. Brunstetter

Isolation of anonaine from Anona squamosa Linn. Feliciana R. Reyes and Alfredo C. Santos *Philippine J. Sci* 44, 409–10(1931) —The seeds of *Anona squamosa* Linn., commonly known as "ates," are used to kill parasites of the human body, especially lice The active principle is a base first isolated by Trimourti (*C. A.* 19, 656). In the present paper it is shown to be identical with *anonaine* obtained from other sources (*C. A.* 25, 705) The powdered seeds (1.8 kg.) yielded 0.258 g. of the base, m. 122–3°, by the method of extn previously described. *Hydrochloride* m. 287–8° (decompn.), *chloroplatinate* m. 248.5° (decompn.) Alfred Burger

The constituents of Sweertia chirata. A. Janaki Ram *Proc 15th Indian Sci. Congr* 1928, 160 —*Sweertia chirata*, a well known valuable Indian medicinal plant, was partially examd by Sahiar in 1914 and Subramaniam in 1924 By steam distn. of the alc. ext. R. obtained a cryst. acid, a phenol and isoamyl alc. The residual resin insol. in water yielded an acid m. 312° and a neutral substance m. 133° The nonvolatile portion sol. in water contained an acid m. 193° E. J. C.

The constituents of Plumbago zeylanica Linn. M. C. Tumminkatti *Proc 15th Indian Sci. Congr.* 1928, 163 —*Plumbagin*, the active principle of the drug, has been isolated in a pure form It forms orange-yellow silky needles m. 78°. It is sol. in most org. solvents and in alk. solns with formation of a crimson or pink color The combustion and the mol.-wt. detn. indicate an aromatic ring compd The deep red color with $FeCl_3$ soln. indicates a phenolic OH group in the compd The Bz deriv. m. 146°. Further phys. and chem. properties are being studied with a view to det. the constitution. E. J. C.

Indian cubeb oil. V. P. Shintre *Proc 15th Indian Sci. Congr.* 1928, 168 —The fruits grown in the Mysore Province gave on distn. with steam 7.5% of an essential oil The oil contained *d*-sabinene (28%), *d* terpinene and cineole (15%), *d*-4-terpineol, *d* terpineol, an unidentified primary alc., *l* cadinene and another sesquiterpene Another sample of oil was found to contain *dl* sabinene and the same constituents as the first sample. E. J. C.

Examination of the active principle of Indian henna. Syed B Ali *Proc 15th Indian Sci Congr* 1928, 173.—A water ext is treated with Pb acetate, the Pb is removed by $H_2S$, and the active principle is extd with benzene. It is quite a pure product, for it gave a const m p. It is easily oxidizable, the color changes to dark red even on exposure to air. The oxidized product can be easily reduced by Zn and HCl. The formula found differs from those given by previous workers. F J. C

Morphine determination in opium. C G van Arkel and P van der Wielen *Pharm Weekblad* 68, 309–16(1931).—The Dutch Pharm method of morphine detn does not give concordant duplicates when considerable gum is present in the opium sample. A detailed description is given of the previously recommended method (*C A* 24, 5107) which makes use of ale tartaric acid for the extn. Repeated analyses of Persian, Levantine and Macedonian opium by this method showed close agreement. A W. Dox

Thalleioquin test for quinine. A Winograd *Chemist Analyst* 20, No 3, 7(1931).—Dissolve the alkaloid in 50 000 times as much $CHCl_3$. To 0.5 cc of the soln., add 2 cc of Br $H_2O$ and 1 cc of dil $NH_4OH$. An intense, emerald green color is given by as little as 0.1 mg of quinine. W T. H

Sensitiveness of the thalleioquin reaction. J Lisenbrand *Arch Pharm* 269, 65–7(1931).—Quinine sulfate is susceptible of detection in a dilu of 1 100 000 (corresponding to quinine 1 140 000) by the thalleioquin test. However, this reaction is highly dependent on the influence of time, furthermore the action of dild Br-$H_2O$ must be accurately regulated, as also the $p_H$ carefully chosen, in order to raise the sensitiveness to the max. The most favorable conditions for highly dild solns with H ion concn $10^{-4}$ to $10^{-5}$ appear to require 10 to 15 sec. Further expts are under way. W O F

History of Austrian pharmacopeias. Otto Zekert. *Pharm Monatshefte* 12, 25, 55–7, 75–6(1931), cf *C A* 25, 1916.—An address. W O F

Three hundred years with cinchona bark. Otto Zekert *Pharm Monatshefte* 12, 25–8(1931).—An address. W O F

Examination of galenical preparations in filtered ultra-violet light. L Zechner and F Gstirner *Pharm Monatshefte* 12, 28–31(1931).—The results obtained in the examn of a series of fluid exts in ordinary and filtered ultra violet light are recorded. W. O E

Occurrence, application and adulteration of ipecacuanha root. Franz Berger *Pharm Monatshefte* 12, 33–4(1931).—A brief summary of the history of this drug in connection with an outline of its microscopical examn and possible adulterants. W O E

Drug novelties of the last forty years. I Herzog *Pharm Monatshefte* 12, 60–1 (1931), cf *C A* 24, 3320.—An address. W O I

Characteristics of the valerates and isovalerates. Arno Müller *Riechstoffind* 6, 4–7, 39–41(1931).—A compilation of the essential properties of the several members of these 2 groups in connection with their occurrence in natural products. W. O E

German Museum and German perfume industry. A M Burger *Riechstoffind* 6, 25–33(1931).—A brief description of the German Museum of Munich (apparently the largest tech and scientific museum in the world), including a few typical displays therein relating to perfumes both crude and finished, in connection with data on, and views of, several noted German establishments for the manuf of perfumes. W O F

Action of bromides on morphine hydrochloride and ethylmorphine hydrochloride. Fischer and Huppmann *Suddeutsche Apoth.-Ztg* 71, 131–2(1931).—Solns of morphine HCl and ethylmorphine HCl yield with bromides the corresponding hydrobromides of these alkaloids, this is similar to the behavior of codeine phosphate. W. O F

Pharmaceutical analysis. C A Rojahn IX. Pharmacological and biological evaluation of pharmaceutical preparations. Julius A Müller *Pharm Ztg* 76, 273–6, 286–8(1931).—This paper deals specifically with adrenaline, anthelmintics, cannabis, disinfectants, antienzymes, skin irritants, insect powders, local anesthetics, narcotics, ergot, valerian prepns., digitalis and laxatives. W O E

Economic drug testing XII. L. Rosenthaler *Pharm Ztg* 76, 288(1931), cf *C A* 25, 557.—*Estn of colchicine in colchicum seed.*—Shake 0.6 g of the powdered sample in a small medicine glass with 12 g $CHCl_3$ and 0.5 g $NH_4OH$ for 10 min., filter, distil 6 g of the soln to dryness, boil the residue with 10 g $H_2O$ until the vapor no longer blues red litmus paper, then add to the hot liquid 2.5 g dil HCl and about 0.5 g of paraffin, and cool in running water. Filter, wash with water until the filtrate shows no acidity, then dil to 250 cc. If 10 cc of this dilu gives with 9 cc HCl (d 1.19) and

1 cc phosphotungstic acid soln a turbidity after 15 min (changing to a yellow ppt the following day), the sample contains at least about 0.4% colchicine W O I

**Estimation of morphine in opium and its preparations.** Lajos David and Istvan Novak *Pharm Ztg* 76, 289(1931) cf *C A* 25, 557 —The outstanding feature of the procedure advocated by D and N consists in the use of MeOH in place of abs EtOH in the extn of morphine, on account of its greater soly in the former alc and of less likelihood of extg contaminating substances W O I

**Examination of liquor cresoli saponatus D. A.-B. 6, and sapo kalinus D. A.-B. 6** Walter Meyer *Pharm Ztg* 76, 327 8(1931) cf *C A* 25, 1031 —Recent examns of prepns alleged to be official were found to contain the fatty acids of linseed oil instead of the prescribed oil itself The methods followed in arriving at these conclusions are described in detail W O I

**Acetyl determinations** Hoffmann *Pharm Ztg* 76, 329(1931) —Reference is made to a recent paper (cf *C A* 25, 1761) in which the advantages in the use of the Verley and Bolsing method of acetylation were emphasized, satisfactory values are reported by this method in the examn of EtOH, glycerol, *iso*-PrOH, thymol, salol, β naphthol menthol and santalol The method failed with citronella oil (geraniol) W O E

**Evaluation of acetate of alumina solution** Otto Schmatolla *Pharm Ztg* 76, 352 3(1931) Attention is directed to the pharmacopeial tests for impurities in the official liquor notably Al formate $CaSO_4$ and $K_2SO_4$ These tests are discussed W O I

**Preparation of homeopathic triturations.** A Kuhn *Pharm Ztg* 76, 366–7 (1931) – The prepn of, and certain tests on, the strength and stability of homeopathic triturations are discussed in connection with an app (illustrated) to det any catalytic decompn likely to develop in the finished product W O I

**Indian kidney tea (Koemis-Koetjing).** G Kuhlmann *Pharm Ztg* 76, 367–9 (1931) —The botanical and pharmacol factors of the plant *Orthosiphon stamineus* Benth are considered in connection with its chem constituents, which at present offer no adequate explanation of the therapeutic (chiefly the diuretic) action of the tea made therefrom W O E

**Diacolation of fluidextract of valerian.** H Breddin *Pharm Ztg* 76, 427(1931) — Directions are given for the prepn of this ext., which is regarded as superior to the one commonly made by percolation W. O. I.

**"Etrate," a new highly active type of drug. II. Estimation of the extract content of crude drugs.** Clemens Grimme *Pharm Zentralhalle* 72, 183-7(1931); cf *C A*. 25, 379 —The present study was undertaken to develop a method capable of yielding a max ext corresponding to the true activity of the drug in question After reviewing the methods commonly employed in the prepn of exts., comparative results are reported on 5 g samples under hot aq extn over a period of 6 hrs., which show the highest values thus far obtainable by any extn method The materials examd were cinchona bark, uva ursi leaves, valerian root, rhubarb rhizome and their resp etrates W. O E.

**Histochemical detection of cetaric acid in Iceland moss.** M Pronier *Pharm Zentralhalle* 72, 227(1931) —In nearly every case a section immersed 2–3 min in 25% $NH_3$ soln developed a rose red to red color in the central hyphae, which changed to brown red on treatment with $FeCl_3$ W. O E

**Chemical investigations of the tobacco plant. II. Chemical changes that occur during the curing of Connecticut shade-grown tobacco.** Hubert B Vickery and George W Pucher Conn Agr Expt Sta., *Bull* 324, 207–40 (1931), *Science* 73, 397–9 (1931), cf *C A* 24, 2332–3 —The catabolic changes occurring in tobacco leaves cured for 0, 12, 18 and 51 days were detd by estg the various N fractions, solids, ash, crude fiber, ether sol solids and carbohydrates in ext of the leaves The ext was prepd by boiling the leaves carefully in water contg sufficient $H_2SO_4$ to maintain a $p_H$ of 4.0 Loss of *nicotine* was thus prevented The residue from the extn was ground and again extd with boiling water A third time the residue was boiled in water, and the exts. were combined and concd *in vacuo* After completion of the curing process approx. 20% of the solids originally present in the leaf disappeared. Over 50% of this loss was in the nitrogenous constituents Chlorophyll destruction was practically complete in 12 days Sol carbohydrates decreased in curing approx 80%; probably most of this loss was $CO_2$ and water Extensive deamination of the amino acids followed by amide synthesis occurred during curing of the leaf The protein underwent complete digestion to amino acids At least 1/2 of the potential amino N of the protein that underwent enzymic hydrolysis in the first 12 days of the curing process was further converted to $NH_3$ and amide N. The approx constancy of the quantities of $NH_3$, amide and amino N in the

exts suggests some sort of equil condition in the relationships between these forms of N Approx 75% of the loss of water and of sol carbohydrate and more than 50% of the loss of org solids and of the ether sol constituents occurred during the first 12 days more than 75% of the quantity of protein digested underwent this process in the same period Far reaching chem changes set in very shortly after the leaves were detached from the tobacco plant C. R FELLERS

**Utilization of by-products of saccharin manufacture in synthesis of drugs and in medical science.** W HERZOG *Chem Rundschau Mitteleuropa u Balkan* 7, No 15, 107 11(1930) cf *C A* 25, 42 —The utilization of *p*-toluenesulfonyl chloride and *p* toluenesulfonamide is described with detailed data from the patent literature S S DE FINÁLY

**Color and ethereal oil content of pulverized cinnamon.** I HORVÁTH AND L BENEDEK *Kisérlet Közlemények* 33, 387–91(1930) —No regular connection was found between ethereal oil content and alc ext content The ethereal oil content decreased with quantity of waste particles, especially of outer cork layers Dark powders mostly contained less ethereal oil S S DE FINÁLY

**Synthesis of local anesthetics** FRIGYES KONEK *Matematik és Természettud Értesito* 46, 348-60 (in German 361-2)(1929) —Some new derivs of 3 methoxysalicylic acid were produced Crystals of 2,3 (*m* $H_2NC_6H_4COO$)(MeO)$C_6H_3CO_2Me$ had anesthetic influence when put on the tongue The anesthetic influence of 2,3 5 (BzO)-(MeO)$(H_2N)C_6H_2CO_2Me$ was somewhat weaker S S DE FINÁLY

**Hungarian essential oils.** M JANICSEK *Mezögazdasdgi Kutatdsok* 2, 153–6 (1929) cf *C A* 24, 2235 —The following data are given for the corresponding essential oils *Coriandrum sativum* $d_{15}$ = 0 8723, $\alpha_D$ = +10° 35′, $n_D^{20}$ = 1 4653, ester content 72 6% *Mentha piperita* (1927) $d_{15}$ 0 9079, $\alpha_D$ —25° 5′, $n_D^{20}$ 1 4575, menthol content 69 34% *Chenopodium ambrosoides var anthelminticum* (1927) $d_{15}$ 0 9852, $\alpha_D$ —8° 39′, $n_D^{20}$ 1 4760 *Salvia officinalis* (1927) $d_{15}$ 0 9195, $\alpha_D$ +13° 32′, $n_D^{20}$ 1 4631 *Salvia sclarea* (1928) $d_{15}$ 0 9043, $\alpha_D$ —24° 2′, $n_D^{20}$ 1 4648, ester content 70% *Majorana hortensis* (1928) $d_{15}$ 0 9058, $\alpha_D$ +29°, $n_D^{20}$ 1 4791 *Lavandula vera* (1928) $d_{15}$ 0 8924, $\alpha_D$ —7° 29′, $n_D^{20}$ 1 4613, ester content 62 52% S S DE FINÁLY

**Composition of tobacco smoke and denicotization of tobacco** J BODNÁR *Természettud Kozlony* 62, 397–404, 443–6(1930) —A review of the present methods for denicotization Hungarian "Denik6" cigars and cigarets did not contain less nicotine than ordinary ones Cotton wool placed in the mouthpiece of cigarets retained about 50% of the original nicotine content of the smoke S S DE FINÁLY

**The assay of digitalis on frogs** B BEHRENS *Arch exptl Path Pharmakol* 140, 237 56(1929) *Physiol Abstracts* 15, 400-1 —The lethal dose for slow intravenous infusion of K strophanthin in frogs (*R temporaria*) was detd on 149 animals and found to be 0 3264 γ per g The standard deviation of a single observation was 20 1% The curve relating dose to mortality would coincide with the curve obtained by Trevan for the subcutaneous injection of digitalis When K strophanthin was injected in 10 doses with 24 frogs on each dose, the corresponding curve had a standard deviation for a single observation of 17 1% When these curves are compared with de Lind's figure of 13 03% for the standard deviation of cats, it is concluded that frogs are more variable than cats The official method in Germany for detg the lethal dose entails injecting 6 frogs on each of a series of doses It is difficult to calc the accuracy of the results to be expected in this case, so an exptl method was adopted A representative imaginary population of frogs was constructed from the results described above The lethal dose for each frog was written on a card, and expts carried out by drawing the cards from a hat It was found that with the standard method in which about 7 groups of 6 frogs were injected, 12% of the expts gave errors of over 10%, and 26% of the expts gave no definite result at all A new method of calcg results is proposed, which diminishes the no of large errors and enables all the results to be used By this method when 39 frogs were used the standard deviation of the result was 4 1% When 26 frogs were used, the standard deviation was 5 8% If the frogs were divided up so that the dose interval was smaller and there were proportionately fewer frogs on each dose, the change had no definite effect on the accuracy of the test. G G

**Assay of Lobelia inflata** O STEPPUN AND V SVEREV *Arch exptl Path Pharmakol* 141, 116–22(1929), *Physiol Abstracts* 15, 401 —A method is described for the biol assay of *Lobelia inflata*, using a decapitated cat as an exptl animal Lobeline causes a rise in blood pressure in decapitated cats By comparing the effects of lobeline and nicotine and by extirpating the suprarenals it was shown that lobeline raises blood

pressure only by acting on the suprarenals and has no peripheral action Hence it is suggested that lobeline should be assayed by comparing its power of raising blood pressure with that of a known soln of adrenaline G G

**Chaulmoogra oil from the seeds of Hydnocarpus heterophylla and the requirements of the Dutch Pharmacopeia V** D R Koolhaas *Pharm Tijdschr Nederland Indië* 7, 313 7(1930) cf *C A* 24, 2133 - The Dutch and Brit pharmacopeias require that chaulmoogra oil be pressed from seeds of *Taraktogenos kurzii*, King Chaulmoogra oils from several other botanical species are known, with nearly the same chem consts and therapeutic values I specially the required soly in alc (due to the high acid value) and the high acid value itself (21 27 Brit Pharm ) are irrational since this oil can be gathered with a low and const acid value (0 44) The high m p (32°) of the fat of *Hydnocarpus heterophylla*, indigenous to Java, the low acid value (<1) and the chem compn (glycerides of chaulmoogric and hydnocarpic acids) make this oil a good one for the combating of leprosy in the Dutch East Indies, though it does not meet the requirements of the Dutch Pharm D R Koolhaas

**The effect of fertilization on the odor and flavor of cigar tobacco.** C Coolhaas *Proefsta Vorstenland Tabak Mededeel* No 66, 1 22(1930) —Fertilization with $(NH_4)_2SO_4$ plus superphosphate gave tobacco of the best odor and flavor Tobacco fertilized with $(NH_4)_2SO_4$ alone was slightly inferior, while that fertilized with farmyard manure and that grown without fertilizer were much inferior D R Koolhaas

**Investigations on fire-holding capacity of tobacco leaf.** C Coolhaas *Proefsta Vorstenland Tabak Mededeel* No 68, 1 71(1930) —The av glowing duration was detd by noting the time in sec that each leaf burned, when ignited with a glowing carbon point at the bottom of the leaf on the right side between two veins About 800 leaves per test were burned The duration of glowing is directly proportional to the logarithm of the percentage of moisture Previous observations were confirmed that a poorly burning leaf contains more Cl and less K than a leaf that burns well The contents of Ca, Mg, and citric, oxalic and malic acids also affect the burning quality, but $SO_3$, $SiO_2$ and $Na_2O$ do not The duration of glowing is not improved by fertilizing, on the contrary, certain fertilizers injure the fire holding capacity The injurious effect is closely assocd with the amount of Cl contained in the org fertilizers $(NH_4)_2SO_4$, if necessary supplemented with double superphosphate, is detrimental to the fire holding capacity of the tobacco, although less so than stable manure Potash fertilization did not improve the fire holding capacity, probably because the absorption of the K is limited by the antagonistic influence of $Na_2O$, CaO and MgO When a leaf was gathered and the stalk placed in a weak potash soln , a considerable increase of the duration of glowing was recorded, after the leaf had been cured and fermented in the usual manner Most non burning tobacco was found in places where quantities of Cl existed in the soil moisture It is therefore probable that all measures to break the soil capillaries will be of value. Different varieties of tobacco grown under identical circumstances showed great differences in the av duration of glowing D R Koolhaas

**Harmine and its preparation from the root Peganum harmala L.** A D Rozenfeld *Farm Zhur* 1930, 183-6 —R reviews briefly the work on harmine, describes its method of prepn and phys properties according to Merck and points out the identity of harmine with *banisterine* Harmine has always been prepd from the seed, but R. was successful in prepg a harmine base from the root of *Peganum harmala* L in 3% yield It forms large needle shaped crystals, m 258° HCl salt m 262° It gives all the reactions common to banisterine and harmine The water soln is fluorescent, especially under ultra violet light B S Levine

**Potassium ferrocyanide as a microchemical reagent for the identification of strychnine.** Yu D Gnesin *Farm Zhur* 1930, 293-5 —G describes a drop method on a test plate. Strychnine, codeine and narcotine, when treated with appropriate solns of HCl and the yellow and red cyanide, yield sp crystals readily recognizable under the microscope The crystals are represented in six drawings B S Levine

**Botany, chemistry and pharmacodynamics of Toddalia aculeata.** J E Lobstein and P. Hesse *Bull sci pharmacol* 38, 157-64(1931) —The root contains a glucoside that is cleavable by emulsin, forms white crystals and is purified by pptn with $(NH_4)_2SO_4$ The oleoresin isolated is yellow and of bitter taste, $d_{17}$ 0 873, $\alpha$ = —15° 30', b 190°. It consists of a mixt of $Me_2O$, $PhCO_2H$, eugenol, citronellol and a paraffin b 80°. A dark brown rosin is contained in a quantity of 1 25%; it is sol in EtOH, $Et_2O$, $CHCl_3$, $C_6H_{11}OH$, benzine and turpentine oil, insol in petroleum ether Other constituents are saponifiable lipides 0 37%, m 39 6°, I value 66 64, $n_{25}$ 1 6339, unsaponifiable lipides 0 43% contg 2 15% phytosterol, reducing sugar, as glucose, 0 46%; hydrolyzable sugar, as sucrose, 0 12%, gum 0 80, protein 5 82, citric, malic, oxalic

and succinic acids Ca Mg Na, Fe Mn Zn, As, Cl P, S and Si The rosin in doses of 0 3 g produces abortus in pregnant guinea pigs of 500 g , in non pregnant, contractions of the uterus Larger doses cause convulsions paralysis of the posterior part and death within 48 hrs The leaves contain a gluco alkaloid, *toddaline*, which is pptd by all reagents for alkaloids, and 2 55% of tannin In pharmacol expts toddaline decreases the chronaxia of both nerve and muscle, and disturbs the isochronism In the isolated *heart the speed and the amplitude are reduced* A I Meyer

**Detection of adulteration of aloes** E Léger *J pharm chim* [8], 13, 143–4 (1931) —L recommends a simple soly test with $NH_4OH$ in the place of the more complex chlorinated aloin test (*C A* 20, 2561) In a conical flask mix 2 g powd aloes with 25 cc of a soln of 10 cc official $NH_4OH$ in $H_2O$ to make 100 cc Cork, allow to stand for 1 hr , shaking 3–4 times, then filter and wash the ppt with dil $NH_4OH$ soln until the filtrate is colorless Avoid evapn of $NH_3$ by covering the funnel to prevent the ppt becoming gelatinous Dry it in air at 25–30° and weigh The results show that Curaçao aloes with 0 25% insol are superior to all others, confirming the aloin $Cl_2$ test A carefully prepd Ooganda aloes gave 0 60% A Cape aloes gave 2 40, 9 35 and 3 40%, resp Cape aloes No 4 gave 45 5% of an insol vegetable powder, hence it was adulterated This method obviously fails to detect rosin, if its presence is suspected, ext. with benzene and apply the usual tests S Waldbott

**Biological assay of digitalis by the Hatcher-Magnus method applied to the dog.** J Pichot *Thesis*, Paris, 1929, *J pharm chim* [8], 13, 183(1931) —The substitution of the dog for the cat renders certain changes of procedure necessary Processes are given to obtain a max soly of the active principles of digitalis in infusions and tinctures Then the min lethal doses were detd for several samples of powd digitalis by means of infusions of various concns or ale tinctures Some expts consisted in the same detns after previous injection of a non lethal dose of *ouabaine*, the constancy of the min lethal dose of which has been previously studied at different concns The max error in all these detns does not exceed 18% S Waldbott

**The chaulmoogra of Cameroun.** R Mathivat *Thesis*, Paris, 1929, *J pharm chim* [8], 13, 183–4(1931) —The morphological and chem aspects of *Caloncoba welwitschii* Gilg, the chaulmoogra of Cameroun are described This shrub and *C glauca* Gilg show distinct morphological differences in their leaves and fruits The consts of the oil of *C welwitschii* are close to those found recently for the oil of *Oncoba echinata* Oliver (cf *C A* 23, 112, 4297) Figures and micrographic descriptions are given of the grains of various species and of the press cake obtained from each of these S Waldbott

**Experimental investigations concerning the standardization and the pharmacology of heart tonics with a new method.** Wm Nyiri and Louis Dubois *J. Am Pharm Assoc* 19, 945–7(1930) cf *C A* 25, 1949 —The work is in 2 parts (*a*) standardization of heart tonics and (*b*) pharmacology of digitalis, with special reference to the relationship of Ca and H ions to the drug The scope of the studies is indicated by the use of 50 cats, 300 rabbits and 4500 frogs In (*a*) warm blooded animals are to be preferred Great variations are found in the frog as a test animal The no of animals necessary to make a satisfactory assay of a prepn of digitalis should be left to the judgment of the individual worker The formula of van Wijngaarden allows too wide a range of variations and does not fulfil the purpose for which it was recommended Intravenous administration is best in the assay of heart tonics The new intravenous anesthesia (barbital Na) is to be preferred over former methods The drop in blood pressure to 0 approaches closest the theoretical end point and is preferred to the stoppage of the heart It is very important to keep the time of the individual expt as uniform as possible The chief difficulty in standardizing digitalis prepns (for heart use) is that some require preliminary treatment before assay, such as evapn of the ale , etc These manipulations frequently ppt active principles The basic requirement for a physiol assay should avoid such damaging treatment A method has been worked out by N and D which meets the principal enumerated requirements. The rabbit is used as the test *animal The advantages of the method* are that animal material is always available The end point is obtained by the drop in blood pressure supplemented by ouabain and is as close as may be expected Rabbits have a higher resistance to heart tonics than other warmer blooded animals so that tinctures need not be diluted more than 1 4 which does not interfere with the test Prepns of great concns as well as those of high dilutions may be tested (*b*) Digitalis and strophanthin poisoning of the heart takes place in the absence of $Ca^{++}$ Increase of $Ca^{++}$ to 4 times the normal reenforces and hastens digitalis action The acid base equil of the nutrient fluid of the heart may be changed within the range of $p_H$ 5 2 to 7 6 Full digitalis action occurs within the above mentioned range L E Warren

**Studies on strychnine. The relative sensitivity of certain chemical and physiological tests.** JUSTUS C WARD AND JAMES C MUNCH *J Am Pharm Assoc* 19, 954-7 (1930) —Analyzed specimens of strychnine salts were subjected to seven of the more common color tests The most sensitive test is $K_2Cr_2O_7 + H_2SO_4$, by which 1 0 γ can be detected $KIO_3 + H_2SO_4$ was the least sensitive of the oxidizing tests Malaquin's test was the least sensitive of any tested, 6 7 γ being required to obtain the reaction A quant test for strychnine was developed which depends on the sensitivity of the individual to bitter taste in tasting various concns of the alkaloid or its salts Individuals vary in sensitivity but the av limit is 5 γ NaCl and sucrose decrease the apparent bitterness Different areas of the tongue differ in sensitivity After an individual has been standardized by tasting knowns it is possible to detect differences of 5% L F WARREN

**A comparison of the $p_H$ of neoarsphenamine and sulfarsphenamine in relation to differences in their structure.** A E JURIST AND W G CHRISTIANSEN *J Am Pharm Assoc* 19, 951-3(1930) —The $p_H$ range of 9 specimens of sulfarsphenamine and 1 specimen of sulfarsphenamine acid lay between 2 15 and 4 36 Sulfarsphenamine contains some free acid as was shown by detns of As, S and Na The excess of S in some specimens is due to the presence of sulfarsphenamine acid This acid is stable while neoarsphenamine acid is unstable Conclusion The observed facts are sufficient to warrant the belief that the structures of neoarsphenamine and sulfarsphenamine are considerably different L L WARREN

**A toxicological investigation of chloral hydrate.** L W RISING AND L V LYNN *J Am Pharm Assoc* 20, 9-11(1931) —It is generally believed that $CCl_3CHO\ H_2O$ (*C*) is very unstable in the presence of decompg org matter, such as the cadaver, but there are no exptl data Knowledge is also lacking concerning the effects of preservatives on the stability of the substance Stomachs of sheep were minced and known weights mixed with known quantities of (*C*) The preservative was added and the container sealed with paraffin The preservatives were EtOH, 1% $HgCl_2$, a satd soln of $As_2O_3$, 10% HCHO and an embalmer's cavity fluid contg EtOH, MeOH, $C_3H_5(OH)_3$, $H_2O$, ethereal and other constituents not named Analyses were made at 1, 3 and 7 months (*C*) was detd by steam distn, subsequent reduction with Zn and titration by $AgNO_3$ In most tests there was progressive decompn At the end of 7 months the undecompd amts were with EtOH 41, HCHO 70, $HgCl_2$ 91, $As_2O_3$ 89, cavity fluid 88 and no preservation 63% R. and L believe that 18 months would elapse before all of (*C*) would be decompd In forensic cases $HgCl_2$ is apparently the best preservative to employ in keeping tissues for analysis for (*C*), EtOH is the poorest Analysts should recover at least 50% of (*C*) if death has occurred within 6 months L E WARREN

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Monograph and analyses of principal alcoholic extracts produced in Mexico (ALVAREZ) 16. The "Deutsche Museum" and its section of pharmacy (SILVA ARAUJO) 2. Effect of C on tobacco culture (BONUCCELLI, CINI) 15. *Cannabis indica* resin (CAHN) 10. Colored condensation products [intermediates for drugs] (Ger. pat 519,051) 10.

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**Storing hygroscopic drugs and chemicals.** HANS GFELLER. Swiss 143,544, Oct 22, 1929 The substances are stored in a container supported in a second vessel contg CaO.

**Synthetic drug.** I G FARBENIND. A.-G (Karl Streitwolf, Alfred Fehrle, Walter Herrmann and Paul Fritzsche, inventors) Ger. 520,225, Aug 26, 1928 2,3-Dimethyl-4-aminopyrazolone-1 phenyl-4' arsonic acid and 3 hydroxybenzaldehyde 4-arsonic acid are brought to reaction, yielding a condensation product which is less poisonous than either initial material The reaction may be effected by boiling together aq solns of the Na salts of the acids An example is given.

**Synthetic drugs (dinitro- and diamino-pyracridones).** DEUTSCHE GOLD UND SILBER-SCHEIDEANSTALT VORM ROESSLER (to I G Farbenind A G) Brit. 339,932, Sept 29, 1928 Pyracridone is nitrated to produce a dinitro compd from which, by reduction, the corresponding diamino compd is obtained

**Therapeutic agent** Percy Desenis Ger 517,935, April 12, 1928 A stable water sol medicine contg I and Ag is obtained by mixing an aq soln of colloidal Ag with Na 7 iodo 8 hydroxyquinoline 5 sulfonate. The medicine is used against tuberculosis

**Salts of alkaloids with camphoric acid.** Schering-Kahlbaum A.-G. (Walter Schoeller and Herbert Schotte, inventors) Ger. 519,033, Apr 16, 1926 Acid camphorates of hyoscyamine, scopolamine and atropine are prepd by the customary salt forming methods Examples are given

**Dilithium sodium or potassium citrate** Firma Johann A Wülfing Ger 516,672 Nov 19, 1929 $Li_2NaC_6H_5O_7$ or $Li_2KC_6H_5O_7$ is prepd by adding $Li_2CO_3$ to a soln of citric acid in alc., boiling off the $CO_2$, adding NaOH or KOH dissolved in the least possible amt of water to the boiling soln., cooling, crystg and drying The compds are used in therapy in anti arthritis or anti diabetes preps Examples are given The yield is 95%

**Organic phosphorus compounds.** I G Farbenind A.-G. (Wilhelm Lommel and Heinrich Munzel, inventors) Ger 521,205, Nov 1, 1928 New compds are prepd by condensing triarylphosphine oxides with phenols Thus, a condensation product m 149–150° is obtained by stirring tri-*o* tolylphosphine oxide with an equimol amt of PhOH at 150° Numerous other examples are given also The products are *useful for combating microorganisms, moths*, etc., and as *intermediates for drugs* Cf *C A* 24, 4121

**Mercury compounds.** Carl L. J Loidmann Ger 519,320, Aug 7, 1928 Double compds of HgS with Hg halides or other Hg salts are prepd. in highly dispersed form by the reaction of a colloidal soln of HgS with the other Hg salt The reaction may be effected by shaking a colloidal soln of HgS with the other Hg salt in the cold, or by boiling the mixt for some hrs The colloidal soln of HgS may be prepd by treating a soln of a Hg halide with $Na_2S$ and NaI in the presence of a stabilizer Examples are given of the prepn of $HgCl_2$ HgS and $HgI_2$ HgS The products are useful for treating syphilis

**Acridine derivatives.** I G Farbenind A.-G. (Karl Schranz and Hans P Muller, inventors) Ger 520,078 Dec 14, 1928 Double compds of 3,6 diamino-10-alkylacridinium salts with salts of 3 6 diiminoacridine are prepd by bringing the salts together, or by the reaction of one of the bases with an acid salt of the other base The reaction proceeds in the cold or on warming, and a solvent may be present. Examples are given The products are more sol in water than their components, and have bactericidal properties

**Derivatives of pyrazolone.** Curt Räth and Arthur Binz Ger 516,534, Nov 26, 1924 1 Pyridyl 3 methyl 5-pyrazolone or its substitution products is treated with an equimol amt or excess of an alkylating agent Thus, 2 [3'-methylpyrazolonyl 1'] 5-nitropyridine is heated with KOH, $Et_2SO_4$ and MeOH to give 2 [2',3' dimethyl pyrazolonyl 1'] 5-nitropyridine, m 172–173°. Another example describes the prepn of 2 [2',3'-dimethylpyrazolonyl 1'] 5 chloropyridine, m 135° *The products are used in therapy*

**Quinoline derivatives.** Johanna Wolffenstein née Deen Ger 520,155, July 8, 1926 2 Phenylquinoline-4 carboxylic acid and its derivs substituted in the phenyl residue with an amino or a dimethylamino group, are esterified with 1 $Et_2NC_2H_4OH$ by the customary esterification processes Examples are given The products have anesthetic properties resembling those of cocaine

**Salts of quaternary bases** Igon Glücksmann Ger 519,324, Sept 30, 1927 New salts of halogen substituted aliphatic quaternary bases are prepd by the reaction of known salts of the bases with suitable salts of the acids to be combined therewith Thus, the halides of the bases are caused to react with Ag salts of the acids, or the sulfates of the bases with Ba salts of the acids An excess of the acid to be combined may be present Examples are given of the prepn of *β,γ-dibromopropyltrimethylammonium coumarin-3 carboxylate* m. about 130°, *triethyl β chloroethylammonium cinnamate, trimethyl β bromoethylammonium p toluenesulfonate, iodomethyltrimethylammonium mandelate β,γ-dibromopropyltrimethylammonium theobromine I acetate*, m about 150°, *iodomethyltrimethylammonium acid phthalate*, m about 133°, *β,γ-dibromopropyltrimethylammonium acetate*, m 120–2°, and *trimethyl β bromoethylammonium propionate*, m about 180° The products are of pharmaceutical value

**Antiseptics.** F Hoffmann-La Roche & Co., A G Ger 519,321, April 8, 1930 Addn to 507,418 (*C A* 25, 560) Substituted phenoxyphenols or their alkali salts are converted into their carbonates or carbamates by the customary processes Examples are given of the prepn of *hydroquinone p tolyl ether carbamate*, m 130–1°, *2-chloro-4 phenoxyphenyl carbamate*, m 129°, and *thymol p hydroxyphenyl ether carbonate*, $b_{14}$ 350°

**Use of quinatoxines with benzoic acid as bactericidal agents.** E Schulze Brit. 339,602, July 22, 1929 Benzoic acid is used together with substances such as eucupino-

toxine or vucmotoxine for sterilizing, disinfecting or preserving various products and materials

**Analgeso-hypnotic composition (a white inodorous molecular compound of pyramidone and ethylisopropylbarbituric acid.)** WERNER M LAUTER (to E. R Squibb & Sons) U. S 1,797,428, March 24

**Thymus gland extracts.** I G FARBENIND A G Brit 339,013, Sept 10, 1929 Thymus gland ext is tested in regard to its physiol activity by detg the smallest dose which, on injection into an immature female animal, will prevent the normal occurrence of rutting An ext made with Ringer's soln is tested and standardized by dilu or by concn *in vacuo* at low temp., in accord with results of the test

**Purifying biocatalysts.** KNOLL A G CHEM FAB Ger 521,126, Aug 29, 1926 Co-enzymes hormones, water sol vitamins, etc., are purified by fractional diffusion or dialysis Thus, an impure soln of the biocatalyst may be carefully introduced at the bottom of a column of solvent, whereupon the biocatalyst diffuses up the column more quickly than some of the impurities and less quickly than others, so that a relatively pure product is obtainable from an intermediate section of the column Alternatively, the impure soln may be dialyzed through two membranes the first of which retains high-mol impurities, while the second retains the biocatalyst but is permeable to low mol impurities such as salts Examples are given

**Hormones.** SIGMUND FRANKEL Ger 519,323, June 28 1927 See Brit 292,062 (*C A* **23**, 1474-5)

**Hormones.** SOC ANON POUR L'IND CHIM A BALE Ger 521 100, Sept 29, 1928 See Brit 298,089 (*C A* **23**, 2786)

**Female sexual hormones from vegetable starting materials.** SIEGFRIED LOEWE Ger 517,761, June 16, 1926 Female plant tissues are extd with water or org solvent, and the ext is freed from undesired constituents The prepn produces heat' in female mammals In example, the ovaries of the water rose *Nuphar* and willow catkins are dried and extd with ether The ext is worked up to give a product which produces "heat" in ovariectomized mice

**Removing nicotine from tobacco by prolonged extraction with water.** LUDWIG LIPPMANN Ger. 520,438, Dec. 20, 1926

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

**Purification of crude sulfuric acid.** H A J PIETERS AND M J MANNENS *Chem Weekblad* **28**, 130-1(1931) —Crude $H_2SO_4$ can be purified by leading through $H_2S$ or air contg about 1 vol % of $H_2S$ Arsenic is pptd quantitatively, nitrites are completely and nitrates partly eliminated The ppt can be removed by filtration or by dilu of the acid till the ppt settles Addn of mineral oil to the acid before pptn causes the ppt. to form at the oil acid boundary and the clean acid can be siphoned off F DE L

**Quinquennial review of the mineral production of India for the years 1924 to 1928. Alum and aluminous sulfates.** C S FOX *Records Geol Surv India* **64**, 311-8 (1930) —Kalinite, alunite and alunogen occur in India in limited amts Practically all the alum is produced by the sepn of $Al_2(SO_4)_3$ from decompd pyritous shales, with the addn of nitre or wood ashes The shale is built up into heaps 18 ft high with layers of wood and clay that had been once burned and exposed to the weather for 1 yr This is ignited, fresh material added on one side and roasted material removed from the other The complicated leaching process is described Alum is being displaced in most of its Indian uses by $Al_2(SO_4)_3$ from bauxite **Sulfur, sulfuric acid and soluble sulfates.** E. H. PASCOE, *Ibid* 440 6 —Small quantities of S occur in several volcanoes $H_2SO_4$ is being manufd from Sicilian S Production data are given The Indian $(NH_4)_2SO_4$ industry is considered briefly ALDEN H EMERY

**Preparation of active magnesium carbonate from magnesite.** FRANK C. MATHERS AND WALTER V. FACLESON *Proc Indiana Acad Sci* **38**, 175-82(1929) —Pptd $MgCO_3$ causes lime plaster to set quickly, but mineral $MgCO_3$ is not effective The cost of pptd $MgCO_3$ is prohibitive The authors prepd active $MgCO_3$ by calcination of magnesite to MgO, followed by hydration and carbonation Variables studied were fineness of grinding of original magnesite, temp and time of burning, time of soaking the oxide in water for hydration and time of carbonation It is recommended that the magnesite be burned at 1000° for 0 5 hr. for pieces passing a 100 mesh screen, and 2 hrs for pieces 4-5 cm in diam., that this oxide be hydrated by soaking for 24 hrs in water, and that

this hydroxide be carbonated by treating with $CO_2$ under slight pressure with agitation Pieces of $Mg(OH)_2$ which are 4–5 cm in diam require 72 hrs ' carbonation; pieces small enough to float will carbonate in 0.5 hr $Ca(OH)_2$ contg 4% of its wt. of this $MgCO_3$ produces a plaster which sets in 3 hrs H. M STARK

Historical notes on salt and salt manufacture. L G M BAAS-BECKING *Sci Monthly* May, 1931, 434–46 E H

Liquid $CO_2$—how technology has harnessed the available sources. GUSTAVE T. REICH *Chem Met Eng* 38, 130–41(1931) —The processes for the concn and purification of $CO_2$ for liquid $CO_2$ production are described Flow sheets of the principal processes are given L. W. T. CUMMINGS

The water-soluble phosphates—their principal industrial uses. CHARLES H BUTCHER *Chem Trade J* 88, 217–9(1931) —$Na_3PO_4$ is now replacing, to a considerable extent $Na_2CO_3$ for softening of boiler and laundry waters, and as a detergent $NH_4$ phosphates are used largely in concd fertilizers Na phosphates are used as detergents and degreasing agents, and in silk weighting and fireproofing agents nearly all the Na and $NH_4$ phosphates have been employed Other applications are mentioned W. H. BOYNTON

Trisodium phosphate—its manufacture and use. FOSTER D SNELL. *Ind Eng Chem* 23, 470–4(1931) —$H_3PO_4$ is added to $Na_2CO_3$ soln to form $Na_2HPO_4$. $CO_2$ escaping This soln is filtered, dild and NaOH soln added to form $Na_3PO_4$ soln , which is filtered hot, and crystd A spray congealed product may be formed if desired Caking of $Na_3PO_4$ crystals may be prevented by formation of double salts. The detergent value of $Na_3PO_4$ is due to its high $p_H$ in soln , its ability to lower interfacial tension against oils or solids, and its marked power of emulsifying oils It is used as a *water softener* and *boiler compd* because of its ability to ppt. Ca and Mg phosphates E M. SYMMES

California desert soda—plant of the Natural Soda Products Company at Keeler, California, on Owens Lake. G ROSS ROBERTSON *Ind. Eng Chem* 23, 478–81 (1931) —Deposits and plant operation are described E M. SYMMES

Rate of calcination of limestone. C C. FURNAS *Ind Eng Chem* 23, 534–8 (1931) —Calcination of limestone takes place in a very narrow zone, which is the phase boundary between $CaCO_3$ and CaO This zone advances from the outside to the inside of the piece at a const. rate for each temp , independently of particle size or degree of calcination Curves and data are given for rates of calcination and temp histories of particles Most of the resistance to heat transfer into the piece appears to be in the narrow zone of calcination, not in the body of the calcined material The calcination data may be used to det the surface area of the particles E M SYMMES

Oyster shells as raw material for chemical lime. J B NEALEY. *Chem Met Eng* 38, 145–7(1931) —The only plant using oyster shells as a raw material for producing chem lime is described. The plant is located at Houston, Texas, and obtains oyster shells by dredging on the Gulf Coast The principal problem is that of removal of mechanically entrapped foreign material L. W. T. CUMMINGS

Testing of the decolorizing power of activated carbons. A S SIPYAGIN AND E S. SERKIN *Zhur. Sakharnoi Prom* 4, 466–70(1930). V. E BAIKOW

The economics of hydrogen production from ammonia. HANS J. BRAUN *Metallborse* 21, 267–8(1931) —The Berliner and Burke process for the production of $H_2$ by the dissocn of $NH_3$ can be operated industrially in Germany at a low cost. Comparative production and shipping costs for both $NH_4$ and $H_2$ are given RUSSELL C. ERB

The present state of bromine technology in the potash mines. J. WALTER AND C. HORST *Bull soc ind Mulhouse* 97, 29–44(1931) —A detailed description is given of the app and procedure used in the recovery of Br from the potash mother liquors of France and Germany I. H. ODELL

Method for reclaiming iodine from titration residues. F. TH VAN VOORST *Chem. Weekblad* 28, 129–30(1931) —The I-contg residues are collected and the I is pptd. as CuI, by addn of $CuSO_4$ and $NaHSO_3$, the liquid is siphoned off and the process repeated until enough CuI is collected The CuI is oxidized with crude $H_2SO_4$ and $Na_2Cr_2O_7$ and the free I distd off Liquids contg $CN^-$ cannot be treated in this way. The difference in the cost of the I and of the chemicals used is large enough to make the method economical. F. DE LEEUW

Hafnium. PAUL M. TYLER. Bur. Mines, *Information Circ* 6457, 11 pp (1931) — There are discussed description and properties, occurrence (list of minerals), identification and analysis, geographic distribution, history, sepn. of Zr and Hf , prepn. of Hf and Zr, prepn. of pure Hf salts, and production ALDEN H EMERY

Detection and importance of saponins. L KOFLER. *Pharm Monatshefte* 12, 53–5(1931) —An address W. O. E.

Laminated material—method of production. HERBERT W ROWELL. *The Times Trade and Eng Suppl* 28, No 664, 19(1931) E. M SYMMES

Furfural and its application in the plastic industry. G GENIN *Rev gén. mat plastiques* 7, 89–95(1931) —A review of the properties and constitution of furfural and of its com applications as a *solvent* and as a base for *synthetic resins* A P.-C.

The importance of the isoelectric point in the manufacture of casein for paper coating. R W. BELL. *Paper Trade J* 92, No 13, 55–6(1931) —The isoelec. point is at a $p_H$ of 4 6, at which point min soly occurs Casein having this $p_H$ value, by whatever process it has been prepd , will, if other factors are properly controlled, be low in ash, dissolve easily, have high adhesive strength and good flowing properties. A P.-C.

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Fractional crystallization in the Blanc process with HCl and $HNO_3$ (MALQUORI) 2. Removing $PH_3$ from gases [with production of gas contg H and N or making $NH_3$] (Fr pat 696,512) 13

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Hydrochloric acid recovery from liquids. GREGOIRE MINKOFF and MARCEL LEVY (to International Sugar and Alcohol Co , Ltd ) U S 1,798,099, March 24 See Brit. 307,986 (*C A* 24, 208)

Storing hydrocyanic acid. HEERDT-LINGLER GES Brit. 339, 717, Oct. 22, 1928. HCN (alone or absorbed in porous or granular substances) is packed in closed metal containers from which the atm O is expelled by boiling the HCN, by generation of an inert gas such as N or $CO_2$ in the container, or by pumping

Stabilizing hydrocyanic acid. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER Ger 517,918, July 4, 1925 HCN is rendered stable by adding such org halogen compds (excepting irritants) which split off acid residues under the given conditions. Examples are $C_2H_3Cl_3$, $C_2HCl_3$, $C_2Cl_4$, $CHCl_3$, etc.

Nitric acid. NIKODEM CARO and ALBERT R FRANK. Fr 696,401, Aug 17, 1929. Gaseous mixts contg oxides of N, O and steam are obtained by the oxidation of $NH_3$ A part of the steam is removed, the remaining water is sepd during a 2nd phase, after or during the oxidation of the gaseous oxides of N, in a 3rd phase $N_2O_4$ or concd. $HNO_3$ is obtained Details of the process are given. Cf. *C A* 25, 2527.

Phosphoric acid. SOC. DES PHOSPHATES TUNISIENS ET DES ENGRAIS ET PRODUITS CHIM Fr 696,127, May 26, 1930 Concd $H_3PO_4$ is clarified by satg the heated acid with $H_2S$, adding $As_2S_3$, stirring and then allowing the solids to ppt

Phosphoric acid and hydrogen. MARKUS LARSSON (to Du Pont Ammonia Corp ). U. S 1,797,726, March 24 Phosphide of Fe is treated with steam or steam and air at an elevated temp. to oxidize the P of the phosphide to $P_2O_5$ and liberate H from the $H_2O$. An arrangement of app is described Cf. *C A*. 24, 3090

Eliminating arsenic from acid to be used in the manufacture of ammonium sulfate. SOC GÉNÉRALE DES FOURS À COKE SYSTÈMES LECOCQ Fr 696,341, May 31, 1930. See Belg 361,815 (*C A* 24, 4596).

Sulfuric acid. STANLEY ROBSON and BERTRAM LAMBERT. U. S. 1,797,923, March 24 In the catalytic oxidation of $SO_2$, sulfurous gases are subjected to such treatment only as is necessary to remove suspended solid matter and then passed in the presence of O over a catalyst contg solid Cr hydroxide hydrogel contg at least one adsorbed base

Sulfuric acid. MAX SCHROEDER Fr. 695,583, May 14, 1930. Mixts rich in $SO_2$ and air are obtained from poor gases such as roasting gases by absorbing the $SO_2$ in water under pressure and treating this soln under atm pressure in a stream action tower with the amt of air necessary to produce a suitable gaseous mixt. for the production of $H_2SO_4$. A moderate heating may be used if desired.

Sulfuric acid. NATIONAL PROCESSES, LTD , STANLEY ROBSON and PHILIP S. LEWIS. Fr 696,476, May 14, 1930 Catalytic materials for the transformation of $SO_2$ into $SO_3$ are made by mixing a compd. having a basis of V with an indifferent support in a finely divided state, damping the mixt and transforming it into an agglomerate with a suitable binder, and treating the damp agglomerate in the cold with a reducing gas until the product has an acid reaction and the V is completely reduced The V compd is either vanadic anhydride in the granular state, a metal vanadate or a soln of a sol vanadate

Sulfuric acid. INDUSTRIKEMISKA AKTIEBOLAGET. Fr. 697,173, June 10, 1930. $SO_2$ is oxidized to $SO_3$ which is hydrated in the liquid phase by leading, blowing or other-

wise causing the gas to pass through a layer or layers of liquid The layer of liquid may contain $H_2SO_4$ and $HNO_3$ or nitrosylsulfuric acid

Sulfuric acid. National Processes, Ltd Ger 516,764, Sept. 13, 1928 See Brit 303,459 (*C A* 23, 4539) and Brit 301,853 (*C A*. 23, 4306).

Rotary furnace for concentrating acids. Silesia, Verein chemischer Fabriken (Georg Narten, inventor) Ger 517,965, June 20, 1929 Details of construction are given

Separating ammonia from gas mixtures. I G Farbenind A G (Friedrich Frowein and Erich Rahlfs, inventors) Ger 519,225, Jan 11, 1929 The mixts are treated with mother liquors which contain metal salts capable of combining with $NH_3$ and which cannot easily be worked up in any other way A suitable mother liquor is obtained in the manuf of $KNO_3$ from $Ca(NO_3)_2$ and KCl The liquor comprises $CaCl_2$ with some $KNO_3$, and when treated while cooling with gases contg $NH_3$, *e g*, with $NH_3$ synthesis products, $CaCl_2 6NH_3$ is pptd After sepg the ppt, the residual soln may be returned to the first stage of the $KNO_3$ manuf, or worked up separately to recover $KNO_3$ The pptd $CaCl_2 6NH_3$ is decompd by heat. Cf *C A* 25, 2250

Alkali salts. Chemieverfahren Ges Fr. 697,069, June 3, 1930 $KNO_3$ and $Na_2CO_3$ are prepd A lye, obtained by mixing $CaSO_4$ in a mother liquor contg $Na_2CO_3$ and sepg the $CaCO_3$ thus formed, is treated with a crude sylvinitic salt of potash and $NH_3$ which produces glaserite and KCl The $K_2SO_4$, obtained by treating this mixt. with water, is treated with $CaCO_3$, previously obtained, and $HNO_3$ which gives $CaSO_4$ and $KNO_3$ The lye sepd from the glaserite and KCl is cooled to remove a part of the $NH_4Cl$ and is then submitted to the Solvay process

Alkaline earth cyanates. I G Farbenind A-G Fr 695,497, May 13, 1930 Alk earth oxides or carbonates are heated to temps between 130° and 400° with urea or substances contg it.

Alkaline earth metal chlorides from sulfates Theodor Lichtenberger and Ludwig Kaiser U S 1,798 091, March 24 An alk earth metal sulfate is dissolved in its corresponding melted alk earth metal chloride, the sulfate is reduced to sulfide (suitably by the action of coke) and the sulfide is converted into chloride by injection of Cl

Reducing alkaline earth sulfates. Wilhelm Rassbach Ger 520,458, Feb 14, 1930 A mixt. of alk earth sulfate with powd Al is ignited, *e g*, by means of a little powd. Mg The reaction products are alk earth sulfide and $Al_2O_3$, but some alk earth oxide and $SO_3$ may also be formed through the vaporization and air oxidation of some of the alk earth sulfide

Process for the manufacture of mono-alkali phosphates. Société d'études scientifiques et d'entreprises industrielles. Belg 372,395, Sept. 30, 1930 An alkali chloride or a mixt. of alkali chlorides is treated with an excess of $H_3PO_4$ so as to form $MH_2PO_4 H_3PO_4$, in which M is an alkali metal or $NH_4$. This salt is treated with alc, the insol $MH_2PO_4$ is sepd, and the $H_3PO_4$-alc mixt. is distd in presence of $H_2O$, the recovered alc being used again in the process

Carbonates. Chemieverfahren G m b H. Fr. 696,386, June 2, 1930 $K_2CO_3$ and $Na_2CO_3$ are obtained by mixing a $Na_2CO_3$ liquor with $SrSO_4$ or $BaSO_4$, sepg the alk. earth carbonate, and treating the lye with crude sylvinitic salt of K and $NH_3$ which produces glaserite and KCl Then the $K_2SO_4$ obtained by treating this mixt. of salt with water is treated in aq soln with $SrCO_3$ or $BaCO_3$ obtained previously, preferably in the presence of $CO_2$, which gives a soln of $K_2CO_3$ or $KHCO_3$ and a ppt. of $K_2SO_4$ and $SrSO_4$ or $BaSO_4$. The $K_2SO_4$ is sepd from the $SrSO_4$ or $BaSO_4$ by heating with water and the $K_2CO_3$ or $KHCO_3$ soln is evapd

Phosphates. Jean Margolès Fr 696,138, May 27, 1930 Aq solns of mono-alkali phosphates are stabilized by adding to the phosphate or to its mixts with the products resulting from the solubilization of crude phosphates, or to the water used for its soln, an acid, preferably org, which is weaker than the acid used for solubilization of the crude phosphate

Sulfates. Alphonse Zieren Fr 696,447, May 3, 1930 An app is described for the uniform distribution of $H_2SO_4$ in mech sulfate furnaces

Thiocyanates. Emil Hene Ger 517,759, Nov 20, 1928 Thiocyanates of the alkali or alk earth metals are prepd by heating S compds of the metals in the required proportions with $CN_2H_2$ or derivs at low temps between 200° and 500°. S may be added during the reaction if necessary Thus, BaS, S and $CN_2H_2$ are heated to about 300° to give $Ba(CNS)_2$ Also NaSH and $CN_2H_2$ give NaCNS Several further examples are given In all cases the yield is above 90%

Fluorine compounds. I G Farbenind A.-G Fr. 695,573, May 14, 1930

Solns of compds contg F and Al are prepd by the action of solns of $AlCl_3$ on difficultly sol compds of F in aq suspension, in such amts that there are at least 2 equivs of Al for 1 of F. Examples are given of the treatment of fluorspar and $Na_2SiF_6$. Complex compds of the formula $AlF_3$, $AlCl_3$ are formed.

**Compounds containing aluminum and fluorine.** I G FARBENIND. A.-G. Fr. 695,688, May 15, 1930. Difficultly sol compds are pptd from solns contg $AlF_3$, $AlCl_3$ (cf. Fr. 695,573, preceding abstr.) by the addn. of carbonates or hydroxides of alkali or alk. earth metals to form basic salts of Al or by the addn. of alkali fluorides to form double fluorides.

**Hypochlorite compounds.** THE MATHIESON ALKALI WORKS. Fr. 695,952, July 4, 1929. See U. S. 1,787,048 and 1,787,080 (*C. A.* 25, 781).

**Nitrogen compounds.** SOC. D'ÉTUDES CHIM. POUR L'IND. Fr. 695,964, May 22, 1930. Cyanamides and metallic cyanides are treated with gases contg. hydrocarbons, N and H at a temp. above 200° and below 1000°, whereby the elementary N becomes fixed as N derivs.

**Beryllium salts.** SIEMENS & HALSKE A.-G. (G. Hellmut Fischer, inventor). Ger. 520,151, Nov. 2, 1928. A soln. of an alkali beryllium fluoride or other halide is treated with an alk. earth hydroxide or a soln. thereof. Practically all the Be is thus pptd. as the hydroxide which is then worked up to Be salts.

**Rubidium salts.** GERHART JANDER. Ger. 517,921, Jan. 27, 1929. Rb salts are obtained by treating Rb carnallite with silicomolybdic acid, and decomposing the resulting Rb silicomolybdate by heating in a current of HCl, with evolution of $MoO_2Cl_2$. The Rb is then leached out from the $SiO_2$. An example is given.

**Water-soluble hydroxides and carbonates.** ALBERT FRITZ MEYERHOFER. Ger. 521,430, June 15, 1924. Aq. solns. of the appropriate fluorides under heat and pressure are caused to react with hydroxides or carbonates of metals forming insol. fluorides. The amt. of water should not exceed that required to produce a concd. soln., and may be less.

**Metal carbonyls.** I G FARBENIND. A.-G. (Emil Keunecke, inventor). Ger. 520,220, Aug. 15, 1928. See Fr. 677,548 (*C. A.* 24, 3329) and Fr. 37,284 (*C. A.* 25, 2528).

**Metal carbonyls.** I G FARBENIND. A.-G. (Leo Schlecht, Walter Schubardt and Emil Keunecke, inventors). Ger. 517,831, Mar. 7, 1929. See Fr. 691,100 (*C. A.* 25, 1042).

**Aluminum chloride.** I. G FARBENIND A.-G. (Johannes Brode and Carl Wurster, inventors). Ger. 520,152, Dec. 28, 1927. Anhyd. $AlCl_3$ is obtained in a stable form suitable for transport by passing $AlCl_3$ vapor into a cooled vessel, suitably into the vessel in which it is to be transported, until a solid block of the salt is obtained. The vessel may be conical and may be lined with a material hindering the adhesion of $AlCl_3$ crystals, *e. g.*, with graphite, soot or talc. Cf. *C. A.* 25, 1644.

**Aluminum chloride.** TURE R. HAGLUND. Ger. 521,339, April 1, 1925. $AlCl_3$ is prepd. by the action of anhyd. chlorinating agents, at a raised temp., on the Al sulfide melts that are obtained by fusing bauxite or the like with reducing agents and fluxes contg. S. The chlorination temp. may be sufficient to effect distn. of the $AlCl_3$. Suitable chlorinating agents are Cl, HCl and chlorides of S and P.

**Aluminum fluoride precipitation.** JOHN E. MORROW (to Aluminum Co. of Am.). U. S. 1,797,994, March 24. Pptn. is effected by adding to an $AlF_3$ soln. a small quantity of a finely divided inert material such as alumina, calcined cryolite or finely divided $AlF_3$ and subsequently heating the soln.

***Alumina from bauxite.*** WOLF J. MÜLLER and HEINRICH HILLER. Fr. 695,586, May 14, 1930. See Brit. 330,661 (*C. A.* 24, 5947).

**Alumina and phosphorus.** ODDA SMELTEVERK A/S and ERLING JOHNSON. Fr. 695,962, May 22, 1930. $Al_2O_3$ and P or $H_3PO_4$ are prepd. by fusion under reducing conditions of a phosphate ore, such as natural phosphate, and Al compds. such as bauxite, Al phosphate, etc., in the presence of compds. contg. Fe and S, so as to volatilize the P and to produce a slag contg. compds. of Al and sulfides which is used for the production of pure $Al_2O_3$.

**Aluminum oxide products from material containing aluminum sulfide.** TURE R. HAGLUND. U. S. 1,797,655, March 24. Sulfide-contg. material which may be in a solid condition is treated with an oxidizing gas such as air or $SO_2$ and $H_2O$ to effect replacement of S by O. Cf. *C. A.* 24, 1473.

**Aluminum sulfate.** COLLOID-CHEMISCHE FORSCHUNGS A.-G. Swiss 143,696, Jan. 7, 1929. Al contg. material such as bauxite, kaolin, etc., is heated with an equal amt. of concd. $H_2SO_4$ and the $Al_2(SO_4)_3$ so formed extd. with water. The aq. ext. is evapd.,

wise causing the gas to pass through a layer or layers of liquid. The layer of liquid may contain $H_2SO_4$ and $HNO_3$ or nitrosylsulfuric acid.

Sulfuric acid. National Processes, Ltd. Ger. 516,764, Sept. 13, 1928. See Brit. 303,459 (*C. A.* 23, 4539) and Brit. 301,853 (*C. A.* 23, 4300).

Rotary furnace for concentrating acids. Silesia, Verein chemischer Fabriken (Georg Narten, inventor). Ger. 517,965, June 20, 1929. Details of construction are given.

Separating ammonia from gas mixtures. I. G. Farbenind. A.-G. (Friedrich Frowein and Erich Rahlfs, inventors). Ger. 519,225, Jan. 11, 1929. The mixts. are treated with mother liquors which contain metal salts capable of combining with $NH_3$ and which cannot easily be worked up in any other way. A suitable mother liquor is obtained in the manuf. of $KNO_3$ from $Ca(NO_3)_2$ and KCl. The liquor comprises $CaCl_2$ with some $KNO_3$ and when treated while cooling with gases contg. $NH_3$, *e. g.*, with $NH_3$ synthesis products, $CaCl_2.6NH_3$ is pptd. After sepg. the ppt., the residual soln. may be returned to the first stage of the $KNO_3$ manuf., or worked up separately to recover $KNO_3$. The pptd. $CaCl_2.6NH_3$ is decompd. by heat. Cf. *C. A.* 25, 2250.

Alkali salts. Chemieverfahren Ges. Fr. 697,009, June 3, 1930. $KNO_3$ and $Na_2CO_3$ are prepd. A lye, obtained by mixing $CaSO_4$ in a mother liquor contg. $Na_2CO_3$ and sepg. the $CaCO_3$ thus formed, is treated with a crude sylvinitic salt of potash and $NH_3$, which produces glaserite and KCl. The $K_2SO_4$, obtained by treating this mixt. with water, is treated with $CaCO_3$, previously obtained and $HNO_3$ which gives $CaSO_4$ and $KNO_3$. The lye sepd. from the glaserite and KCl is cooled to remove a part of the $NH_4Cl$ and is then submitted to the Solvay process.

Alkaline earth cyanates. I. G. Farbenind. A.-G. Fr. 695,497, May 13, 1930. Alk. earth oxides or carbonates are heated to temps. between 130° and 400° with urea or substances contg. it.

Alkaline earth metal chlorides from sulfates. Theodor Lichtenberger and Ludwig Kaiser. U. S. 1,798,091, March 24. An alk. earth metal sulfate is dissolved in its corresponding melted alk. earth metal chloride, the sulfate is reduced to sulfide (suitably by the action of coke) and the sulfide is converted into chloride by injection of Cl.

Reducing alkaline earth sulfates. Wilhelm Rassbach. Ger. 520,458, Feb. 14, 1930. A mixt. of alk. earth sulfate with powd. Al is ignited, *e. g.*, by means of a little powd. Mg. The reaction products are alk. earth sulfide and $Al_2O_3$, but some alk. earth oxide and $SO_3$ may also be formed through the vaporization and air oxidation of some of the alk. earth sulfide.

Process for the manufacture of mono-alkali phosphates. Société d'Études scientifiques et d'entreprises industrielles. Belg. 372,395, Sept. 30, 1930. An alkali chloride or a mixt. of alkali chlorides is treated with an excess of $H_3PO_4$ so as to form $MH_2PO_4.H_3PO_4$, in which M is an alkali metal or $NH_4$. This salt is treated with alc., the insol. $MH_2PO_4$ is sepd., and the $H_3PO_4$-alc. mixt. is distd. in presence of $H_2O$, the recovered alc. being used again in the process.

Carbonates. Chemieverfahren G. m. b. H. Fr. 696,380, June 2, 1930. $K_2CO_3$ and $Na_2CO_3$ are obtained by mixing a $Na_2CO_3$ liquor with $SrSO_4$ or $BaSO_4$, sepg. the alk. earth carbonate, and treating the lye with crude sylvinitic salt of K and $NH_3$ which produces glaserite and KCl. Then the $K_2SO_4$ obtained by treating this mixt. of salt with water is treated in aq. soln. with $SrCO_3$ or $BaCO_3$ obtained previously, preferably in the presence of $CO_2$, which gives a soln. of $K_2CO_3$ or $KHCO_3$ and a ppt. of $K_2SO_4$ and $SrSO_4$ or $BaSO_4$. The $K_2SO_4$ is sepd. from the $SrSO_4$ or $BaSO_4$ by heating with water and the $K_2CO_3$ or $KHCO_3$ soln. is evapd.

Phosphates. Jean Margoulis. Fr. 696,138, May 27, 1930. Aq. solns. of mono-alkali phosphates are stabilized by adding to the phosphate or to its mixts. with the products resulting from the solubilization of crude phosphates, or to the water used for its soln. an acid, preferably org., which is weaker than the acid used for solubilization of the crude phosphate.

Sulfates. Alphonse Zieren. Fr. 696,447, May 3, 1930. An app. is described for the uniform distribution of $H_2SO_4$ in mech. sulfate furnaces.

Thiocyanates. Emil Heine. Ger. 517,759, Nov. 20, 1928. Thiocyanates of the alkali or alk. earth metals are prepd. by heating S compds. of the metals in the required proportions with $CN_2H_2$ or derivs. at low temps. between 200° and 500°. S may be added during the reaction if necessary. Thus, BaS, S and $CN_2H_2$ are heated to about 300° to give $Ba(CNS)_2$. Also NaSH and $CN_2H_2$ give NaCNS. Several further examples are given. In all cases the yield is above 90%.

Fluorine compounds. I. G. Farbenind. A.-G. Fr. 695,573, May 14, 1930.

Solns of compds contg F and Al are prepd by the action of solns of $AlCl_3$ on difficultly sol compds of F in aq suspension, in such amts that there are at least 2 equivs of Al for 1 of F Examples are given of the treatment of fluorspar and $Na_2SiF_6$ Complex compds of the formula $AlF_3.AlCl_3$ are formed

**Compounds containing aluminum and fluorine.** I G Farbenind. A.-G. Fr. 695,688, May 15, 1930 Difficultly sol compds are pptd from solns contg $AlF_3$, $AlCl_3$ (cf Fr 695,573, preceding abstr.) by the addn of carbonates or hydroxides of alkali or alk. earth metals to form basic salts of Al or by the addn of alkali fluorides to form double fluorides

**Hypochlorite compounds** The Mathieson Alkali Works Fr 695,052, July 4, 1929 See U S 1,787,048 and 1,787,080 (*C. A.* 25, 781).

**Nitrogen compounds.** Soc d'Etudes Chim pour l'Ind Fr 695,994, May 22, 1930 Cyanamides and metallic cyanides are treated with gases contg hydrocarbons, *N and H at a temp above 200 and below 1000°*, whereby the elementary N becomes fixed as N derivs

**Beryllium salts** Siemens & Halske A G (G Hellmut Fischer, inventor) Ger 520,151, Nov 2, 1928 *A soln of an alkali beryllium fluoride* or other halide is treated with an alk. earth hydroxide or a soln thereof Practically all the Be is thus pptd as the hydroxide, which is then worked up to Be salts

**Rubidium salts.** Gerhart Jander Ger 517,921, Jan 27, 1929 Rb salts are obtained by treating Rb carnallite with silicomolybdic acid, and decomposing the resulting Rb silicomolybdate by heating in a current of HCl, with evolution of $MoO_2Cl_2$ *The Rb is then leached out from the $SiO_2$ An example is given*

**Water-soluble hydroxides and carbonates.** Albert Fritz Meyerhoffer Ger 521,430, June 15 1921 Aq solns of the appropriate fluorides under heat and pressure are caused to react with hydroxides or carbonates of metals *forming insol fluorides* The amt of water should not exceed that required to produce a coned soln., and may be less

**Metal carbonyls.** I G Farbenind A.-G (Emil Keunecke, inventor) Ger. 520,220, Aug 15, 1928 See Fr 677,548 (*C. A.* 24, 3329) and Fr 37,281 (*C. A.* 25, 2528)

**Metal carbonyls.** I G Farbenind A.-G (Leo Schlecht, Walter Schubardt and Emil Keunecke, inventors) Ger 517,831, Mar. 7, 1929. See Fr. 691,100 (*C. A.* 25, 1042).

**Aluminum chloride.** I. G Farbenind A.-G (Johannes Brode and Carl Wurster, inventors) Ger 520,152, Dec 28, 1927. Anhyd $AlCl_3$ is obtained in a stable form suitable for transport by passing $AlCl_3$ vapor into a cooled vessel, suitably into the vessel in which it is to be transported, until a solid block of the salt is obtained The vessel may be conical and may be lined with a material hindering the adhesion of $AlCl_3$ crystals, *e. g.*, with graphite, soot or talc Cf *C. A.* 25, 1044

**Aluminum chloride.** Turf R Haglund Ger 521,339, April 1, 1925. $AlCl_3$ is prepd by the action of anhyd chlorinating agents, at a raised temp., on the Al sulfide melts that are obtained by fusing bauxite or the like with reducing agents and fluxes contg S The chlorination temp may be sufficient to effect distn of the $AlCl_3$ Suitable chlorinating agents are Cl, HCl and chlorides of S and P

**Aluminum fluoride precipitation.** John E Morrow (to Aluminum Co of Am.) U S 1,797,094, March 24 Pptn is effected by adding to an $AlF_3$ soln a small quantity of a finely divided inert material such as alumina, calcined cryolite or finely divided $AlF_3$ and subsequently heating the soln

**Alumina from bauxite.** Wolf J Müller and Heinrich Hiller Fr. 695,586, May 14, 1930 See Brit 330,661 (*C. A.* 24, 5047)

**Alumina and phosphorus.** Odda Smelteverk A/S and Erling Johnson. Fr 695,962, May 22, 1930 $Al_2O_3$ and P or $H_3PO_4$ are prepd by fusion under reducing conditions of a phosphate ore, such as natural phosphate, and Al compds such as bauxite, Al phosphate, etc., in the presence of compds contg Fe and S, so as to volatilize the P and to produce a slag contg compds of Al and sulfides which is used for the production of pure $Al_2O_3$

**Aluminum oxide products from material containing aluminum sulfide.** Turf R. Haglund U. S 1,707,635, March 24 Sulfide contg material which may be in a solid condition is treated with an oxidizing gas such as air or $SO_2$ and $H_2O$ to effect replacement of S by O. Cf. *C. A.* 24, 1473.

**Aluminum sulfate.** Colloid Chemischip Forschungs A.-G Swiss 143,696, Jan. 7, 1929 Al contg material such as bauxite, kaolin, etc., is heated with an equal amt. of coned. $H_2SO_4$ and the $Al_2(SO_4)_3$ so formed extd. with water. The aq ext. is evapd.,

purified by addn. of alc., filtered and the $Al_2(SO_4)_3$ obtained by crystn. An example is given stating that a 50-60% yield is obtained

Ammonium sulfate. Daniel Vorländer and Albert Lainau. Ger. 519,043, Aug. 22, 1929. $(NH_4)_2SO_4$ is prepd. by oxidizing $(NH_4)_2SO_3$, or a mixt. of $NH_3$ and $SO_2$, in the presence of a complex cobalt sulfito-ammonia compd., which may be formed *in situ*. Thus air may be passed over solid $(NH_4)_2SO_3$ moistened with an aq. soln. of a cobaltammine or an ammoniacal soln. of $CoSO_4$ may be circulated in countercurrent to a mixt. of air, $NH_3$ and $SO_2$. Gases poor in $SO_2$ may be treated, and the air used may be completely deoxygenated in the process.

Ammonium sulfate. Gewerkschaft Victor Stickstoffwerke (Hans Schmalfeldt inventor). Ger. 517,967, May 7, 1929. In evapg. $(NH_4)_2SO_4$ solns., $Na_2SO_4$ and $NH_4HCO_3$ are deposited as well as $(NH_4)_2SO_4$. To avoid this, the soln. is neutralized with $HNO_3$ prior to evapn. so that $(NH_4)_2SO_4$ can be crystd. out at a certain stage of the evapn. leaving $NH_4NO_3$ in soln.

Ammonium carbonate. Kali Chemie A.-G. (Friedrich Rusberg and Gustav Clauss inventors). Ger. 517,758, Mar. 2, 1926. Addn. to 488,757 (*C. A.* 24, 2251). The crust of solid $(NH_4)_2CO_3$ formed on the walls of the chamber, previously moistened with water or $(NH_4)_2CO_3$ soln. into which gaseous $NH_3$ and $CO_2$ are led, as described in 488,757, is improved by keeping the temp. of the chamber below 60°.

Antimony oxides. Deutsche Schmelz- und Raffinierwerke A.-G. Fr. 696,448, May 5, 1930. Pure amorphous oxides of Sb, particularly the trioxide, with good covering power are made by heating Sb, Sb ores or mixts. of ores to a high temp. and then burning the metal with air or O dild. with inert gases, *e. g.*, O and $CO_2$.

Barium carbide and acetylene. International Industrial & Chemical Co., Ltd. Ger. 517,993, Nov. 29, 1928. See Fr. 682,479 (*C. A.* 24, 4362).

Calcium hypochlorite. The Mathieson Alkali Works. Ger. 517,964, May 24, 1927. $Ca(OCl)_2$ is formed by chlorinating an aq. lime mash and pptd. with NaCl. Examples are given. Cf. *C. A.* 25, 781.

Dehydrating calcium phosphate. I. G. Farbenind. A.-G. Fr. 697,287, June 12, 1930. $CaHPO_4$ contg. water of crystn. is dehydrated by suspending it in an aq. liquid, preferably of acid reaction and heating to the temp. necessary for dehydration. Substances favoring dehydration such as fluorides or silicofluorides may be added to the liquid. The liquid is used again.

Storing liquid carbon dioxide. P. Stapf. Brit. 338,777, Dec. 3, 1929. A tank and compressor system is described in which liquid $CO_2$ may be stored under low pressure and near triple-point temp. and various details of operation are given.

Carbon disulfide. I. G. Farbenind. A.-G. (Eberhard Legeler and Hermann Kob, inventors). Ger. 521,336, Dec. 14, 1926. An app. for superheating the S vapor is located in the same heating space as the reaction retort. In the case of an electrically heated retort, the superheater may be located in the retort. Cf. *C. A.* 25, 2251.

Carbon disulfide. I. G. Farbenind. A.-G. Ger. 521,337, June 8, 1923. Superheated S vapor is led to a retort contg. heated C. The supply of S vapor may be regulated so that the reaction temp. is maintained in the retort by the heat of the reaction.

Chlorine dioxide. Willy Becher. Ger. 517,755, Sept. 27, 1929. In the prepn. of $ClO_2$ from chlorate and concd. $H_2SO_4$, the chlorate is mixed with water and indifferent inorg. material to form solid pieces, into which the concd. $H_2SO_4$ is then poured. Thus $KClO_3$ is mixed with gypsum made into a paste with water, and dried. 96% $H_2SO_4$ is then added. Further examples are given.

Magnesium chloride. I. G. Farbenind. A.-G. Fr. 697,285, June 12, 1930. Hydrated $MgCl_2$ is dehydrated, without much decompn., into MgO and HCl, by introducing it into a mixt. of chlorides in soln., *e. g.*, KCl 50, NaCl 40 and MgCl 10%, the content of $MgCl_2$ in soln. not being allowed to pass that of natural carnallite. The dehydration may be combined with the production of Mg by electrolysis by introducing the hydrated $MgCl_2$ into a chamber sepd. from that of the electrodes, in a part of the electrolyte poor in $MgCl_2$.

Magnesia. Rheinisch Westfälische Kalkwerke. Ger. 519,420, Sept. 27, 1928. See Brit. 319,690 (*C. A.* 24, 2555).

Potassium nitrate. Wintershall A.-G., Carl T. Thorssell and August Kristensson. Ger. 517,919, Mar. 17, 1927. Solns. of KCl and $HNO_3$ are mixed in the concn. described in Ger. 242,014. After sepg. the $KNO_3$ from the mother liquor, the NOCl present is reduced to NO and worked up to $HNO_3$. $FeCl_2$ is used as the reducing agent at low temps. An example is given.

Sodium phosphate. I. G. Farbenind. A.-G. Fr. 696,360, May 31, 1930. Hydrates of $Na_3PO_4$ having various amts. of water of crystn. are made by neutralizing

$H_3PO_4$ with $Na_2CO_3$ and NaOH in a single operation The concn of the $H_3PO_4$ is detd by the content of water of crystn to be obtained It is treated with an amt of $Na_2CO_3$ calcd to produce $Na_2HPO_4$ and an amt of NaOH necessary to form $Na_3PO_4$

**Sodium sulfide.** I G Farbenind A -G Fr 696,451, May 6, 1930. Pure anhyd $Na_2S$ is prepd by reducing $Na_2SO_4$ in molded pieces below the m p of $Na_2SO_4$ by means of H or other reducing gases Cf *C A* 25, 1956

**Sulfur dioxide.** Soc anon pour l'ind chim a Bale Brit 339,926, May 15, 1929. Fr 695,500, May 13, 1930 $SO_2$ is obtained in concd form from gases contg it by absorbing it in a mixt of water and an aromatic amine such as aniline, and expelling the absorbed gas by heat

**Furnace for making sulfur dioxide by burning hydrogen sulfide.** C Otto & Co G m b H Ger 520,150, April 4, 1930

**Aqueous dispersion of titanium dioxide.** Charles de Roiden (to Commercial Pigments Corp) U S 1,797,760, March 24 For producing an aq soln contg highly dispersed $TiO_2$, about 1 part of $TiO_2$ which has been calcined after coagulation from an aq colloidal dispersion is ground with about 1 part of a dil $NH_4$ soln and water is added to the resultant paste.

**Borax.** Henry Blumenberg, Jr Fr 695,274, May 7, 1930 Borax contained in borax ores is dissolved out with water, the soln is sepd and a sol compd of an alk earth metal is added to ppt an insol borate which is calcined

**Active carbon.** I G Farbenind A G (Alwin Mittasch and Josef Jannek, inventors) Ger 517,966, Feb 6, 1923 Lignite consisting mostly or wholly of humus sol in aq alkali or $NH_4$ soln., is heated to 1000° or over The porous active C so obtained is washed with HCl and is useful in the catalytic prepn of $H_2S$ Cf *C A* 25, 2253

**Active carbon; fuel gas.** Metallges A -G (Gustav Bailleul, inventor) Ger 520,381, Oct 5, 1929 Cheap adsorption C and a heating gas are obtained by treating carbonaceous materials such as semi-coke and lignite with a mixt of steam and O, with or without other gases, contg not more than 6% by vol of O The steam-gas mixt is preheated to a temp between 120° and 200°, and the reaction temp., which is generally maintained without external heating, is about 500-600°. The conditions are adjusted so that the loss in wt of the carbonaceous materials does not exceed 40% The process may be effected at atm., raised, or reduced pressure, and the carbonaceous materials may be stationary or moved in countercurrent to the steam gas mixt. Examples and addnl details are given

**Compressing chlorine.** Krebs & Co., Ges Brit 339,855, Oct 10, 1929 Cl to be compressed is cooled by liquid Cl introduced and allowed to expand in it. App. is described

**Hydrogen.** Alfred T. Larson (to DuPont Ammonia Corp) U. S 1,797,426, March 24 Steam and CO, in a volume ratio of at least 1 5 to 1, are subjected to the action of a catalyst contg Cu and ZnO at a temp sufficiently high (suitably about 300-600°) to effect reaction with production of H Cf *C A*. 25, 1315.

**Hydrogen.** D Tyrer and Imperial Chemical Industries, Ltd Brit. 340,050, Oct. 3, 1929. H or gas mixts contg H are obtained by the alternate passage of hydrocarbon gas (with or without addn of steam) and air through a bed of highly heated coke or refractory material, the air being supplied at different levels within the bed or in different amts at different levels Various details of app and procedure are described Cf. *C. A*. 24, 5117.

*Phosphorus.* Metallges. *A -G Fr 696,540, May 27, 1930.* P or O compds of P are prepd from crude phosphates in pieces in a shaft furnace, a phosphate previously fritted in pieces in an appropriate app., *e g*, a Dwight Lloyd machine is used

**Phosphorus.** Wsesousnoe Objedinenie Chimitschieskoy Promyschlennosti "Wsechimprom" Ger 520,382, Apr 25, 1930 Pulverulent red P is prepd by simultaneously heating and grinding yellow P, *e g*, in a ball mill App. is described

**Purifying sulfur.** I G Farbenind. A -G Fr. 696,010, May 23, 1930. S is purified by treating it at ordinary or raised temp. with acids of medium concn while eliminating, if necessary, the tarry impurities by a simultaneous treating with energetic oxidizing agents

**Crystalline substances.** Superfine Chemicals, Ltd. Fr. 695,508, May 13, 1930 Cryst substances, particularly salts, are obtained in a more easily sol form than the ordinary cryst form by producing, in a vessel having a smooth and substantially continuous interior surface, a relatively large amt of a supersatd soln of the substance in question by cooling in the state of rest a hot concd soln, and at the same time pre

venting evapn at the surface of the soln The cooled soln. is then agitated or seeded Examples are given

Sulfonation Paul Baumgarten Ger 519,046, Aug 12, 1926. Org or inorg substances to be sulfonated are treated in aq soln or suspensions with a trisubstituted sulfamic acid prepd by treating a tertiary amine with $SO_3$ or a compd giving rise thereto Examples are given

Active masses suitable for use as catalysts. Fritz Stoewener (to I G Farbenind A G) U S 1,797,804, March 24 After prepg an irreversible colloid of the second kind such as silica sol it is mixed before drying with a catalytic substance such as $CuSO_4$ and the mixt is then dried and most of the catalytic substance may be removed (as by acids) to leave a highly adsorbent product Cf *C A* 24, 3615

Urea-formaldehyde condensation products. Kunstharzfabrik F. Pollak G m b H Brit 339,601, May 11 1929 See Fr 680,110 (*C A* 24, 3867)

Urea-formaldehyde condensation products. Fabriques de produits de chimie organique de Laire J Malet and R Armenault Brit 340,114, Dec 6, 1928 Condensation of urea or its derivs with formaldehyde or its polymers is effected in the presence of a Zn or Pb carbonate or oxide, Bi carbonate, a colored metal carbonate, or $TiO_2$ (an example being given of the use of $ZnCO_3$ in producing a moldable product from urea and formaldehyde)

Condensation products containing halogen. I G Farbenind A G Fr 695,602, May 14 1930 Aq solns of $CH_2O$ satd with hydracids are caused to react on phenols with the exception of nitrophenols, halogen phenols and those contg a COOH or aldehydic radical Cryst. or resinous products are obtained according to the conditions of working and contain halogenated methyl groups They are useful as starting materials for the manuf of *dyes artificial resins, tanning materials* etc

Moldable phenolic pentosan material. Orland R Swepney (to Iowa State College of Agriculture and Mechanic Arts) U S 1,797,559, March 24 Reaction is effected between a solid pentosan-contg material such as corncobs and a phenol (the latter being in a proportion of approx 60% by wt of the pentosan-contg material) in the presence of HCl approx 10% by wt of the pentosan material, at about 100° for 3 hrs

Moldable phenolic pentosan material. Orland R. Swpney (to Iowa State College of Agriculture and Mechanic Arts) U S 1,797,593, March 24 A process similar to that described in U S 1,797,559 (preceding abstr.) is employed for effecting reaction of ground corncobs and cresol in the presence of S monochloride.

Aromatic condensation products. Compagnie nationale de matières colorantes et manufactures de produits chimiques du Nord réunies établissements Kuhlmann Fr 695,980, May 22, 1930 Products which as salts or "free" are *emulsifying, wetting or dispersing agents* are prepd by condensing aromatic hydrocarbons, sulfonated or not, with esters of $ClHSO_3$ Condensing agents such as $H_2SO_4$, oleum or $ClHSO_3$ may be used. Thus, $C_{10}H_8$ is sulfonated and the reaction product of $SO_2Cl_2$ on iso-PrOH is added and the mixt heated to about 100° for 4 hrs

Celluloid substitute. Motomu Sugata U S 1,797,806, March 24 Camphor (suitably in the proportion of about 50% the wt of the rosin) is added to rosin and the mixt. is heated to fuse it to a sticky condition and is mixed with a product such as may be obtained by boiling floss-silk, other silk or like fiber in dil alkali soln so as to swell and gelatinize it, suspending homogeneously in alc or ether and mixing intimately with $MgCO_3$ or MgO, and heating and kneading

Artificial substances Bakelite Corp Fr 695,589, May 14, 1930 Nonfibrous artificial substances are composed of viscose, the surface of which carries a coating of a flexible resinoid of phenol and possesses a dielec resistance of more than 1000 v per mm

Artificial substances. Hans Kappeler Fr 697,169, June 10, 1930 Infusible substances are prepd by condensing furfural or its derivs with other aldehydes or their polymers with or without solvents or diluents and in the presence of acid condensing agents Several examples are given

Artificial masses. I G Farbenind A -G Fr 696,008, May 23, 1930 Artificial masses are made by condensing polyvinyl esters with unsatd aldehydes in the presence of catalysts The products may be vulcanized in the usual manner or fillers, dyes, etc., may be added

Plastic masses from ivory-nut material. Emil Teltschik & Co Ger 516,589, Dec 11, 1927 The ivory nut material is ground up, treated with an org solvent and added to binding material Thus, the powd nut is mixed with S and MgO and treated with $C_6H_6$. Rubber soln may be added and the whole pressed at 70–100° Another example describes the admixt. of acetone, celluloid waste and rubber soln

**Moldable compositions.** BAKELITE CORP. Fr 695,699, May 15, 1930. A moldable compn contains granular or fibrous filling substances and resinoid binders in colloidal dispersion in a soln so as to be easily sepd from the liquid and applied to the filler Examples are given

*Molded fibrous materials.* COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ. Fr 696,962, May 13, 1930 In making molded fibrous materials, the binding agent and the other ingredients of the mixt except the fibers are reduced to a powd state and are dispersed along with the fibers in water The aq suspension is sepd into an aq and a solid phase, the latter serving, after drying, as a primary material for molding

**Construction material.** FRIDA ROSE REIMANN NÉE VAN JACKSTEN Fr. 696,509, May 20, 1930 Coumarone resin is melted with filling materials with the addn of lithopone and if necessary hard waxes, hydrocarbons of high mol wt or rubber

**Artificial horn.** INTERNATIONALE GALALITH GES. HOFF & CO Ger 521,346, Jan 14, 1928 Artificial horn is prepd by moistening casein until its total moisture content is about 20–25%, allowing it to stand in the cold for 6–15 hrs, homogenizing it between heated rolls under high pressure and then cooling one of the rolls so as to form a skin The product is cut off, molded and further worked up as usual

**Adsorption and filter masses.** RHEINHOLD & CO, VEREINIGTE KIESELGUHR- UND KORKSTEIN GES. Ger 517 756, Feb 23, 1929 Kieselguhr contg Fe and S compds is heated with natural or org addns The temp is kept below 600° to avoid the formation of readily sol S and Fe compds Oil or vegetable fiber is mentioned as the added material

*Improving the filtration and decolorizing properties of kieselguhr.* RHEINHOLD & CO, VEREINIGTE KIESELGUHR- UND KORKSTEIN GES Ger 517,757, May 7, 1929 The kieselguhr is mixed with natural org material and subjected to a heating process at suitable temps for suitable times Tables showing the effect of heating various kinds of kieselguhr at temps ranging from 300° to 600° with methylene blue are given

**Kieselguhr.** RHEINHOLD & CO, VEREINIGTE KIESELGUHR- UND KORKSTEINGESELLSCHAFT Ger 517,536, Apr 27, 1929 The acid content of kieselguhr is reduced by heating the crude material with exclusion of air, at suitable temps, *e. g.*, 250–600°

**Kaolin purification.** E MÜLLER Brit. 340,142, Jan 4, 1930 Kaolin (previously sepd from raw material, as by fractional pptn with or without the addn of electrolytes, centrifugal action, etc) is formed into a suspension of a sp gr of 1 06–1 12 and is subjected to further fractional pptn. by allowing it to stand for about 12 hrs (the height of the suspension vessel being not greater than $\frac{3\,2}{S-1}$ cm, where $S$ represents the sp gr. of the suspension. The poured-off and filter-pressed suspension is a highly plastic kaolin of a high degree of purity

*Treating bauxite.* METALLGES. A.-G (*Hans Siegens, inventor*). Ger 509,131, June 2, 1926 In the manuf of $Al_2O_3$ and ferrosilicon by electrothermic reduction with C of the oxide impurities in bauxite, the sepd ferrosilicon is freed from Al by using it to pre reduce a further batch of bauxite After sepg the purified ferrosilicon, the pre-reduced bauxite is further reduced with C Operative details and examples are given

**Asbestos and other artificial fibers.** WERNER LÜDKE. Fr. 697,254, June 12, 1930. Asbestos and like artificial fibers are made by spinning, according to the processes used in the artificial silk industry, sol silicates or mixts of silicates in soln through appropriate coagulating agents such as inert gases or through vapors of org liquids, or org liquids such as acetone or alc. Neutral salts such as $MgCl_2$ or $CaCl_2$ may be used as pptn or conversion agent.

*Lime kilns.* LÉANDRE RIGAUD. Fr 695,343, May 9, 1930.

**Apparatus for slaking lime.** SPOERRI & CO Swiss 142,389, Dec. 23, 1929 Details are given.

**Rotary-drum apparatus for slaking lime.** SPOERRI & CO Ger. 519,007, Dec. 28, 1929

**Adhesive.** MARIE A MAJOR NÉE ODAU. Ger. 521,199, Mar. 17, 1928 A thick adhesive for patching fabrics, etc, comprises crude crepe rubber 10, $C_2HCl_3$ 80, $C_2Cl_4$ 20, AcOEt 25 and methylated spirit 15 parts Cf. *C. A.* 25, 1348.

**Adhesive.** NAAMLOOZE VENNOOTSCHAP W. A SCHOLTEN'S CHEMISCHE FABRIEKEN Fr 696,635, June 4, 1930. A dry stable product capable of use as a strong glue is made by incorporating sol salts of naphthenic acid with an alk. starch capable of swelling in cold water or like starchy materials

**Viscous adhesive.** ADOLF MENGER (to I. G FARBENIND A.-G). U. S. 1,798,097, March 24 Nitrocellulose and ethyl acetanilide are used together with a softening

agent such as castor oil and a solvent and ground asbestos (suitably at least 10%) to form a viscous highly sticky product suitable for uniting leather or wood veneer to iron or Al. Various other mixts. are described

Cold-water paste. Henkel & Cie G m b H Fr. 696,867, June 10, 1930. Starch and products resembling starch are made suitable for the manuf of cold water pastes by heating them under pressure.

Marine algae Compagnie française de l'iode et de l'algine. Fr. 695,778, Sept. 6 1929 Marine algae are submitted to the action of solns. of alk. earth salts which transform the algine into an alk. earth compd not capable of swelling in water After dilu with water the compd is treated with dil $H_2SO_4$, washed and taken up by an alk. soln to form a soln of an alkali alginate which is filtered to sep cellulose. Cf *C. A.* 24, 2563

Cleaning metal surfaces. C. F Dyerly Brit. 340,047, Sept. 28, 1929 Rust and oil etc., are removed from metal surfaces such as those of vehicle bodies by the use of rust solvents (such as phosphoric, selenic, oxalic, acetic, tartaric or citric acids) together with a compatible oil and grease-solvent such as alcs., ketones such as Et Me ketone or esters and a thickening agent (such as raw sienna or metallic oxides such as ferric or Mn oxides) which is inert at ordinary temp but reacts with the rust solvent on heating or drying and thus renders the compn friable and "self peeling" A pigment such as willow charcoal or lampblack may also be added

Polish for lacquered surfaces, etc. Arthur van der Bruggen Ger. 519,084, May 2 1928 Collodion, wax $PhNO_2$ and petroleum are used with or without acetone

Composition for cleaning and polishing painted or other surfaces. James G Fancy U. S. 1,798,075, March 24 Phosphate rock powder 16, soap 4 and alc. 8 parts.

Coating compositions. Jean L. Sicard and Alice Sicard née Paris. Fr. 697,120, June 6, 1930 A coating compn which agglomerates instantly is made by heating 3 parts of glue with 1 part of alum to 60° and incorporating 10 parts of sawdust or the like

Coating materials. Hermann Mayr. Fr. 697,211, June 11, 1930 A metallic coating on objects of all kinds is obtained by applying several layers of a mixt. of metallic powder, powd. graphite, prepd. chalk, Java chalk, $Na_2SiO_3$ and casein Cf *C. A.* 25, 484

Decorating agents. Jean de Granville Fr. 696,776, Sept. 4, 1929 A double oxysulfate of Zn and Al is prepd. by the reaction of $Al_2(SO_4)_3$ with ZnO under pressure and at 50° A plastic mass, which is resistant and very hard, is obtained by carrying out the reaction in the presence of a mass capable of independent crystn. such as re-heated $CaSO_4$ The mass obtained may be molded, and nitrated cellulose previously dissolved in acetone etc., may be added during mixing Metal powders may also be added

Peroxide containers. I G Farbenind A.-G. Fr. 695,498, May 13, 1930. $H_2O_2$ or other peroxide compds. are produced treated or stored in metal vessels coated with an enamel very resistant to acids

Wetting agents. Röhm & Haas Co Fr. 696,328, May 30, 1930 For wetting, emulsifying, or penetrating agents use is made of salts of tertiary alkyl amines in which the alkyl radicals consist of a long straight chain of C atoms and 2 straight chains with not more than 4 C atoms in each, except the hydrochloride of cetyldiethylamine, the remaining valencies of the C atoms being completely satd. with H Examples are given of the prepn. of salts of *n*-octyldiethylamine, di-*n*-butyllaurylamine, dimethylcetyl amine and diethyloctadecylamine

Wetting, etc., agents. I G Farbenind A.-G. Fr. 693,814, April 12, 1930 Sulfuric acid esters of aliphatic, cycloaliphatic or aliphatic-aromatic compds., each atom of which has not more than 2 valencies bound to the O or their salts are used as wetting, cleansing, dispersing or solvent agents Thus cetyl alc. in ether soln. is treated with $ClHSO_3$ and the ether is removed, giving a product for use as wetting, etc., agent in the textile industry Several other examples are given Fr. 693,815 describes the prepn. of wetting etc., agents by transforming alcs. or amines or their derivs. with carboxylic acids or their derivs. into esters or amides, the substances participating in the reaction (aliphatic, cycloaliphatic, aliphatic-aromatic or aromatic) are chosen so that the product of reaction contains at least one aromatic radical, sulfonic groups are introduced Thus stearic acid and $C_6H_4CH\cdot OH$ are boiled while passing a current of HCl gas through. Excess $C_6H_4CH_2OH$ is removed and the product sulfonated Several other examples are given

Wetting and emulsifying agents. H Th Böhme Chem Fabrik Fr. 696,104, May 26, 1930 Wetting and emulsifying agents are prepd. by condensing triglycerides,

particularly castor oil, or unsatd fatty acids, or oils contg. a large proportion of acids and emulsifiable with water, in the presence of condensing agents, with hydrocarbons (aliphatic or aromatic, satd or unsatd) or with mixts contg hydrocarbons such as solar oil, paraffin oil or resin oil or with appropriate derivs of hydrocarbons, *e. g.*, (1) halogen compds of hydrocarbons such as $CHCl_3$, (2) ales or ethers, (3) aliphatic carboxylic acids, (4) primary or secondary amines or other N compds, except those which form insol compds with the triglycerides or their fatty acids, and (5) esters and ester acids of ales The products may be sulfonated to increase the wetting, etc, properties Several examples are given Cf. *C A* 25, 2531.

Transfer sheet. HELENA S. SADTLER U S 1,797,997, March 24 A design is printed in sol dyes on a base such as paper and after the design is dried the design-bearing surface is coated with mucilaginous material such as gum tragacanth or gum karaya

*Impregnated fibrocement plates, tubes or other objects.* G ARNOUTS and M. BLAMPAIN Belg 373,033, Sept 30, 1930 The objects, after oven-drying, are impregnated with a mixt of pitch, solvent naphtha and wood oil, or of bitumen, benzene and $CCl_4$

Sound record compositions. A D. LITTLE, INC, and H J BILLINGS. Brit. 340,099, Nov 15, 1929 Outer playing surfaces of records are formed of fibers and a binder of thermoplastic material such as shellac, with a laminated core formed of fibers and a binder including hardwood pitch and preferably also including a resin having low susceptibility to temp changes such as copal resin, manila gum, ternati gum or the like Numerous details and formulas for prepg the compns used are given

*Bearings.* FREDERICK H RAGAN (to Columbia Axle Co) U S. 1,797,444, March 24 Bearings are formed with a rigid plate or tube having cemented to it a substantial layer of granular compressible material such as cork and graphite.

Bearing material. BERT H MCQUEER (to National Carbon Co). U S 1,797,833, March 24 Bearings are formed comprising carbonaceous material such as petroleum coke, a B compd. such as borax and a polyhydric ale. such as glycol

Brake linings, etc. I. G FARBENIND A.-G. Fr 696,705, June 6, 1930 Fibrous materials are soaked with the products resulting from the condensation of urea, thiourea or their derivs or mixts with aldehydes or their polymers and molding under heat and pressure, if necessary in the presence of small quantities of an acid condensing agent The condensation may be carried out on the fiber itself

Dental cements. HANS HEYNEMANN Ger 520,138, Sept. 30, 1927 In the manuf. of these by prepg. oxides, phosphates or silicates of one or more metals of the second or third periodic group by a sintering or fusion process, and then mixing the product with $H_3PO_4$, a compd of Li is added to the material to be fused or sintered. A lower temp can then be applied, without increasing the soly of the final product.

Cigaret tips. CHEMISCHE FABRIK VON HEYDEN A.-G Ger. 516,752, Dec 31, 1926 Cigaret tips consist of a layer of cellulose hydrate mixed with mineral colors, cork or wood dust, mica, etc.

Pest-destroying agents. HEERDT LINGLER G. M. B. H. Ger. 516,594, Feb. 14, 1928 The agent depends for its action on the evolution of HCN from alk. earth cyanides when exposed to air The alk. earth cyanides are powd., optionally mixed with irritants and odorants, and pressed into briquets, etc., with binding material. Thus, $Ca(CN)_2$ is mixed with nicotine sulfate and briquetted

Phenylurethan derivatives. F. HOFFMANN LA ROCHE & Co A.-G. Ger. 519,226, Nov. 23, 1928 The dialkylaminophenyl esters of alkylcarbamic acids are converted into quaternary salts by treatment with dialkyl sulfates Examples are given The products are non hygroscopic, stable in air, sol in water, and strongly poisonous They are useful for destroying animal pests. Cf *C A* 21, 962

Rat poison. I G FARBENIND A.-G (Karl Streitwolf, Alfred Fehrle and Hubert Oesterlin, inventors) Ger. 517,513, Sept 9, 1928 A poison for rodents consists of org aromatic As or Sb compds mixed with fats, waxes, starch, albumin, etc Bait may also be added. In an example, fresh margarine is melted with chlorophenylarsine oxide. Several further examples are given.

*Foam-producing compositions for extinguishing fires.* MINIMAX A.-G. and HANS BURMEISTER Ger. 521,271, July 31, 1925 A hygroscopic substance, *e. g.*, anhyd $Na_2CO_3$, is included in foam producing compns. that are to be dry-stored

# 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G E BARTON, C. H KERR

The history of Hungarian glass manufacture. O KNAPP *Termeszettud Kozlony* 61, 46–8(1929) L SZATHMÁRY *Ibid* 481–6 —Historical review S S DE FINÁLY

Manufacture and characteristics of laminated glass WILLARD L. MORGAN, *Ind Eng Chem* 23, 505–8(1931) —The early work of Benedictus in 1911 is described In modern manuf glass sheets are cut to size, thoroughly cleaned and sprayed with a microscopic layer of gelatin Several sheets of celluloid, previously sprayed with a mixt of a plasticizer and high boiling solvent, are placed on top of the glass followed by a final glass cover These sandwiches, so-called are pressed at 200–260 F at 150–350 lb pressure for 6–20 min The edges of the finished glass are sealed with a water proofing substance such as pitch The use of cellulose acetate instead of celluloid as the inner component of laminated glass has been unsatisfactory The major problems in the industry are dirt elimination securing of permanent adhesion, selection of a plastic and control of the laminating process to prevent off color, brittleness or bubbles JOHN M LADINO

Permanent marking of glass and porcelain vessels. H G ISBELL *Chemist-Analyst* 20, No 3, 20(1931) —A good ceramic ink can be prepared from 1 g $K_2CO_3$ 1 g borax 2 g PbO and 2 g $Co(NO_3)_2$ Mix with raw linseed oil with possibly a little turpentine apply with a pen and heat W T H

Removing the iron of Hungarian sands L L DE PUTNOKY AND B BORBST *Magyar Mernok Epit Közlonye* 65, 63–70(1931) —Five Hungarian sands were examd for Fe content and means for reducing it to an amount which does not prevent the use of the sand in glass ceramic, etc, industries By washing sands with 2 *N* HCl about 25% of the original Fe was removed HCl (0.5 *N*) removed only 10–12% of Fe HCl also dissolves $CaCO_3$ thus sands contg lime lose much wt and contain relatively even more Fe after washing than originally HCl attacks the limonite crust of sand particles, but it cannot dissolve grains of siliceous Fe On washing with water, a sample from Mountain Mátra gave fairly pure quartz, contg 0.2% $Fe_2O_3$ and 93.6% $SiO_2$ with some $Al_2O_3$ and no $CO_2$ Other methods for Fe removal are under examn S S DE FINÁLY

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The effect of the H ion concentration in the adsorption of ions of Ba, Al and Th by clays (HELD, SOKOLOVA) 2. Plating glass and clay (WERNER) 4. Discoloration of glass by $\beta$ and $\gamma$ rays (HOFFMANN) 3. Ceramic plates for lining dyeing and bleaching vats, etc. (Ger pat 520,375) 25.

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Apparatus for feeding molten glass. SOC. ANON MANUF DES GLACES ET PRODUITS CHIM DE SAINT GOBAIN, CHAUNY ET CIREY Fr 697,054, June 2, 1930

Glass-melting tank furnaces. W T BARKER (to Hartford Empire Co) Brit. 340,110, May 20, 1929 Structural features

Glass-tank furnace OTTO ROSENSTEIN (to Illinois Pacific Glass Corp). U. S 1,797,590, March 24 Structural features

Manufacture of glass tubes and rods. N.-V MAATSCHAPPIJ TOT EXPLOITATIE VAN UITVINDINGEN Brit 340 076 Oct. 21, 1929 Mech. features

Glass sheets or plates. C LOCREILLE Brit 339 910, March 28, 1929 Various details of app and operation are described for making sheets with an impressed pattern on one side and a fire polished surface on the other

Take-off leering conveyor for sheet-glass-forming apparatus. EUGENE GENTIL (to American Bicheroux Co) U S 1,797,649, March 24 Structural features

Flatting furnaces for reheating glass sheets or plates, etc. FELIX J MALHERBE U S 1,797,780, March 24 The life of fireproof materials such as those of the soles of flatting furnaces is increased by impregnating them with a mixt of Na and K silicates in petroleum

Apparatus for conveying intermittently rolled plate glass to a number of leers. SOC. ANON DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE ST GOBAIN, CHAUNY & CIREY Ger 521,299, Feb 5 1929

Roll-conveyor leer for intermittently rolled plate glass. N V MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN Ger 521,298, May 11, 1930

Plant for cutting plate glass in plastic state. N.-V MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN Ger 519,477, Oct 4, 1928

**Glass-annealing apparatus.** CHARLES HUZEL (to American Bicheroux Co.). U.S. 1,707,650, March 24. Structural features.

**Tempering glass.** SOC. ANON. DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE ST. GOBAIN, CHAUNY ET CIREY. Brit. 310,108, March 13, 1929. See Fr. 680,890 (C. A. 25, 700).

**Apparatus for tempering glass.** SOC. ANON. DES MANUF. DES GLACES ET PRODUITS CHIM. DE ST. GOBAIN, CHAUNY ET CIREY. Fr. 690,810, Sept. 21, 1929.

**Glass permeable to ultra-violet rays.** F. WOLLNER, R. WOLLNER and F. NIKOLAI. Brit. 330,901, March 12, 1929. See Austrian 120,071 and Fr. 691,805 (C. A. 25, 2250).

**Treating silver mirrors.** RUDOLF RITSCHL. Ger. 520,023, June 22, 1929 and 520,024, Oct. 13, 1929; addn. to 520,023. The mirror layers are mechanically and optically improved, and rendered more resistant to chem. influences, by treating them with $HNO_3$ vapor (520,023). The same results are attained by treating the mirrors with other oxidizing agents, e.g., $O$, $O_3$ or $H_2O_2$, during or after their prepn., the formation of an oxide layer (520,024) being avoided.

**Apparatus for rolling and wire-reënforcing glass sheets.** CHANCE BROS. & CO. LTD., and A. J. LOCKETT. Brit. 330,704, Nov. 20, 1929. Structural features.

**Compound glass.** GEORGE J. HEYL and MORRIS GREENHUT. Ger. 510,028, Aug. 30, 1928. A sheet of cellulose acetate or other cellulose deriv. is interposed, while immersed in a softening liquid such as triacetin, between two glass sheets, and the resulting compound sheet is pressed, rolled and finally united by steam pressure. The edges of the sheet may be treated with rubber soln. before the steam treatment.

**Composite glass bars.** EDWARD J. CONLAN (to Kimble Glass Co.). U.S. 1,707,855, March 24. A glass rod is placed within a glass tube and the intervening space is filled with a liquid cement.

**Composite sheets of glass with intervening cellulose derivative material.** CELLUTOID CORP. Brit. 330,702, Nov. 24, 1928. Intervening sheets are used for uniting glass, formed of a cellulose deriv. such as cellulose nitrate together with a non-volatile plasticizer such as dibutyl tartrate, triacetin or the like, and stabilizers such as urea, and dyes (*preferably of violet hue*) *also may be added*. *Various other details of manuf.* of the composite sheets are also described.

**Uniting sheets of glass and cellulose acetate, etc.** SOC. DES USINES CHIMIQUES RHÔNE-POULENC. Brit. 330,872, April 13, 1929. The surfaces to be united are coated with an adhesive (such as gelatin and celluloid) and the sheets are assembled at slight pressure in a bath of volatile liquid which is a solvent for the plastic sheet only when hot (such as a soln. of ethyl lactate or ale. and water with cellulose acetate sheets) and the materials are then heated in an autoclave contg. gas under pressure. *Cf. C. A.* 24, 1051.

**Safety glass.** ROBERT P. P. V. HAMOIR. Fr. 690,787, Sept. 10, 1929. Safety glass is made with sheets of glass united by a layer of transparent or translucid synthetic resins, particularly by products having a basis of urea $CH_4O$.

**Safety glass.** I. G. FARBENIND. A. G. Fr. 695,130, May 8, 1930. A layer or layers of esters of polyvinyl ale. such as polyvinyl acetate is interposed between 2 or more layers of glass.

**Bleaching and purifying clays and other minerals.** R. PERROT. Brit. 330,707, Dec. 18, 1928. "Earths" clay, china clay, quartz, feldspar, alumina, baryta, Ca and Sr carbonates and sulfates, etc., are bleached and purified by initial washing with *peptizing* of the colloid matter by a nonelectrolytic org. substance preventing coagulation such as *an infusion of plants, straw or bark, followed by solubilizing of impurities such as* Fe by a suitable oxidizing, reducing or oxidizing and basic treatment (as by successive use of Cl and $SO_2$ and $NaHSO_3$ in the presence of glycerol, glucose or Na hydrosulfite) and the purified material may be neutralized if acid, with water contg. lime, Na zincate or a silicate. Various details and modifications of procedure are described.

**Ceramic materials.** M. LASLEY. Brit. 330,770, Jan. 10, 1929. See Fr. 680,207 (*C. A.* 25, 672).

***Apparatus for making ceramic products in a continuous manner.*** WILLY LINGERSDORFF and MAX LINGERSDORFF. Fr. 695,050, May 22, 1930.

**Apparatus for drying ceramic products.** MAISON P. FOUCHÉ. Fr. 690,648, June 4, 1930.

**Drying chamber for porcelain goods.** GEBRÜDER NETZSCH. Ger. 521,000, Dec. 22, 1928.

**Furnace for baking tiles, etc.** SOC. SERDORFF-HARFRED GEORGE. Fr. 690,210, May 28, 1930.

Automatic stoker for brick kilns. ROBERT K. GOODWIN. U S 1,797,608, March 24 Structural features

Glazed silica articles QUARTZ & SILICE SOC. ANON. Ger 519,363, June 3, 1927 See Brit 273,636 (*C A* 22, 2040)

Molded articles of fused silica. QUARTZ ET SILICE Brit. 340,167, April 18, 1929. A silica blank is placed over a mold (which may be formed of graphite or Ni) so that an air tight joint is formed between the mold and blank, and suction is produced between the blank and mold while heat is applied to the blank (suitably by an O-H blowpipe)

Articles made from mica sheets. I G FARBENIND A.-G Fr 696,196, May 28, 1930 Articles such as insulators are made by uniting sheets of mica by the condensation products of dicarboxylic acids of ethers or thioethers with polyhydric alcs with or without other substances Examples are given of the use of the condensation products of diglycolic acid or thioglycolic acid and glycerol

Electrical insulation formed by vitrification of aluminum oxide. SIEMENS & HALSKE A G Brit. 339,726, Oct. 17, 1928 To avoid formation of Al carbide in producing insulation such as that for spark plugs, by vitrification of $Al_2O_3$, the heating is carried out in an elec. furnace free from C parts and in a vacuum or atm free from reducing gases or vapors contg C. An atm. of mixed N and H may be used. Cf *C A* 24, 447.

Refractory furnace linings. T H GRAY. Brit. 340,141, Jan 1, 1930. A furnace lining is made of fireclay mixed with about 1.5 times as much foundry sand, which is screened and dampened and made into a paste with the clay Other fillers may be added.

Apparatus for projecting refractory material on to furnace walls. BLAW-KNOX CO Ger 519,163, Feb. 28, 1929

Refractory and acid-proof masses, coatings, etc. STETTINER CHAMOTTE-FABRIK A. G VORM DIDIER. Ger 521,350, Dec. 23, 1924 Use is made of refractory and acid-proof substances, *e g*, Zr or $ZrO_2$, with the use as binder of colloidal $ThO_2$ in the form of a mineral glue obtained by boiling Th salts with acids

Abrasives. SOC. ANON DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE ST GOBAIN, CHAUNY & CIREY Ger 521,124, June 17, 1928 Ground bauxite is mixed with up to 2% of an alkali or alk. earth fluoride or fluosilicate, and the mixt. is heated to 1300–1350°

Enamels. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM ROESSLER. Fr 695,609, May 14, 1930 Enamels, which are resistant to acids, are made by melting together $Li_2SiO_3$ or a eutectic mixt of $Li_2O$ and $SiO_2$ with a flux such as minium.

Rotary furnace for enameling and glazing MITTELDEUTSCHE STAHLWERKE A.-G (Wilhelm Philipp inventor) Ger 490,973, Feb 28, 1928 Structural details are given.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Cement investigations in Japan. C. R. PLATZMANN *Tonind.-Ztg* 55, 424–5 (1931).—A summary of articles by S Nagai *et al* appearing in *J. Soc Chem Ind* (Japan) 33, (1930) B A SOULE

Chemical composition—influence on manufacture and quality of cement. ALTON J BLANK. *Rock Products* 34, No 2 62–3(1931).—As the $Al_2O_3/Fe_2O_3$ ratio increases, kiln output decreases fuel consumption increases, grinding becomes more difficult quick setting and unsoundness tend to become more frequent. These conclusions are based on several years' observations in various plants RAYMOND WILSON

Sources of trouble in a cement plant. ALBERT HEISER. *Tonind.-Ztg* 55, 433–4 (1931).—Correct sampling and accurate analyses are of primary importance. Ignorance and carelessness of employees as well as poorly working kilns must be considered. H. gives analysis of raw materials and shows how to calc. the correct mixt. for a product contg 76.4% $CaCO_3$ and a ratio $SiO_2 : Al_2O_3 + Fe_2O_3 = 2.3$ B A SOULE

Transporting and elevating in cement works. A. C. DAVIS *Cement and Cement Manuf* 3, 681–90(1930).—Belt, bucket, screw and pneumatic conveying systems are described. RAYMOND WILSON

Power for cement works. A C DAVIS *Cement and Cement Manuf* 3, 925–45 (1930).—Elec. power equipment is described. RAYMOND WILSON

New apparatus for measuring the consistency of cement pastes. KARL E DORSCH

*Zement* 20, 26–8(1931).—A plunger is allowed to fall freely between guides upon the surface of the cement paste contained in a hard rubber ring. The paste consists of 300 g. cement mixed for 3 min. with about 28% $H_2O$. The depth of penetration of the plunger or the weight of the paste displaced may be used to compare consistencies. H. F. Kriege

**Indirect determination of lime in cement with sodium oxalate.** A. Heiser. *Zement* 19, 1154–5(1930).—A definite weight, 1.9832 g., of $Na_2C_2O_4$, equiv. to 0.8300 g. CaO, is added to the soln. of 1.000 g. cement from which the $SiO_2$ and $R_2O_3$ have been removed. After several hrs.' standing, the pptd. $CaC_2O_4$ is filtered off and washed. The filtrate is made up to 500 cc., and the excess $Na_2C_2O_4$ remaining in soln. is detd. by titrating 100-cc. portions with 0.10 *N* $KMnO_4$ soln. in the usual way. H. F. K.

**Testing refractories for cement kilns.** J. Schaefer. *Zement* 19, 1112–3(1930).—A furnace is described in which cement or powd. clinker is carried by the flame against the heated face of the refractory. H. F. Kriege

**Some observations and data in connection with the manufacture of portland cement from raw materials and fuels high in sulfur content.** Alton J. Blank. *Rock Products* 34, No. 8, 64–5(1931). cf. *C. A.* 25, 183.—Clinkers of high $SO_3$ content yield cements which are unsound or show retrogression in strength. This effect may be due to CaS assocd. with the $CaSO_4$. Raymond Wilson

**The entropy of portland cement.** Geoffrey Martin. *Cement and Cement Manuf.* 3, 678–80(1930).—In calcg. the thermal balance of the rotary kiln it is necessary to consider the temp. at which heat is available. A table of entropy changes for portland cement clinker is given. Raymond Wilson

**Action of carbon dioxide and acetic acid on portland cement.** Hans Th. Bucherer and J. W. Meier. *Zement* 19, 1134–8(1930).—Various cements were titrated with 1% AcOH in the presence of $CO_2$ in an attempt to dissolve out the CaO and MgO without the $SiO_2$ and $R_2O_3$. The titration curves of the quantity of acid used against the time in seconds before the color change of the indicators occurred showed breaks or stages for most of the cements, indicating the soln. periods of definite compds. $SiO_2$ and $R_2O_3$ were found in the soln. in increasing amts. as the CaO dissolved. The titration curve of lime under similar conditions showed no breaks. H. F. Kriege

**Chemical action of gypsum and other set-retarders upon portland cement clinker.** L. Forsén. *Zement* 19, 1130–4, 1155–60(1930).—The sulfate ion disappears from 100 cc. of a satd. soln. of gypsum when shaken in contact with 50 g. of ground clinker. This is considered to be taken up by the Ca aluminates, since considerable $Al_2O_3$ dissolves in $H_2O$ unless gypsum is present. When aq. filtrates from clinker and gypsum suspensions were combined, 2 types of crystals were found, one spherulitic and the other in long needles. These crystals were found to consist of $3CaO.Al_2O_3$ plus $X CaSO_4$, where $X = 2.38$–$2.75$. From 1 to 2% of $Ca(NO_3)_2$, $CaI_2$, $CaBr_2$, $Ca(ClO_3)_2$ and $Ca(NO_2)_2$ was found to increase the setting time of clinker flour 2–3 hrs., while some sparingly sol. salts such as $CaCrO_4$, $CaSO_3$ and CaS had little effect. The action of several Ba, Na, K and $NH_4$ salts as set retarders is also discussed. Complex compds. of $Al_2O_3$, CaO and $CaSO_4$ with strong hydration and crystn. properties are thought to form first, serving as nuclei for the setting of the cement proper. H. F. K.

**Free lime in portland cement clinker and soundness of cement.** Katsugo Koyanagi. *Rock Products* 34, No. 7, 74–5(1931).—See *C. A.* 25, 1353. R. W.

**A tentative modification of the free-lime method [for portland cement].** H. R. Brandenburg. *Rock Products* 34, No. 6, 68–9(1931).—The addn. of 1 g. anhydrous $BaCl_2$ greatly hastens the soln. of CaO in the alcohol glycerol mixt. R. W.

**Crushing and preliminary grinding in portland cement manufacture.** A. C. Davis. *Cement and Cement Manuf.* 3, 813–22(1930).—Jaw, gyratory, roll, hammer and disk crushers and ball mills are described. Power requirements and characteristic size-reduction ratios are given for the various mills. Raymond Wilson

**Grinding of cement clinker.** A. C. Davis. *Cement and Cement Manuf.* 3, 1184–95(1930).—Jaw and cone crushers and ball and tube mills are discussed. R. W.

**Coal grinding.** A. C. Davis. *Cement and Cement Manuf.* 3, 1050–72(1930).—The coal grinding equipment used in the cement industry, with particular reference to unit systems, is described. Raymond Wilson

**Quick-setting silicate of soda cements for acid-proof tank and tower construction.** Foster Dee Snell and Howard Farkas. *Ind. Eng. Chem.* 23, 525–9(1931).—Acid-proof cements composed of a mixt. of inert aggregate and highly siliceous Na silicate set by evapn. of water and drying. They are workable until they dry and give a weak bond until thoroughly dry. When an acidic material such as Na fluosilicate is incorporated, the cements are workable for only a few min., set without drying and yield

a hard, brittle cement with a good bond Alk. types contg Al hydrate and neutral types contg a mixt of Al hydrate and Na fluosilicate are intermediate in properties They set after a few min to give a rubbery mass which sets further by drying The neutral or alk types are therefore best able to take up strains incidental to further building operations Details of representative types of acid proof construction are given for which the original must be consulted FOSTER DEE SNELL

Tricalcium silicate. ERNST JÄNECKE *Zement* 20, 26(1931), cf. *C A.* 24, 1309 — Further notes are given which deal with the controversy over the existence of the compds $3CaO\ SiO_2$ and $3CaO\ Al_2O_3$ or $8CaO\ Al_2O_3\ 2SiO_2$ in portland cement. H F. K

Field determination of cement content of paving concrete. H ALLEN *Eng News Record* 106, 513(1931) —A field method is described for detg the wt. per cu ft. of concrete as placed, from which data the yield and cement content per unit vol can be calcd for jobs on which proportioning is done by wt and the mixing water is accurately measured R P THOMPSON

Artificial control of the strength of concrete. III. C R PLATZMANN *Zement* 19, 1139–41(1930) —The use of certain hardening and acid proofing materials for concrete floors is discussed H F. KRIEGE

Cinders as concrete aggregate. EINER CHRISTENSEN. *J. Am Concrete Inst* 2, 583–646(1931) —Report of Comm 203 of the Institute RAYMOND WILSON

Ideally graded aggregates and the quality of concrete. PAUL HIRTEL. *Zement* 19, 1087–90, 1117–21, 1141–4, 1167–9(1930) —The combined aggregate gradings designed by Fuller and by Otzen (slightly heavier in intermediate sizes than Fuller's grading) are compared in concrete with natural gradings Both gravel and crushed basalt were used Specimens of const cement content (300 kg per cu m ) were made up to similar consistency and of nearly equal *w/c* ratio for the usual strength tests and for water imperviousness The natural sand and gravel grading which was excessively fine showed by far the lowest strength and water imperviousness The aggregates graded according to Fuller's curve gave concrete of excellent transverse and compressive strength for both crushed and rounded coarse aggregates, though slightly lower than those of Otzens gradings. Greater water imperviousness resulted from the use of Fullers grading than from any other The mere presence of a fairly high cement content is not sufficient to insure strength or quality in concrete H F. KRIEGE

Strength and resistance to sulfate waters of concrete cured in water vapor at temperatures between 100 and 350°F. DALTON G MILLER *Proc. Am Soc Testing Materials* 30, Pt II, 636–53(1930) —With some exceptions the trend of those cements that lost strength most rapidly in storage was toward greatest resistance to the action of sulfate waters Curing in water vapor between 100° and 190° F did not generally increase the resistance of concrete to the action of sulfate water, in some cases a decrease was indicated Curing in water vapor at 212° F and above markedly increased the resistance with increase of curing temps between 212° and 285° F for a 12 hr curing period Curing at 212° F has been more effective in developing resistance when continued for 6 days than for 2 Absorption of concrete cured in water vapor at high temps is not a criterion of resistance to sulfate waters H. C. PARISH

Heat balance of the gypsum plaster kettle process. WALLACE C. RIDDELL. *Rock Products* 34, No 9, 66(1931) —A report on a 10-day test run showing 61% of total heat imput utilized in calcination, 20% loss in stack gases, and 19% lost by radiation and otherwise RAYMOND WILSON

Roumanian trasses, their reactions and technical properties. A STEOPOE *Tonind-Ztg* 55, 436–8(1931) —Exptl data are given to show that the baryta no method for detn of quality is valueless. S 's method (*C A* 23, 680) is reliable B A SOULE

Scales for field tests of materials. HAROLD ALLEN *Eng News-Record* 106, 533 (1931) —A brief illustrated description of scales suitable for use in making sieve analyses, detg wt per cu ft and moisture content of aggregates, etc., for small projects for which the expense of a lab would be unwarranted R. E THOMPSON

The active material of wood-conservation agents. E PANNEWITZ *Z. Desinfekt u Gesundh* 23, 57–68(1931) —The inorg and org chemicals, in use or proposed, fungicides or insecticides in wood conservation are completely reviewed Special consideration is given to German patent literature B C BRUNSTETTER

Hygroscopicity of woods after different kinds of drying. CARL G SCHWALBE AND KURT BERNDT *Kolloid Z* 54, 314–26(1931) —Small rectangular blocks of pine (*Picea excelsa* and *Pinus silvestris*) were subjected to 92% humidity after a drying treatment. Drying at 50° in a vacuum for 24 hrs and drying at 105° for 48 hrs decreased the water absorption No difference was found on drying the wood in an $O_2$ stream or a $N_2$ stream Preswelling the wood in water and then placing in the 92% humid air

increased the water absorption The processes are irreversible only to a slight degree *Drying* with $C_2H_5OH$ or $C_6H_6$ does not change the water absorption The swelling capacity may be detd by the measurement of the water absorption A. P.

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Apparent specific gravity apparatus [for stone, slag, gravel, etc.] (Shurr) 1. Accurate air separator for fine powders (Roller) 1. *Preparation of active* $MgCO_3$ from magnesite (Mathers, Eagleson) 18. Distilling shale, coal, etc [to form pitch-like residue suitable for roads, roofing, etc.] (Brit. pat. 339,963) 22.

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Bussmeyer, Hans. **Wärmewirtschaft in der zementindustrie.** Dresden: T. Steinkopff. About 100 pp. About M. 7, bound, about M. 8.20.

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**Cement.** Charles E. Kraus. Ger. 520,053, June 18, 1926. See Brit. 253,929 (*C. A.* 21, 2778).

**Cement.** Stefan Kohut. Ger. 520,211, Oct. 9, 1929. In the manuf. of cement by a fusion process in which a mixt. of raw material and solid fuel is supplied to a shaft furnace supplementary pulverulent, liquid or gaseous fuel is supplied to the furnace, at a point above the tuyères, in order to reduce the production of CO in the furnace. The known methods of supplying supplementary fuel when smelting Fe in cupola furnaces may be adopted in the process.

**Method and apparatus for grinding cement while cooling.** Carl Pontoppidan. Ger. 519,308, Sept. 23, 1928. *Corresponds to Brit.* 283,091.

**Rotary kiln and cooling drum for use in cement manufacture.** Fritz Luther (to the firm G. Polysius). *U. S.* 1,797,831, March 24. *Structural features.*

**Shaft and rotary furnaces in series for cement manufacturing.** G. Polysius A.-G. Ger. 516,526, May 3, 1928. Details of arrangement and interconnection are given.

**Rotary-tube furnace and cooler for cement, ores, etc.** G. Polysius A. G. Ger. 520,212, Sept. 3, 1925.

**Apparatus for adding flux, etc., to cement mixtures.** G. Polysius A.-G. Ger. 517,652, Feb. 21, 1929.

**Sample plates or tiles of colored cement.** Philipp Schubert. Ger. 517,706, Jan. 23, 1930. A layer of water-absorbing material (*e. g.*, gypsum, felt, pumice, etc.) is formed on a ground plate of metal, etc., dried and the colored cement layer is then added.

**Artificial aggregate for mortars and concretes.** John E. Greenawalt. Fr. 696,067-8, May 24, 1930. See U. S. 1,786,713 (*C. A.* 25, 793).

**Porous concrete.** Enamuele Stracquadaini. Fr. 697,127, June 6, 1930. A cellular or porous concrete is made by adding powd. Al, Zn or Ca and a resin such as colophony to a cement, *e. g.*, portland cement.

**Concrete bricks, pipes, etc.** G. R. Tustian. Brit. 340,112, Dec. 3, 1929. Bricks, pipes and other articles of concrete are waterproofed and hardened by coating them, while still moist, with a compn. of cement, sand, powd. mica and water, subjecting them to steam satn. in a closed chamber, and drying.

**Mixtures of concrete and asphalt.** Hermann Milke and Josef Oberdach. Fr. 695,265, May 7, 1930. Mixts. of concrete and asphalt are prepd. by adding to mixts. of ores and natural calcareous asphalt, mixts. of coal tar and artificial asphalt.

**Macadam, etc.** I. G. Farbenind. A.-G. Fr. 697,286, June 12, 1930. A slag suitable for making macadam, paving blocks, etc., is made by adding to a slag from P furnaces, the compn. of which corresponds approx. to Ca metasilicate, about 5–10% of $Al_2O_3$. The $Al_2O_3$ may be added to the furnace charge in the form of $Al_2O_3$ or in the form of materials contg. $Al_2O_3$.

**Paving slabs.** The Dunlop Rubber Co., Ltd. Fr. 696,044, May 23, 1930. Rubber paving slabs have the upper layer of relatively elastic rubber; the intermediate layer is of hard rubber of the consistency of ebonite, and both are seated in bitumen and bituminous aggregates.

**Impregnating natural or artificial stone with bituminous material.** Kleinberger & Co. A.-G. Ger. 519,129, May 9, 1926. The stone is heated to about 250° and then immersed in a bitumen bath having a lower temp.

**Fireproof mortar.** Rheinhold & Co., Vereinigte Kieselguhr- und Korkstein-Ges. Ger. 517,959, Feb. 22, 1930. A fireproof mortar contains a mixt. of carbonates and (or) oxides of alk. earth metals and heavy metals, with an addn. of at least 2% of heavy metal oxide. In the example, the mortar contains $Fe_2O_3$, $MnO_2$, $CaCO_3$, CaO calcined kieselguhr, powd. asbestos, gypsum and $FeSO_4$.

**"Artificial marble."** F. Roses-Galceran. Brit. 339,674, Sept. 10, 1929. A

polished plate of material such as glass, "crystal," steel or brass which has been treated with oil and then cleaned is placed in the bottom of a mold, and over this is placed three successive layers of material (1) a wet mixt of cement and ochre or other earthen coloring matter to which Zn white is usually added, (2) a dry mixt of fine sand and cement, and (3) a wet mixt of rough sand and cement The product may be repeatedly treated with boiled linseed oil

Roofing material W M SHAKESPEARE (to International Copperclad Co) Brit. 340,168 March 1, 1929 Structural features of composite roofing which may be formed with asphalted felt and thin Cu (which may be in the form of an electrodeposited strip)

Securing linoleum and similar plastic masses to floors, etc. ARTIFEX CHEMISCHE FABRIK G M B H Ger 517,847, Oct 13, 1929 Use is made of a layer of an uncongealed mixt of oil and $CS_2$ to which mineral material may be added Latice and tar-oil may be added The oils mentioned are, olive castor, soy and maize

"Sheathing lumber" from redwood bark. ILTON R DARLING (to Pacific Lumber Co) U S 1,797,901, March 24 Redwood bark is treated for the sepn of its fibers by boiling in a soln of a salt such as $Al_2(SO_4)_3$ capable of forming colorless tannates and producing a product which is suitable for making sheets or boards

Photographic reproductions of wood grain. MASA GES ZUR HERSTELLUNG KÜNSTLICHER OBERFLÄCHEN Brit 340 131, Jan 20, 1929 A smooth board, before being photographed, is treated with a hard wax or with a polishing stone, such as agate or like non smearing material, to alter the n of the surface parts without affecting the underlying parts Cf *C A* 24, 560

"Wood substitute" S SCHLESS. Brit. 339,853, Jan 27, 1930 A product which may be made in laminated form comprises a mixt of pulverulent CaO or $Ca(OH)_2$ with pulverulent silica and cellulose or other fibrous material, the mixt being moistened, allowed to stand pressed heated to about 100–110°, treated with $CO_2$, and finished if desired by oiling, impregnating and polishing

Apparatus for drying wood CHARLES GOODALL Ger 517,714, Sept 15, 1929 O or $O_3$ is added to the drying air

Plant for drying wood. FRITZ HAAS Ger 521,005, June 18, 1929

Preserving wood SOC ANON DES ÉTABLISSEMENTS ARMAND BEAUMARTIN Fr 695 479, May 12, 1930 Wood to be preserved by antiseptics has its surface perforated with a large no of small holes by an instrument covered with sharp projections

Impregnating wood with salt solutions IMPREVA HOLZIMPRÄGNIERUNG UND HOLZVERWERTUNG A G Ger 521,110 Dec 1, 1925 The wood is steamed, rapidly dried at a temp up to 150°, and then immersed while hot in the cold salt soln, *e g*, a soln of $HgCl_2$ The wood may be kept hot after drying by steaming again App is described

Preserving organic material SERGE PISSAREV Ger 514 981, Sept 3, 1926 Wood, paper, fiber, etc, are preserved by impregnating with metal salts of naphthenic acid in alk $NH_3$ soln and fixing with metallic $NH_4$ compds of cellulose Salts of Cu, Zn or Ni are preferred

## 21—FUELS, GAS, TAR AND COKE

A C FIELDNER AND ALDEN H EMERY

Notes on recent developments in fuel technology. R WIGGINTON *Fuel in Science & Practice* 9, 497 9 54 7(1930) —Brief reviews are given of industrial use of pulverized fuel, Esthonian oil shale, gasification of coke breeze, prevention of gas explosions, industrial use of coal gas, oil in Germany, burning a hole in fog

D A REYNOLDS

Graphical methods of fuel control. JAS. CUNNINGHAM *J Inst of Fuel* 4, 216–22 (1931) —C shows that much of the fuel data entered into plant records can be used graphically to increase fuel economy)

D A REYNOLDS

Manufacture of alcoholic motor fuel K. R DIETRICH *Z Spiritusind* 53, 349 (1930) —General discussion of the subject

S J

The addition of alcohol and other substituents to motor fuels. E PYHÄLÄ *Acta Chem Fennica* 3, 123–4(1930) —A review

S A KARJALA

Molasses as a fuel. A RODZIEWICZ *Gazeta Cukrownicza* 68, 133–5(1930), *Listy Cukrovar* 49, No 26, Rozhledy 24 —Low monetary values of molasses suggested the use of molasses as a combustible The sugar factory at Brześć Kujawski mixed coal with 20 and later with 10% molasses The mass became tacky in the furnace and was

difficult to stoke The warm molasses drained off the coal into the ashes before combustion occurred Greasy soot deposited throughout the drafts For economical usage the furnaces will have to be altered so that the molasses will enter the hot coals and a copious blast of air will have to be supplied to prevent the formation of soot
FRANK MARSH

**New method of briquet manufacture.** T SZAPPKA *Tüzelőtech* 2, 21-2(1929).—The manuf of colloid briquets is described S S DE FINÁLY

**Hungarian lignites.** SÁNDOR ERDÉLYI *Tüzelőtech* 2, 41-2(1929).—Drying alone cannot produce lignites with more than 6000-4500 cal A salable product of 7,000 or more cal can be obtained by distg lignites Hungarian lignites contain about 8% tars 50% of which can be sepd on distn and used for various purposes S S DE F.

**Importance of air occlusions and discharge of air in the manufacture of [fuel] briquets.** J ÉNERY *Soproni M K Bány Erd Főiskola Bány És Koh Oszt Közleményei* 1930, 3 11 Solidity of briquets after cooling is due partly to the solidification of binding substances and partly to the decrease of inner pressure caused by air occlusions Solidification is improved by conducting pressure heat from the presses Decrease of inner pressure of occluded air is facilitated by warming the material to 400° before pressing S S DE FINÁLY

**Modern carbonization technic in the United States and [as compared to] the Ruhr.** W ROELEN *Brennstoff Chem* 12, 111-3, 128-9(1931).—Coking practice, by-product recovery, markets efficiencies, and economies are contrasted F W JUNG

**Low-temperature carbonization.** W J SKILLING *Trans Inst Mining Eng* 79, 151-60(1931), cf *C A* 24, 3626 Low temp carbonization is divided into three groups according to whether the retorts are externally heated, internally heated by hot gases from an external source, or internally heated by combustion of a portion of the material under treatment On another basis, the processes are classified as (*a*) continuous and (*b*) intermittent Lab-scale and industrial scale expts are described and the commercial development is indicated Several illustrations are shown and data tabulated W H BOYNTON

**Low-temperature carbonization of Donetzky coal.** A P SIRAKINO AND I B. RAPOPORT. *Brennstoff-Chem* 12, 121-2(1931), cf *C. A* 24, 2860 Distn results, with the Al retort, are tabulated for a series of coals from the Donetz district representing all 6 types in the rank classification of S and R. Analytical data for the coals used, the coke and tar obtained, including proximate, ultimate and calorific analyses are also given in table form F. W. JUNG

**Coal in 1930.** G. L. EVANS *Mining J* (London) *Ann Rev. No* (Jan. 24 1931), 10 ALDEN H. EMERY

**Analyses of Washington coals.** Bur. Mines, *Tech. Paper* 491 (1931). The coal fields of Washington. S H ASH. *Ibid* 1-11. Methods of mining and preparation of coal. H. F. YANCEY AND S H ASH *Ibid* 12-22 Production, distribution and use. O E. KIESSLING AND JOSEPH DANIELS *Ibid* 23-34 Relation of mine samples to commercial shipments. N H. SNYDER AND L. N PERIN *Ibid* 35-8 Analyses of delivered coal. *N H.* SNYDER AND L. N. PERIN *Ibid* 39-65 —About 225 averages of samples of delivered coal are given Analyses of mine samples. A C FIELDNER, H. M. COOPER, AND F. D. OSGOOD. *Ibid* 66-101 —Over 500 analyses are tabulated Description of mine samples. F D OSGOOD *Ibid* 102-08 ALDEN H. EMERY

**The washability of Transvaal coals.** J MUNDELSOHN *J. Chem Met Mining Soc. S Africa* 31, 101-5(1931).—M was unable economically to wash 8 Transvaal coals below 8.0% ash Analyses of 5 samples are given ALDEN H EMERY

**Hydrogenation of South African coal.** P. N. LATHOAN. *J. Chem. Met Mining Soc S Africa* 31, 199-200(1931); cf *C A*. 24, 2959-60, 5133; 25, 301 A H E

**The Charleston coalfield.** W H A. PENSHURR. *New Zealand J. Sci Tech* 12, 211-56(1931).—The location, history, geology and phys characteristics of Charleston, N. Z., coal are discussed The proximate analyses of 22 samples of the coal are tabulated The coal is generally non caking, has a high S content, and burns to a buff-colored ash. W. H. BOYNTON

**The hydrogen in coal.** A FEELEY, G. H KENYON AND A McCULLOCH. *Fuel in Science & Practice* 10, 4-15(1931).—Four coals of different ranks were chlorinated and distd. under identical conditions Carbonization was effected in 100° stages up to 900° and the products of each stage were examd $CH_4$ was the only paraffin hydrocarbon found in the gaseous products in measurable quantities. No tar was formed Practically all the Cl in the coal was evolved as HCl, this evolution was almost complete at 600° except with one coal where it continued to 900°. D A REYNOLDS

**The swelling of coal during coking.** K. BAUM AND P. HEISER. *Glückauf* 66,

1497, 1538(1930) *Fuel in Science & Practice* 10, 51–64.—An abstract of recent literature bearing upon the hydrogenation of coal. D. G. Skinner. *Fuel in Science & Practice* 10, 109–37(1931).—A review of scientific press and patent literature with 248 references. D. A. Reynolds

**Development of hydrogenation of coal.** Sz. Hankiss. *Tüzelőstech.* [N. S.], 2, 17–22(1930).—A review of the theoretical and technical development, present state and possible future of coal hydrogenation. S. S. de Finály

**Distribution of carbon, hydrogen, nitrogen, sulfur and oxygen in the products of hydrogenation of a Hungarian coal.** Imre Makray. *Tüzelőstech.* [N. S.], 2, 25–8(1930), cf. *C. A.* 25, 188.—The coal used contained $H_2O$ 2.60, ash 7.30, total S 4.23, combustible S 3.92, C 63.01, H 5.42, N 1.04, O 16.71%, net calorific power 6024 cal. The oil obtained contained 53% of the original C, H 30, S 2.9, N 17 and O 15%. The gas produced contained 21.7% of original C, H 47, no S, N 50 and O 46%. The water obtained contained 0.2% of the original C content of coal, H 10, S 0.4, N 16 and O 34%. S. S. de Finály

**A study of the Marshall-Bird test for determining the agglutinating value of coal.** K. A. Johnson and H. F. Yancey. *Fuel in Science & Practice* 9, 517–21(1930). See *C. A.* 24, 3343. D. A. Reynolds

**The spontaneous ignition of coals.** Károly Gärtner. *Matematik és Természettud. Értesítő* 46, 378–406(in German 407–8)(1929).—Ignition points of Hungarian brown coals were detd. in air and in O currents. Coal consisting of smaller particles ignited more readily. Ignition is accelerated by the presence of unsatd. org. compds. The presence of S, moisture and humic acid showed no influence on the ignition temp. Data in the literature on the spontaneous ignition point of coals have value only in case grain size of coal is stated. S. S. de Finály

**Coking coal. Its nature and synthesis.** Balaram Sen. *Proc. 15th Indian Sci. Congr.* 1928, 292.—The coking value of coal does not depend on its ash, volatile matter or fixed C, but is due to a resinous substance in the coal (called resinoid by S.) which can be extd. with a suitable solvent. Coal treated with a suitable solvent loses its coking power to an extent depending on the degree of extn. Poor coking coals can be made to cake by the judicious addn. of pitch or other suitable bond. Increases of volatile matter in the coking coal results in the lowering of its coking value. E. J. C.

**Coal-dust recovery at Toronto Station.** W. S. Johnston. *Power* 73, 409–11(1931).—Bag filters are used. D. B. Dill

**The connection between ash content and specific gravity of Hungarian brown coals.** J. Finkey. *Soproni M. K. Bány. I. rd. Főiskola Bány. és Koh. Oszt. Közleményei* 1930, 158–65.—Expts. made with sep. fractions of washed coal showed a mathematical connection between sp. gr. and ash content. A brown coal of Dorog gave, *e. g.*, the following data:

| Fractions | % of unwashed coal | Ash content % | Sp. gr. |
|---|---|---|---|
| 1 | 8.5 | 5.6 | 1.32 |
| 2 | 56.8 | 11.6 | 1.41 |
| 3 | 14.1 | 28.1 | 1.57 |
| 4 | 20.6 | 71.0 | 2.17 |

Sp. gr. was detd. with the volumoscope of Kühn within 2 min. Graphical examn. of the above data gave the equation $A = 82d - 104$, in which $A$ is ash content and $d$ sp. gr. of the coal. S. S. de Finály

**The possibility of manufacturing illuminating gas from Hungarian brown coals.** Zs. Gálócsy. *Tüzelőstech.* 2, 42–7(1929).—An address. S. S. de Finály

**The Fleissner method of drying lignites.** H. Klein. *Intern. Bergw. Berglech.* 23, 377–82(1930), cf. *C. A.* 24, 4916.—The method is well adapted for improving low-grade fuels, especially brown coal. The method consists of preheating the coal, heating under pressure with live steam, release of pressure and airing. A plant operating with this method is described. The properties and economic possibilities of dried lignites are discussed. A. Hirsch

**Plant and operating costs with the low-pressure Mont Cenis process.** W. F. Scholvien. *Chem. Met. Eng.* 38, 133–5(1931), cf. *C. A.* 25, 1971.—Detailed plant and operating costs based on the data of German plants show that anhyd. $NH_3$ may be produced in the U. S. for 2.25 cents per lb. by the low pressure Mont Cenis process. L. W. T. Cummings

**Combustion of natural gas.** T. J. Ess. *Blast Furnace and Steel Plant* 19, 647–50(1931), cf. *C. A.* 24, 5135, 25, 269. W. H. Boynton

Results of laboratory experiments on manufacture of gas from Hungarian coals. István Jakóby and Ervin Becker. *Tüzelőstech* [N. S.], 2, 1-6(1930).—Seven typical samples of various Hungarian coals were tested for distn. A large content of S (1-6%) makes purification of gas too expensive. Coal of Nagybátony (41.90% C) gave 13.9 cu. m. gas per 100 kg. coal on high-temp. carbonization, 72% coke remained, with a C content of 34 kg. Half of this was converted to water gas and mixed with the original distn. gas. This mixed gas contained $CO_2$ 5.5, $O_2$ 0.8, $C_nH_m$ 0.5, CO 28.6, $H_2$ 47.3, $CH_4$ 12.5 and $N_2$ 4.8%; sp. gr. was 0.619, net calorific power, 3587 cal. S. S de F.

Catalytic preparation of a gas rich in methane from a mixture of water gas and steam. J. C. Ghosh and K. Chakravarty. *Proc. 15th Indian Sci. Congr.* 1928, 148-9.—The authors have previously shown that a gas mixt. contg. CO and $H_2$ 1:1 by vol. can be made to yield a fuel gas contg. over 25% $CH_4$ if passed over suitable catalysts at temps. 350-450°. The efficiency and life of certain catalysts have now been very considerably increased by introducing steam in suitable proportions in the reacting gas mixture. The following reactions take place simultaneously on the catalyst surface: (1) $2CO \longrightarrow CO_2 + C$, (2) $C + H_2O \longrightarrow CO + H_2$, (3) $CO + 3H_2 \longrightarrow CH_4 + H_2O$, (4) $2CO + 2H_2 \longrightarrow CH_4 + CO_2$. It is seen from (1) and (2) that CO reacts with steam giving $CO_2$ and $H_2$. The $H_2$ so produced increases the ratio of $H_2$ to CO in the reacting gases and prolongs the life of the catalyst by preventing deposition of C. Catalysts (not mentioned) have been found which so regulate the rates of the reaction given above that the resulting fuel gases, after removal of $CO_2$, contain more than 50% $CH_4$. E. J. C.

Experiments on a Goffin gas plant. A. Romwalter. *Soproni M. K. Bány. Erd. Főiskola Bány. es Koh. Oszt. Közlemények* 1930, 166-77.—By a special method light hydrocarbons were obtained instead of low-temp. tars from S-contg. Hungarian brown coals. Lignite coke and distn. gas were secondary products. The amount of light hydrocarbons obtained was larger than that obtained by hydrogenation of low temp. tars produced by the usual carbonization. Results of large-scale expts. will be published later. S. S. de Finály.

The origin and decomposition of organic sulfur compounds under gas-making conditions with particular reference to the role of the carbon sulfur index. John C. Holtz. *Fuel in Science & Practice* 10, 16-30(1931).—Exptl. work on the cracking of a gas oil contg. 3.61% S showed that $CS_2$ may be formed if a temp. of 649° is exceeded. $CS_2$ was formed on cracking a S-free oil in the presence of a gas from the same oil to which $H_2S$ was added. An important loss of S to products other than $CS_2$ was noted. N contg. small quantities of $H_2S$ was passed over sugar charcoal and heated to incandescence. After a short time $H_2S$ was formed and its concn. slowly increased. After more gas had passed, $CS_2$ appeared as a reaction product. The residue contained S, and concns. proportional to the surfaces per unit wt. of charcoal exposed. The effect of hot surfaces of pumice or charcoal free from S in removing org. S was studied. As the deposition of C and S on these surfaces increased they became ineffective for removal. Conclusion. Org. S compds. result from the decompn. of a complex of S and C. This theory was tested under equil. conditions by passing N contg. $H_2S$ over sugar charcoal and cooling the reaction products to prevent reversion. $CS_2$ and other org. compds. were formed. Other factors affecting the formation of gaseous org. S compds. studied were: temp.; concn. of $H_2S$, the presence of $H_2O$, CO, O or H. An increase in temp. or concn. of $H_2S$ caused an increase of total org. S formed as well as that of $CS_2$. CO or O caused an increase in the org. S other than $CS_2$. H caused a decrease in the concn. of org. S. $H_2O$ had little effect on the concn. of total org. S but reduced that of $CS_2$. D. A. Reynolds.

Organic bases for gas purification. R. R. Bottoms. *Ind. Eng. Chem.* 23, 501-4 (1931).—Certain amines and amino compds. have the property of absorbing $CO_2$ and $H_2S$ to form unstable carbonates and hydrosulfides that decomp. at about 50° to liberate the gases and release the free bases in their original forms. Among the N bases found to be suitable are benzylamine, diaminopropanol, diethanolamine, diethylamineethanol, etc. Operating methods are outlined. H. L. Olin.

The bearing of fluctuations in the price of coke and by-products on the cost of production of gas. M. Barash. *Trans. 2nd World Power Conf.* (Berlin) 2, 42-62 (1930).—Comparative costs of gas production in continuous vertical retorts, intermittent vertical retorts and horizontal retorts are shown. The value of the coke represents > 70% of the cost of coal. The credit for tar is sufficient to pay for the capital and maintenance charges, the labor costs and a portion of the fuel costs. The total value of coke and by-products forms so large a proportion of the credit side that the net cost of gas is likely to be more dependent on fluctuations in the prices of these resi-

duals than on variations in capital charges, fluctuations in labor costs, etc. These factors far outweigh any economies from large units Figures given show that each variation of 1 shilling in selling price of coke affects the cost of gas production 3–4% Cost figures for low temp carbonization are given and show that only under very favorable conditions will the process pay Tar, road tar, coal tar pitch, creosote oils and coal tar preservatives, cracking of tar, benzene, $(NH_4)_2SO_4$, and steam from waste heat are discussed Benzene extn is not a paying proposition and $NH_3$ liquor is a source of loss ALDEN H EMERY

Phenols in lignite tars. F v HESSERT *Z angew Chem* 43, 771–4(1930).—A tar ext. representative of the phenolic compds was dissolved in NaOH, polyphenols being eliminated by air oxidation The remaining phenols were liberated and fractionated Fractions were dissolved in 50% KOH, at 50°, and powd $K_2S_2O_7$ was added to form phenylsulfuric esters After satn with $CO_2$, inorg salts were pptd with excess of alc The dried esters, dissolved in abs alc, were repptd with $Et_2O$ Alkyl groups were oxidized with alk 6% $KMnO_4$, the soln was filtered, acidified with HCl, and evapd Phenolcarboxylic acids were taken up with $Et_2O$, and again dried Salicylic acid was extd. with $CHCl_3$ and the remaining acids were sepd by fractional crystn from $H_2O$ H identified the 3 hydroxybenzoic acids, the 4,1,3- and 5,1,3 $HOC_6H_3(CO_2H)_2$, the 2,1,4-$HOC_6H_3(CO_2H)_2$, the 3,1,2- and 4,1,2-$HOC_6H_3(CO_2H)_2$ From these, quant and qual conclusions regarding the original phenols were drawn All the known coal-tar phenols were also found in the lignite tar Considerable amts of $FtC_6H_3OH$ were present in the xylenol fraction. Trialkylphenols could not be detected *p*-Substitution appeared to be the most favored K. H. ENGEL

An economic comparison between German and Japanese coking plants. S AYABE *J Soc Chem Ind* (Japan) 34, Suppl binding 77(1931) E H

New methods of coke testing WOLFGANG MELZER *Arch Eisenhüttenw* 4, 225–38(1930).—The phys properties of coke samples from different locations in a retort differ greatly The reactivity, structure, hardness and friability are influenced both by the type of coal and the method of coking Coke produced in narrow retorts is not the equiv of that from wide retorts For blast furnaces which produce high-Si Fe a slow-burning, dense, hard coke is preferred H F JOHNSTONE

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Reduction of ZnO by $CH_4$ or natural gas (DOERNER) 9. The reaction mechanism of C combustion at low pressures (SIHVONEN) 2. Corrosion and metal protection in steam power plant equipment (STUMPER) 9. Flame temperatures of hydrocarbon gases (JONES, *et al*) 2. NaCNS as a gas drying agent (KELLER, NORDT) 2. Apparatus and methods for precise fractional distillation—new method of gas analysis (PODBIELNIAK) 2. Finished products from oil shale (BLELOCH) 22. Butadiene hydrocarbons (Fr. pat. 696,706) 10. Fuel gas (Ger pat. 520,381) 18. Dearsenification of acid [for manufacture of $(NH_4)_2SO_4$] (Fr pat. 696,341) 18. Refining paraffin (Ger pat. 517,744) 22. Distilling coal, etc (Brit pat. 339,963) 22.

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FANSHAWE, J R. A Microsopical Study of Coal—Pennsylvania Anthracites and West Virginia Coking Coals. Lille G SAUTAI 112 pp

GUMZ, W Feuerungstechnisches Rechnen. Leipzig O Spamer 133 pp M 8, bound, M 9

Some Features of the Glover-West System of Continuous Carbonisation in Vertical Retorts. Manchester, Eng West's Gas Improvement Co, Ltd 54 pp.

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Fuel. KARL NEYNABER. Ger 516,762, Nov 30, 1929 Details of a dehydrating press for crude peat, etc., are given.

Producing fuel for internal-combustion engines from water gas. MARCUS BRUTZKUS Ger. 520,222, Feb 21, 1925 See Brit. 252,786 (*C A*. 21, 2551).

Motor fuels. ERNST G F MEYER. Ger 520,011, June 13, 1926 Motor fuels consist exclusively of hydrocarbon distillates, $Et_2O$, and a readily volatile base, *e g*, $NH_3$, $NH_2Me$ or $NH_2Et$, which diminishes the volatility of the $Et_2O$ The hydrocarbon distillate may boil within the range 70–200°, and may contain 1–5% b up to 80°, 8–25% b up to 100° and 20–65% b up to 120° The proportion of $Et_2O$ may be 1–5%.

Motor fuels from plants or fruits containing fatty oils GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G Brit 340,107, Nov 23, 1928 In a modification of the process described in Brit 339 048 (*C A* 25, 2548), in which fatty oils are converted into products of low b p suitable for use as motor fuels by heating their vapors at high temps with H and preferably with catalysts, the plants or fruits contg the oils in

their natural state are subjected to a similar treatment without preliminary extn. of the oils Soy beans yield 20% of an unsaponifiable oil b 60–200°. The catalysts may be used as aq solns of suitable salts and the hydrogenation may be effected in a rotary furnace

Liquid hydrocarbons. PHYSICAL CHEMISTRY RESEARCH Co Fr 696,610, June 3, 1930 Liquid hydrocarbons, particularly fuels, are obtained by bringing gases from the distn of solid fuels mixed with water gas under the action of an electrostatic field and under the action of a source of ultra violet rays An app is described

Fuel agglomerates. P GLOESS Brit 339,876, Feb 14, 1929 Fuel agglomerates formed with algine are impregnated with coal tar, wood tar, pitch or other org coking material, followed by coking to render the agglomerates resistant to water

Fire-lighting fuel. BRIQUETTING & CARBONISING SYNDICATE, LTD., and T A GOSKAR Brit 339,985, Sept 17, 1929 Finely divided material such as coal or coke is mixed with comminuted peat and pugged and molded into briquets, and sawdust or paper pulp may be added and the peat may be treated with Na silicate before milling The briquets are dipped in a bath of paraffin, paraffin oil and resin Various details of manuf are described

Briquet manufacture. W BOOTH, V BOOTH and W J BOOTH Brit 339,868, Feb 6, 1930 Mech features

Acetylene storage. ALTOGEN GASACCUMULATOR A G (to Gas Accumulator Co (United Kingdom), Ltd.) Brit 339,899, May 30, 1929 Cylinders for holding $C_2H_2$ are filled with a cemented block of pumice, trass, natural or artificial slag or other material having the same coeffs of expansion by gas absorption and heat as cement

Hydrogenation and desulfuration of hydrocarbons. PAUL L F NICOLARDOT Fr 696,771, Aug 14, 1929 Gases from the distn of coal, oils, tars, etc., are transformed into substances resembling gasoline and petroleum, by subjecting the gases to a preliminary hydrogenation to sat the unsatd hydrocarbons and to render the sulfured products more sensitive to the final action of desulfuring materials, and then to a subsequent desulfuration and hydrogenation Both operations are carried out at ordinary pressure or pressures not above 50 atm The preliminary hydrogenation may be by means of nascent H produced by oxidizing CO with steam in the presence of a reacting mass at 350–500°

Destructive hydrogenation. N V BATAAFSCHE PETROLEUM MAATSCHAPPIJ Brit. 339,873, March 11, 1929 Co-pptd Fe and Al oxides (which may contain water and may be obtained by the action of $NH_3$ on a soln contg $FeCl_3$ and $AlCl_3$, washing the ppt. and drying it at 150° until it contains 10–12% $H_2O$) are used as catalysts in the destructive hydrogenation of materials such as coal, brown coal, tar, mineral oils and their derivs, wood, etc.

Filtering oils from destructive hydrogenation products, etc. I. G FARBENIND A.-G Brit 339,681, Sept 13, 1929 Mixts of oil and carbonaceous matter such as produced in the destructive hydrogenation of coal, brown coal or tar or by refining oils with active C or with bleaching earth are filtered at an elevated temp. through a layer of powd or granular material or through a plurality of fine mesh filters, and the filter residue is freed from oil by distn at low temp., by extn with solvents or by emulsification The filtration may be effected in an inert gas, and numerous details and modifications of procedure are described, as is also an app

Apparatus for distilling bituminous fuels. COMPAGNIE CONTINENTALE POUR LA FABRICATION DES COMPTEURS ET AUTRES APPAREILS and ALBERT BREISIG Fr. 696,696, June 5, 1930

Furnace for the low-temperature distillation or carbonization of coal, etc. CHARLES HONNAY. Fr 696,502, May 19, 1930

Apparatus for carbonizing bituminous materials. HENRY LATHAM DOHERTY. Fr 696,414, Mar 15, 1930

Apparatus for carbonizing bituminous materials. I. G. FARBENIND A.-G. Fr 697,075, June 4, 1930

Rotating furnace for carbonizing fuel at a low temperature. BRENNSTOFF-VERSCHWELUNG G M B H Fr 697,085, June 4, 1930

Electrically heated traveling-grate apparatus for low-temperature carbonization. TROCKNUNGS- VERSCHWELUNGS-, UND VERGASUNGS-G M B H. Ger. 520,456, Feb. 3, 1928

Agitating and conveying apparatus suitable for use in low-temperature fuel carbonization. MAXWELL MCGUINNESS U S 1,798,026, March 24 Structural features

Low-temperature carbonization of coal. WALTER RUNGE (to International Coal Carbonization Co) U. S. 1,797,796, March 24 Coal, while suspended in a "cloud-

like ' form, is subjected to the action of gases in a processing zone having an av. temp of approx 575°, to effect deduction of a large portion of its volatile hydrocarbon content as gases and vapors, and the gases and vapors are cooled within the same app to such an extent that a large portion of the vapors are condensed in a cooling zone with parts having a temp as low as 150° and condensates thus obtained are returned to the processing zone where they are subjected to carbonization, gases thus obtained being sepd. from the coke and removed and collected App is described. Cf. *C. A.* **24**, 5137.

Directly heated distillation retort for coal, etc. Georg Merkel. Ger 521,201, Jan 16 1929

Rotary chamber oven for distilling coal, etc. Hector Hardy Ger 519,442, May 5, 1929

Coking of soft coal. N.-V. Silica En Ovenbouw Maatschappij Fr. 696,385, June 2, 1930 Soft coal is coked by introducing it into the coke ovens in as divided a state as possible with appropriate charging means, the water content being kept between 6 and 10%.

Drying coal. Böhmische Handelsges Ger 520,369, Nov 27, 1927 Coal is treated in a closed vessel with superheated water under pressure and when the coal has attained the temp of the water the pressure is released. The water present in the coal itself is then liberated The method is intended particularly for coarse lignite.

Centrifugal drying of peat and other materials. D W Berlin Brit 340,156, Feb 6, 1929 Peat, sawdust, waste wood, dry grasses or the like, which may be wet carbonized, is subjected to successive centrifugings the first of which throws out the solid from assocd. liquid and the second of which (suitably utilizing app with walls penetrable to liquid) throws liquid away from the solid. Various details of app. and procedure are described.

Gas. Humphreys & Glasgow, Ltd., and Arthur R. Griggs. Fr. 696,082, May 24, 1930 In the manuf of gas by passing through coal the hot gases produced in the manuf of water gas from coke, the gases produced by injecting air are drawn off from the coke without passing through the coal and used for heating a recuperation chamber surrounding the retort contg the coal. The steam used for making the water gas is superheated by passage through this chamber An app is described.

Desulfurizing gases. I G Farbenind A.-G Brit. 340 016, Sept. 16, 1929 S compds are converted into $H_2S$ and subsequently removed from coal gas, coke-oven gas, gases from cracking and distn. processes, etc., by use of catalysts comprising sulfides of elements of groups 2 to 7 of the periodic system together with metals of group 8 or heavy metals of group 1 or their compds. (preferably at a temp of 200–400°) A suitable catalyst for treating coal gas may be prepd. by pptg Mo sulfide on Florida earth, applying Ni carbonate and reducing at 300°

Washing gases. N. V. Silica En Ovenbouw Mij Fr 696,682, June 5, 1930 Substances contained in distn. gases, particularly $C_6H_6$, are removed by bringing a solvent for the substance in a finely divided form into the gas, after which the gas charged with fog is brought to an elec. app for purifying gases where the substance and solvent are pptd.

Removing nitric oxide from gases. Ges. für Linde's Eismaschinen A.-G Ger. 521,031, Oct. 15, 1929 Traces of NO are removed from gases by washing them with solns. contg lower oxides of S or the alkali salts of the corresponding acids Since the presence of free OH ions promotes the absorption, an alk. washing liquor is preferred, and the gases should be preliminarily freed from acid constituents other than $CO_2$. The method is particularly useful in purifying coke-oven gases prior to sepg constituents thereof by liquefaction, and may be put into effect in this case by adding an alkali sulfite to the alk. washing liquor used to remove $CO_2$

Apparatus for making fuel gas from crude liquid fuels. Heino Ballhöfer. Ger. 520,012, Feb 8, 1929

Washing coal gas, etc. Ges. für Kohlentechnik m. b. H. Ger 521,361, Dec. 13, 1929 A portion of the gas-washing water, which contains $CO_2$ and $NH_3$, is withdrawn from the still column at an intermediate point at which the water has lost most of its $CO_2$ content but still retains most of its $NH_3$ content. This portion of the water is returned to the gas washer

Water gas. I G Farbenind A.-G (Fritz Winkler and Paul Feiler, inventors) Ger 516 655, Nov 28, 1926 Addn. to 437,970 A method is described of producing water gas by conveying steam up a whirling column in which finely powd. fuel is burning Cf *C. A.* **25**, 2273

Apparatus for cooling gas such as carbureted water gas. J S Haug (to Humphreys & Glasgow, Ltd.) Brit. 339,885, May 6, 1929 Structural features.

**Plant for generating gas in furnaces.** CLARK C. BOARDMAN (to Thermatomic Carbon Co.) U. S. 1,797,256, March 24. A generator whose rate of discharge is subject to quick rises is assocd with a chamber contg primary cooling means such as a water spray cooling the gases discharged from the generator, with a second chamber for receiving the gases from the cooling chamber, and with auxiliary cooling means controlled in accord with the temp in the second chamber. Various details of construction are described.

**Gas producer.** J. S. HAUG (to Humphreys & Glasgow, Ltd.) Brit. 339,743, Dec. 7, 1928. Various structural details are described relating to a water-jacketed water gas producer having a rotary grate with a central tuyère.

**Gas producer.** ALDO LOMBARDI. Fr. 695,817, May 19, 1930. A device is described for making a gas rich in CO from wood.

**Gas producers.** MASCHINEN- UND FAHRZEUG FABRIKEN ALFELD-DELLIGSEN A. G. Ger. 517,580, Jan. 16, 1927. The producer has an inclined grate for the introduction of air and a lower roller grate partly immersed in water.

**Producer for gasifying fuels.** MATHIAS FRÄNKL. Ger. 514,194, Dec. 3, 1929. A producer comprising two shafts communicating at the bottom is used. Steam is passed in at the top of one shaft, and O or oxygenated air is passed in at the bottom of the shaft. The gases are withdrawn from the top of the other shaft. The functions of the shafts are interchanged from time to time.

**Recuperator for gas-heated gas producer.** JEAN SAUVAGEOT and HENRY DIFTER LEN. Fr. 696,052, May 24, 1930.

**Cooling the gas liquor of gas producers.** WILHELM OEFVERBERG. Ger. 517,977, Aug. 9, 1924. Details of the app. are described.

**Apparatus (with thermostatic control) for producing lampblack by combustion of natural gas, etc.** BRADLEY W. RUMBARGER (to Imperial Oil & Gas Products Co.) U. S. 1,797,368, March 24. Structural features.

**Tars or pitch.** COMPAGNIE DES MINES DE VICOIGNE, NOEUX ET DROCOURT. Fr. 696,245, Sept. 7, 1929. Tars or pitch from the distn. of coal, lignites or schists at high or low temp. are treated to eliminate oxygenated asphaltic or acid substances by pptn. with appropriate solvents such as petroleum, gas oil, etc., or by fixation with alk. solns. The purified products are hydrogenated.

**Acid treatment of wax-free tar.** THERMAL INDUSTRIAL & CHEMICAL (T. I. C.) RESEARCH CO., LTD., and C. O. CONDRUP. Brit. 339,640, Aug. 6, 1929. In connection with the agitation of wax free tar with acid such as $H_2SO_4$ at a temp. of about 50–80°, the mixt. of oils and tars (either with or without previous sepn. and remixing) is neutralized, dehydrated, and heated until of the desired consistency, and the oils may be sepd. and fractionated and the residue and oils (except those oils distg. 325–395°) mixed with the tar after neutralization. Various auxiliary steps and modifications of procedure are described.

**Filtering oleaginous or tarry liquids.** I. G. FARBENIND. A.-G. Brit. 339,636, June 7, 1929. A filtering diaphragm such as that of a described rotary vacuum filter is prepd. for filtering oleaginous or tarry liquids by applying to it a layer consisting of finely divided carbonaceous residues contg. oily, tarry or asphaltic substances such as those derived from destructive hydrogenation or heat pressure treatment of coal, peat, shale, tars or mineral oils (preferably after the residues have been heated to 250–300° to drive off lighter fractions).

**Distillation apparatus for removing tar from waste waters from cokeries.** PAUL GRUHL. Fr. 696,837, June 7, 1930.

**Coke.** GUSTAV HILGER. Fr. 696,966, May 15, 1930. Canals for the evacuation of gas are formed in the charge of fuel used for making coke or semi-coke so that the gases are led from the hot walls of the furnace to the colder center of the charge.

**Coke.** SOC. GUSTAV WIPPERMANN, MASCHINENFABRIK, STAHLWERK UND EISENGIESSEREI G. M. B. H. Fr. 696,647, June 4, 1930. Metallurgical coke is improved by adding coke dust of irregular-sized grain of dimensions below 3 mm. obtained by crushing under pressure the coal used for making the coke.

**Method of dry-cooling semi-coke.** N.-V. CARBO-UNION INDUSTRIE MAATSCHAPPIJ. Ger. 519,441, Oct. 5, 1924.

**Coke ovens.** ARNOLD BECKERS. Fr. 695,632, May 15, 1930. Construction of tight fitting doors is described.

**Coke ovens, carbonization chambers, etc.** WOODALL-DUCKHAM (1920), LTD., and ARTHUR MCD. DUCKHAM. Fr. 697,233, June 11, 1930.

**Horizontal coke oven.** CARL OTTO. U. S. 1,798,129, March 24.

Vertical chamber oven for producing gas and coke. HEINRICH KOPPERS. Ger 521,105, Feb 2 1926

Regenerative coke oven. HEINRICH KOPPERS A.-G. (Friedrich Totzek, inventor). Ger 520 073, Dec. 13, 1927

Coke-oven battery with horizontal coke chambers. JOSEPH BECKER. Ger 516,532 Jan. 25, 1925

Heating coke ovens. UNION CHIMIQUE BELGE, SOC ANON Belg 372,788, Sept 30 1930 The rate of feed of heating gas is maintained const., but in the periods between inversions the amts of air introduced at various points are varied No 372,789 provides for the use of a heating gas of variable compn., or consisting of a mixt. of 2 or more constituents, the proportions of which can be modified as required during the interval between 2 inversions of the heating medium

Coke-oven-heating system. WOODALL-DUCKHAM (1920), LTD., and A. M. DUCKHAM Brit. 339,641, Aug 6, 1929 Structural features

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F FARAGHER

Hydrogenation of petroleum oils. RALPH H McKEE AND ANTONI SZAYNA *J Inst Petroleum Tech* 17, 121–33(1931).—The mechanism of hydrogenation is discussed from a consideration of the data in the literature L. W. T CUMMINGS

Decolorization of petroleum with acid clay. I. K. YAMAMOTO AND H. ISHIKAWA. *J Soc Waseda Applied Chem* 1930, No. 12, 6–13, *Mem Faculty Sci Eng Waseda Univ* 1930, No 7, 28.—The power of acid clay to decolorize petroleum products increases with decreasing particle size II. III. *Rept Tech Chem Lab. Waseda Univ* 1930, No. 13, 5–7, 7–14 *Mem Faculty Sci Eng Waseda Univ* 1930, No. 7, 29, 30–1.—The acidity and petroleum-decolorizing power of acid clays decrease as the temp of treatment increases from 100° to 1000° HCl treatment increases and alkali treatment decreases the decolorizing power of acid clay. L. W T. CUMMINGS

Synthesis of petroleum hydrocarbons from hydrogen and carbon monoxide at ordinary pressure. II. K. KOBAYASHI, K YAMAMOTO AND H ISHIKAWA. *Mem Faculty Sci Eng Waseda Univ* 1930, No 7, 26–7 cf *C A* 23, 5035.—Nine catalysts composed of Co, MnO and Cu were used in the synthesis of oil from CO and $H_2$. Active C formed from the decompn of the CO is considered the basic material for subsequent hydrogenation and polymerization to oils. $CH_4$ was formed simultaneously. L. W T. CUMMINGS

Luminous stationary flames: the quantitative relationship between flame dimensions at the sooting point and chemical composition, with special reference to petroleum hydrocarbons. S. T. MINCHIN *J Inst Petroleum Tech* 17, 102–20(1931).—The tendency of hydrocarbons to smoke as detd. in a Weber photometer lamp was found to decrease in the naphthalene and benzene series as the no of C atoms increased, but increased in the paraffin series. This property also increases in synthetic mixts. of paraffins and aromatics or naphthenes as the concn. of either of the latter is increased L. W. T. CUMMINGS

Cretaceous limestone as petroleum source rock in northwestern Venezuela. HOLLIS D HEDBERG *Bull Am Assocn Petroleum Geol* 15, 229–46(1931).—The lithology, microscopic character and occurrence of oil in La Luna and Cogollo limestones are compared in detail. The conclusion is that the oil in the former is indigenous, whereas it has migrated into the latter The La Luna formation is probably a petroleum source rock. The specific source of the oil generating material in these sediments is discussed. ALDEN H EMERY

East Hackberry salt dome, Cameron Parish, Louisiana. A. J. BAUERNSCHMIDT, JR. *Bull Am Assocn Petroleum Geol* 15, 247–56(1931).—The Hackberry oil is a typical heavy Gulf Coast crude oil ranging from 18° to 24° Bé (av. 22°) A. H E.

Finished products from oil shale. WM BLELOCH *S African Mining and Eng J.* 41, Pt. II, 393(1930).—The following products are obtained from Scottish shale oil gasoline (motor fuel), extg spirit (for removal of oil from seeds and bones), solvent naphtha (mfg rubber goods), 0 741 naphtha (safety lamps), 0 750 naphtha (flare lamps), white spirit (paints), solvent (removal of naphthalene from coal gas and manuf. of linoleum), various grades of illuminating oil, gas oils, fuel oils, cleaning oil, batching oil (jute

spinning), lubricating oil, residual oil for compounding thick greases, paraffin wax, $(NH_4)_2SO_4$ and coke. ALDEN H. EMERY

Oil in 1930. ANON. *Mining J* (London) *Annual Rev. No.* (Jan. 24, 1931) 10 The oil industry of the U. S. S. R. during 1930. W. LEONTIEF *Ibid* 11-2.—Oil production and consumption in Russia increased at a greater rate than ever before; production increased 17.1% in 1929 and 26% in 1930. Refinery production increased 37.1%. Cracking is almost negligible. ALDEN H. EMERY

The pyrogenic decomposition of paraffin oil by different catalysts in air and hydrogen. R. ODA. *J. Soc. Chem. Ind. Japan* 34, Suppl. binding 58-62(1931).—$Fe_2O_3$, $Al_2O_3$, $Ni_2O_3$, Fe, MgO, ZnO, $SiO_2$ and fullers' earth have been tried. $SiO_2$, the best catalyst, gave 73% of cracked oil, 70% of which boiled between 35° at 760 mm. and 200° at 9 mm. The original oil b. 83–215°. V. F. HARRINGTON

Examination of paraffin products by means of the refractometer. W. J. PIOTROWSKI AND J. WINKLER. *Erdöl u. Teer* 6, 447–8, 463–5(1930); cf. *C. A.* 24, 233.—The method of Diggs and Buchler (*C. A.* 21, 816) is adapted to a rapid detn. of small percentages of oil in paraffin wax, by simplifying the isolation of the pure components. "Blue oil" (from Polish sources), mixed with amorphous $SiO_2$ (2:1), was chilled to −21°. A few drops of the pure oil were obtained by filtration through a Gooch crucible. Other samples were prepd. by dissolving paraffin products from various sources in $Et_2O$ and reppte. paraffin by addn. of EtOH (1:1). All products gave closely agreeing values for $n_{D^{20}}$ as 1.4387. It was found that oils were selectively removed from paraffin wax by fuller's earth (2:1) at 80°. A pure paraffin retained its $n_D$ value after such a treatment, various com. samples and artificial mixts. of the components gave const. values for the pure paraffin after a single filtration (1.4370). The analysis of a mixt. requires only the detn. of its $n_D$ value, if the values for the pure components have been detd. Applied to known mixts., the method was accurate within 0.2%. Holden's method gave results which were higher by 1.1–2.6%. K. H. ENGEL

The chemical aspect of drilling muds. ALEXANDER DUCKHAM. *J. Inst. Petroleum Tech.* 17, 153–82(1931).—Drilling mud is used to carry cuttings from the bit to the surface, to keep the cuttings in suspension, reducing settling when circulation ceases, to act as a lubricant for the drill pipe and between the formation and the bit, to minimize the abrasive action of sand and rock particles in the pumps, to keep gas, oil and water back in the formation, to plaster the walls of the hole and of cavities and exhausted sands, and to protect the operators against blowouts. Mud must often be "doctored" as to sp. gr., viscosity and colloidality. Sp. gr. is raised by adding barytes. Bentonite is used very generally to raise the colloidality, though no standardization has been worked out. It has been suggested that 0.02% of bentonite should be added to the mud for every 1% of settling which would otherwise occur in 24 hrs. By adding quantities of $Na_2CO_3$ of the order of 0.2%, wt. may be increased as desired without increasing the viscosity. Costs of doctoring are considered. EMMA E. CRANDAL

The reactions of olefins with sulfuric acid. W. R. ORMANDY AND E. C. CRAVEN. *J. Inst. Petroleum Tech.* 17, 185–7(1931).—A series of olefins of C content $C_6$, $C_8$, $C_{10}$ and $C_{12}$ was treated with $H_2SO_4$ of concns. from 81 to 99.5%. The olefins of higher mol. wt. resisted the action of the $H_2SO_4$ better than those of lower mol. wt., when acid of 81.0 to 92.8% concn. was used. For the acids of highest concns. this was not true. The statement of Howes and Nash, that the olefins which are stable to $KMnO_4$ are also fairly resistant to $H_2SO_4$, was not confirmed (cf. *C. A.* 24, 333, 3107). E. E. C.

Twenty-second semiannual motor gasoline survey. II. Additional data. A. J. KRAEMER AND E. C. LANE. Bur. Mines, *Rept. of Investigations* 3092, 33 pp. (1931); cf. *C. A.* 25, 806.—Results of the detn. of Cu strip corrosion, color, S content by the lamp method, Cu-dish evapn. residue, gum content (steam-oven method) and antiknock value are given. Only 1 of the 298 samples failed to pass the Cu strip test; 23.7% of the competitive-priced gasolines and 84.6% of the premium-priced motor fuels were artificially colored, for the others, color was without significance, and 85.6% of the samples had < 0.10% S (lamp method). There is no relation between doctor test and color, S or gum content. The av. octane no. of the competitive gasolines is 59 (51–68) and of premium motor fuels 74 (65–80). ALDEN H. EMERY

Gravity of natural gasoline and percent evaporated at 140° F. are related. S. S. SMITH. *Natl. Petroleum News* 23, No. 4, 31–2(1931).—From data obtained from inspection of a large no. of Mid Continent gasolines it is shown that gasolines with 70% evapd. at 140°F. have gravities of from 85 to 89 and when they are controlled to 26 lb. vapor pressure they will fall close to 70% evapd. at 140°F. and have gravities of 86 ± 2. R. W. KELLY

Gasoline dopes. H. C. DICKINSON. *Ind. Eng. Chem.* 23, 517–9(1931).—Based

has a Krämer Sarnov m p of 37°, no phenol reactions, free asphaltic acids 1.37%, lactones and anhydrides 2.20%, asphaltenes 2.11%, asphaltic resins 41.29% and oily constituents 51.25% Elementary analysis gives C 81.77, H 10.85, S 1.29, N 0.94, O 4.07 and ash 1.08% FRANK MARESH

**The Ragusa asphalt rocks.** ANDREA LA PORTA *Ind mineraria* 5, 65–77(1931).—A ton of Ragusa bituminous limestone contains 40–65 kg of org combustible matter of higher calorific value than coal At 450° it loses ⅔ of the hydrocarbons A rock with 4% asphalt yields 2.5% of mineral oil The bitumen contains 84.9% C, 11.7% H and 3.4% S The consts of the raw mineral oil are $d_{15}$ 0.960–0.965, viscosity (Engler degrees) at 20°, 20 000, at 50°, 3 500 and at 100°, 1 300 Pensky Martens flash 126°, fire point 158°, ash 0.008%, hard asphalt 1%, soft asphalt 0.15%, 32% remains unchanged by $H_2SO_4$ S 2.19% org acidity (oleic acid) 0.35%, org acidity ($SO_3$) 0.049%, no mineral acidity, no alkalinity fractions under 300° 18–22.3% Distn at Strasburg gave under 225° 1%, 225–300° 13%, 300–350° 35%, 350–380° 27% and a residue of 24% Distn in a vacuum at 50 mm., at 200–290°, gave 28% of oil with a Pensky Martens flash of 158°, viscosity (E 35°) 1.5, from 290° to 345° there was 30% of oil with a flash point of 220° viscosity (E 35°) 41.8, at a pressure of above 50–100 mm above 345° there was 9% of oil with a flash point of 98°, viscosity (E 35°) 8.4 residue 6.6% loss 2.5%, 180–310% paraffin The oil has cyclic, naphthenic and other unsatd compds, org S compds, little H, a high sp gr, very little hard asphalt and no resinifiable substances The presence of unsatd compds makes it suitable for producing lubricants Cracking yields 50% of light compds R S

**Atjeh turpentine, its present quality and properties.** IR W. SPOON *Ber. Afdeel. Handelsmuseum Ver Koloniaal Inst* No 57, 30 pp (1930).—A description of the tapping and distn app used in Sumatra and tables of the principal consts of the turpentine are given By the use of modern app an improved product is obtained, which, however, cannot as yet replace the superior product imported from the United States and France The reason for this condition is discussed in detail J C JURRIENS

**The iodine number of turpentine oils.** V KUBELKA AND S. ŽURAVLEV *Chem Listy* 25, 124–8(1931).—Using the Hanuš, Margosches and Rosenmund methods for detg the I no of a French turpentine, K finds the action proceeding in 2 phases (1) a rapid and active phase lasting 3 hrs in the M and R methods and 30 min in the H. method, (2) a slow and prolonged phase due to side reactions The wt of the sample alters the I no, it should not exceed 0.1 g The 3 methods gave the following I nos: H 190–200, M 280 and R 300 If the turpentine is pinene with 1 unsatd bond, 1 mol of pinene adds 2 equivalents of I and demands an I no in the range 185–200, this is the value given by the H method If 1 mol of pinene combines with 4 equivalents of I, the I no must be 370, this value is approached by the R. method. In the first phase of the reaction, the pinene unsatd bond combines with I, later, in the second phase, the internal chain is attacked and gives rise to free bonds which attach I The Hanuš method gives results which have a sound theoretical foundation Recommendations had been given that distn products of turpentine and pine oils could be differentiated by the I no By the H method on 0.1-g samples and with the time of reaction limited to 30 min., 15 turpentine oils of standard grades were analyzed The I nos ranged from 154 to 202 The I no cannot be used for differentiating fractions of pine oils, etc Changes in I nos of oils during 1.5 yrs were insignificant FRANK MARESH

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Genetic connection between salt deposits and petroleum (WEINFELD) 8. Anomalous velocity distribution in thin lubricant films (UMSTÄTTER) 2. Compaction of sediments (TRASK) 8. Apparatus and methods for precise fractional distillation (PODBIELNIAK) 2. Conditioning refinery water (BORN) 14. Butadiene hydrocarbons (Fr pat. 696,706) 10. Hydrogenation and desulfuration of hydrocarbons (Fr pat 696,771) 21. Solvents and emulsifying agents [for mineral oils] (Fr. pat 697,102) 27. Apparatus for extracting oil from bleaching earths (Ger pat 520,169) 27. Destructive hydrogenation (Brit. pat. 339,875) 21. Filtering oleaginous liquids (Brit. pat 339,636) 21. Filtering oils from destructive hydrogenation products, etc (Brit. pat 339,681) 21. Electrically heated apparatus for cracking oils (Brit. pat 339,649) 4. Desulfurizing gases [from cracking and distillation] (Brit. pat. 340,016) 21. Absorbing olefins with $H_2SO_4$ (Brit. pat 340,098) 10.

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**Petroleum.** YVES CORNIC. Fr. 696,163, May 27, 1930 Petroleum is obtained by treating $CH_4$ with nascent $CO_2$; the O of the $CO_2$ burns a part of the H of the $CH_4$ which then condenses to petroleum The $CO_2$ is obtained from carbonates dissocd.

by heat with or without the addn of substances favoring dissocn and with or without pressure

**Cracking petroleum oils.** Cornelius B Watson (to Gyro Process Co). U. S 1 797,305, March 24 Petroleum, from which free gasoline has been removed, is vaporized in a still and the vapor is conducted to a cracking app and cracked by heating; highly heated cracked vapors are passed to a sep receptacle through a closed coil within which charging stock is passed to effect vaporization of its low b p constituents, and the high b p portion of the charging stock is discharged into the receptacle in liquid form for admixt with vapors discharged from the cracking app, to lower the temp of the cracked vapors and arrest further cracking An arrangement of app is described

**Cracking hydrocarbons.** Martin B Schuster Ger 521,052, Jan 18, 1927 See Brit. 289,556 (*C A* 23, 696)

**Pressure cracking of liquid hydrocarbons.** Samuel J. M Auld and Percy H Herring (to Anglo-Persian Oil, Co, Ltd) U S. 1,798 054, March 24. The liquid is heated in a single stream to below a detd limit of the eventual temp of cracking, then passed in narrow streams at low velocity in a direct and relatively short course into a reactor, and subjected in the narrow slowly moving streams having a very low cross-sectional temp gradient to heat uniformly and gradually applied to a cracking temp without causing consummation of the cracking reaction, and the liquid is maintained in the reactor to consummate the cracking before withdrawal of the treated liquid App is described

**Cracking hydrocarbon oils.** Γ. P E. S Duplan Brit. 339,841, Jan 21, 1929 Cracking is effected by heating oils, under pressure sufficient to maintain them liquid, to a temp somewhat below 360°, while flowing through a tubular heating furnace at a speed of 6 to 72 cm. per sec for a tube of 10 mm diam, so that the oils are heated for about 1 0–1 5 min only. Various details of app are described

**Cracking oils.** Petroleum Conversion Corp Brit 340,030, Sept. 19, 1929 Oil vapors are brought into contact with a heated carrier gas supplied in stages so as to maintain a substantially const. temp level throughout the operation App and details of temps and other features of procedure are described Cf *C A*. 25, 410

**Cracking oils.** A P Sachs and E W Beardsley (to Petroleum Conversion Corp) Brit 340,021. Oct 6, 1928 In a vapor phase cracking process in which heat for the cracking is supplied by a carrier gas the oil is fractionally vaporized and the sep fractions are added in stages to the carrier gas so that the lighter fractions are subjected to a longer period of conversion An arrangement of app and various details of operation are described

**Cracking and hydrogenating oils, etc., in the interior of a compressor.** Marcus Brutzkus Ger 520,223, Feb 21, 1925 See Brit 252,787,(*C A* 21, 2556)

**Coatings for oil-cracking retorts** Albert C. Holzapfel. Ger 519,085, July 19, 1927 See Brit 291 585 (*C A* 23, 1260)

**Refining hydrocarbons in vapor phase.** Frank A Apgar (to Sinclair Refining Co) U S 1,797,255, March 24 The vapors are passed through fuller's earth or other suitable adsorptive catalyst in 2 different bodies through which the vapors are successively passed, and the sequence of passage of the vapors is periodically reversed before complete deactivation of the first body of adsorbent occurs An arrangement of app is described Cf *C A* 24, 718

**Refining hydrocarbons in vapor phase.** Eugene C Herthel (to Sinclair Refining Co) U S 1,797,262, March 24 Hydrocarbon vapors such as those from cracking processes are passed through an adsorptive catalyst such as fuller s earth and high b p polymers produced are then sepd and the vapors are subjected to fractional condensation to sep substances of higher b p than desired in the final product. Oil components are vaporized from the polymers and higher b p condensate and are condensed free from tar including the high b p polymers and this oil condensate is passed through the adsorptive catalyst with the hydrocarbon vapors to be refined during the refining operation, as a washing agent An arrangement of app is described

**Refining hydrocarbon oils.** Irving C Carpenter and Arthur R. Moorman (to Contact Filtration Co) U S 1,797,715, March 24 A body of oil such as crude petroleum is maintained at a temp above the vaporization temp of water but not substantially above the vaporization point of a desired fraction of the oil, by heating a stream of oil withdrawn from the body to such intermediate temp, sepg vapors from the heated liquid and returning a portion of the heated liquid to the body of oil to maintain a substantially const volume, with sep feeding onto the surface of the body of a stream of oil to be treated and sep removal of vapors from the body App is described Cf *C A* 24, 3638

**Refining oils.** The Sharples Specialty Co Fr. 696,461, May 9, 1930. Oil of low m. p is obtained in a continuous manner from mineral oil contg paraffin by submitting the mineral oil to a continuous vaporizing heat and obtaining from the resulting mixt of vapors and liquid by a continuous fractionated condensation with reflux, a fraction contg paraffin which ppts during a lowering of temp of this fraction in a form in which it may be removed by a continuous centrifuging process

**Hydrocarbons of low boiling point.** I. G. Farbenind A.-G Fr. 695,496, May 13, 1930 Hydrocarbons of high b p, mineral oils, distn residues, etc., are preliminarily treated in the liquid state at high temps. with H under pressure, in the presence of catalysts contg elements of group 2 to 8 The S and O compds contained in the starting materials are destroyed, to a great extent, without any appreciable amt of decompn. or hydrogenation of the hydrocarbons Afterward the purified materials freed from the catalyst, are decomposed by heat in the presence of H Cf *C A* 24, 5470; 25, 1536

**Distilling shale, coal, etc.** F Esling Brit. 339,963, Sept. 12, 1929 Bituminous shales, cannel coals, torbanites, etc, are distd in admixt with petroleum or its derivs at ordinary, reduced or slightly increased pressure, to form distillates of low S content and an un-coked pitch like residue suitable for road surfacing, roofing, etc Vegetable oils such as linseed, cottonseed, rape, olive or tung oil may be added, and the shale is preferably powdered and may be mixed with lime to assist in removal of S Steam may be injected during the distn.

**Column still suitable for use in fractionation of oil vapors, etc.** J V. Gaudet and A Abramson Brit. 339,663, Aug 8, 1929 Various structural details are described

**Oil-refining residues.** I. G. Farbenind A.-G (Richard Michel, inventor). Ger. 516,653, July 27, 1928 The ext. left by the refining of oils by liquid $SO_2$ is worked up by treating with olefins in the presence of catalyzers. Thus, such an ext of viscosity 1.4°E. at 20° is treated with $C_2H_4$ at 20 atm. at 140° in the presence of $AlCl_3$ until no further $C_2H_4$ is absorbed The product is washed with water and distd., giving a yellow oil of viscosity 4°E at 20°, and a resinous residue A further example is given

**Refining paraffin.** A. Riebeck'sche Montanwerke A.-G Ger. 517,744, April 5, 1928 Paraffin is deprived of smelling and tasting impurities by treating it with alkali in solid form or in concd aq soln or suspension The paraffin is then sepd. without distn. Adsorbants may also be added The process may take place under pressure and is particularly suitable for lignite tar paraffin

**Filter for gasoline, etc.** Antonin Boulade (to Soc. du carburateur Zenith). U. S 1,797,399, March 24 Structural features.

**Apparatus for refining "cracked gasoline" by use of fuller's earth, etc.** Rudolph C. Osterstrom and Robert T Tucker (to Pure Oil Co) U S 1,797,513, March 24 Structural features

**Liquid fuels.** General Technical Co., Ltd. Fr. 696,822, Sept. 21, 1929 Heavy residues from the distn. of petroleums above 350° or from the thermal dissocn of hydrocarbons, asphaltic compds., bitumens, tars, tar residues, natural waxes, etc., are converted into a mixt of gasoline, kerosene and gas oil distg below 350°. The products to be treated are submitted, under atm pressure, to the action of an alk. earth base between 350° and 400° so that the gas oil and kerosene products are formed at a temp below the critical temp of dissocn The process may advantageously be combined with a cracking under pressure. The residual oil is transformed either directly or indirectly into gasoline, gas oil and kerosene and the latter 2 are sent either directly or indirectly into the cracking circuit under pressures to be transformed into gasoline and residual oil which is treated again

**Non-detonating motor fuels.** Arthur B. Brown and Frederick W. Sullivan, Jr (to Standard Oil Co of Ind) U S 1,797,819, March 24 A high b. p. hydrocarbon oil such as gas oil is subjected to conversion temps under pressure in the presence of $NH_3$ or a nitrogenous org compd of the substituted-$NH_3$ type such as urea, $(NH_4)_2CO_3$, guanidine or dicyanodiamide to produce cyclic N compds in the oil, and a fuel of the gasoline b p range is distd.

**"Antiknocking" motor fuels.** I. G. Farbenind. A.-G Brit. 339,637, July 10, 1929 Antiknocking agents for addn to motor fuels comprise an amine which is alkylated or arylated on its N atom, and at least 5% of Fe carbonyl Examples are given of the use of dimethylaniline, monoethylaniline and diethylaniline and the use of other amino derivs and various diluents, etc., is also mentioned

**Motor fuels and lubricants.** Albert J. Ducamp. Ger. 520,010, Mar. 26, 1929. $Hg(CN)_2$ is added to motor fuels or lubricants, to prevent premature combustion and knocking The $Hg(CN)_2$ may be dissolved in glycerol and the soln dispersed in a hy-

drocarbon fuel with the aid of an oil and alkali, or the salt may be dissolved in EtOH and $Et_2O$ and the soln added to a hydrocarbon fuel, or the salt may be dissolved in an ester, *e. g.*, AcOEt, and the soln added to an alc fuel. An addn of 0.1–1 g. of $Hg(CN)_2$ to 10 l. of fuel is suitable. Alternatively, the salt may be dissolved in glycerol, with addn of PhOH if desired, and the soln dispersed in the lubricating oil for the motor.

**Lubricants.** Lubricating Products S. A. and J. Woudhuysen. Belg. 372,620, Sept. 30, 1930. Lubricants consist of an emulsion of fatty acid, glycerol, NaOH, $Na_2CO_3$, AcOH, $K_2Cr_2O_7$, talc, graphite, mineral oil, vegetable or animal oil and water.

**Cooling system for lubricating oil such as that of internal-combustion engines.** T. R. Cave Brown Cave. Brit. 339,650, Sept. 10, 1929. A cooling coil mounted in an oil tank contains a liquid of lower b. p. than that of the oil, such as $CCl_4$ or EtBr, and this coil is connected to a condenser. Various structural details and modifications are described.

**Regenerating lubricants such as those from marine or internal-combustion engines.** Swan Hunter & Wigham Richardson, Ltd., and Horace J. Young. Ger. 517,848, Mar. 25, 1928. See Brit. 292,300 (*C. A.* **23**, 1502).

**Filter for waste lubricating oils, etc.** Stanley Pipkin (49% to James Higgins). U. S. 1,798,031, March 24. Structural features.

**Transformer and switch oils.** I. G. Farbenind. A.-G. (Richard Michel, inventor). Ger. 519,069, July 17, 1927. Liquid polyalkylnaphthalenes b. p. above 160° are used. The oils may be prepd. by condensing $C_{10}H_8$ or its non-oxygenated derivs. with olefins at raised temp. and pressure in the presence of $AlCl_3$, and fractionally distg. the products.

**Asphaltic compositions.** Hermann H. Schröder. Ger. 519,031, Oct. 29, 1926. See Brit. 260,621 (*C. A.* **21**, 3443).

**Bituminous emulsions.** Jonathan Parker. Fr. 696,277, May 28, 1930. See Brit. 333,303 (*C. A.* **25**, 589).

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**An explanation of the swelling effect of thiocyanates on cellulose; compounds of cellulose with neutral salts.** J. R. Katz and J. C. Derksen. *Rec. trav. chim.* **50**, 149–52(1931).—The swelling of stretched ramie fibers by concd. LiSCN solns. has been investigated by the x ray method. When solns. more concd. than $3LiSCN\,1H_2O$ are used the fibers show an altogether new Röntgen spectrum for cellulose. With solns. of lower concns., the salt appears to be adsorbed on the surface of the micelle, without any change in the structure of the latter. With higher concns., presumably addn. products are formed on the O atoms of the cellulose, and these compds. are responsible for the new x ray patterns. Cellulose can be mercerized by solns. of salts of high soly., the degree of mercerization increasing with the salt concn. and the length of heating. J. H. Reedy

**Cellulose acetate—its production and uses.** Herbert Levinstein. *The Times Trade and Eng. Suppl.* **28**, No. 664, 8–9(1931).—A review. E. M. Symmes

**Nitrocellulose—a basis for plastics.** F. Sproxton. *The Times Trade and Eng. Suppl.* **28**, No. 664, 10(1931).—A review. E. M. Symmes

**$p_H$ control in rayon manufacture.** Chas. E. Mullin. *Rayon* **10**, No. 12, 8, 16, 38–9, 44(1930).—The probable advantages of $p_H$ control in the processes of rayon manuf. are discussed and the glass-cell electrode is suggested for certain detns. C. E. M.

**Paper coloring on the calender and in the size tub.** P. W. Carr. *Dyestuffs* **31**, 38–41(1930). Chas. E. Mullin

**Making beater-dyed paper fast to light.** Ivar Ekholm. *Dyestuffs* **32**, 10–5(1931).—Suitable dyestuffs are suggested. Chas. E. Mullin

**Electrical materials commonly used—paper.** Wm. C. Hirsch. *Elec. Mfg.* **7**, No. 4, 55–7(1931).—A brief general outline of paper manuf. is given, attention being specially drawn to the prepn. and properties of papers particularly useful to the elec. industry. The numerous applications of paper in the manuf. of motors, condensors, transformers, etc., and as insulation material, as well as for decorative effects, are reviewed. Edward B. Sanigar

AcOH and cellulose acetate in the United States (Partridge) **10**. Thermoelastic effect in cellulose ester films (McNally, Sheppard) **2**. Structure of celluloid and nitrocellulose and the gelatinizing medium of nitrocellulose as a swelling medium (Katz, *et al.*)

2. The importance of the isoelectric point in the manufacture of casein for paper coating (Bell) 18. Automatically controlling density [of wood pulp aqueous mixtures] (U. S. reissue 18,005) 13. Roller apparatus for applying liquid to paper on one side (Ger. pat. 519,404) 1. Rubber latex [in impregnation of paper] (Ger. pat. 519,483) 30. Preserving [paper] (Ger. pat. 514,981) 20. Synthetic rubber [products for manufacture of coatings, films, artificial silk, etc.] (Brit. pat. 340,008) 30.

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Faust, O. Kunstseide. 4th and 5th ed., revised and enlarged. Dresden: T. Steinkopff. 289 pp. About M 13.50, bound, about M 15.

Stark, Curt. Die Kollodiumwolle. Ihre Herstellung und Verwendung für Zelluloid, Kunstleder, Nitroseide, Nitrolacke, Filme und plastische Massen. Anhang: Andere Zellulosen. Berlin: M. Krayn.

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**Cellulose.** Bernardino Oglietti. Fr. 697,228, June 11, 1930. Cellulose is extd. from vegetable materials, particularly waste wood, by submitting the material to a treatment with aq. NaOH or KOH of 3–10% concn. and in amt. of 3–6 parts by wt. to 1 part of material for 5–12 hrs. at 100–160°. The material is afterward treated with strong mineral acids or by the wash waters from a previous chlorination and then chlorinated with Cl gas.

**Digester for cellulose manufacture.** Einar Morterud. Ger. 519,110, Mar. 5, 1930.

**Regenerated cellulose films.** Ernest Muller. Ger. 520,105, June 4, 1926. The films are given a final wash, dried to remove about 80% of their water content and then treated with a softening agent, *e. g.*, glycerol, glucose or maltose. They are then dried completely. The softening agent may be applied in concd. form to one or both sides of the films, or the films may be passed through an aq. soln. of the softening agent.

**Press for alkali cellulose.** Maschinenfabrik M. Hausser. Ger. 521,362, Nov. 5, 1929.

**Cellulose derivatives.** Léon Lilienfeld. Ger. 519,138, May 30, 1926. See Brit. 252,654 (*C. A.* 21, 2384).

**Cellulose derivatives.** Léon Lilienfeld. Ger. 521,452, Mar. 28, 1922. Alkali-sol. alkyl derivs. of cellulose are prepd. by treating alkali sol. conversion products or derivs. of cellulose with an alkylating agent in such an amt. that not more than 1 mol. of alkylating agent, preferably 0.33–0.66 mol., is present for each mol. of $C_6H_{10}O_5$. Suitable cellulosic initial materials are crude or purified viscose and cellulose hydrates. The reaction may be effected in aq. alk. soln. Examples are given. Cf. *C. A.* 24, 3646.

**Cellulose derivatives.** U. S. Industrial Alcohol Co. Fr. 695,401, May 10, 1930. In the manuf. of org. derivs. of cellulose such as the acetate, propionate, benzoate or ethers, a volatile liquid is used as a constituent of the reaction mass and this liquid, by the latent heat of evapn., is used to control the temp. of the reaction. A suitable app. is described.

**Moldable masses from solutions of cellulose derivatives.** I. G. Farbenind. A.-G. (Erich Richter, inventor). Ger. 514,640, July 8, 1925. The cellulose is partly pptd. from the soln. by precipitants which evap. more quickly than the solvent. Thus, a soln. of nitrocellulose and tricresyl phosphate in AcOBu, AcOEt, toluene and benzene is pptd. in a gelatin network by addn. of a soln. of ester gum in AcOBu and alc. The whole is then kneaded to desired shape. Other examples are given.

**Cellulose ethers.** Imperial Chemical Industries, Ltd. Fr. 696,158, May 27, 1930. Cellulose is mercerized in 18–20% NaOH soln., pressed and ripened by storing at about 20–30° and for 12–90 hrs. according to the temp. used and the product desired. The product is treated with at least 50 parts of NaOH for 100 parts of cellulose and then by an alkyl chloride such as EtCl or MeCl. The ethers are sol. in ethylene chlorohydrin, or a mixt. of alc. and $C_6H_6$ or both.

**Cellulose ethers.** Alexander Wacker Ges. für elektrochem. Ind. G. m. b. H. (Alfons Ascherl and Wolfgang Gruber, inventors). Ger. 520,384, Feb. 16, 1930. About 1% of a carbonate, calcd. on the alkali cellulose, is included in the reaction mixt., and the reaction is interrupted as soon as $CO_2$ is evolved. This method of detg. the end point of the reaction is particularly useful in the reaction of alkali cellulose with alkyl halides under pressure. An example is given.

**Cellulose esters.** I. G. Farbenind. A.-G. Fr. 695,283, May 7, 1930. Esters of cellulose or other carbohydrates are prepd. by first partially substituting by an alkoxy group the OH group of the carbohydrate and afterward esterifying the alkoxy compd. obtained. Thus, cellulose is treated with ethylene oxide and afterward esterified to

give a mixed acetic-butyric ester of a partially hydroxyethylated cellulose which is directly sol. in acetone. Other examples are given.

**Cellulose esters.** I. G. Farbenind. A.-G. Fr. 697,156, June 7, 1930. Esterification of esters is carried out in the absence of free fatty acid and in the presence of liquid chlorinated hydrocarbons not miscible with water and b. below 100° such as $CH_2Cl_2$, $C_2H_4Cl_2$ or $CHCl_3$, acting as solvents. The reaction is carried out at normal temp. and with less catalyst than usual. In a variation of the process the esterification is effected with the anhydride of one acid in the presence of the chlorinated hydrocarbon and another fatty acid.

**Concentrated colloidal dispersions of cellulose esters.** Hugh M. Spencer. U. S. 1,797,843, March 24. A cellulose ester such as a cellulose nitrate is incorporated with a substantially anhyd. alkali in soln. such as $NH_3$ in EtOAc.

**Cellulose acetate.** Kurt Brating and Albert Giesmanns. Ger. 519,137, Feb. 19, 1929. The manuf. of cellulose acetate is effected more rapidly and uniformly by transferring the reaction mixt. from a container under pressure to an evacuated container through a narrow orifice. The mixt. may be repeatedly transferred.

**Precipitating cellulose acetate.** Verein für chem. Ind. A.-G. Ger. 521,125, Aug. 12, 1928. Cellulose acetate soln. and a precipitant are drawn through sep. conduits by a centrifugal pump, which mixes the soln. and the precipitant and feeds the mixt. to a collecting vessel.

**Films of cellulose acetate.** Spicers, Ltd. Fr. 696,603, June 3, 1930. A plasticizer for use in the manuf. of plastic materials having a basis of a cellulose ester is composed of an org. deriv. of phosphoric acid contg. a naphthyl group, *e. g.*, β-naphthyldiphenyl (or dicresyl) phosphate.

**Disintegrating vegetable fibers.** Firma Otto C. Strecker. Fr. 697,030, May 30, 1930. In the disintegration of vegetable fibers and transformation of phenols by the method of phenolates to obtain cellulose, the aerobic enzymes and like organisms of the vegetable fiber used are rendered inactive by heat. The lye contains with the phenolate, free phenol and free phenolic compds. During the cooking the greater content of phenolate is reached before the highest temp. is reached. The gases and hydrocarbons liberated during the cooking are eliminated by distn. from the lye.

**Carbohydrate xanthates.** Wm. Harrison. Ger. 519,050, Oct. 5, 1926. See Brit. 264,261 (*C. A.* 22, 164).

**Sodium hydroxide solutions for viscose manufacture.** Hoesch & Co. Fr. 696,153, May 27, 1930. Solns. of NaOH produced by electrolysis with a Hg cathode for the manuf. of viscose are improved by adding to these solns. a small quantity of compds. of Na, K, Fe or Mn, *e. g.*, NaCl, KCl, KOH, complex compds. of K, ferrites, ferrates and their complex compds.

**Viscose.** Friedrich G. C. Klein. Fr. 696,411, Feb. 14, 1930. Viscose is made by passing cellulose or transformation products of cellulose in a const. uninterrupted course, avoiding all treatment in charges, through app. in which the material is simultaneously treated (*e. g.*, impregnated, disintegrated, ripened, pressed, sulfured, dissolved, filtered, ripened again, deaerated, etc.) and transported. A suitable app. is described.

**Hollow fibers of viscose, etc.** Courtaulds, Ltd. Ger. 516,572, April 26, 1927. See Brit. 273,506 (*C. A.* 22, 2056).

**Mat fibers, etc., from viscose.** Steckborn Kunstseide, A.-G. Ger. 516,573, Nov. 27, 1928. An emulsion of org. material sol. in viscose, etc., is added to the viscose, etc., so that the O or other chemicals in the viscose, etc., ultimately cause pptn. of the material to give the mat finish. Anthrahydroquinone and the phthalic acid ester of isoamyl alc. are mentioned in examples as the org. material added.

**Filaments, films, etc., from viscose.** I. G. Farbenind. A.-G. (Adolf Kämpf, inventor). Ger. 519,349, Jan. 6, 1928. The pptg. bath contains up to 42% of a mineral acid, calcd. as $H_2SO_4$, and is substantially satd. with an org. substance of high mol. wt. capable of pptg. gelatin, *e. g.*, Na carbazolesulfonate or a condensation product from $CH_2O$ and naphthalenesulfonic acid. The baths are intended particularly for unripened viscose.

**Artificial silk from viscose.** Vereinigte Glanzstoff-Fabriken A.-G. Ger. 519,233, Jan. 13, 1929. Filaments of less than 6 deniers are prepd. by spinning crude viscose through orifices of the normal size into pptg. baths contg. higher concns. of acid than is normal. Higher concns. of acid are used for finer filaments, and the min. concn. of acid is greater or less according to whether the diameter of orifices is greater or less than 0.1 mm.

**Artificial silk, etc., from viscose.** I. G. Farbenind. A.-G. Brit. 339,740, Nov. 2, 1928. The process described in Brit. 307,829 (*C. A.* 24, 240) is modified by the use of an

unripened viscose prepd from a ripened alkali cellulose The viscose may contain 10% or more of cellulose and the use of high-cellulose viscoses reduces the dilu of the spinning bath Filaments of 1 denier may be made by this process, having a dry strength of 3 g or more per denier and a wet strength of 2 g or more

**Artificial silk.** J. A SINGMASTER Brit 339,603, May 8, 1929. For modifying the luster and covering power of artificial silk (such as that made from nitrocellulose or cellulose acetate) by incorporating in the filaments finely divided inert white pigments, the pigments are first distributed in the solvent used for the soln of the material and after the addn of the dispersed pigment the resulting soln is subjected to filtration, which removes the larger particles and renders the material more homogeneous Various examples of pigments used, etc., are given Cf *C A* 24, 3902

**Artificial silk, etc.** I. G FARBENIND A.-G Brit. 340,138, Dec. 20, 1928. Artificial silk, artificial horse hair or ribbons are made by pptn of cellulose hydrate by a wet-spinning process, and the freshly pptd. material is stretched by passing it over one or more rubbing surfaces which are heated, so that damage to the material is minimized For this purpose there may be used glass tubes or rollers which are internally heated by electricity, gas, steam or liquid, and if desired the surface of the stretching device may be irrigated with water or other suitable liquid at about the same temp in order to prevent accumulation of crystn products, etc., on the heated surface The strength of viscose silk is thus improved Some details of app are described

**Artificial silk.** MARTIN HÖLKEN Ger 517,747, Oct. 11, 1928 In degasifying cuprammonium silk spinning soln by reducing the pressure, the gases are passed over solid superphosphate, etc., so that the $NH_3$ present is absorbed, forming a powerful *fertilizer*

**Artificial silk.** EUGEN MOSSGRABER. Ger 517,932, Dec. 14, 1929 A device is described for supplying the viscose, acetylcellulose, etc., to the spinning heads for making artificial silk

**Artificial silk.** CHATILLON (SOCIETÀ ANONIMA ITALIANA PER LA SETA ARTIFICIALE). It 307,261, June 12, 1930 The brilliancy of artificial silk is diminished by producing a current of air or gas perpendicular or oblique to the threads leaving the nozzle by means of a small propeller blade inside the spinning vessel and in the neighborhood of the nozzle

**Artificial silk.** HANS SUTER. Fr. 696,306, May 30, 1930. Filaments obtained by dry- or wet-spinning cellulose derivs., particularly cellulose acetate, are drawn under adequate tension in the presence of swelling agents and org substances which have the power of diminishing the solvent action of the agents. As swelling agents, $CH_2Cl_2$, $CHCl_3$ and $C_2H_4Cl_4$ may be used, and as substances to reduce the solvent action, $CCl_4$, $C_2H_4Cl_2$, $C_6H_6$, PhMe, xylene and their homologs may be used

**Artificial silk.** SOC. POUR LA FABRICATION DE LA SOIE "RHODIASETA" Fr. 695,490, May 13, 1930. Mat effects are obtained on cellulose acetate silk by dissolving in the spinning soln a small quantity of a sol acid such as stearic acid or a sol anhydride, dry-spinning the solns obtained and treating the filaments obtained with aq solns. of salts or bases which form insol or difficultly sol compds with the acid used Fr. 695,491 describes the production of mat effects on cellulose acetate threads by dissolving in the spinning soln non-volatile or high-boiling substances, dry-spinning the solns obtained and removing the added substances from the finished thread by a washing operation Salts of alk. earth metals and org substances such as glycerol or stearic acid may be used

**Artificial silk, etc.** HENRY DREYFUS. Fr. 696,219, May 28, 1930 In the manuf. of artificial filaments the spinning soln in its passage to the extruding nozzles is passed through one or more parts in metal or other impermeable substance pierced by a series of small holes which are not sensibly greater, preferably much smaller, than the extruding orifices Details of construction are given

**Artificial silk.** HENRY DREYFUS. Fr. 697,216, June 11, 1930. Filaments or threads are made by extruding a spinning soln of a cellulose deriv. through a nozzle and receiving the filaments in an evaporative medium in which an exterior skin like layer is formed, and afterward passing them into a solvent vapor to soften the layer and drawing the filaments thus softened. The filaments are then passed through a second evaporative medium An app is described

**Artificial fibers.** JOHN BILLWILLER and JOHANN BILLWILLER. Ger. 517,933, Sept. 3, 1922 Carbohydrates contg little or no fibrous material are worked up by treatment with disintegrating liquids such as solns of $NH_4OH$, NaOH, alkali carbonates, hydrosulfides, $H_2SO_4$, $H_2S$, etc., at temps. above 175° and under pressure, with strong and continuous rotary washing. The product is then spun in the manner of artificial silk. In the example bran is treated with $NH_4OH$ at 280°.

**Artificial fibers.** Alsa Soc. anon Ger 521,055, Oct. 30, 1927. The gas content of hollow artificial fibers is raised by soaking the fibers in a liquid in which gas is then evolved by phys. or chem means Thus the fibers may be (*1*) immersed in cold water satd with gas, and the water then warmed or (*2*) immersed successively in liquids which react to form a gas or (*3*) immersed in a soln of an unstable compd that yields a gas on decompn *e g*, a diazo compd The method may be used to distend collapsed hollow fibers Examples are given

**Making films, fibers, etc., from cellulose esters and ethers.** I G Farbenind A G (Adolf Kämpf, inventor) Ger 520,411, Aug 20 1927 The solvent for the ester or ether contains a substantial proportion of $CS_2$ Examples are given

**Artificial threads, films, etc.** Otto Sindl. Fr 697,272, June 12, 1930 Solns. of cellulose esters are submitted to the action of a coned mineral acid Thus cellulose acetate in an org solvent is spun and coagulated in $H_2SO_4$ contg more than 30 and less than 80% monohydrate The $H_2SO_4$ contains at least 0.01% $CH_2O$

**Ribbons from cellulose esters or ethers.** Henry Dreyfus Fr. 695,843, May 19 1930 Solns. of cellulose esters or ethers, such as cellulose acetate in org solvents miscible with water, are passed through narrow and relatively long extruding orifices and the ribbons received in coagulating baths composed of water, aq solns. of salts or aq solns of mineral acids

**Artificial silk filaments.** I G Farbenind A-G (Otto Faust, inventor) Ger 517,771 Mar 5, 1927 Filaments which will dye uniformly are spun by passing the filaments from the nozzle over a spring abutment and winding them on a roller, the tension of the spring ensuring a uniform filament

**Spinning nozzle for artificial silk.** Henri Colomb Ger 519,348, Nov 17, 1928

**Spinning nozzle and holder for artificial silk.** Oscar Konorn & Co and Alfred Lehner Ger 516,571, Jan 24, 1930

**Spinning nozzle with means for uniform aeration of the threads leaving the nozzle.** I G Farbenind A-G Fr 697,260, June 12, 1930

**Spinning pot for artificial fibers.** Siemens-Schuckertwerke A-G (Hans Dietzius, inventor) Ger 520,172, Jan. 28, 1930.

**A spinning pot for artificial silk.** Eduard Svatek. Fr. 695,840, May 19, 1930 Use is made of artificial resin mixed with detached particles of fibrous material and strengthened with layers of fiber soaked in artificial resin

**Continuous filtration apparatus for solutions for spinning artificial fibers.** I G Farbenind A G (Adolf Kampf, inventor) Ger 520,296 Mar 21, 1928

**Apparatus for making artificial silk by dry-spinning.** Adolf Ewald Gull. Ger 520,479, Oct 5, 1928 See Brit. 303,778 (*C A* 23, 4573)

**Apparatus for making artificial silk from cuprammonium cellulose solutions by stretch-spinning.** Grunert & Giannettl. Ger 520,063, Oct 9, 1925. Brit. 263,462 (*C. A.* 22, 165)

**Apparatus for stretch-spinning of artificial threads.** Courtaulds, Ltd, W. H Glover and G D Bond Brit. 339,745, Nov 4, 1929 Structural features.

**Apparatus for making artificial silk filaments, ribbons or straw, etc., by the dry or evaporative process.** British Celanese, Ltd, A H Tidmus, F. A. Reeson and R. H J Riley Brit. 339,670, Sept 5, 1929 Two spinning jets are arranged in series and in proximity to each other on a single supply pipe so that the second jet may be removed or replaced without interfering with the first jet Various structural details are described

**Apparatus for washing and after-treating artificial fibers in spinning pots.** I G Farbenind A-G (Richard Hofstadt and Wilhelm Eller, inventors) Ger 521,010, Sept 16, 1927

**Thread guide for artificial silk.** Comptoir des textiles artificiels (Soc. anon) Fr 696,211, May 28, 1930 Construction is described of a slightly conical thread guide and drawer mounted in a box where the drops of coagulating liquid are collected and returned to the bath

**Apparatus for treating cakes of viscose silk with liquids.** Acme Rayon Corp Fr 696,965, May 14, 1930.

**Washing apparatus for yarn spools.** Harzer Achsenwerke G m b H Ger 517,733, April 17, 1927.

**Grinding mill for wood pulp, cellulose, etc.** Max Tamaschke Ger 520,423, Nov 18, 1927.

**Fibrous pulp from wood and other materials.** O. A Müller. Brit. 340,164, Feb 9, 1929 Easily bleached cellulose is made from wood or the like contg cellulose

and lignin by treating the material, after chlorination while moist, with a mixt of a water-sol org solvent such as alc and an inorg acid such as HCl, by using boiling alc. on the countercurrent principle the chlorolignin is extd and the cellulose can be purified by further treatment with fresh alc MeOH, acetone, glacial HOAc, PrOH, phenol, etc., also may be used, and various details of procedure are described.

*Treating waste liquor from chemical wood-pulp manufacture.* LINN BRADLEY and EDWARD P MCKEEFE (to Bradley McKeefe Corp) U S 1,797,678, March 24 The inorg content with admixed org matter of a coned mixt of the waste residual liquor resulting from the digestion of cellulosic material such as wood chips in a soln of Na-S salts (contg most of the Na in the form of a sulfite of Na) and the residual liquor resulting from the digestion of cellulosic material in an alk soln contg Na compds (the major portion of which are S-free Na compds such as NaOH) is subjected to furnacing under reducing conditions to produce a furnace product contg the Na compds mainly as $Na_2CO_3$ and Na sulfide, and the resulting Na compds are treated to produce an alk cooking liquor for further use as a digesting agent for cellulosic material Cf *C A* 24, 4158

**Treating waste liquors such as those of soda and sulfate pulp manufacture.** DAVID D PEEBLES (to Peebles Processes, Inc) U S 1,797,585, March 24 The liquor is dehydrated to a high concn by continuously circulating the heated liquor through a closed expansion chamber while simultaneously continuously removing evolved vapors from the chamber, and the coned waste liquor is burned in a furnace with gases evolved from the chamber

*Rotating autoclave for the extraction of glucose from wood pulp.* SILLER & RODENKIRCHEN G M B H Ger 517,890, June 14, 1928 Structural details.

Paper pulp. MEAD PULP & PAPER CO Brit. 339,599, Aug 28, 1929 Material such as wood, straw, fibrous grasses and the like is used for the prepn of a free pulp of high strength, good color and clay carrying properties, by first subjecting the material to an incomplete chem digestion (suitably for 1–2 hrs at 125° and then at 160–180° for 1–4 hrs with addn of $CO_2$ in a soln of alkali metal sulfite and $NaHCO_3$ or a tartrate, citrate, borate or oxalate) while maintaining substantial neutrality of the cooking liquor, and then subjecting the material to a limited chlorination treatment while dild and subsequently to a stronger chlorination while thickened The process is especially suitable for treating waste wood from furniture factories App and various details of procedure are described Cf *C A* 24, 4392, 25, 2503

Paper. DONALD K. PATTILLO (to Mathieson Alkali Works). U. S 1,797,789, March 24 Cl is added to the stock in the beater near the beginning of the beating operation to sterilize the stock, which is then subjected to beating and made into paper. *Cf. C A.* 24, 4932

Paper-making apparatus. HERMAN L KUTTER (to Black-Clawson Co). U. S 1,797,290-1, March 24 Various details of doctor construction, etc., are described.

Paper-making apparatus. T D. NUTTALL and BENTLEY & JACKSON, LTD Brit. 340,087, Nov 6, 1929 Structural features

Paper-making apparatus. C G HAUBOLD A.-G. Ger. 520,122, Sept. 6, 1927. Means is described for controlling the run of the wire cloth and the felt.

Dewatering machine for paper manufacture. EISENGIESSEREI, MASCHINEN- UND PAPPENFABRIK F A MÜNZNER G M B H Ger 521,172, Feb 15, 1929

Couch press for paper manufacture. JOHANNES RAITH. Ger 519,111, Jan 20, 1928

Suction rollers for dehydrating paper, cellulose, wood pulp, etc. JULIUS STEPHANSEN Ger 517,661, April 27, 1926

Machine for disintegrating paper, cardboard, etc. LEOPOLD SCHUMANN Ger. 516,505, Mar. 19, 1929

Sizing papers and cloth. JULIUS GLATZ Fr 695,626, May 15, 1930 Paper and cloth are sized by adding, during or after their manuf., the $NH_4$, Na or other salt of the glycolic acid of cellulose sol in water, or homologous compds, or a substance such as starch having an affinity for cellulose

Water-fast colored paper. SOC ANON POUR L'IND CHIM À BÂLE. Swiss 143,416, April 4, 1929 The paper is immersed in a dye bath which contains also a salt of oleyldiethylethylenediamine and then is dried

Corrugated cardboard. THE WESTON PAPER AND MANUFACTURING CO. Ger 519,209, Jan 12, 1930 The cardboard is prepd from a mixt of straw cellulose that has been boiled with $Ca(OH)_2$ soln and straw cellulose that has been boiled with NaOH soln

# 94—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Consumption of explosives in February, 1931. W. W. Adams and L. S. Gerry. Bur. Mines, *Repts. of Investigations* 3103, 15 pp. (1931). Alden H. Emery

The velocity of the phenomena involved in the detonation of solid explosives. P. Lafitte and M. Patry. *Compt. rend.* 192, 744–6 (1931).—An optical method (*C. A.* 25, 1383) was used for measuring the velocities of the shock wave and of the luminous gases from the detonation of 10-cm. columns of dynamite No. 1 and ammonal, 13 mm. in diam., loaded in tubes at different densities (Δ). The 2 velocities are identical in the vicinity of the charge and are greater than the velocity of detonation in the column of explosive itself. The velocity of the gas then diminishes more rapidly than that of the shock wave, the sepn. of the 2 waves occurring at the following distances from the charge for tetryl, with Δ = 0.55, 35 cm., Δ = 0.65, 45 cm., Δ = 0.90, 55 cm., for dynamite, with Δ = 0.90, 35 cm., Δ = 1.25, 50 cm., Δ = 1.65, 58 cm. These distances are independent of the length of the column of explosive, but increase as the diam. of the column increases. C. G. Storm

The propulsive strength and rate of pressure development of the Cardox blasting device. N. A. Tolch and G. St. J. Perrott. Bur. Mines, *Repts. of Investigations* 3084, 7 pp. (1931).—The propulsive strength of the Cardox blasting device Model G does not increase directly with the $CO_2$ charge, but depends on the heater and disk used. In general, the propulsive strength increases with the wt. of the heater and always with the thickness of the disk. The smaller grain sizes of $NaClO_3$ as used in the heater element gave greater propulsive strength than the larger sizes. An increase in the charge of $CO_2$ lengthened the duration of the pressure period. The shearing of the disk took place before the pressure was completely developed. With 104-g. heaters and a non-shearable disk, the av. max. pressures developed for 570-, 680- and 1135-g. charges of $CO_2$ were 810, 1380 and 2850 kg./sq. cm., resp.; with 140-g. heaters, 340- and 680-g. charges of $CO_2$ gave av. max. pressures of 940 and 2110 kg./sq. cm. Alden H. Emery

Ignition, combustion and explosion. N. Athanasesk. *Chem. Rundschau Mitteleuropa u. Balkan* 7 (15), 57–8 (1930).—An address. S. S. de Findly

Instability of colloidal powders. Henri Muraour. *Bull. soc. chim.* 49, 275–9 (1931); cf. *C. A.* 25, 817.—A further discussion relative to the effect of water and acid produced by the hydrolyses of nitrocellulose on thermolysis is occasioned by comments of de Brun, which are quoted. At temps. of 15–20°, water exerts no action on nitrocellulose, even during periods of 20–30 yrs.; at 50–75°, however, hydrolysis proceeds rapidly in the presence of moisture. Nitrocellulose (13.24% N) kept in 20% $HNO_3$ for 8 months was reduced to 12.91% N. Thirty % $HNO_3$ caused the same effect in 3.5 months. As a result of the greater effect of acid of increased concn., a decrease in the moisture content of a powder contg. even a trace of free acid may cause an increase in the rate of decompn. C. G. Storm

Influence of moisture on the speed of combustion of colloidal powders. Henri Muraour. *Bull. soc. chim.* 49, 278–74 (1931).—The influence of moisture in smokeless powder was calcd. from the ignition temp. (approx. 200°) and the sp. heat of the powder (0.27 for poudre B, and 0.337 for the non solvent type of powder). The addn. of 1% moisture caused an increase of 13.3 and 10.7%, resp., in the energy required for combustion of the two types. $\int pdt$, or the total area of the time-pressure curve, is a measure of the total energy required for decompn. of the powder. $\int pdt$ was therefore detd. in the Vieille bomb on powder samples with different moisture contents, and the effect of 1% moisture was noted. These expts. showed an increase in $\int pdt$ for 1% moisture equal to 12.9% for poudre B, and 10.8% for the non-solvent type of powder. The sample of the latter type contained nitrocellulose (11.7% N), nitroglycerin (approx. 25%) and diethyldiphenylurea, with or without Et phthalate. C. G. Storm

Burning characteristics of smokeless powder. I. Burning temperature. A. M. Ball. *Ind. Eng. Chem.* 23, 498–501 (1931).—The method of calcn. of burning temp. from the heat of combustion of the powder and sp. heats of the gases is discussed in detail. Heats of combustion of the various constituents of smokeless powders are listed, and a tabulation given showing for 16 different powder compns. their heat of combustion, burning temp., gas vol. and compn. of gases, illustrating the effects of increase in content of nitroglycerin and of addns. of deterrent materials. C. G. S.

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The question of gas formation in city sewers (Kehr, Müller) 14.

GECK, WALTER H.: Die Verhütung von Staubexplosion. Ein Merkbuch für jeden Betriebsleiter. Berlin: J. Springer 67 pp. M. 6.90

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**Explosives.** HANS RATISBURG Ger. 521,034, Mar 17, 1928. See Brit. 308,179 (*C. A.* 24, 242).

**Explosives.** DYNAMIT-ACTIEN-GES. VORM ALFRED NOBEL & Co Fr. 696,632, June 4, 1930 The dinitrate of ethanolamine and the trinitrate of diethanolamine or nitrates of the homologs of these compds or the *N* alkyl derivs of the mono- or diethanolamine are used, either alone or with other compds., as explosives. Cf *C. A.* 24, 4397

**Explosives.** WILLEM P JORISSEN and JOHAN BOOY. Fr 695,529, May 13, 1930 The explosiveness of detonating mixts., whether gaseous, liquid or solid or as a dispersion, is reduced by adding to the mixts. a gaseous, liquid or solid "anti detonator" such as one or more org halogen derivs., or one or more phenolic substance or substances which are both halogen and phenolic derivs

**Explosives.** LOUIS V. RABUT. Fr 696,911, Jan 17, 1930 An explosive suitable for mines and quarries contains $NaClO_3$ 77.1, dinitrotoluene 17.1, castor oil 5.05 and paraffin 0.75%. Fr 696,912 describes a similar explosive contg $KClO_3$ 75, dinitrotoluene 18.4 mononitronaphthalene 1.00 castor oil 4.8 and paraffin 0.74%.

**Explosives.** ALFRED STETTBACHER Fr 697,213, June 11, 1930 See Brit. 312,318 (*C. A.* 24, 967)

**Blasting fuses and detonators.** I G FARBENIND A.-G Brit. 340,041, Sept. 24, 1929 A mixt of chloronaphthalene (contg Cl 45–60%) with up to about 20% of S is used for sealing elec blasting fuses and detonators

**Detonators.** WILHELM ESCHBACH and WALTER FRIEDERICH. Fr. 696,663, June 5, 1930 The capsules for detonators of $PbN_6$ or $C_2HgN_2O_2$ are made of an alloy contg Cu up to 90–95 and Al 5–10%. The latter may be replaced in part by Mg

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## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**The numerical solubility of dyes.** W. C. DURFEE *Proc. Am Assoc. Textile Chem. Colorists* 1931, 103–4; *Am Dyestuff Reptr.* 20, 185–6(1931). R. H.

**The dyestuffs act in Britain.** E. F. ARMSTRONG *Ind. Eng. Chem.* 23, 575–80 (1931). G. G.

**Fast-to-light substantive dyes.** T. F. MURPHY *Dyestuffs* 31, 97–9(1930).—The light-fastness properties of the Solantine dyes are discussed. CHAS. E. MULLIN

**Azo-chromophore. III.** J. S. P. BLUMBERGER. *Chem. Weekblad* 28, 190–8 (1931); *cf. C. A.* 22, 3824.—*Absorption spectra of about 20 dyes of the o- and p-amino- and -hydroxy-azobenzene types were detd. and compared* The effect of the auxochrome is influenced by the polar character of the substituents, through an inductive action over atoms of alternating functions. In the abnormally behaved *o*-hydroxyazo dyes the effect on the chromophore is heightened by a coördinate bond between the OH and N N groups In a series of related, isomeric dyes, the electrostatically most unsym mol has the deepest color The influence of the substituents, whether $NH_2$, OH, $NO_2$ or $CH_3$, depends on their position A *p*-$NO_2$ is strongly bathochrome, a *m*-$NO_2$ feebly so in aminoazobenzenes, and hypsochrome in hydroxyazobenzenes. *A second auxochrome in the primary dye component has a negligible effect; p,p'-*diaminoazobenzene and *p*-hydroxy-*p'*-aminoazobenzene absorb very much the same as aminoazobenzene, the stronger auxochrome, in the second case, detg. the character of the dye. K. H. ENGEL

**Azo dyestuffs derived from arsanilic acids.** VENANCIO DEULOFEU AND EUGENICO MARÍN. *Anales soc. espaü. fis quím* 29, 65–73(1931).—By diazotizing the acids and coupling with the phenols in alk. soln the following compds. were prepd: From *p*-arsanilic acid and resorcinol, 2,4-dihydroxyazobenzene-4'-arsonic acid, yellow-orange, with phloroglucinol, 2,4,6 trihydroxyazobenzene-4'-arsonic acid, red brown, with orcinol, 2 methyl-4,6-dihydroxyazobenzene-4'-arsonic acid, deep red brown; from 2 methyl-4-aminobenzenearsonic acid and resorcinol, 2,4 dihydroxy-2'-methylazobenzene-4'-arsonic acid, orange; from *o*-arsanilic acid and PhOH, 4 hydroxyazobenzene-2'-arsonic acid, yellow; with resorcinol, 2,4-dihydroxyazobenzene-2'-arsonic acid, light orange-yellow; with phloroglucinol, 2,4,6-trihydroxyazobenzene-3'-arsonic acid, red; and with

orcinol, 2 methyl-4 6 dihydroxyazobenzene 2' arsonic acid, deep red Comparison of the colors of the dyes shows that they follow the Nietzki rule F M Symmes

**Properties of insoluble azo colors on the fiber in relation to their constitution. Fastness of kier boiling and the method of testing.** F. M Rowe *J. Soc Dyers Colourists* 47, 29-35(1931) —The products of the interaction of β hydroxynaphthoic acid and aromatic amines depend upon the conditions employed Examples of the reaction are given Halogen and other groups in the compds obtained from this reaction increase the fastness The presence of a nitro group in an azo coloring matter has an adverse effect on the fastness or kier boiling of the dyeing Robert Houghton

**Action of boiling caustic soda (kier boiling) on insoluble azo colors on the fiber.** F M Rowe *J Soc Dyers Colourists* 47, 35-9(1931) —Cotton exerts a favoring influence to decompn of the color aggregates into other compds A study is made of the effect of boiling NaOH upon the chem decompn of the color lakes of some azo colors Robert Houghton

**New kinks in wool dyeing** Werner von Bergen. *Proc Am Assoc Textile Chem Colorists* 1931, 98-103 *Am Dyestuff Reptr* 20, 180-5(1931) —The effect of metals on wool dyes causing change of color and a method for detg this effect are presented Vat colors are dyed on wool at *p*H 9.2-9.4 Tippy dyeings and methods of avoiding them are discussed Chlorinated wool can be detected by treating under the microscope with 0.1 *N* NaOH A decided swelling indicates chlorinated wool Robert Houghton

**Dyeing of union felt.** Walter Winkler *Dyestuffs* 31, 41-2(1930). C. E M

**The dyeing of rayon yarns.** D O Gryder. *Proc Am Assoc Textile Chem Colorists* 1931, 92-8, *Am Dyestuff Reptr* 20, 174-80(1931) —Methods of handling rayon yarns during dyeing are discussed Robert Houghton

**Dyeing raw stock for carpet yarns.** F. C. Walsh *Dyestuffs* 31, 186-7(1930) Chas. E. Mullin

**Dyeing carpet yarn.** Harry Peers *Dyestuffs* 31, 28-9(1930) —Formulas and dyes are suggested Chas E Mullin

**Dyeing cotton yarn in the package.** Kenneth MacKenzie *Dyestuffs* 31, 12-4 (1930) —The application of the direct, developed, S and vat dyes is discussed Chas. E Mullin

**Printing of cotton.** Geo M Bishop *Dyestuffs* 32, 1-10(1931) —Direct, discharge, vat, and naphthol printing are discussed, with formulas Chas E Mullin

**Wooden vessels in the dyehouse.** Fred Grove Palmer. *Am Dyestuff Reptr* 20, 189-93(1931) —The selection of the proper wood for the use and installation are discussed Robert Houghton

**Peculiarities of fading** Wm H Cady *Proc Am Assoc. Textile Chem Colorists* 1931, 130-5, *Am Dyestuff Reptr* 20, 232-7(1931), cf *C. A* 25, 386 —Combinations of fast and fugitive dyes are given which exhibit peculiar fading properties Various methods of fading by light exposure are presented and discussed R H

**Detection of traces of active chlorine in textiles.** Alfred Schmidt *Z. angew Chem* 44, 278(1931) —The iodo-starch test recommended by K Schwarze (*C A* 25, 1387) is inconclusive, inasmuch as chloramines present in vegetable fibers will give the test Whether they are injurious, or to what degree, is not yet known with certainty They can be destroyed by treatment with bisulfite or thiosulfate but are more stable than hypochlorites, which react with hot $Na_2O_2$ solns W T H

**Washing of wool and its chemical control.** V Döhrmann *Kisérlet Közlemények* 32, 405-13(1929) —Well washed wool should not contain more than 1% fat No washing agent should remain in wool and washing should not deteriorate the physical qualities of wool fibers $Na_2CO_3$ soln weaker than 2.5% combined with a neutral K soap should be used as washing substance at exactly 45° Washed wool should be examd for (1) fat content by extn., (2) content of $Na_2CO_3$ by titration, and (3) quality of wool fibers by the elasticum reaction of Allworden S S de Finály

**Artificial wools and wool-like finishes on fabrics.** Chas E Mullin and Florence H Cadwell *Textile Colorist* 52, 161-4, 198, 241-4, 269(1930) —A review and discussion of the patents and literature on the manuf., uses, properties and probable future of the so-called artificial wools wool substitutes and imitation wool finishes on the vegetable fibers Chas E Mullin

**Identification of artificial silks.** A K. Gyzander *Dyestuffs* 31, 1-2(1930) — National Erie Black GXOO dyes the regenerated silks black and acetate silk yellow or orange A soln contg 20 mg National Erie Yellow F or National Erie Fast Orange CG, 50 mg $Na_2CO_3$, 1 g soap and 1 g $Na_2SO_4 \cdot 10H_2O$ in 50 cc $H_2O$ dyes cuprammonium silk in a few min but viscose is hardly stained Chas. E Mullin

The investigation of faults in rayon hosiery. V. T. F. Heyes. *Rayon Record* 5, 233-7(1931), cf *C A* 24, 5504.—II gives methods for the detection and examn of the character of oil and metallic soaps in rayon hosiery. A. K. Johnson

Peraktivin. Richard Teibelmann *Chem.-Ztg.* 55, 191-2(1931).—In order to strengthen the bleaching power of aktivin, dichloramine is suggested in place of chloramine. Its insoly in $H_2O$ is disadvantageous, but it can be used in a finely divided or colloidal state, by dissolving in alkali and diluting. Peraktivin contains about 30% active Cl, and is employed as a bleaching agent in the textile industry and as a "safe" bleaching agent in laundries. Curtis L. Wilson

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Waste gas-cleaning materials [from dyes works] as weed destroyer [Anon.] 15. Stream pollution by textile wastes (Weston) 14. Treatment of a sewage containing wool-scouring refuse (Beedham) 14. Anthracene derivatives [dyes] (Ruggli, Heitz) 10. Dyes derived from acenaphthenequinone (Guha) 10. The structure of aniline black (Joffe, Metrikina) 10. Anthraquinone azo compounds. II. Insoluble disazo dyes from 1,5-diaminoanthraquinone (Maki) 10. The natural coloring matter of raw silk fiber of the domestic cocoon (Oku) 11D. Automatically controlling density or character [of dye solution] (U. S. reissue 18,005) 13. Rubber latex [in impregnation of fabrics] (Ger. pat. 519,483) 30. Agents [for use in dyeing] (Fr. pat. 696,327) 29. Adhesive [for patching fabrics] (Ger. pat. 521,199) 18. Zn-Ca formaldehyde sulfoxylate [for printing textiles] (Ger. pat. 521,204) 28. Organic P compounds [for combating moths] (Ger. pat. 521,205) 17. Sizing cloth (Fr. pat. 695,626) 23. Condensation products containing halogen [starting materials for manufacture of dyes] (Fr. pat. 695,602) 18. Colored condensation products [wool dyes, intermediates for dyes] (Ger. pat. 519,051) 10.

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Lehne, A., and Hegel, K. T. Textilchemische Erfindungen. Lfg. 7. Wittenberg: A. Ziemsen Verlag. 172 pp. M. 10. Cf. *C. A.* 25, 1390.

Schultz, Gustav. Farbstofftabellen. 7th ed. Band I. Lfg. 14-15. Leipzig: Akad. Verlag. G. m. b. H. Pp. 577-672. Cf. *C. A.* 25, 1390.

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Dyes. I. G. Farbenind. A.-G. (Karl Wilke, Josef Stock and Fritz Schubert, inventors). Ger. 516,698, Dec. 2, 1928. Dyes of the benzanthronepyrazoleanthrone series are prepd. by the action of aminobenzanthronepyrazoleanthrone with compds. which cause a substitution of the *N*-linked H atoms. Numerous examples are given, in which the amino compd. is treated with $Ac_2O$, BzCl, cyanuric chloride, $Na_2PO_4$, $Me_2SO_4$, 1-chloroanthraquinone and AcONa, and other substances, to produce dyes of various colors.

Dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 143,025, Mar. 16, 1929. A new dye is obtained when 2 mol. 4-aminoazobenzene-3'-sulfonic acid is condensed with 1 mol. of 4,4'-dinitrostilbene-2,2'-disulfonic acid under pressure. The dye colors cotton in light- and alkali-fast yellow-orange shades.

Azo dyes. I. G. Farbenind. A.-G. Brit. 340,009, Aug. 19, 1929. Azo dyes of the tartrazine series are obtained by a selection of the reacting components such that the finished dye is substituted in the 1- and 4-positions of the pyrazolone ring by a phenyl and a phenylazo radical, resp., which each contain 2 sulfo groups, and such that of the 4 sulfo groups one pair occupies the 5'- and 5''-positions while the other pair occupies either the 2'- and 2''- or the 3'- and 3''-positions, or, if each of the phenyl radicals carries a methyl group in the 2'- and 2''-positions, the second pair of sulfo groups occupies the 4'- and 4''-positions. The products give greenish yellow dyeings fast to water and are especially suitable for printing on paper and are convertible into lakes by the usual methods. Numerous details and examples are given.

Azo dyes. I. G. Farbenind. A.-G. Brit. 339,620, July 10, 1929. Azo dyes insol. in water are made in substance or on a sub-stratum or fiber such as regenerated cellulose and cellulose-ester and -ether fibers, by coupling a diazo or tetrazo or diazoazo compd. free from COOH, $SO_3H$ and OH groups with an arylide such as 2',3'-hydroxynaphthoyl-4-amino-1,2-dimethoxybenzene (which may be made from 2,3-hydroxynaphthoic acid and the corresponding 4-amino-1-alkoxymethoxybenzene). Examples are given of various suitable components.

Azo dyes. I. G. Farbenind. A.-G. (Hermann Wagner and Karl Beck, inventors). Ger. 520,240, Oct. 22, 1927. The diazo compds. from esters of 2,3-aminonaphthoic acid or their substitution products are coupled, in substance or on the fiber, with arylides of 2,3-hydroxynaphthoic acid or their substitution products. Examples are given. Cf. *C. A.* 25, 2299.

**Azo dyes.** I G FARBENIND A G (Heinrich Clingestein and Karl Wiedemann inventors) Ger 520,242, July 27, 1928 The dyes obtained by coupling diazotized *o*-aminophenolsulfonic acids or their nuclear substitution products with 1,7-aminonaphthol or its *N* acyl derivs are treated in substance with chroming agents, yielding blue dyes Examples are given

**Azo dyes.** I G FARBENIND A.-G (Leopold Laska and Arthur Zitscher, inventors) Ger 520 241, May 8, 1928 Diazo, tetrazo, or diazoazo compds not contg the COOH or $SO_3H$ group are coupled, in substance or on a support, with a 2,3 hydroxynaphthoyl 2 amino-5-halohydroquinone dimethyl ether The dyes are insol in water, and are useful as pigment colors as well as for dyeing or printing vegetable fibers Numerous examples are given Cf *C A*. 25, 2290

**Azo dyes.** I G FARBENIND A.-G (Leopold Laska and Arthur Zitscher, inventors) Ger 520,243, Feb 2, 1928 See U S 1,762,022 (*C A*. 24, 3652).

**Azo dyes.** I G FARBENIND A.-G Fr 696,542, May 27, 1930. Dyes contg. Cu are prepd by treating dyes obtained by coupling tetrazotized 4,4'-diaminobiphenyl 3,3'-dicarboxylic acids with 2 mols of aminonaphtholdisulfonic acids or their substitution products, with agents yielding Cu or by prepg the dyes in the presence of agents yielding Cu The products dye cotton in fast blue and gray shades Several examples are given

**Azo dyes.** I. G FARBENIND A.-G Fr. 696,873, June 10, 1930 Azo dyes, which dye wool in shades going from red to violet, are prepd by introducing acyl radicals into the monoazo dyes obtained by coupling diazotized 4 nitro-1 aminobenzene 2-sulfalkyl , -aryl- or -aralkylamides with 2 naphthylaminosulfonic acids or 2 amino-8-naphtholsulfonic acids or their derivs and reducing in an alk medium (See Fr 515, 442) Examples are given

**Azo dyes.** SOC ANON POUR L'IND CHIM À BÂLE Fr. 697,141, June 6, 1930 Metallized azo dyestuffs are prepd by treating azo dyes capable of forming complex metal derivs , with substances which yield metals, in the presence of org bases such as pyridine, quinoline, $PhNH_2$, triethanolamine or benzylamine The azo dyes were derived from coupling components such as naphthylamines of their derivs Examples are given Cf *C A* 25, 822

**Azo dyes.** SOC. ANON. POUR L'IND CHIM À BÂLE Fr 695,869, May 20, 1930 The azo dyestuffs obtained by the union (in an alk medium) of diazo compds contg a OH or COOH group in the *o*-position with respect to the azo group, with derivs of 2,5 aminonaphthol-7-sulfonic acid substituted at the N atom by an appropriate group such as an alkyl, aralkyl or aryl group, are treated with $HNO_2$ and agents capable of liberating metals to form lakes The dyes are particularly suited for regenerated cellulose Several examples are given

**Vat dyes.** C SHAW, R F THOMSON, J THOMAS and SCOTTISH DYES, LTD Brit. 339,954, June 11, 1929 *Bz*-1,*Bz*-1'-dibenzanthronyl or a substitution product is treated with a dichromate in $H_2SO_4$ and the product is subjected to alkali fusion, with or without a diluent such as alc or phenol The resulting dyes give blue-gray to black shades

**Vat dyes.** I. G FARBENIND A.-G (Erwin Hoffa, Hans Heyna, Erwin Thoma and Otto Hirschel, inventors) Ger 521,051, May 30, 1926 3,5-Dimethyl-4 halophenyl-1 thioglycolic acids, or 3,4-dimethyl-5-halophenyl-1-thioglycolic acids, or their derivs substituted in the 2 position with CN, $CONH_2$ or COOH group, are converted into the corresponding hydroxythionaphthenes, and these are converted into sym thioindigo dyes by oxidation, or condensed with the customary thioindigo dye components Examples are given

**Vat dyes.** I. G FARBENIND A.-G. (Werner Zerweck, inventor). Ger. 517,846, Apr 3, 1928 A brown vat dye of the anthraquinone series is produced by condensing aminoanthracene with 1-chloroanthraquinone 2-carboxylic acid and treating the product with an acid condensing agent Thus, naphthalene, 1-chloroanthraquinone 2-carboxylic acid, $(COOH)_2$ and β-anthramine are heated in a reflux condenser, and the product diluted with ligroin The dye colors vegetable fibers in fast red brown shades Several further examples are given Cf *C A* 25, 1094

**Vat dyes.** I G FARBENIND A.-G (Georg Rösch, inventor). Ger. 520,088, Sept. 13, 1929 Addn to 518 017 (*C A* 25, 2573) Yellow to orange vat dyes are prepd as in Ger 518,017, using naphthalene-2 7-dicarboxylic acid or its derivs not contg OH groups, instead of naphthalene 2,6 dicarboxylic acid or its derivs Examples are given

**Vat dyes.** I. G FARBENIND A.-G Fr 696,011, May 23, 1930 Vat dyes of the anthraquinone series are prepd by treating with acid condensing agents the products resulting from the reaction of aminoanthraquinones with 5,8 dihalo-1,2 benzanthra-

quinones Thus, the product obtained by the reaction of 1 mol of 5,8-dichloro-1,2-benzanthraquinone with 2 mols of 1-aminoanthraquinone is introduced into a soln. of $AlCl_3$ in pyridine and heated to 125–130°

Vat dyes. I. G. Farbenind A.-G Fr 696,423, April 8, 1930. Vat dyes of the anthraquinone series are prepd by causing one or more radicals of anthraquinone-β-carboxylic acid, substituted or not, to enter into the $NH_2$ group of α-aminoanthrimidcarbazoles or their derivs or substitution products by known methods Examples and the formulas of the compds obtained are given

Vat dyes. I G Farbenind A.-G Fr. 697,231, June 11, 1930. Acylating agents are caused to react with condensation products, or their derivs halogenated in the benzanthrone ring, which are obtained by the alkali treatment of 1-(benzanthronylamino)-4 (5 or 8)-aminoanthraquinone Similar dyes are prepd by submitting 1-(*Bz*-1-benzanthronylamino)aroylaminoanthraquinones or their substitution products to an alk. condensation using agents practically free from OH groups. Several examples are given

Green vat dyes. I G Farbenind A.-G Fr. 696,862, June 10, 1930. New dimethoxydibenzanthrone is halogenated in the presence of indifferent org solvents and catalysts Examples are given

Brown vat dye. Paul Nawiasky and Julius Mueller (to General Aniline Works) U S 1,797,478 March 24 The nitrobenzanthrone obtainable by treating benzanthrone with $HNO_3$ in boiling glacial HOAc is treated with a caustic alkali Cf *C A* 24, 1225

Dye mixtures. Soc. anon pour l'ind. chim à Bâle Ger 521,476, June 19, 1928 Brown dye mixts are prepd by mixing sym 1,2 naphthothioindigo with sym 2,1 naphthothioindigo, or by mixing the corresponding leuco compds or hydroxythionaphthenes and oxidizing the mixts

Metallic dyes. Soc. anon pour l'ind. chim. à Bâle. Swiss 143,026, Mar. 16, 1929 The azo dye from 5-nitro-2-diazo-1-phenol and 1-amino-8-hydroxynaphthalene-4-sulfonic acid is treated with Cu yielding agents The dye colors silk in greenish blue shades

Metallic dyes. Soc. anon pour l'ind. chim. à Bâle. Swiss 143,027. Mar. 16, 1929. The chromed dye from 5-nitro-2 diazo-1-phenol and 2 phenylamino-5-hydroxynaphthalene-7-sulfonic acid is reduced, diazotized and coupled with salicylic acid. The dye colors cotton and artificial silk in blue-green shades

Wool dyes. I. G Farbenind. A.-G. Fr. 695,807, May 17, 1930 1-Amino-4-bromoanthraquinone-2-sulfonic acid is condensed in aq soln. and in the presence of agents neutralizing the acid and a catalyst with aryldiamino compds. (with the exception of *o*-diamines and *p*-phenylenediamine) or their substitution products, particularly their sulfonic acids contg at least one free $NH_2$ group. The condensation products obtained may be treated with acylating agents, or the sulfonic groups contd. in the anthraquinone ring may be sepd

Anthraquinone dyes. Imperial Chemical Industries, Ltd. Ger. 521,382, July 27, 1929 See Brit. 323,026 (*C. A.* 24, 2890).

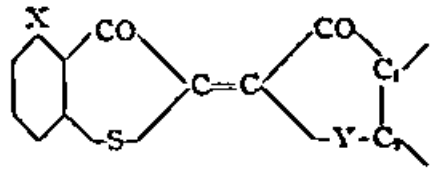
Anthraquinone vat dyes. I G. Farbenind. A.-G. Brit. 339,626, Aug 8, 1929. 2,2'-Dimethyl-1,1'-dianthraquinonyls or 2,2'-dimethyl *ms*-benzo- or naphtho-dianthrones in which the H atoms of both methyl groups are partially or wholly replaced by halogen are treated with acid or alk condensing agents having a reducing action and capable of splitting off halogen or a H halide. Numerous details, examples and modifications of procedure are described The dyes dye materials orange-yellow to red shades.

Indigoid dyes. Compagnie nationale de matières colorantes et manufactures de produits chimiques du nord réunies etablissements Kuhlmann. Fr. 695,979, May 22, 1930 4,6-Dimethyl-5-nitro- and 4,6-dimethyl-5-amino-1-phenylthioglycolic acids are obtained by diazotizing 1,3-dimethyl-2-nitro-4-aminobenzene in the presence of a mineral acid, pouring the diazo soln into a dil soln of alkali xanthogenate or the like in alk medium, sapong., adding alkali monochloroacetate or the like and acidifying after elimination of alc The new dyes, *5,7,5',7'-tetramethyl-6,6'-dinitro-* and *-diamino-2,2'-bisthionaphtheneindigo*, are obtained by cyclization of the acids mentioned, *e. g.*, by means of $ClSO_3H$

Indigoid dyes. Soc. anon. pour l'ind. chim à Bâle. Ger. 519,265, Nov. 16, 1928 New indigoid dyes are prepd from 1-methyl-2,3-naphthoxythiophene by oxidizing this or condensing it with the cyclic diketones or their reactive derivs. usually employed as indigoid dye components. 1-Methyl 2,3 naphthoxythiophene is prepd from 1-methyl 2 aminonaphthalene by diazotization, treatment with alkali xantho-

genate and sapon to yield 1 methyl 2 thionaphthol, conversion of this into 1 methyl-2-naphthylthioglycolic acid, followed by conversion of the acid into its halide and treatment of this with acid condensing agents to effect ring closure The dyes obtained may be halogenated Examples are given Cf *C A* 25, 825

Thioindigo dyes. I G Farbenind A -G Fr 695,763, May 16, 1930 3 Halophenyl 1 thioglycolic acids, which are substituted in the 2 position by a carboxylic, carboxamide or nitrile group, are transformed into the corresponding hydroxythionaphthenes and the latter by oxidation into symmetrical thioindigo dyes, or the said hydroxythionaphthenes or their 2-derivs may be condensed with diketones or their 2 derivs Compds of the formula



are obtained in which X is a halogen, Y an imino group or an atom of S, and $C_1$ and $C_2$ belong to a $C_6H_4$ or a $C_{10}H_6$ ring

Triarylmethane dyes. I. G Farbenind A -G Brit. 339,823, Jan 4, 1929. 1 Naphthaldehyde 2 sulfonic acid or a deriv is condensed with an alkylated or aralkylated arylamine and the resulting leuco compd oxidized (if desired after sulfonation) The dye formed from 1 naphthaldehyde 2 4-disulfonate and ethylaniline produces a bluish green color on wool and other examples also are given

Xanthene dyes. Imperial Chemical Industries, Ltd Ger. 521,291, June 30, 1929 See Brit. 320,345 (*C A* 24, 2608)

Xanthene dyes. Imperial Chemical Industries, Ltd Ger 519,345, June 30, 1929 See Brit. 320,345 (*C A* 24, 2608)

Sulfurized phenol derivatives for use in dyeing. I G Farbenind A -G and A Thauss. Brit 340 007, Aug 19 1929 In processes such as described in Brit. 173,313 (*C A* 16, 1510) and Brit. 298 280 (*C A* 23, 2837) for the production of mordanting thio derivs of phenols by heating phenol or a homolog or substitution product (other than a phenol contg N) with S in the presence of a neutral salt of an org carboxylic acid or of a weak inorg acid, an excess of at least 50% of phenol over the theoretical quantity of 1 mol phenol to 2 mols of S is employed The reaction proceeds rapidly to completion and the excess of phenol is removed by distn *in vacuo*

Bromo substitution product of isodibenzanthrone. Soc. anon pour l'ind chim. à Bâle Swiss 143,711, July 20, 1929 Isodibenzanthrone is treated with 2 atoms of Br in the presence of $ClSO_3H$ and a carrier such as S or I The product dyes cotton violet blue from a red blue vat.

Pyrazoleanthrone condensation products. I G Farbenind A.-G (Georg Kalischer, Heinz Scheyer and Heinrich Ritter, inventors) Ger 517,845, Feb 17, 1928 2 Methylpyrazoleanthrone is alkylated or aralkylated, and the *N*-alkylated or *N*-aralkylated product treated with alkali until the product gives a red color in concd. $H_2SO_4$. Thus 2 methylpyrazoleanthrone is treated with $Me_2SO_4$ to produce *N* methyl-2-methylpyrazoleanthrone, m 163° This is heated with NaOH in a reflux condenser to give a dye which colors cotton red from a green blue vat. Further examples are given

Dye pastes. Imperial Chemical Industries, Ltd Ger. 521,123, July 6, 1928. See Brit. 300 800 (*C A* 23, 4079)

Colored lakes fast to light. I G Farbenind A -G Fr 695,495, May 13, 1930 Basic dyes, which may contain acid groups, are treated with complex acids or their salts and substances having a basic reaction in amt. not sufficient for complete neutralization are added before allowing them to react on the dyes Examples are given

Dyes and intermediates. I G Farbenind A G Brit. 339,659, July 8, 1929 *ms* Naphthodianthrones, *allo ms* naphthodianthrones and *ms* anthradianthrones are treated with a nitrating reagent (preferably in the presence of diluents such as mono-, di or tri-chlorobenzene, bromobenzene or quinoline) and the nitro groups in the products are replaced by halogen or are partly or wholly reduced Examples are given for producing dyes giving various colors

Dye intermediates. I. G Farbenind A -G Brit 339 699, Sept. 24, 1929 Aromatic aminoaldehyde compds are made by heating aldehydes of the benzene and anthraquinone series contg easily replaceable halogen atoms with acid amides or sulfonamides or their monoalkyl, aralkyl or aryl derivs, in the presence of an acid binding

agent, with or without a diluent or catalyst, and saponifying the acylamino or sulfamino compds obtained Examples are given of the production, as final products, of 5-nitro-2 aminobenzaldehyde, 6-methylacridine, 6 chloro-2 amino- and 2 6-diaminobenzaldehyde, 3 nitro-2,6-diaminobenzaldehyde 2,5-diaminoterephthalaldehyde and 1 aminoanthraquinone 2 aldehyde

**Dye intermediates (anthraquinone derivatives).** P F Bangham, L J Hooley, J Thomas and Scottish Dyes, Ltd Brit 339,589 June 4, 1929 Anthraquinone derivs with heteronuclear substituents are obtained by condensing halogenated phthalic acids, salts or anhydrides with halogenated phenols in $H_2SO_4$ or oleum with $H_3BO_3$ or borax Halogen atoms in α positions may be wholly or partly hydrolyzed to OH groups The products are chlorinated quinizarins and alizarins Examples are given

**Dye intermediates.** I G Farbenind A.-G Fr 690,043, May 23, 1930 Substituted phenol o-carboxylic acids are prepd by heating under pressure with $CO_2$ the alkali salts of chloromethyl or dimethyl phenols, particularly *asym o* xylenol, *p*-chloro-*o*-cresol or *o*-chloro-*p*-cresol Examples are given

**Dyeing** I G Farbenind A G (Franz Streng, inventor) Ger 519,252, July 29, 1928 Colored reserves under aniline black are obtained with a printing paste free from nitro-substituted bases and comprising a nitrosamine alkali salt and, as coupling component, an arylide of 2 3 hydroxynaphthoic acid or a compd contg a reactive $CH_2$ group The paste contains also ZnO and an excess of caustic alkali The material is slop padded with the usual aniline black liquor, dried, printed with a paste of the kind described steamed to develop the black and then passed through a bath contg AcOH and a bichromate soda bath Cf *C A* 24, 5509

**Dyeing fabrics.** Karl Schmidt Ger 517,916, Oct 21, 1926 An aniline black dye is produced by a slop pad bath contg $PhNH_2$, an oxidizing agent, a large amt of weak acid salt an org catalyzer and a heavy metal salt as an auxiliary catalyzer Such a bath contains $PhNH_2$ HCl, Na $S_2O_3$, $CuS_2O_3$, $NaClO_3$, $(NH_4)_2SO_4$ and *p*-phenylenediamine The slop padded goods are dried and developed by a Cr bath A further example is given

**Dyeing fabrics.** Soc. anon pour l'ind chim à Bâle Ger 521,200, Dec 22, 1928 Color effects on fabrics, etc, are obtained by treating the materials with an alkali salt of a 1 naphthol-4 aryl ketone and with a dye or other compd fixable on the materials by steaming The materials are then steamed, and finally the ketone is coupled with a diazo compd to produce an azo dye Thus, a mixed fabric of cotton and acetate silk may be padded with a bath contg a salt of 1-naphthol-4 phenyl ketone and aminoazobenzene, steamed so as to fix the dye on the acetate silk, and then treated with a diazo soln from 4 chloro-2 aminobenzene 1 phenyl ether The acetate silk is colored yellow and the cotton red Further effects may be obtained by impregnating the materials with the ketone, printing with dyes requiring steaming, and then proceeding as above

**Dyeing animal fibers.** Durand & Huguenin S A Ger 516,669, April 21, 1928. Addn to 418,487 Colors fast to rubbing are produced on animal fibers by ester salts of leuco vat dyes. The dyes are developed by acid sapamin soaps in an acid oxidizing bath Thus, wool, soaked in a 10% soln of ester salt of leucoindigo, is immersed in a cold bath contg sapamin, $NaNO_2$ and $H_2SO_4$ The wool is washed and dried Leuco compds of quinone and anthrone are mentioned also

**Dyeing silk.** Compagnie nationale de matières colorantes et manufactures de produits chimiques du nord, réunies établissements Kuhlmann Fr. 695,981, May 22, 1930 Natural silk is dyed by combination with diazonium salts of amines such as *m* chloroaniline, *m*-nitro-*o*-anisidine or bianisidine.

**Dyeing acetate silk.** I G Farbenind. A.-G Fr. 696,026, May 23, 1930. Acetate silk is dyed by treating it with dyes of the type $(4)H_2NRN{\cdot}NR'NX_2(4)'$, diazotizing and developing with 2 hydroxynaphthalene 3-carboxylic acid In the formula R is a phenyl group substituted or not by halogen, an alkyl or alkoxy group or several of these, R' is a phenyl or naphthyl group substituted or not by a halogen or an alkyl, and X is an aliphatic group Examples are given

**Dyeing materials containing cellulose acetate and like substances.** British Celanese, Ltd Brit. 339,997, June 8, 1928 Dispersed relatively insol coloring agents having an affinity for unsaponified cellulose esters are used for dyeing materials such as mixed goods contg partially saponified cellulose acetate or the like which may be assocd with cotton, wool, silk, linen or regenerated cellulose, and the non-ester portion may be dyed with suitable dyes having an affinity for such portion.

**Dyeing cotton associated with "cuprammonium yarn."** Fritz Steinberg (*to* American Bemberg Corp). U. S 1,797,247, March 24. For equalizing the dyeing

effect of a fabric comprising a mixt. of cotton and "cuprammonium yarn," the cotton is treated with a Cu-oxide-$NH_3$ soln.

Printing on cloth with dyes. I G Farbenind A.-G (Friedrich Teller, inventor) Ger 519,440, Mar 20, 1929 See Brit. 329,207 (*C. A.* 24, 5510)

Printing textiles. I G Farbenind. A.-G (Heinz Gossler, inventor) Ger 521,219, Apr 1, 1928. Reserves colored with vat dyes under dyeings with vat dyes are obtained with the use of reserve pastes contg thickeners which permit the addn of acid reacting heavy metal salts or like reserving substances to the paste, and which fix the reserve dye as a pigment to such a degree that the reserve dye is not removed during the dyeing with the grounding dye Suitable thickeners are cellulose ethers, carob-bean gum and blood albumin Thus, the goods may be printed with a reserve paste contg a rose vat dye, carob-bean gum, $CuSO_4$, $Cu(NO_3)_2$ and $Cu(OAc)_2$, then vat-dyed in the ordinary way with indanthrene blue, washed, acidified, washed again and dried. The reserve color is then fixed by padding the goods with a soln contg *Rongalite C, NaOH and glycerol, steaming and finishing* as usual. Cf *C. A.* 24, 974

Use of color reserves in textile printing. I. G Farbenind. A.-G. (to Durand & Huguenin A.-G.) Brit. 340,088, Nov 5, 1928 Color reserves under vat dyeings are obtained by means of ester salts of leuco vat dyes by use of the process described in Brit. 298,088 (*C. A.* 23, 2830) and Brit. 321,964 (*C. A.* 10, 1058), as modified or improved upon by the processes described in Brit. 281,336 (*C. A.* 22, 3536) or Brit. 306,800 (*C. A.* 23, 5329), by incorporating in the printing paste, together with glycol or a glycol ether, a heavy metallic reserve salt, printing therewith, drying and steaming to develop the ester salt, and finally dyeing with the vat dye in the usual manner Various details and examples are given. Cf *C. A.* 24, 5510

Apparatus for dyeing fabrics in open width. Frank Davis Ger 520,009, Sept. 21, 1927 See Brit. 275,207 (*C. A.* 22, 1800).

Apparatus for dyeing merchandise in the piece. F Randall (Luton), Ltd. Fr 695,318, May 8, 1930.

Cloth-dyeing machine. Maschinenfabrik Benninger A.-G Ger 516,667, July 21, 1929

Machine for dyeing hank yarns. Maschinenfabrik Tellm Gerber Söhne and Gebr. Wansleben Ger 520,068, June 22, 1929

Dye vat. Rudolf Thun Ger 517,732, Oct. 27, 1927 The vat has a drum with rungs on which articles for dyeing are hung

Tubular heating apparatus for dyeing vats. Wilhelm Schönicke Ger 520,376, Mar 11, 1930.

Ceramic plates for lining dyeing and bleaching vats, etc. Paul T Gerber Ger 520,375, Sept. 27, 1929 Structural features are described

Charts with relatively movable sheets for indicating the correct compositions of different dye baths. I G Farbenind. A.-G Brit. 339,842, Feb. 2, 1929

Dyeing apparatus with telescoping adjustable dye-liquor circulating pipes. C. E. Oldroyd. Brit. 339,909, March 20, 1930. Various structural details are described.

Treating textiles. Camille Dreyfus. Fr 696,224, May 28, 1930. The luster of cloth or textiles of or contg artificial filaments is diminished by submitting the cloth, etc., to a wearing action by an abrasive on brushes, etc An app. is described.

Boiling (bucking) textile materials. G Ullmann Brit. 339,550, Jan. 26, 1929 In obtaining fibers from vegetable materials such as cotton, flax or jute, by removal of fatty and waxy substances, pectin substances, albuminoids, coloring substances and woody and husk portions, using such solvents as hydroxides of Fe or alk. earth or alkali metals, the use of these reagents together is effected and a product capable of continuous bleaching without pressure is obtained by adding to the boiling liquor such materials as allow the metallic soaps of the fats and waxes present to be produced in a sol or highly dispersive form in which they can easily be rinsed off For this purpose, various sulfonated prepns and compds. may be added

Waterproofing textiles. Alexander Nathansohn. Ger 521,029, Sept 15, 1929 The materials are partly esterified by treatment with a fused fatty acid chloride or anhydride in the absence of a solvent. The excess of esterifying agent is afterward removed by means of a solvent. Thus, a dyed cotton fabric may be immersed for 8 hrs. at 65° in fused stearic anhydride, and the excess of the latter afterward removed with $CS_2$. Cf *C. A.* 25, 1686

Treating textile fibers. Wilhelm Francke. Fr 696,072, May 24, 1930. Natural or artificial silk is wound on bobbins, etc., in such a way as to form uniform channels throughout so that the treating liquids, gases or vapors flow or are forced under moderate pressure through the bobbins.

Apparatus for the wet treatment of textiles. René Clavel. Fr. 696,158, May 29, 1930.

Retting fibers. Röhm & Haas Co. (Soc. anon.). Fr. 696,850, May 12, 1930. Vegetable fibers surrounded by ligneous materials are retted in a bath contg. an enzyme, glauber salt and a substance preventing the growth of bacteria such as toluene.

Retting bast fibers such as flax straw. Vickers, Ltd., and O. D. Lucas. Brit. 339,858, Dec. 23, 1929. The material, after de-seeding, is placed in a tank to which water together with a portion of liquid from a previous first stage of treatment is admitted at a temp. of 25° which is maintained for 12–24 hrs., a portion of the liquor is then run off and may be used for the next batch, and the tank is filled with fresh water and the temp. slowly raised to 37° and this temp. is maintained until retting is completed (after 3–4 days). Various auxiliary details of procedure also are described.

Softening fibers with sulfonic acids. I. G. Farbenind. A.-G. Brit. 339,858, Aug. 24, 1929. "Cuprammon rim silk" or other fibers are softened and rendered flexible by treating with aq. solns. of true sulfonic acids prepd. from carbocyclic acids of aliphatic satd. hydrocarbons contg. more than 8 C atoms, or water-sol. salts of such acids. Use of the mono-Na salt of sulfopalmitic acid or of sulfostearic acid or the salt of triethanolamine with the sulfonic acid or stearic acid is described.

Weighting fibers. Oscar Berg and Max Imhoff. Ger. 521,122, Dec. 10, 1925. See Brit. 256,727 (C. A. 22, 504).

Calendering and glazing fabrics. Arnold Bosshard. U. S. 1,797,338, March 24. The fabric is dried and electrostatically charged and subjected to heat and pressure (in a roller app. which is described) while in the dry electrostatically charged condition.

Removing stains from fabrics. Soc. anon. des produits R. Appenzeller. Brit. 340,077, Oct. 23, 1928. Stains are removed from crepe-de-chine or other fabric by the action of the vapor of a volatile solvent in the presence of an adsorbent such as fuller's earth and bleaching charcoal sepd. from the fabric by a thin cloth or leather. The solvent, such as a small proportion of benzene, may be mixed with the adsorbent, and the treatment may be effected by weighting down the materials between a marble slab and a covering felt.

Fabrics containing natural silk. British Celanese, Ltd. Brit. 339,886, March 5, 1929. In the manuf. of fabrics contg. natural silk, especially in combination with yarns of cellulose acetate or other artificial silk, the silk in the state of yarn or fiber is degummed and then sized before weaving, knitting or other textile operations, and after these treatments the size is removed. Sizes are used which can be easily removed with hot water, and various details and examples of materials used are given.

Apparatus for finishing and polishing cloth. William B. Broadbent. U. S. 1,797,704, March 24. Structural features.

Centrifuge for the wet treatment and drying of yarns on beams. Carl Bayer. Ger. 519,043, Mar. 12, 1927, and 519,045, May 22, 1928, addn. to 519,043.

Centrifuge for the wet treatment and drying of yarns on beams and bobbins. Carl Bayer. Ger. 519,044, April 18, 1929.

Bleaching animal and vegetable fibers and materials. Österreichische Chemische Werke G. m. b. H. Ger. 516,581, July 6, 1927. Feathers, hair, fur, bristles, etc., are bleached by the action of gaseous $H_2O_2$. The materials are kept at about 50°. In the case of furs, etc., the skin is given a protective coating of fat, etc., before bleaching the fur, etc. Cf. C. A. 24, 3872.

Treating wool-washing waters. Carl von Overstraeten. Ger. 520,170, Nov. 11, 1927. The waters are treated with a reagent, e. g., $CaCl_2$ or an acid, capable of pptg. all the suspended or dissolved substances derived from the wool. The ppt. is dried, e. g., by centrifuging, and treated with $Na_2CO_3$ to convert the Ca soaps or free fatty acids into Na soaps. The product is dild. with soap soln., and the emulsion so obtained is resolved by centrifuging into sludge, soap soln. and wool fat.

Oiling wool. Gaston L. Dechorgt. Fr. 696,801, Sept. 18, 1929. Wool is oiled by an emulsion in oil of an infusion of substances such as algae, lichens or gums with the addn. of substances preventing mold formation.

Apparatus for drying wool in air currents. P. Malard. Brit. 339,907, April 29, 1929. Structural features.

Proofing wool, fur, feathers, hair, etc., against moths, etc. I. G. Farbenind. A.-G. (Max Weiler and Hermann Stötter, inventors). Ger. 520,184, Apr. 10, 1929. The materials are treated with hydroxybiphenyls or their substitution products contg. halogen atoms or alkyl or alkoxy groups, but not contg. sulfo, carboxy, or nitrogenous groups. Examples are given.

**Wool fat.** Eugène Mertens Ger 520,008, Oct. 26, 1926. The scum obtained in known manner from wool washing waters is heated under 2–3 atm pressure without addn of reagents, whereby it is resolved into wool fat and an aq soln of soap, etc An example is given Cf *C A* 24, 4641

**Artificial silk.** Aceta G m. b H Fr 695,737, May 16, 1930 App for wetting or oiling threads is described

**Artificial silk cloth.** Soc. pour la fabrication de la soie "Rhodiaseta." Fr 696,875, June 10, 1930 Crêpe effects are obtained on cloth composed of or contg strongly twisted cellulose acetate, without sizing the threads before twisting, by treating the cloth in a bath having a very marked swelling action on cellulose acetate, and the peptization action of which is small or nil Examples are given of the use of baths contg EtOH and water, MeOH and water, EtOH and $C_6H_6$ and EtOH and trichloroethylene

**Desulfurizing and bleaching artificial silk.** Wilhelm Francke Fr. 695,845, May 19 1930 Use is made of baths contg active O, *e g*, baths contg $H_2O_2$ A desulfurization and preliminary bleaching may take place in a bath already used and a further bleaching in a fresh bath

**Artificial threads, filaments, ribbons, etc.** Henry Dreyfus Fr 695,844, May 19, 1930 The properties of products of cellulose esters or ethers which have been coagulated with aq agents are improved by the action of heat The heating may take place in the presence of solvents, swelling or plastifying agents

**Ribbons, bands, films, etc.** Camille Dreyfus. Fr 695,371, May 9, 1930 A liquid having a limited solvent or softening action on cellulose derivs is applied to a series of filaments of cellulose acetate or other thermoplastic deriv. of cellulose so that the filaments are rendered adhesive, and heating, under pressure if necessary, so that they unite to give a product of flattened cross section The solvent or softening agent may be diacetin, triacetin, dibutyl tartrate or tritolyl phosphate.

**Treating regenerated cellulose or vegetable fiber yarns.** Chem Fab vorm Sandoz Ger 521,121, Oct. 20, 1929 The dyeing properties of yarns of cotton or other vegetable fibers or regenerated cellulose are modified by treating the yarns, while wound on bobbins or the like, in turn with an alkali soln and a soln of an esterifying agent, the treating liquids being forced or drawn through the yarns *via* the hollow cores of the bobbins, etc Suitable esterifying agents are $PhSO_2Cl$ and its homologs Cf *C A* 24, 5168

**Fireproofing porous materials such as cotton fabrics.** Harry Hopkinson (to Brunsene Co of Mass) U S 1,797,865, March 24 The material is treated with a soln of a Pb salt such as Pb acetate and then treated with a soln of a haloid such as $AlCl_3$

## 26—PAINTS, VARNISHES AND RESINS

A H Sabin

**The paint trade—new types of finishes** H Houlston Morgan. *The Times Trade and Eng Suppl* 28, No 664, 10–11(1931).—Cellulose ester lacquers and synthetic resin varnishes are discussed briefly. E. M Symmes

**Covering power of paint.** H. Rabate *Peintures, Pigments, Vernis* 7, 1184–92 (1930) B. Hamilton

**Some considerations on black asphalt paints.** Manuel González de la Vega *Rev Quim* 6, No 8, 25–7(1931).—The author shows that paints made with natural asphalts, such as gilsonite, are superior to those having asphalts obtained from petroleum distillate residues Petroleum asphalt paints under the action of air, sun and rain are turned into a fine dust This effect is especially noted when the proportion of linseed oil is too great or when Pb or Mn resinates are used as driers A marked difference in weathering properties and fusion points was noted A natural asphalt resists exposure 3 times as long as a petroleum asphalt The fusion points were 300° and less than 50°, resp In a further study of the fusion points, the presence of volatile vehicles altered the results Exposure for 24 hrs at room temp eliminated any volatile matter. Linseed oil lowers the fusion point but after 24 hrs is converted into linoxyn, which raises the fusion point. The presence of resinates and linoleates was disregarded with reference to their effect on the fusion point The author developed the following method for detg the nature of asphalts· One-half of the surface of 2 similar glass pieces is painted with a uniform coating The pieces are dried at room temp for 24 hrs. A mark is made on the glass close to the painted area and the unknown samples are placed in a

controlled heating device The heating progresses slowly and the temp at which the paint runs down and reaches the mark on the glass is found to be significant in each case. The temp for petroleum asphalt paints was found to be less than 85°, and for natural asphalt paints 135° The former always run at less than 100°, except in cases of emulsions with asphalts in different phys conditions JOHN M LADINO

**Titanox-C in paints.** M DONIGER *Paint, Oil & Chem Rev* 91, No 15, 12–4 (1931) —Some of the advantages of Titanox C are its low sp gr, its ease of wetting and its non reactivity with acid vehicles Because of its low sp gr it is the slowest settling white pigment available Other factors involved in the settling properties of paints are (1) non volatile content of the vehicle, (2) character of pigment, (3) mixing and grinding of the paint, (4) use of $H_2O$ (5) character of the vehicle (6) use of metallic soaps and methods of incorporating them With respect to (6) the use of as much as 12% Pb in the oil portion of vehicles is advantageous To avoid excessive darkening, the Pb is best incorporated on down heats and in the form of basic carbonate G G SWARD

**The viscosity and brushability of paints.** HANS WOLFF *Farben-Ztg* 36, 1088–9, 1131–2(1931) —Data are produced to show that the turboviscometer is as suitable for detg the consistency of paint as the Couette viscometer (cf *C A* 24, 2313) The plastic nature of paints is brought out more clearly if the data obtained with the latter be plotted as $\phi\omega$ against $\omega$ instead of simply $\phi$ *vs* $\omega$ Curves of viscous materials are parallel to the axis With either app, the data do not reveal differences in the brushing properties of paints G G SWARD

**Hydrogen-ion concentration and the color of lead chromate pigments.** R. C. ERNST, E PRAGOFF, JR, AND E L LITKENHOUS. *Ind Eng Chem, Anal Ed* 3, 174–6(1931) —Lead chromates were pptd from solns of $Pb(OAc)_2$ and $K_2Cr_2O_7$ The acidity of the solns was regulated by the addn of HOAc, HCl, $HNO_3$ and $H_2SO_4$. H-ion concn was detd by use of the quinhydrone electrode Each acid caused the color to change from yellow at $p_H$ 3 5 to orange at $p_H$ 9, at which there was a max of brilliance and darkness of shade For $p_H$ values above 9 the colors were off shades The color changed from yellow at low temps to a max at 80°, above which the color again became lighter. Variations in time of pptn and in concn of metal ions had no appreciable effect on the color H M STARK

**Uses of solvents—important applications.** THOMAS H. DURRANS. *The Times Trade and Eng Suppl* 28, No 664, 11(1931) —Nitrocellulose lacquer solvents are discussed briefly E M. SYMMES

**Glyptals, albertols and coumarone—their value to the varnish manufacturer.** E. E. WALKER. *The Times Trade and Eng Suppl* 28, No 664, 7(1931) —A review. Vinyl resins are also included E. M. SYMMES

**Formula for black, acid-proof stain for wood.** F. L. KISKADDEN. *Chemist-Analyst* 20, No 3, 17(1931) —Apply 2 coats of hot aq soln contg 4% copperas, 4% blue vitriol and 8% $KMnO_4$. Rub off the excess of the second coat and apply 2 coats of aq 12% aniline and 18% concd HCl When dry apply a coat of linseed oil W T H

Gum ester. A. NAUROY. *Peintures, Pigments, Vernis* 7, 1214–8, 1262–6 (1930).—A review. B. H.

**The older compounds—permanently fusible gums and resins.** H. COURTNEY BRYSON *The Times Trade and Eng Suppl.* 28, No 664, 17(1931).—A review of the manuf of molded plastics E M SYMMES

Phenolic resins—the raw materials. G T. MORGAN. *The Times Trade and Eng Suppl* 28, No 664, 8(1931) —A review, with plant illustrations. E M. SYMMES

Synthetic resins. O KUULA AND O. ROUTALA *Acta Chem. Fennica* 4, 1–16 (1931).—A review on the prepn., properties, reactions and uses of synthetic resins. S. A. KARJALA

**The constitution of the synthetic resins.** GEORG WALTER. *Z. angew. Chem.* 44, 136–7(1931) —The ability of thiourea to form complex compds. with metal salts, *e. g.*, $CuCl_2$, was utilized in prepg thiourea-formaldehyde condensation products contg Cu and Cl The colloidal solns. of these products give on electrolyte flocculation, *e. g.*, with KCl, ppts which, unlike the gelatinous ppts obtained from urea formaldehyde condensation products (I), may readily be dried to const. wt. The dry ppts. present, because of their content of Cu and Cl, a suitable material for an analysis Comparative cryoscopic investigations of solns. of methylolthiourea (II) and solns. of the complex compds prepd from II and $Cu_2Cl_2$, together with the results obtained from the analysis of the flocculation ppts., gave data from which, certain plausible assumptions being considered, numerical expressions were obtained as to the structure and size of the mol present in the colloidal soln. of I. W. has previously shown (*C. A.* 21, 3626) that clear

condensation products may be prepd from the methylol compds. of urea also in the absence of water. It was now detd. that by condensing dimethylolurea in the presence of the generally known condensation agents 6% $CH_2O$ and 22% $H_2O$ were sepd. These values vary somewhat with the different condensing agents used. In the absence of condensing agents a sepn. of 12.5% $CH_2O$ and 15.1% $H_2O$ took place and methylol methyleneurea was formed, in agreement with the calcd. values. The remaining resin was investigated in each case. The values obtained show that the urea residues must be connected through $CH_2$ groups (*C. A.* 23, 2425). W. discusses the structure of the condensation products, the av. no. of links in the chains, etc. Cf. *C. A.* 22, 4538, 23, 1136, 1623; 25, 1398. D. Thiessen

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Testing and evaluating stearin pitch (Siebert, Blennemann) 27. Furfural and its application in the plastics industry (Genin) 18. Condensation products containing halogen [starting materials for manufacture of artificial resins] (Fr. pat. 693,602) 18. Aqueous dispersion of $TiO_2$ (U. S. pat. 1,797,760) 18. Synthetic rubber [products for manufacture of lacquers] (Brit. pat. 340,008) 30. Distillation products of polymeric hydrocarbons (Fr. pat. 696,812) 10.

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Paint. Josef Blumenfeld. Ger. 516,748, April 22, 1926. See Brit. 256,302 (*C. A.*, 21, 2002).

Paints. I. G. Farbenind. A.-G. Fr. 695,523, May 13, 1930. White pigments having good covering power are made by adding to Zn lyes a fixed sol. base such as hydroxides of alkali or alk. earth metals in excess so that the liquid above the ppt. formed has a $p_H$ value of 12 or more.

Testing paint films. Kali Forschungs-Anstalt G. m. b. H. (O. F. Kaselitz, Erich Ritter and Paul Nettmann, inventors). Ger. 519,486, Feb. 2, 1930. The method described by Ritter (*C. A.* 23, 3357) is modified by coating the gelatin layer with a thin layer of metal, concrete or other material to which the paint to be tested is intended to be applied in use. This may be effected by spraying molten metal onto the gelatin layer, or by dusting graphite on to the layer and then depositing metal electrolytically. The paint is then put on the metal, etc., coating and the test proceeded with as before.

Painting with successive coats. E. Frenkel. (trading as the firm of H. Frenkel). Brit. 339,789, Dec. 10, 1928. In a process involving application of successive coats before the underlying material is dry, the binding medium of the coating compns. comprises oil treated with air or gases contg. $O_3$ so that they are viscous, and a finishing

coat such as a nitrocellulose varnish also may be applied before the preceding coat is dry Use of various other addnl ingredients also is mentioned

**Driers for use in paints, etc.** I G Farbenind A -G Brit. 339,865, Feb. 22, 1929 Solns of heavy metal or alk earth naphthenates which are sol in drying oils and org solvents, for use as driers, are made by dissolving the naphthenates in the fatty acids of drying or semi drying oils such as linseed, wood, soy bean or poppy oils Examples are given of driers contg Co and Mn

**Driers for paints, etc.** I G Farbenind A -G Brit. 339,922, June 14, 1929 The process described in Brit. 339,865 (preceding abstr ) of prepg solns of driers by dissolving heavy metal or alk earth naphthenates in the fatty acids of drying or semi-drying oils is modified by partially replacing the fatty acids by drying or semi drying oils, *e. g.*, a soln of Pb and Mn naphthenates in various proportions of linoleic acid and linseed oil may be used

**Mixing and grinding machine for paints, enamels, inks, etc.** Lionel G Holmes Ger 520,495, April 6, 1930

**Pigments.** Compagnie Lorraine de charbons pour l'électricité Fr 696,242, Sept 7, 1929 Flocculent pigments of very fine grain are deflocculated by treatment with a dispersing agent composed of an amphoteric colloid in aq soln possessing a suitable elec sign In the case of pigments composed of lamp black, C black, etc, a protein previously brought to a suitable $p_H$ value above 7 is used, the grains of pigment being totally or partially absorbed by the micellas of the protein used The apparent d of the treated pigment is increased by a final trituration made in the dry state

**Pigments.** Soc. anon pour l'ind chim à Bâle Swiss 143,293 to 143,295, Aug 21, 1928. Addns to 141,886 (*C A* 25, 2310) Colored pigments which withstand weather, light and water are formed by treating suitable dyes with metals. In 143,293, the azo dye obtained by treating the sapond dye from the diazotized *p*-toluenesulfonic acid ester of 1,8-aminonaphthol-3,6 disulfonic acid and cresidine ($CH_3$ $OCH_3$ - $NH_2$ = 1,4 3) is treated with $COCl_2$ and MgO In 143,294, the azo dye from the tertiary condensation product (from 1 mol cyanuric chloride, 1 mol of 1,8-aminonaphthol-3,6-disulfonic acid, 1 mol of *p*-aminobenzeneazosalicylic acid) from 1 mol of PhNH and 1 mol of the azo dye from diazotized 1,8-aminonaphthol-3,6-disulfonic acid and cresidine, is treated with pptd chalk or similar Ca compds In 143,295, the same dye is treated with MgO

**White lead.** Compagnia Metalurgica de Mazarron (Georg Sitz, inventor). Ger 521,383, Aug. 13, 1924 An aq sludge of PbCl, or suitable metallurgical products contg $PbCl_2$ is gradually treated, while stirring, with $Na_2CO_3$ soln , which may contain NaOH, the addn. of the $Na_2CO_3$ soln. being regulated so that the mixt does not show an alk. reaction until all the Pb has been converted into basic carbonate Instead of $Na_2CO_3$ soln , NaOH soln may be used while passing $CO_2$ into the mixt An example is given

**Red lead.** H. Erzinger and Chemische Fabrik Schonenwerd H. Erzinger A -G Brit. 340,082, Oct 30, 1929 Red lead of low d is produced by adding to PbO, in an excess of water, small quantities of an org acid (such as acetic, formic, or amino acids obtained by heating protein refuse) capable of forming basic Pb salts sol in water, treating with $CO_2$ until a strongly basic Pb carbonate of low sp. gr. and an approx compn. $4PbCO_3 Pb(OH)_2$ is formed, sepg this product and oxidizing it to red lead by burning at the lowest possible temp (preferably 100° lower than that usually employed in red lead production, care being taken to prevent pulverization)

**Naphthazarine derivatives.** I. G. Farbenind A -G (Georg Kränzlein and Robert Welde, inventors) Ger 520,089, Sept 5, 1929 Addn to 507,347 (*C. A.* 25, 609). The fastness to light of the products described in Ger 507,347 is improved by treating them with oxidizing agents, *e. g.*, $NaNO_2$, NaOCl or $MnO_2$ and $H_2SO_4$ Examples are given

**Printing inks.** Hans Zimmer. Fr. 696,723, June 6, 1930 The inks are improved by incorporating colors sol in water, particularly tar colors, in the oil base Colors sol in the oil are also added

**Intaglio printing ink.** I G Farbenind A -G Brit. 339,733, Oct. 23, 1929 An ink suitable for printing on metal foils, celluloid, acetyl cellulose products, cellulose foils, paper, etc , comprises cellulose esters sol in EtOH such as acetylcellulose or nitrocellulose contg. 10 5–11 5% N, coloring matter and a solvent consisting of at least 70% EtOH but free from aliphatic homologs of 1,4-dioxane Various resins, pigments, oils, fillers, plasticizers, etc., may be added

**Ornamenting surfaces.** Helena S Sadtler. U. S 1,797,998, March 24 A film such as cellulosic material is secured to a base material and is covered with a layer of

water sol adhesive such as gum arabic and a protective layer such as varnish or lacquer overlying the base and film bearing a design imprinted on it in coloring matter which would be injuriously affected by the solvent of the protective film

Thick oils. Josef Sommer. Ger 517,506, Mar 27, 1929 Thick oils, such as lithographic or printing varnish are prepd by heating linseed, etc., oils in a vessel in an atm of indifferent gas and subjecting them during heating to tangential currents of superheated steam App is described

Varnish. I G Farbenind A.-G (Karl Daimler, inventor) Ger. 517,902, May 2, 1925 A varnish comprises an aq emulsion of resin in $NH_4$ salts of fatty acids, with or without addn of aq.-sol org solvents Thus, nerolenic acid and colophony are mixed with aq $NH_3$ and water Spirit, methylcyclohexanol, PrOH, etc., and coloring matter may be added Further examples are given

Varnishes, etc. Bakelite Corp Fr. 695,588, May 14, 1930 Solns. of resins having a basis of thiourea and $CH_2O$ are prepd by the reaction between thiourea and $CH_2O$ or paraformaldehyde free from water, in the presence of a solvent such as Et lactate The amt. of hardening agent used is such that a resin of the hardening type is obtained The reaction may be carried out in the presence of the mono-Et ether of ethyleneglycol.

Lacquers. I G. Farbenind A.-G Brit. 339,936, Aug 8, 1929 Lacquers with a base of cellulose deriv such as nitrocellulose are colored with alk earth metal salts of azo dyes contg sulfonic groups obtained by coupling diazotized nitroarylamines with acetoacetic acid arylides. Several examples are given

Esters of polysaccharide ethers. I G Farbenind A.-G Fr. 695,323, May 8, 1930 Cyclic carboxylic acids having more than 6 C atoms are caused to react on polysaccharide ethers with or without catalysts Thus, benzylcellulose is added to linoleic acid heated to 100° and contg a little $H_3BO_3$. Prolonged heating at 120–150° gives the linoleate of benzylcellulose. The products are used in the manuf. of lacquers and plastic masses Several examples are given

Coating compositions. Wm. E Smith. Fr 695,922, May 21, 1930 A coating compn. which is resistant to acids and chem agents consists of approx. pigment 45 and a carrier 55%. The pigment consists of asbestos fiber 28, Al silicate 44 and $BaSO_4$ 28 parts The carrier may consist of a mixt. of mineral asphalt, stearin pitch and petroleum asphalt, melted and reduced with naphtha to produce a quickly drying mixt. resistant to acids

Oily resinous products suitable for softening celluloid, casein, synthetic resins, etc. I G Farbenind A.-G Brit. 339,958, Aug 12, 1929 Esterification of the hydroxyl groups of aliphatic long-chain carboxylic acids contg OH groups in the chain, or esters of such acids with alcs such as castor oil, nerolenic acid or dihydroxystearic ethyl ester, is effected by heating with colophony or other natural resinic acid materials, either *in vacuo* or in a current of inert gas, with use of either acid or alk. condensing agents. Several examples are given

Resin acid derivatives. Chemische Fabriken Kurt Albert G. m. b. H. Fr 696,584, June 3, 1930 The acid is transformed into its anhydride and the crude anhydride treated with alcs., phenols, amines, amides, esters, etc. Several examples are given. Cf. *C. A.* 25, 710

Resin layers. Bakelite Corp. Fr. 696,754, June 6, 1930 Layers contg one or more resinoids are fixed to a metal or wood support by means of a cement obtained by treating rubber with $H_2SO_4$.

Paracoumarone resins. Edward H. Ellms (to Barrett Co.). U. S. 1,797,260, March 24. A paracoumarone resin is made contg Na sulfonates and $Na_2SO_4$, the sulfonate ash being greater than the $Na_2SO_4$ present as such and the total ash within the range of 0.3 to 1.9%. This product forms stable emulsions in water and oils such as "spindle oil."

Artificial resin coating. Compagnie française pour l'exploitation des procédés Thomson Houston Fr 695,951, May 22, 1930 An adhering surface coating forming a thin film is obtained with an alkyd resin reduced to a finely divided state and put in suspension in an inert volatile liquid and appropriately heated after application. Suitable liquids are $CCl_4$, kerosene and paraffin hydrocarbons or oils of the terpenic series

Synthetic resins. American Cyanamid Co Fr 695,424, May 10, 1930 Synthetic resins are made by heating a mixt. contg esters of a polyhydric alc. and a polybasic acid, stearic acid or palmitic acid or both and one or more unsatd. fatty acids. An example contains glycerol 100, phthalic anhydride 160, stearic acid 45 and distd. fatty acids from coconut oil 45 parts.

**Synthetic resins.** BAKELITE CORP Fr 690,390, June 2, 1930 Phenol resins or compns having a basis of phenol resins are made by first making a resin or compn. contg a free phenol, treating the resin with $Ca(OH)_2$ or an equiv base to transform the phenol into the corresponding phenolate, then mixing with the resinous mass obtained an amt. of $(CH_2)_6N_4$ or an aldehyde with equiv hardening action, with or without the addn of appropriate fillers Cf *C A* 24, 4945

**Synthetic resins.** BAKELITE, LTD Fr 697,207, June 12, 1930 In the manuf. of resins having a basis of urea and PhOH or their derivs or homologs, and an aldehyde, a solid polymer of the aldehyde such as paraformaldehyde or trioxymethylene is used The 3 constituents are preferably solid and heated to complete condensation The urea is in proportion considerably greater than the phenol and the reaction mixt. is maintained neutral or alk Cf *C A* 25, 1400

**Synthetic resins.** I G FARBENIND A.-G Fr 695,476, May 12, 1930 Neutral resins sol in oil are made by the reaction of mono- or poly nuclear hydrocarbon derivs, which contain one or more $ClCH_2$ groups, with aromatic hydrocarbons or their derivs contg at least one aliphatic or hydroaromatic side chain, or at least one phenolic OH group which may be alkoxylated Several examples are given

**Artificial resins.** THOMAS & HOCHWALT LABORATORIES, INC. Brit 340,001, July 16, 1929 See Fr 679,402 (*C A* 24, 3915)

**Synthetic resins.** BRITISH CELANESE, LTD Brit 340,101, Nov 17, 1928 BzH is condensed with an aromatic sulfonamide such as benzenesulfonamide or a toluene or xylene sulfonamide, and mixed products may be obtained by including in the reaction mixt other synthetic resin components such as formaldehyde, furfural, acetone, urea, phenol or aniline The condensation may be effected without a catalyst or with use of an acid, neutral or alk catalyst, and the products obtained may be used in cellulose ester or ether compns for forming lacquers, varnishes, plastic masses, etc., for making films, filaments or the like or as adhesives for manuf of laminated glass Pigments, natural resins, etc., may be added Various details and examples are given

**Synthetic resins.** BRITISH CELANESE, LTD Brit. 340,102, Nov 17, 1928 Products are obtained of generally similar character to those described in Brit 340,101 (preceding abstr.) and by a similar process except that furfural is used as an initial material instead of BzH

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

**Lecithin retards hydrolysis of fats.** RALF B TRUSLER *Oil and Fat Ind.* 8, 141–3(1931).—In catalytic splitting of fats it was observed that glycerides from various sources behaved differently; animal fats could be split 90% in 10–18 hrs while crude vegetable oils showed no change for similar treatment By treating such oils with 5–7% of a 20% soln of $H_2SO_4$ or with 1–3% HCl, hydrolysis by means of a catalyst can then be effected This difference in behavior is explained by the presence of some compd which inhibits hydrolysis and is removed by the acid treatment. This also explains why a pretreatment with acid is necessary with the use of the Twitchell reagent. It is thought that the inhibiting substance is lecithin or a closely related substance. By incorporating lecithin with lard and then subjecting the latter to hydrolysis with a catalyst in the presence of oxalic acid for 6 hrs only 20% of fatty acids was produced E. S

**A stearin 80 years old.** J DAVIDSOHN. *Seifensieder-Ztg.* 58, 222(1931).—A stearin which had been kept for 80 yrs in a corked bottle showed the following characteristics: a rancid odor, disappearing when treated with 5% of Frankonite bleaching earth, a pure white color, acid no 209 5, sapon no 210 3, I no (Hanus) 7.05, unsapon matter 1 07%; it m 54°. P. ESCHER

**The Twitchell reagent for splitting fats. III. Influence of salt additions and of physical conditions upon the activity of the reagents now on the market and upon the color of the resulting fatty acids.** K. NISHIZAWA AND Y. MATSUKI. *Chem. Umschau Fette, Oele, Wachse Harze* 38, 73–8(1931).—See *C. A.* 24, 3915. P. ESCHER

**Twitchell reagent. IV. Influence of electrolyte additions on the colloidchemical properties of commercial fat splitters.** K. NISHIZAWA, R. ASADA AND B. SAKUMA. *Kolloid-Z.* 54, 334–40(1931).—See *C. A.* 25, 427. **V. Various influences on the colloidchemical properties of a new commercial fat splitter, Dilvulson D.** K. NISHIZAWA AND B. SAKUMA. *Ibid* 340–6.—See *C A.* 25, 612. ARTHUR FLEISCHER

**Testing and evaluating stearin pitch.** GG. SIEBERT AND E. BLENNEMANN. *Farben-Ztg* 36, 1090(1931).—The following tests should be applied to stearin pitch: presence of

wool fat or of asphalt, soly., viscosity of solns., drying rate and color, and character of film produced by baking at various temps. G. G. SWARD

Hydrogenation of oils in the presence of a catalyst prepared from nickel borate. L. L. UBBELOHDE AND H. SCHÖNFELD. *Allgem. Öl- Fettztg.* 27, 425–6(1930).—A catalyst prepd. by the reduction of Ni borate at 420–430° contained 47.4% $B_2O_3$. The free boric acids amounted to about 23%. The reduced Ni borate when cooled in the presence of $H_2$ was unaffected by atm. $O_2$. In the hydrogenation of oils it showed approx. 1/4 the catalytic activity of a Ni kieselguhr catalyst. On hydrolyzing and washing Ni borate with $H_2O$ it was possible to reduce the $B_2O_3$ content to 13.5%. This corresponds roughly to the $B_2O_3$ content of Ni metaborate. Reduction of this hydrolyzed Ni borate at 420–430° resulted in a product having about 3 times the catalytic activity of the originally reduced Ni borate. It was also unaffected by atm. $O_2$. It is suggested that it is possible to produce a borate of the same $B_2O_3$ content by the pptn. of a Ni salt with a mixt. of soda and borax. W. I. BOLLENS

Saponification values of highly colored oils. H. S. JOIS, B. L. MANJUNATH AND S. V. RAO. *Half Yearly J. Mysore Univ.* 4, 241–2(1930).—"The Albert method of detg. the sapon. no. of highly colored oils (cf. H. H. Coburn, *C. A.* 24, 2902) was applied to several oils and found to be very satisfactory." GEORGE CALINGAERT

The determination of inorganic impurities in sulfonated oils. R. HART. *Chem. Umschau Fette, Oele, Wachse Harze* 38, 81–3(1931).—Referring to Nishizawa-Winokuti's paper (*C. A.* 25, 426) H. discusses the development of his own method now official with the Am. Leather Chemists Assoc. which dets. indirectly the inorg. impurities from the % of ash, the original $SO_3$ and the alkali combined with soap, and gives formulas of calcn. in the presence and absence of $Na_2CO_3$ in the ash. When a sulfonated oil is washed with concd. $Na_2SO_4$ the originally combined $H_2SO_4$ is more completely neutralized than with NaCl and the oil is then the least sol. of all its forms. P. FISCHER

The composition of linseed oils, obtained by different methods and stored under different conditions. K. H. BAUER AND A. FREIBURG. *Chem. Umschau Fette, Oele, Wachse Harze* 38, 78–80(1931).—Three La Plata linseed oils were obtained from one lot of seeds of 1927 by cold pressing, warm pressing and by benzine extn. Their "consts." did not vary greatly, but in the drying tests the cold pressed oil dried more rapidly and completely than the others, the warm pressed oil being the slowest. The 3 oils were exposed to diffuse daylight and sunlight in well stoppered bottles for 1 yr. and again tested. The drying tests showed the 3 oils in the same order as before, but the total time was very much shortened. The complete analysis by the Eibner-Schmidinger method (*C. A.* 18, 1211) of the fresh oils and the stored oils gave such contradictory results, that no definite conclusions could be drawn, the same is true when they were analyzed by Kaufmann's thiocyanate method and no conclusive relationship could be established. The only definite result is a change in the oils by exposure to light, not measurable by chem. means. P. FISCHER

Thiocyanometric analysis of soy-bean oil. H. P. KAUFMANN. *Allgem. Öl- Fettztg.* 27, 325–7(1930).—The fatty acid constituents of oils from various varieties of soy beans were detd. The satd. and unsatd. acids were sepd. by both the Twitchell and Bertram methods. The individual unsatd. acids were detd. by the thiocyanate method of K. Crude and refined oils from Manchurian soy beans gave, resp.: satd. acids 15.1, 15.7, oleic acid 21.1, 25.7, linoleic acid 54.5, 50.9, linolenic acid 8.1, 7.0, unsaponifiable 1.2, 0.6. Oils from Am. soy beans and so-called Am. "giant beans" gave, resp.: satd. acids 15.0, 14.7, oleic acid 24.55, 24.6, linoleic acid 53.3, 50.2, linolenic acid 6.4, 9.9, unsaponifiable 0.65, 0.57. W. F. BOLLENS

Properties and composition of sandal-seed oil. M. SREENIVASAYA AND N. NARAYANA. *Proc. 15th Indian Sci. Congr.* 1928, 160.—Sandal seeds contain 50–55% of a thick viscous oil. On exposure to light, the oil spontaneously thickens to a resinous mass, at 130–40°, S is absorbed and a plastic rubber-like compd. formed. On sapon. with alc. potash a white resinous mass is thrown out which has a very high I no. Another extd. oil has the following consts.: $n^{30}$ 1.4790, $d_{30}$ 0.9304, I no. 130–140, sapon. no. 185–195, acid no. 20–25, Hehner no. 96.97, Richert Meissel no. 1.5, Polenske no. 0.2–0.3. The mean mol. wt. of the mixed fatty acids is 288.5. E. J. C.

The hardening of linseed oil at very high hydrogen pressure. H. I. WATERMAN AND J. A. VAN DIJK. *Rec. trav. chim.* 50, 279–82(1931).—In these expts., Ni pptd. on kieselguhr was used as a catalyst (cf. Waterman, *Het harden van oliën* 5(1921)), the hardening being carried out in the rocking autoclave described previously (Perquin, *Diss. Delft* 1929) with an initial H pressure of 100–195 atm., and at temps. varying from 35° to 70°. Some of the hardened fats had a pungent odor, strongly resembling that of acrolein but after treatment with water vapor in a vacuum at 150° complete deodorization took

place For comparison the results of a no of expts. with the same linseed oil raw material at ordinary pressure in Normann cups at a max. temp. of 180° are also given A comparison of both sets of figures shows that the hardening at high pressure proceeds in an entirely different manner from that at ordinary pressure, the former especially resulting in the formation of satd fatty acids. The fats hardened to the same I no contain more satd fatty acids on hardening at high pressure and show a higher m. p., while the SCN I no is lowered more in the beginning Consequently at high-pressure hardening a smaller quantity of H is needed to obtain fats of a definite m. p. C. F VAN DUIN

**Recent developments in the fish oil and fish meal industries.** H M. LANGTON. *Food Manuf* 6, 109–13(1931) E H

**The chemistry of liquid soaps.** H POMERANZ. *Seifensieder-Ztg.* 58, 220–1(1931).—The transparency of solid and liquid soaps is due to the soly of the $C_6$ to $C_{18}$ fatty acids (in coconut oil), to hydroxy acid (in castor oil) and to sulfonated acids P ESCHER

**Washing effect of unfilled soap.** C. F. GOHRING *Dyestuffs* 31, 52–6(1930).—The theory of detergents is discussed, as well as soap concn., temp., hard water and the germicidal properties of soap CHAS E MULLIN

**The influence of lead soaps on the Mackey test.** H WOLF AND R. HERLINGÖTTER. *Allgem Öl Fettztg* 27, 407–8(1930).—Oleic acid, free from metallic soaps, after being heated in a Pb container for 20 hrs at 80–90° contained 1% of Pb The same oleic acid, allowed to stand in a Pb container at room temp for 4 weeks, contained 0.39% Pb The addn of 1% of Pb in the form of Pb oleate to an oleic acid not spontaneously combustible in the Mackey app causes it to become so The addn of 1% of Pb to an oleic acid contg 5% of linseed oil increased its spontaneous combustibility in the Mackey app W F BOLLENS

**Determination of sodium silicate in washing compounds.** M DITTMER *Seifensieder-Ztg* 58, 168–9, 185–6(1931).—D criticizes the Wizöff standard method which first filters the hot aqueous soln of the sample, D decomposes the sample with acid without first filtering, fearing that filtering might remove some $SiO_2$ which may have become insol D further proposes the formula $Na_2Si_4O_7$ for calcn in place of the present $Na_2Si_4O_9$ P ESCHER

**The Marwa process.** O UHL. *Seifensieder Ztg* 58, 167–8(1931).—The Marwa washing process of E Walter launders in a washing machine with fatty acids plus an excess of $Na_2CO_3$ in place of normal soap U finds no advantage in this method P. ESCHER

**Evaluation of creolin.** P KARSTEN AND D VAN OS. *Pharm Weekblad* 68, 295–303 (1931).—Methods for the analysis of "creolin," a soap emulsion of crude phenols, are discussed A W DOX

**Sulfonated wetting and cleansing agents and related products.** CHAS. E MULLIN AND ROSS M STRIBLING *Textile Colorist* 51, 367–71(1929), *Textile Recorder* 48, No 571, 65, No 572, 61, No 573, 63–5(1930), cf. *C A* 24, 5522.—A review of the patents covering the manuf and uses of the sulfonated aliphatic oils, including the mineral oils, halogen substituted sulfo acids, etc CHAS. E. MULLIN

**The manufacture and constitution of the new wetting-out and emulsifying agents.** CHAS E MULLIN AND ROSS M STRIBLING *Textile Colorist* 51, 655–8(1929).—A review of the patents covering the manuf of wetting, cleansing and emulsifying agents of the aromatic type, such as the compds of $C_{10}H_8$, mineral oils, ethers, resins, proteins, phenols, etc. CHAS. E MULLIN

**Various applications of the wetting-out agents.** CHAS. E MULLIN AND ROSS M. STRIBLING *Textile Colorist* 51, 727–30, 807–10(1929).—A review of the patents covering the use of wetting agents in wetting, scouring, bleaching, mercerizing, dyeing, carbonizing, fulling, spinning, desizing, retting, rayon manuf., polishing and cleaning mixts., dyestuff manuf., inks and paints, absorbents, emulsifiers, etc CHAS. E MULLIN

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SCHÖNFELD, H., Neuere Verfahren zur Raffination von Oelen und Fetten. Berlin: Allgem. Industrie-Verlag G. m. b. H 110 pp M 12

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**Oils and fats.** I. G FARBENIND A.-G Fr 696,707, June 6, 1930. Oils and fats are freed from mucilaginous substances by heating them with sulfonic acids of org compds or their salts Examples are given of the use of β naphthalenesulfonic acid

**Bleaching fatty acids from marine oils.** ARNE GODAL. Ger. 520,475, Jan. 27, 1926. The acids are freed from impurities coagulable by $H_2SO_4$, and are then treated in the dissolved state with up to 5% of concd $H_2SO_4$ at 15–20°. Further bleaching with an adsorbent may follow. Cf. *C A*. 24, 983.

Apparatus for extracting oil from bleaching earths, or for filtering. PHILIPP L. FAUTH Ger 520,169 Jan 8, 1927. See Brit 283,216 (*C. A.* 22, 4001)

Apparatus for distilling and recovering solvents used in oil extraction. LOUIS J. SIMON AND SIMON BROTHERS (ENGINEERS), LTD Ger 520,396, June 22, 1927 Brit 278 815 (*C A* 22, 2851)

Solvents and emulsifying agents. MENDEL BURAK. Fr. 697,102, June 5, 1930 Solvents and emulsifying agents for fatty materials and mineral oils are made by adding olein or its equivs to a mixt of soaps or soap equivs such as aromatic or hydroaromatic sulfonic acids or their salts, with ales of high mol wt Examples are given

Glycerol. HENKEL & CIE G M B H Ger 519,470, Oct. 15, 1927. Glycerol recovered from waste soap lye is purified by treatment with aldehydes or ketones in the presence of a small quantity of mineral acid, whereby liquid glycerol aldehyde or -ketone condensation products are formed which do not dissolve the saline impurities in the glycerol After sepg the pptd salts, the condensation products are decompd., *e. g.*, by boiling with water Examples are given Cf *C A* 24, 5044

Soap HENKEL & CIE G M B H Ger 520,090, Mar 24, 1928 Fatty acid glycerides are saponified by heating them with alkali carbonate soln to about 100° in the presence of a small quantity of a catalytic fat splitter, *e. g.*, an alkylnaphthalenesulfonic acid Emulsifying agents may be included in the mixt An example is given Cf *C A* 24, 3670

Soap. HEINRICH SCHMIEG and ROTHENBURGER SEIFEN- UND ÖLFABRIK SCHMIEG & SCHEIB G M B H Ger 521 478, Nov 24, 1928 Soap prepd by a cold process is cooled in a machine of the kind used for cooling curd soap The cooling water is run out of the machine, and the soap soln is then poured in Cooling water is not supplied to the machine until the evolution of heat due to the reaction has ceased

Soap. FEDERICO JAACKS-BALLESTER Swiss 143,405, June 5, 1929 A soap for cleansing and softening the skin even when stained with tar, lubricating oil, etc., consists of water, cacao butter, NaOH, KOH and corn $C_6H_6$

Soap. GEORGES M M GUIOT. Fr 696,978, May 17, 1930 A soft soap is made by mixing ordinary black soap with powd $CaCO_3$ and adding, with stirring, a satd soln of $Na_2CO_3$ in repeated amts

Machine for pressing and cooling soap SIMON A.-G Ger. 516,654, April 4, 1928

Soap-cooling apparatus. KÖNIG FRIEDRICH AUGUST-HÜTTE A.-G Ger. 517,507, Mar 17, 1927

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

Short review of the most important work in the chemistry of carbohydrates for 1929. P P. SHORUIGIN *Zhurnal Sakharnoi Prom* 4, 413–27(1930) —A review V. E BAIKOW

Notes on the economic production of sugar. WILLIAM E. CROSS. *Rev ind agr Tucumán* 20, 105–14(1929–30) —C. discusses selection of suitable ground, prepn. of the plantation and cane selection, methods of cultivation, fertilizers, watering, harvesting, cane transportation, factory control, grinding, losses in crude juice due to fermentation, defecation, decantation, evapn crystn., refining, class of sugar most desired, losses, chemicals, fuel economy and by products S L B ETHERTON

Errors which disturb chemical control of the sugar factory. WM E CROSS *Rev ind agr Tucumán* 20, 120–3(1929–30) —C discusses errors in the detn of sugar entering, of sugar extd., wt of sugar cane water of imbibition, cane fiber, sugar yield, sugar retained, plant efficiency and sugar losses, and he gives an extensive list of the effects of errors on values directly detd and on calcd values in chem control work S. L. B. ETHERTON

Mechanical refrigeration in the sugar industry. CHARLES DOMBITSKY *Refrigerating Eng* 20, 354–7(1930) —The manuf of sugar from sugar beets is described. Refrigerating processes are of importance in recovering sugar from molasses A. H. JOHNSON

Colloids of a diffusion juice. A V. DUMANSKII *Zhurnal Sakharnoi Prom.* 4, 427–42(1930) V E B.

Centrifugal pumps for sugar liquids. M G EFIMOV AND I I. EGOROV *Zhur. Sakharnoi Prom* 4, 450–8(1930) V. E B

The action of sulfides on filter cloth. O SPENGLER. *Deut Zuckerind* 56, 17–8 (1931) —A discussion J. F. LEETE

**The results of experiments on continuous vacuum pan of the Zuev-Vostokov system.** V. I Kolpakov and B A Burdakov *Zhurnal Sakharnoi Prom* 4, 458–60(1930) —The app for continuous boiling represents a combined vacuum pan and crystallizer If this app is compared with vacuum pans there is not much advantage in heat transmission, but there is higher efficiency, decrease in labor and economy of steam V I Baikow

**Effect of preliminary liming on the juice work and on the quality of the sugar.** F Naehring *Deut Zuckerind* 55, 1353(1930) —Lab tests on the Teatini process (*C A* 24, 5529) showed that prelming of diffusion juice with 0.15–0.2% CaO improves the quality of the juice, but that addn of $SO_2$ at this stage causes no further improvement On the basis of this observation, 40 l of milk of lime was added in the factory in each juice measuring tank, and the prelimed juice passed through the heaters This gave a juice of yellow color, with a quick settling, dirty green ppt, consisting of large flocs The alky was 0.030% CaO The juice was then further treated as usual, but with only 1.5% and later 1.25% CaO, instead of the usual 1.75% With the new method, the color of the juice increased only 1.65° Stammer from the 2nd presses to the 4th effect, while with the old method the increase averaged 5.93° In factories using only fresh water in the diffusion battery the CaO may be reduced even further to 0.75–1%, instead of 1.25%, with 0.20% for the prelming The quality of the sugar compared favorably with that obtained by the Teatini process Other favorable effects of N's process will be reported later I W Zerban

**The effects of sediment during digestion and evaporation of sugar juices.** Jos Hamous *Listy Cukrovar* 49, 108(1930) Stanek and Pavlas (*C A* 23, 4388) showed that if the coned and satd solns are not filtered before digestion more Ca remained in suspension than if the same liquors were filtered before the digestion H carried out his expts on a com scale Unfiltered liquor from the first satn was passed through a heat interchanger until 96° was attained, pumped into liquors awaiting second satn, satd during the usual second satn and filtered The filtrate was coned at 102° and filtered again The process involved only 2 filtrations The above procedure was used throughout the entire 1930 season Compared to previous seasons, the heat interchanger was free from incrustations (more Ca remained in suspension in unfiltered liquors) One filtration process was saved without interrupting the manuf or decreasing the quality of the product Better results were obtained by a single filtration of the coned liquor than from 3 filtrations of liquors before evapn F. M

**The effect of Atlacide on Aegineta indica.** Julian A Agati and Jose P. Tan, Bureau of plant industry (Manila, P I), *Sugar News* 12, 82–9(1931) —Aegineta indica on sugar cane. Manuel L. Roxas *Ibid* 89–91 —The application of the weed killer Atlacide in a manner similar to that of fertilizer is effective in destroying *Aegineta indica*, which is becoming more and more dangerous in the sugar cane regions in the P I. V. G Lava

**Filterability of raw cane sugars. I. Effect of various factors prior to pan-boiling.** J C Krant and H G Hill *Ind Eng Chem* 23, 421–4(1931) —Poor filterability of sirups and sugars is closely assocd with the quantity of suspended matter So far no satisfactory method has been found to det filterability except by actual filtration tests Pulverized raw sugar shows a much higher filtration rate than the original sugar. The filtration rates of sirup and of the resulting sugar were greatly improved by adding 0.008 g $P_2O_5$ to each 100 cc of raw juice before liming The total $P_2O_5$ content of raw juice is no criterion as to whether such juice requires further addn of $P_2O_5$ to obtain good clarification, because evidently the $P_2O_5$ may be only partly in available form *II. Effect of pan boiling operations* *Ibid* 424–7 —The filterability of sugars is affected not only by that of the sirup from which it is made, but also by pan boiling operations The principal factors in the latter class are pan circulation, design and manipulation F. W. Zerban

**The removal of some of the soluble aliphatic salts of calcium during saturation.** T Nemes *Z Zuckerind. Techoslovak Rep* 55, 159–62(1930), *Listy Cukrovar* 49, 315–8(1931) —Expts were conducted to det whether other Ca salts besides Ca formate were adsorbed and removed from soln by $CaCO_3$ A definite quantity of fatty acid (insufficient to exceed the soly. of its Ca salt), together with the corresponding wt of CaO, was placed in a 200 cc flask, which was then filled to the mark at room temp The soln was heated to 85° and satd with $CO_2$, cooled to room temp and again made up to the mark The quantity of $H_2O$ displaced by $CaCO_3$ was calcd and this amt was added After filtration 50 cc of the soln was used for the detn. of the Ca salt as follows: The free lime was titrated with 0.1 *N* HCl against methyl orange, and the total lime was detd by pptn as oxalate and conversion to sulfate. The difference

gave the lime in combination with fatty acid and from this value the adsorbed Ca salt of the fatty acid was calcd It was found that the adsorption of Ca salts by $CaCO_3$ was greater with acids of higher mol wt, *i. e.*, formic, acetic, propionic, isobutyric, *caproic* and valeric The results for caproic, which has a higher mol. wt than valeric (and should, therefore, follow it), cannot be considered accurate because of the impossibility of thorough satn with $CO_2$ on account of foaming J. F. Leete

Determination of natural alkalinity and calcium salts. I. B. Mintz and I I Shorkhet *Nauk Zapiski Tzukrovoi Prom* 10, 131–7(1930) V. E. B

Optimum alkalinity and calcium salts. S S. Afanasenko *Nauk Zapiski Tzukrovoi Prom* 10, 42–50(1930) V. E B.

Calcium salts in juices and products of beet-sugar fabrication. I Levin *Nauk Zapiski Tzukrovoi Prom* 10, 17–23(1930). V. E B.

Determination of the sugar losses in the filter-press cakes, following the ordinary and Shapiro's methods. I I Shorkhet. *Nauk Zapiski Tzukrovoi Prom* 10, 14–7 (1930) V. E B

Foam pressure as a measurable quantity. K. Schiebl. *Chem.-Ztg* 55, 169–70 (1931) —The fact that in the satn of batches of limed beet sugar sirup with $CO_2$ the end point of desired $p_H$ is estd by observing the height of the foam led to a study of the variations of this height during the process. The total head of liquid and foam at various levels, from the bottom of the vessel to the upper limit of foam, was measured by an app in which the hydrostatic pressure was transmitted through air-vessels to manometers At the bottom, the head remains const. throughout the process. At the level of the non foaming liquid, the head rises from zero at the start to a const. value which continues until near the end and then falls to a final value characteristic of the end point in a given vessel Above this level, positive pressure is observed early in the process (as soon as the foam rises) and follows a curve similar to the above. Thus the process can be controlled by 2 manometers, one at the bottom to indicate the proper amt of charge and one at the quiet level of liquid to indicate the end point pressure. The operation can be made automatic, and the same principle can be applied to a continuous satn process I. H. Odell

Rendering the diffusion juice alkaline when working with dried beet cossettes. O Spengler and N. Loginow. *Z Ver deut Zuckerind* 81, 107–18(1931) —Diffusion expts were carried out with dried beet chips in a lab diffusion battery with (1) tap water, (2) water + lime and (3) water + soda Conclusions: (1*a*) With tap water the $p_H$ falls continuously from the first to the last cell of the battery. (1*b*) The amt of invert sugar, % sucrose, increases in the course of the diffusion process by about 40% (2*a*) On the addn of 0.1% CaO or 0.2% $Na_2CO_3$ (calcd on fresh beets) equally distributed among the cells of the battery, an almost neutral ($p_H$ 6.9) diffusion juice of normal purity is obtained (2*b*) The invert sugar, % sucrose, in the juice obtained is practically equal to that in the dried cossettes (3) The relative viscosity of the juices rendered alk. is higher than for the same juices without alkali addn by some 14% for the 0.1% CaO treatment and by 8% for the 0.2% $Na_2CO_3$ method By the addn of alkali to the diffusion battery invert sugar formation is practically completely stopped The addn of lime to the extent of not over 0.1% on fresh beets is recommended By the addn of too much alkali the risk is incurred of making the exhausted chips unfit for fodder, *e. g.*, 0.2% CaO gave dirty greenish exhausted chips, while 0.5% $Na_2CO_3$ gave sticky chips of normal color F Camps-Campins

Calculation of production in raw sugar factories and refineries (beet). J. Hamous. *Z. Zuckerind Techoslovak Rep* 55, 120(1930) —*A discussion with computations* J. F. Leete

The coagulation of the colloids in the beet juice. A G Arkhipovich *Nauk Zapiski Tzukrovoi Prom* 10, 250–6(1930) V. E B.

The Teatini process for the clarification of [sugar beet] juices. H Claassen *Centr Zuckerind* 38, 1283(1930) —A discussion. J. F. Leete

The mathematical expression of the composition of sugar-beet juice and other questions of beet analysis. F Krýž. *Z. Zuckerind Techoslovak Rep* 55, 60–3(1930) —A discussion J. F. Leete

Observations on over-saturation and saturation [of beet-sugar juices]. Breyer *Deut Zuckerind* 55, 1201–2(1930) —A discussion J F. Leete

The use of sulfur dioxide in the purification of sugar [beet] juices. K. Solon *Deut Zuckerind* 56, 119–20(1931) —A discussion with references J F. Leete

The return of diffusion and press waters to the process in the beet-sugar factory. P Hirschfelder *Centr Zuckerind* 39, 12–3(1931) —A discussion. J. F. Leete

The yield of dry [sugar beet] pulp and the specific gravity of moist and dry pulp.

F. KRÝŽ *Z Zuckerind. cechoslovak. Rep* 55, 128–9(1930). *Listy Cukrovar* 49, 284–5 (1931) J. F. LEPTE

Hydrolysis of pulps. M. S FILOSOFOV. *Nauk. Zapiski Tzukrovoi Prom* 10, 419–22(1930).—In order to det. the sugar losses in pulps a hydrolytic method was tried The pulps were treated with concd $H_2SO_4$ then dild to 0.7 *N* and boiled for 2 hrs From 45.62 to 62.46% (on the wt of dry substance) sugar was obtained by the iodometric method. On fermentation 18.76% of alc on the wt. of dry substances (minus the alc. from sucrose) was obtained The nature of the sugar was not investigated V. F. BAIKOW

Contribution to the knowledge of crystallizer operation. P HONIG AND W F ALEWYN *Sugar News* 11, 727–34(1930), 12, 22–34, 97–100(1931).—See *C. A.* 22, 1698. V. G. LAVA

Annual analytical report of the research department for starch manufacture. A PARLOW *Z Spiritusind* 53, 311(1930) S. J.

Practical yield tables for dried potatoes. B LAMPE *Z Spiritusind* 53, 326–8 (1930).—L. has revised the tables of Parlow *Ibid* 347–8.—The use of the tables is given S. J.

The constitution of starch. M. SCHOEN. *Bull. soc chim biol* 12, 1033–99(1930), cf. *C. A.* 24, 4951.—A review with bibliography C. G. K.

The chemical study of chicory and topinambur in connection with the problem of inulin and crystallized fructose production. G. L. EINHORN, A. B. MILSKII AND E. YA KALASHNIKOV *Nauk. Zapiski Tzukrovoi Prom* 10, 143–50(1930) V. E. B.

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The effect of the soil reaction on beet yields (JORET) 15. Losses of water-soluble $H_3PO_4$ by the clarification of molasses under acid conditions and heat (HUMMER) 16. Beet infections with *Cercospora beticola Sacc.* (CHRZANOWSKI) 15. Molasses as a fuel (RODZIEWICZ) 21. Vitamins in sugar-cane juice and in some cane juice products (NELSON, JONES) 11E. Tartaric compounds [from vinasses] (Fr. pat. 697,179) 16. Automatically controlling [bleaching and filtering of sugar solutions] (U. S. reissue 18,005) 13. Electrically heated apparatus for concentrating sugar juices (Brit. pat. 339,649) 4. The use of denatured sugar, molasses-fodder and sugared cossettes in agriculture (ŠANDERA) 12.

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Methods of Chemical Control for Cane Sugar Factories of the Association of Hawaiian Sugar Technologists. 6th ed., revised. Honolulu: Advertiser Pub. Co. 140 pp.

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Apparatus for drying and transporting beet roots. SUGAR BEET & CROP DRIERS, LTD. *Fr.* 697,283, June 12, 1930

Crystallization apparatus for sugar, etc., with rotary heating or cooling tubes. TEODORO GRUENWALD Ger. 521,104, April 20, 1928

Treating sludge from sugar manufacture, etc. A. BORSIG G. M. B. H. Ger. 520,288, Apr. 18, 1928 Sludges such as are obtained in washing beets are fed to a rising column of water, the velocity of which is regulated so that clean sand sinks to the bottom of the column.

Zinc calcium formaldehyde sulfoxylate. EDGAR BOULOGNE and SOC. INDUSTRIELLE DES DÉRIVÉS DU SOUFRE Ger. 521,204, Nov. 27, 1929 An insol. double salt is prepd. by warming a mixt. of Zn formaldehyde bisulfite and neutral Zn formaldehyde sulfoxylate with a sol. or insol. compd. of Ca, *e. g.*, $CaCl_2$, milk of lime or bleaching powder. *The product may be used in sugar manuf.* and in *printing textiles* Examples are given

Starch. ERNST STERN. Ger. 519,300, Aug. 6, 1924. A product that swells in cold water is prepd. by treating an aq. soln. of alkali starch at *atm. temp.* with a salt of an alk. earth or heavy metal, *e. g.*, with $BaCl_2$, sepg. the resulting ppt., and mixing the ppt., after drying it if desired, with a water-sol. alkali salt. Examples are given

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## 29—LEATHER AND GLUE

ALLEN ROGERS

A new and improved method of moisture determination and its application to leather. A. COLIN-RUSS. *J. Intern. Soc. Leather Trades' Chem.* 15, 113–26, 166–82 (1931).—An app. is described wherein leather is heated in a tube surrounded by vapor

of a boiling liquid, and the $H_2O$ evolved from the leather is allowed to react with $CaC_2$ forming $C_2H_2$ which is collected over Hg and measured A blank on the $CaC_2$ is indispensible For standardizing the procedure, numerous hydrates and liquid $H_2O$ were used, the latter, as well as Glauber's salt, give up their $H_2O$ so rapidly that the reaction with $CaC_2$ is incomplete, borax and gypsum are not completely decomposed at 100°, $(NH_4)_2C_2O_4 \cdot H_2O$ gave the theoretical yield of $H_2O$, and the time gas volume curve is that of a monomolecular reaction With leather of heavy vegetable tannage, it was found that the percentage water obtained by the method is almost independent of the reaction temp *(controlled by suitable choice of surrounding solvent vapor)* over the range from 61 5° to 133 5° 12 6% at 61 5°, 13 1% at 76 5° 13 8 at 100 5°, 13 05 at 133 5° Time required to complete the reaction decreased as temp increased Degree of subdivision of the sample is practically without effect In a sumac tanned leather, which showed marked contraction at 100°, percentage $H_2O$ obtained by the method decreased from 13 9% at 61–74° to 10 3 11 0% at and above 100°, the decrease indicating that the contraction involves fixation of $H_2O$ Comparative results on 4 leathers by the carbide and by the oven drying methods showed that the former always gives lower results the difference varying from 1 45% for Cr tanned calf to 6 03% for heavily curried vegetable cowhide Good agreement was obtained between results yielded by the carbide method and those obtained by very prolonged desiccation over $H_2SO_4$, except in the case of the abnormal sumac leather H B Merrill

Salt stain in the manufacture of leather. P White and F. G Caughley *New Zealand J Sci Tech* 12, 108–13(1930).—Lab scale tests show that the growth of the halophyllic organism responsible for "red heat" of hides is inhibited in media and on skin by adding 0 5–1 0% NaF or $Na_2SiF_6$ to fresh curing salt. With used curing salt, the fluorides were not effective Fluorides appear to cause unusual shrinkage of hide during curing, the effect largely disappears after liming Practical tests are projected H B Merrill

Deliming and bating. E Stiasny *Schweiz Leder-und Ztg* No 25 (1929); *J Am Leather Chem Assoc* 25, 46.—The theory of deliming and bating is discussed The most important role of trypsin is believed to be that of producing a partial peptization of the collagen fibers This action is more marked in the presence of chlorides than in the presence of sulfates, for this reason $NH_4Cl$ is preferred to $(NH_4)_2SO_4$ The activity of the bate falls off rather slowly on the alk. side of the optimum $p_H$ range *(which is from 7 5 to 8 5), being little less at $p_H$ = 10 than at 8 5, at $p_H$ values lower* than 7 5 the decrease in activity is more marked H B Merrill

High tannin yield from South African gum trees. G Smith *Shoe and Leather Reporter* 179, No 6, 16(1930); *J Am Leather Chem Assoc* 25, 427.—The bark of *Eucalyptus astringens* has been found to contain 33–44% tannin The rate of growth is rapid enough to justify com culture H B Merrill

Theory of chrome tanning. K. H Gustavson. *J. Tech Assoc Fur Ind* 2, 7-26 (1931).—A review H B Merrill

Camphor as a preservative for tan liquors. P. D Dalvi *Proc 15th Indian Sci Cong* 1928, 154.—*Aspergillus niger* and certain other fungi constantly found in tan liquors bring about a reduction in the tanning value of the liquors because of the fermentation of the tannic acid induced by the organism The action of various disinfectants or preservatives in diminishing this loss has been investigated, and of those tried camphor seems the most promising, since it is efficient in small quantities and without harmful effect on the activity of the liquor E J C

The washing and utilization of chrome leather shavings. E. Sauer and W. Eschmann *Kolloid Z* 54, 326–34(1931).—The raw material showed the following analysis $H_2O$ 14 8, *ash* 10 7, $Cr_2O_3$ 5 9 *and* N 11 8% Tests on the extn of $Cr_2O_3$ were made at 20° and 30° with 0 5–10% $H_2SO_4$, treatment with 1% alkali before $H_2SO_4$ treatment, treatment with lime and subsequently HCl, and treatment with dil $H_2O_2$-NaOH soln The highest extns (93%) were with pretreatment with NaOH and subsequent $H_2SO_4$ extn. and with the $H_2O_2$-NaOH solvent A dark-colored glue may be extd from the residue A F.

Level dyeing in leather. Walter C Durfee *Dyestuffs* 31, 125–7(1930) Chas. E. Mullin

Glues and gelatins—varied applications. J C Kernot *The Times Trade and Eng Suppl.* 28, No 664, 24 (1931).—Examples of uses are given. E M. S

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Condensation products containing halogen [starting materials for manufacture of tanning materials] (Fr. pat. 695,602) 18.

GRASSER, GEORG Kurzes Lehrbuch der Chromgerbung. Ein Leitfaden für Praktiker und Theoretiker Stuttgart F Enke About 210 pp. About, M. 14; linen, M 16

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**Leather.** ALBERT J DUCAMP and CHARLES F A GUÉNOT Fr 696,252, Sept 9, 1929 The hardness and resistance to wear of leather is increased by introducing into the leather chem substances having the character of anti-catalysts such as cyanides, particularly $Hg(CN)_2$, or organometallic compds such as $PbI_2$, $PbI_2Ph_2$ and Fe carbonyl, or phenols such as resorcinol or their derivs The catalysts are used in soln in appropriate solvents

**Stretching and drying skins, hides, etc.** THE LEATHER MAKERS PROCESS CO Ger 516,568, Feb 18, 1930

**Stretching and drying hides.** MACHINERY DEVELOPMENT CO Ger 516,569, Jan 8, 1929

**Tanning.** CHARLES L MAYER Fr 696,254, Sept 10, 1929 Acrolein in the form of vapor or in soln in animal, vegetable or fish oils is used for tanning leather, etc Fr 696,255 describes the tanning of leathers by treating them with phenolic compds (phenols cresols, naphthols etc) and aldehydic compds ($CH_2O$ AcH, acrolein, etc.) in succession The products may be used in soln in animal or vegetable oils or fats

**Tanning.** OTTO RÖHM Ger 520,091 June 21, 1927 $H_3PO_4$ or $H_3AsO_4$ or salts or esters of these acids are added to mineral tanning baths Examples are given

**Tanning agent.** OSKAR A MÜLLER Ger 510 267, Feb 10, 1929 Ligneous cellulose materials are chlorinated while moist and then extd with a water sol org solvent, *e g* EtOH, in the presence of a strong mineral acid The ext is freed from chlorolignin by pptg this with water, and the org solvent is removed by distn The tanning agent can then be extd from the aq residue with AcOEt, or pptd therefrom with $Ba(OH)_2$

**Tanning and cleaning agents.** RÖHM & HAAS CO Fr 696,327, May 30, 1930 Compds formed by condensing a phenol with an aldehyde in the presence of a small quantity of acid as catalyst are afterward condensed at high temps with an unsatd fatty acid having 10 or more atoms of C, such as oleic acid, and the resin obtained is sulfonated to obtain a product sol in water The products are useful for tanning, cleaning, emulsifying, wetting, mordanting, as penetrating agents for acid coloring materials and as dispersing agents for dyes

**Detanning chrome-tanned leather.** HENKEL & KRAUSE, CHEM FAB G M B H (Erich Krause, inventor) Ger 521,477, Nov 11, 1928 The leather is treated with alk. reacting borates, or with alk reagents in the presence of sol borates The Cr compds are then extd with acid. Examples are given

**Dressing for leather.** E I DU PONT DE NEMOURS & CO Fr 696,523, May 23, 1930 A dressing for leather contains a cellulose deriv such as the nitrate or acetate, a wax, a softening agent, a solvent and a diluent. An example contains cellulose nitrate of high viscosity 1 7, dibutylphthalate 0 8, carnauba wax 1 7, $TiO_2$ 3 3, AcOEt 15 5, AcOBu 10 3 and alc 66 7%. Other examples are given

**Preserving bone material.** BRITISH GLUES & CHEMICALS, LTD., and R B DREW Brit 340,010, Sept 7, 1929 Fresh bones are subdivided as by cutting into shavings, followed by drying, and, before drying, may be extd with a solvent such as water contg NaCl to remove blood, fat-splitting enzymes and other undesirable constituents An app and various details of operation are described

**Transparent gelatin, etc., layers.** GEBRÜDER KLOTZ Ger 516,586, Feb 6, 1926 Transparent foils of gelatin are toughened by coating with transparent rubber

**Working up animal wastes, etc.** GUSTAV HÖNNICKE Ger 516,819, Dec. 28, 1928 The waste is treated with super heated steam to ext sol matter and glue The ext is treated with a pptg agent to ppt the extd matter and the glue, which may be then added to the solid residue remaining after extn

## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

**The plasticizing of rubber.** F. JACOBS *Rev. gén caoutchouc* 8, No. 69, 17–27 (1931), cf *C A.* 25, 1705.—A review and discussion of the properties of gutta resins, various pine products and fatty acids. C. C. DAVIS

**Hard rubber—its main applications.** T. R. DAWSON. *The Times Trade and Eng. Suppl.* 28, No. 664, 18(1931). E. M. SYMMES

Organic rubber colors. F. Harris Cotton *India Rubber J.* 81, 413–4(1931); cf *C. A.* 25, 1117.—A general discussion, with 21 references C. C. Davis

Stretch in rubber transmission belting. C. W. Staacke. *Proc Am. Soc. Testing Materials* 30, Pt II, 944–56(1930).—The expts were made to det the proper inelastic stretch to remove from belting contg a given fabric during the vulcanization process C. C. Davis

A study of the performance characteristics of a 4-inch 4-ply rubber transmission belt. J. E. Skane *Proc Am Soc. Testing Materials* 30, Pt II, 928–43(1930).—The tests were made to det the performance of the belt under varying loads, speeds and slips. C. C. Davis

Substitutes for natural rubber—difficulties of synthetic process. Henry P. Stevens. *The Times Trade and Eng. Suppl* 28, No. 664, 26(1931).—A review E. M. Symmes

Synthetic rubber. Ernst Kleiber *Kunststoffe* 20, 5–6(1930).—A review. B. H.

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Distillation products of polymeric hydrocarbons (Fr. pat. 696,812) 10.

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Rubber. Albert C. Burrage, Jr. Fr. 697,090, June 4, 1930. Oxidation or aging of vulcanized rubber is prevented or reduced by substituted nitrosoamines such as *diphenylnitrosoamine, phenyltolylnitrosoamine, di α naphthylnitrosoamine*, etc.

Porous rubber. K. D. P., Ltd. Ger. 521,307, Mar. 31, 1928. Latex is converted by mech. means into foam, if desired with the aid of a foaming agent, and the foam is vulcanized. Thus, a mixt. of latex, S, ZnO and an accelerator may be agglomerated with $(HCOO)_2Ca$ soln. and the mass beaten to a stable foam after addn. of saponin. The foam is charged into molds and vulcanized.

Rubber latex. I. G. Farbenind. A.-G. Ger. 519,483, Nov. 12, 1926. Salts of true sulfonic acids having good wetting properties are used as preservatives for rubber latex, alone or with other preservatives. The salts may be used also as assistants in the *impregnation of fabrics, cork, paper, etc.*, with latex. Examples are given.

Coagulating latex. Metallges. A.-G. Fr. 695,786, May 17, 1930. Latex is coagulated by adding substances which do not on addn., have a thickening or coagulating action, but which on a change of phys. conditions such as change of temp. introduce substances which have a coagulating action in an amt. sufficient for the coagulation of the latex. A complex salt which gives a coagulating ion on dissocn. by heat, a salt which dissoc. on heating to give an acid, or a coagulant protected by a layer of inert adsorption substance which is removed by heat may be used.

Rubber inner tubes from latex. Edwin B. Newton (to American Anode, Inc.). U. S. 1,797,240, March 24. Various details are described of uniting valve pads of masticated rubber to wet coagulated tubes, pressing, drying and vulcanizing.

Electrodeposition of rubber, etc. The Anode Rubber Co. Ger. 520,323, April 30, 1926. See Brit. 253,085 (*C. A.* 21, 2438).

Preserving rubber. Marion C. Reed (to B. F. Goodrich Co.). U. S. 1,797,241, March 24. An addn. product of an aromatic nitro compd. such as dinitrochlorobenzene with a secondary aromatic amine such as phenyl β naphthylamine is added to rubber compns. as a preservative (suitably in the proportion of about 0.5%). Various other examples are given also. Cf. *C. A.* 25, 2331.

Rubber preservation against aging. P. C. Jones (to B. F. Goodrich Co.). Brit. 339,834, Jan. 21, 1929. Aging is retarded by adding tetrasubstituted hydrazines (several of which are mentioned as suitable) to latex, to rubber before vulcanization or to the surface of rubber after vulcanization. Some description of the manuf. of these preservative substances also is given. Cf. *C. A.* 25, 617.

Rubber dispersion. Waldo L. Semon and Richard A. Crawford (to B. F. Goodrich Co.). U. S. 1,797,243, March 24. A mixt. of rubber 100, benzene 10–100, glue 1 and casein 1 part is masticated while slowly adding an aq. soln. of K oleate until the rubber constitutes the dispersed phase of the batch. The product is suitable for use as a cementing medium. Cf. *C. A.* 24, 2918.

Filtering apparatus suitable for filtering rubber dispersions. Andrew Szegvari and Charles M. Spencer (to American Anode Inc.). U. S. 1,797,248, March 24. Structural features of an app. having a filtering material such as a textile fabric strip.

Apparatus for making spongy articles from organic dispersions. The Dunlop Rubber Co., Ltd., and The Anode Rubber Co., Ltd. Fr. 696,176, May 27, 1930.

Coloring rubber, etc. I. G. Farbenind. A.-G. (Arwin Ranft, inventor). Ger. 506,207, Nov. 14, 1924. Addn. to 462,221. Natural or synthetic rubber, gutta percha

or balata is colored with water insol vat, sulfur or azo dyes or lakes by incorporating in the rubber, etc., an aq soln of the leuco compd or other sol. modification of the dye, or an aq soln of the dye or lake components, and then converting the leuco compd., etc., into the insol dye or lake in known manner Examples are given Cf. *C. A.* 25, 2021, 2331

**Light rubber board.** Dunlop Rubber Co., Ltd., and E. W. Madge Brit. 340,024, Sept 19, 1929 Light rubber board suitable for use in airplane and speedboat construction comprises one or more porous layers of hard rubber (obtained from aq dispersions) sepg 2 or more layers of metal, ebonite, ebonite-coated metal, fabric-reënforced ebonite or ebonite-impregnated fabric or "doped fabric" or plywood The aq dispersions used may contain rubber, gutta-percha, balata and similar vegetable resins, natural or artificial, vulcanized or unvulcanized, etc Various details of manuf are described

**Forming rubber tubes suitable for use as tire inner tubes.** Ernest Hopkinson and Willis A Gibbons (to Morgan & Wright) U S 1,797,580, March 24 An aq dispersion of rubber is placed in contact with a surface of a tubular form of fibrous material such as woven fabric and fluid from the dispersion is withdrawn through the form to deposit solids from the dispersion in tubular shape on the form, the thickness of the deposit adjacent to its ends is gradually reduced to form skived ends, the deposit is dried and removed, and its skived ends are united App is described, as are also various compns used

**Rubber threads.** Dunlop Rubber Co., Ltd., W G Gorham and E A Murphy Brit 339,676, Sept 13, 1929 Threads are made by cutting an unvulcanized sheet which may be produced directly from latex, and vulcanization is then effected (after skeining, if desired) The sheets may be made, from a dispersion prepd as described in Brit 290,313 (*C A* 23, 1012), by the method described in Brit. 302,201 (*C A* 23, 4375)

**Stiffening and impregnating fibrous materials such as "shoe socks."** Dunlop Rubber Co., Ltd., D F Twiss and E. A Murphy Brit 339,974, June 18, 1929 Shaped cellulosic or other fibrous products such as shoe socks are treated with the foam obtained by whipping up aq dispersions such as those of rubber which may be prepd as described in Brit 332,525 and Brit. 332,526 (*C A* 25, 437), and the treated material is cured and dried or subjected to a setting treatment as described in Brit 303,544 (*C A* 23, 4596) The material may be preliminarily stiffened, waterproofed and coated with acid latex.

**Rubber impregnation of ropes, cords, etc.** D. P. Frost and British Ropes, Ltd. Brit 340,051, Oct 3, 1929. Some of the yarns to be formed into a strand are treated with an aq rubber dispersion in such quantity that when the treated yarns, together with untreated yarns, are formed into a strand, the strand will have the desired degree of impregnation Various details of procedure are described

**Apparatus for manufacture of cords or strings of rubber-impregnated materials, etc.** Reginald Truesdale, Robert C. Smith and Edward Simpson (to Dunlop Rubber Co., Ltd.) U S 1,797,249, March 24 Structural features

**Putting rubber tags on laces.** A Schoeler Brit 340,173, Feb 27, 1930 A mixt of coned latex and S is applied at the end of a hollow lace, which is pressed into a needle form in a heated mold (the mixt being transformed into soft rubber) To accelerate vulcanization, a metal salt or oxide in alk. soln may be added, with other materials such as tannin, phenol, lampblack, ocher, etc. Various modifications of the procedure also are described

**Pencil erasers.** Établissements P. Orange et Cie. Fr. 695,288, May 7, 1930. A rubber suitable for removing pencil marks, etc., contains starchy materials, a suitable compn being natural rubber 4, starchy substances 10, petrolatum 4, vulcanized waste 2, abrasives 2, factice 1, lithopone 3, S 0.1 and accelerators 0 05 part. The mixt. may be vulcanized or not.

**Polymerizing butadiene hydrocarbons.** I. G Farbenind. A.-G. Fr. 695,299, May 8, 1930 The polymerization of butadiene hydrocarbons using alkali or alk. earth metals is carried out in the presence of small quantities of unsatd. ethers such as vinyl ethyl, vinyl butyl, allyl ethyl or propargyl ethyl ether. Several examples are given Cf *C A*. 25, 1412

**Polymerizing diolefins.** I G. Farbenind A -G. Fr. 695,441, May 12, 1930. In the polymerization of diolefins by alkali or alk. earth metals, the reaction is carried out in the presence of org compds contg an atom of C, 2 valencies at least of which are satd with O Acetals, especially cyclic acetals and among them those contg a double bond, are particularly advantageous. Several examples are given.

Diolefin polymerization products. I G Farbenind A.-G (Georg Ebert and Friedrich A Jones inventors) Ger. 420,104, Jan 26, 1929 The polymerization of butadiene and other diolefins by means of alkali or alk. earth metals is improved and accelerated by addn. of a small quantity of a cyclic ether, *e. g.*, dioxane The products may be made into filaments or films, which may be hardened by heat or by vulcanization The vulcanized products resemble *soft rubber* Examples are given.

Artificial rubber-like masses. I G Farbenind A.-G Fr. 635,300, May 8, 1928 Polyvinyl alcs are condensed with aldehydes in the presence of catalysts such as $AlCl_3$, $ZnCl_2$ or $NaHSO_4$. The products may be vulcanized to hard substances resembling ebonite

Synthetic rubber. I G Farbenind A.-G Fr. 635,745, May 16, 1928 Masses resembling mixed rubber are made by taking polymerizates, finished or unfinished, of diolefin hydrocarbons and continuing their polymerization with one or more analogous or homologous diolefin hydrocarbons under the same or modified conditions Examples are given.

Synthetic rubber. I. G Farbenind A.-G Fr. 636,149, May 27, 1928 Diolefins are polymerized in the presence of alkali or alk. earth metals, their mixts. or alloys in the form of particles of uniform size.

Synthetic rubber. I G Farbenind A.-G Brit. 340,008, Aug 19, 1929 Polymerization of diolefins with alkali or alk. earth metals is effected in the presence of an org. compd. contg. a C atom with at least 2 valencies satisfied by O, such as satd. and unsatd. acyclic or, preferably, cyclic acetals, or the components of such acetals, *e. g.*, dibutyl acetal, ethylene acetal or other acetals from 1,2- and 1,3-glycols with aldehydes, unsatd. acetals such as those from crotonaldehyde or acrolein and butylene glycol. Various aliphatic, aromatic or hydroaromatic ketones also may be added, as may aldehydes, esters, small quantities of acids such as HOAc or formic acid, etc., and either tough or soft and plastic products can be obtained by varying the proportions of the added substances. The products are *suitable for vulcanizing or for the manuf. of coatings, films, lacquers, artificial silk*, etc. Numerous details and modifications of procedure are described.

Synthetic rubber, etc. I. G Farbenind A.-G Brit. 340,004, Aug 12, 1929 Unsatd. org. compds. such as acrylic, linolenic, ricinoleic and other long-chain acids or their derivs. such as their esters and their mixts. (*e. g.*, crude linseed oil), unsatd. aliphatic hydrocarbons with more than one double linkage such as butadiene, isoprene or other diolefins or their mixts., or unsatd. aromatic compds. such as styrene are polymerized in the presence of heavy metal carbonyls such as those of Fe, Ni, Co Mo, W or Cr Numerous details and modifications of procedure are described.

Storing unvulcanized rubber sheets. P Beebe (to Goodyear Tire & Rubber Co.). Brit. 339,730, Feb 26, 1929 Adhesion of the sheets is prevented by interposing between their surfaces a non-adhesive liner comprising fabric which has been treated with soap soln. (suitably soap prepd. from coconut oil)

Transparent vulcanized rubber. Douglas F Twiss and Edward A. Murphy (to Dunlop Rubber Co., Ltd.) U. S. 1,707,250, March 24. Deposits or products are formed directly from a mixt. of rubber latex, S and an ultra-accelerator such as Zn pipendine carbothionolate without use of ZnO, and vulcanized.

Rubber vulcanization accelerators. Dunlop Rubber Co., Ltd., D F. Twiss and F A. Jones. Brit. 340,083, Nov. 1, 1929 Accelerators are prepd. by the interaction of halogen derivs. of $C_6H_6$ or its homologs with dithiocarbamates. An example is given involving the use of pipendine pipendine 1-carbothionolate and 4-chloro-1,3-dinitrobenzene, and other suitable starting materials also include Zn diethyldithiocarbamate, diethylammonium diethyldithiocarbamate and picryl chloride. Various details of procedure are described.

Rubber vulcanization. Deutsche Hydrierwerke A.-G Brit. 339,826, Jan. 8, 1929 Vulcanization is accelerated by the addn. of esters of cyclic alcs. such as the bornyl ester of adipic acid, cyclohexyl esters of hydrophthalic acid, and cyclohexyl ester of benzoic acid.

Vulcanizing synthetic rubber. I. G. Farbenind. A.-G. Fr. 635,269, May 7, 1928 See Brit. 335,970 (*C. A.* 25, 2022).

# CHEMICAL ABSTRACTS

Vol. 25. JUNE 20, 1931 No. 12

## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Two laboratory devices. M. TROMBE. *Bull. soc. chim.* [4], 49, 185-6(1931).—In a modification of the ordinary coil gas-washing *bottle* the upward movement of the bubbles is utilized for producing a continuous circulation of the washing medium through the 2 limbs of the app. An open vessel of any size can be used for holding the washing medium. In an app. (of glass) for producing hydraulically a high-pressure *air blast* the water level, which dets. the air pressure, is automatically maintained for any set water pressure by means of a float valve. Sketches are included. W. A. LA LANDE, JR.

Laboratory apparatus for tube distillation. HUGO BURSTIN AND JOSEF WENZLER. *Chem.-Ztg.* 55, 212(1931).—*This is an illustrated description of a continuous vacuum* distn. outfit of cast iron, Cr-Ni steel or other metal which was originally designed for crude-oil distn. but which can be used for soap, naphtha, sulfonic acid, etc. The basic principle of the app. is that the liquid *to be distd. is led in a uniform stream through* the heating zone and from there is immediately brought to a dephlegmator filled with filter rings and to a condenser. Since the heating surface and the vaporization space are very large compared with the amt. of heated liquid, a continued heating of the liquid is avoided. M. McMARON

Laboratory oven for carrying out chemical reactions. E. BERL AND K. WINNACHER. *Chem. Fabrik* 1931, 194.—*A Cu block oven* is described in which about 95% of the inner space is held const. to ±2°. J. H. MOORE

Liquid filters for the preparation of artificial sunlight. R. LUTHER. *Z. wiss. Phot., Schaum-Festschr.* 29, 234-8(1930); cf. *C. A.* 25, 1450. E. J. C.

Use of filter pencils. E. SCHWARZ VON BERGKAMPF. *Mikrochem., Emich Festschr.* 1930, 268-74.—Filter pencils made of tightly rolled ashless filter paper placed in a glass tube serve for the sepn. of ppts. such as silica which have to be further treated after ignition. B. C. A.

A buret for titration with solutions affected by air. PETER DICKENS. *Chem. Fabrik* 1931, 185.—The buret is fused *into the stopper of the stock bottle* and is so connected that it is filled by pressure from a cylinder of H or N. J. H. MOORE

A simple extraction apparatus. ARTHUR G. MULLIGAN. *J. Soc. Chem. Ind.* 50, 144T(1931).—The app. used for the extn. of rubber with $(CH_3)_2CO$, consisting of a siphon extn. tube suspended in the wide neck of the boiling flask, is improved by inserting between the flask and cooler a tube filled with small glass beads to heat the condensate to the b. p. before it drops into the extn. tube. J. H. MOORE

An apparatus for extracting liquids with solvents *of higher specific gravity*. P. H. PRAUSNITZ. *Chem. Fabrik* 1931, 193-4.—The usual form of the extn. vessel is modified by putting in the bottom a glass filter plate *through which* compressed air, or other gas, is blown to mix the liquid and solvent, thus hastening the extn. Some results and a few references are given. J. H. MOORE

Cooling apparatus. JUAN HALLER. *Chem. Ztg.* 55, 267-8(1931).—The app. is for quickly cooling and holding small quantities of liquid at any temp. down to −15°. *It depends upon the evapn. of* $CS_2$ *by* bubbling a current of air. If the liquid container is replaced by a coil, gas currents may be cooled. J. H. MOORE

An automatic balance. F. J. VERMEYER, C. H. HOFMANN AND C. V. GIVAN. *Science* 73, 424-6(1931).—A description is given of a device operating on the displacement principle in which the usual difficulties encountered *in* such app. are overcome. a sensitivity of 0.02 g. at a load of 3 kg. is given. If it is attached to a 200-g. balance an accuracy of less than 0.005 g. is possible. J. H. MOORE

Microbalance with proportional swings and damped oscillations. J. DONAU. *Mikrochem., Emich Festschr.* 1930, 39-42; cf. *C. A.* 25, 1121.—The balance may be adjusted *to give a movement of 1* division per 0.05 mg. and may be loaded up to 500 mg. B. C. A.

**A device for producing a slow constant flow of liquid.** R. J. DAVIES. *J. Sci. Instruments* 8, 110–1(1931).—The liquid is forced out of the container by displacement with Hg, the flow of which is regulated by passing it through a system of capillary tubes A steady flow of 25–150 cc per day may be obtained J. H. MOORE

**The construction of some new acid pumps.** H. WINKELMANN *Chem Fabrik* 1931, 195–6.—Two pumps are described, 1 based on the "2 liquid" principle in which the working parts are protected by an "oil cushion" on the acid, so arranged that there is no mixing of oil and acid J. H. MOORE

**Improved apparatus of Engler-Heusler.** JAROSLAV FORMÁNEK. *Chem. Obzor* 6, 36–7(37 English)(1931).—The stopper with a small metallic drum is replaced by a simple cork with a larger bore for a small burner, it also contains 6 bores for the air A small hollow glass burner, fitted on an Erlenmeyer flask, is used A moderate air current is blown into the inside tube of the burner, thus makes the min gasoline flame larger By this arrangement 6-g gasoline can be burned in 1 hr The small delivery tube is ground into the adsorption cylinder and drawn out at the mouth into an opening 2 mm in diam The opening is provided on the sides with 4 bores approx 1.5 mm. in diam, and thus a better distribution of the combustion products, collected in the adsorption vessel, is obtained J. KUČERA

**Spray driers.** O. ZAHN *Chem.-Ztg* 54, 973–5(1930).—Patents covering driers of this type are reviewed The essential points in design are the atomization of the liquid and the course of the hot air current In the author's "Ravo-Rapid" system the drying chamber is a vertical cylinder The liquid is allowed to fall centrally onto a rapidly rotating disk, while the main air feed rises in an ascending spiral and thus passes transversely across the course of the droplets Subsidiary air feeds assist the atomization, and the dried powder is collected at the bottom of the chamber. It is claimed to yield a very uniform product and to have a high thermal efficiency. B. C. A.

**Ionization manometer for small pressures.** RUDOLF SEWIG. *Z. tech. Physik* 12, 218–21(1931).—The app is described in detail Curves are given showing its adaptability to pressures from 0.01 to 0.0001 mm Hg WILLIAM F. VALGHAN

**The thermometer and its production.** H. FISCHER *Uhrmacherkunst* 1929, Nos 7, 8, 9, *J. Soc. Glass Tech* 14, 41–2A.—The evolution of the thermometer is traced from Galileo's "thermoscope" (1593) to the first Hg filled thermometer of Fahrenheit (1714) Methods of making modern thermometers are described, the requirements for the glass and for the filling liquid are discussed, calibration is described, and constructional details of the various types of thermometer are given E. H.

**Theory, design and construction of sensitive vacuum thermopiles.** C. H. CARTWRIGHT *Rev. Sci. Instruments* 1, 592–604(1930) E. H.

**Impervious tubes of pure alumina.** F. ADCOCK AND D. TURNER. *J. Sci. Instruments* 7, 327(1930).—Tubes are made by extrusion through dies and fired at about 1900° in a C resistance furnace, being supported by packing with powdered alumina They are then glazed by careful heating with an oxyhydrogen flame and are practically impervious to gases at the ordinary temp B. C. A.

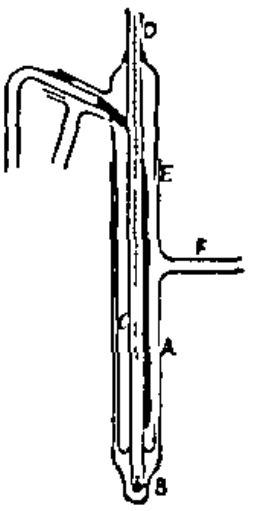
**Sublimation apparatus using sintered glass.** A. SOLTYS. *Mikrochem., Emich Festschr.* 1930, 275–9.—An app is described wherein satn of the current of air by the vapor of the subliming substance is ensured by spreading the material on a plate of sintered glass, the max sublimation velocity at any given temp is thus obtained The plate is fused into a glass tube, which is fitted at the lower end with a water-cooled tube for condensing the vapor and at the upper end with a capillary for the admission of the air current B. C. A.

**A strongly lighted fluorescence microscope.** MAX HAITINGER. *Mikrochemie* [N. S.] 3, 220–3(1931).—In the search for a suitable source of ultra-violet rays, iron proved to be the most practical metal to use for the electrodes, improvements in the design were made whereby a steady light, free from flickering, could be obtained The lamp finally designed uses about 5 amp of current and by means of it good illumination and great detail is obtained under the microscope. The app of improved design can be obtained from C. Reichert of Vienna W. T. H.

**New photoelectric recording microphotometer.** J. A. CARROLL AND E. B. MOSS. *Monthly Not. Roy. Astron. Soc.* 91, 191(1930).—This is a detailed description with diagrams and photographs of a new recording microphotometer patterned after the Dobson-Skinner instrument and designed for studying photographs of stellar and solar spectrum lines and for measuring extended objects, as *e. g.*, nebulae and the corona J. W. MCFARLANE

**Fractional macro- and microsublimation at ordinary and at reduced pressures.** G. ILLARI *Ann. chim. applicata* 21, 127–36(1931).—Sublimation, although having

several advantages over distn and crystn , has not been developed to the same extent owing to the lack of suitable app After defining the *initial temp of sublimation* as that temp at which the first sublimate is observed, for a given pressure, I. describes the app shown for detg this temp *A* is a tube provided with a well *B*, in which the material is placed, and a side arm *F*, which may be connected to a suction pump Inside is the condenser *C*, which passes through the ground glass joint at *E* and is provided with the thermometer *D*, which passes right through so as to be imbedded in the material at *B* The material is heated at such a rate as to raise the temp 1° per min until the first sublimate is observed In this way the *initial temp of sublimation* of the following were detd at 760 and at 7 mm anthracene 98°, 50°, naphthalene 50°, 22°, benzoic acid 82°, 27° cinnamic acid 95°, 42–4°, α-naphthol 67°, 26°, β naphthol 78°, 27–8°, camphor 40°, 20°, caffeine 113°, 48°, theobromine 175°, 87 90° Detns were also made at intermediate points for some of the above compds and the curves plotted Results show that the rate of rise of the *initial temp* is most rapid between 0 7 to 100 mm , and then increases more slowly By modifying the app , so that it is shaped like a U and provided with condensers with ground glass joints at the bases of the U, a mixt. of 2 compds. can be *fractionally* sublimed by opening only one of the condenser arms, till 1 component has sublimed and then opening the other to condense the second component A W CONTIERI




A simple thermostat for 20°, with temperature regulation independent of room temperature. V. ČUPR. *Z Elektrochem* 37, 129–30(1931) —There is a continuous flow of cool water (cooled with ice if necessary) through the thermostat, this eliminates the necessity for stirring The water is heated before it enters the bath by an elec. heater which operates intermittently when the circuit is closed by the thermoregulator and relay system. An EtOH-Hg regulator is used, with a Hg relay The regulation interval is said to be 0 02° CHANNING WILSON

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Porous masses from gypsum [for filter stones, etc.] (Ger. pat 522,139) 18.

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Oil filters. SOC. ANON. DES ÉTABLISSEMENTS TÉCALÉMIT. Fr. 697,949, Sept. 27, 1929.

Filter presses. WM. H. YATES and JAMES A. BLACK. Fr. 697,314, June 13, 1930.

Endless sifting or filtering band. FRIED. KRUPP GRUSONWERK A.-G. Ger. 522,165, Sept. 26, 1928.

Filter system for laundry apparatus. GEORGE W. DUNHAM (to Whirldry Corp ). U. S. 1,798,730, March 31. Structural features.

Apparatus for the continuous separation of liquids of different specific gravities. AKTIEBOLAGET SEPARATOR Fr. 697,837, June 24, 1930.

Apparatus for determining the velocity of separation of small particles suspended in liquids. KARL T R. LUNDGREN. Ger. 516,720, June 9, 1928.

Rectification system for separating constituents of gaseous mixtures such as those of air. CLAUDE C VAN NUYS and JOSEPH L. SCHLITT (to Air Reduction Co ). U. S. 1,799,937, April 7. Various details of app and operation are described. Cf. *C. A.* **24**, 4963.

Device for removing dust from air by centrifugal action. CHARLES A. WINSLOW and ELBERT J. HALL. U. S 1,798,510, March 31. Structural features.

Electromagnetic separator for separating magnetic from non-magnetic material. UKRAINSKOE AKTZIONERNOE OBSHCHESTVO PO PATENTAM I REALIZATZII ISOBRETENII UAKORIZ Russ 14,436, Mar. 31, 1930 An app for concg. ores or separating copper shavings from iron and cast-iron shavings is described.

Modification of an electromagnetic separator. S. V. SAMBUROV. Russ. 19,186, Feb. 28, 1931. Addn. to Russ. 14,436 (preceding abstract).

Colorimeter. WM. L. PATTERSON (to Bausch & Lomb Optical Co ). U. S. 1,799,639, April 7.

Syringe hydrometers. LEO EDELMANN (to E. Edelmann & Co ). U. S. 1,800,138–9, April 7. Structural features

Membrane decanting siphon. OSCAR PETERS. U. S. 1,799,023, March 31. Structural features

Dehydrating agent suitable for use in desiccators. GEORGE F. SMITH. U. S.

1,798,175, March 31 A granular dehydrating material comprises $Mg(ClO_3)_2$ and $Ba(ClO_3)_2$

Drying apparatus. V. N Antonov Russ. 19,536, Feb 28, 1931

Tubular drying apparatus. I G Farbenind A.-G Ger. 522,460, Mar. 7, 1928. Details of the air blast supply are described

Canal or chamber driers. Möller & Pfeifer. Ger. 516,837, Mar. 4, 1928. Details of loading are given

Drying drum. Eduard Seyffert Ger 522,140, Aug 30, 1928. Details of the discharging means are described

Rotary drying drum for casein, etc. Eduard Seyffert Ger 522,142 and 522,143, May 11, 1930

Oven for drying and burning sea weeds. N A Zemlyanitzin and I I. Mikhailovskii. Russ. 19 533, Feb 28, 1931 Mechanical details.

Drier for beets, etc. I. G Zlobinskii. Russ. 19,535, Feb. 28, 1931. Constructional details

Concentrating or evaporating apparatus. Émile Depasse. Fr 698,742, Oct. 14, 1929

Apparatus for continuous evaporation or distillation under vacuum. Ottorino Angelucci Fr 698,376, July 4, 1930

*Evaporating milk or other liquids in multiple-effect evaporators with superposed flash chambers.* David D Peebles. U. S 1,799,478, April 7. Various details of app and operation are described

Apparatus for the wet purifying and absorbing of gases. The Bartlett Hayward Co Ger. 516,990, Dec 11, 1928 App for spraying the gas with various liquids in various chambers is described

Hollow metal container for holding gases under high pressure. Sydney B N Hill (one-half to Chesterfield Tube Co., Ltd) U S. 1,798,535, March 31. Structural features.

*Apparatus for proportionate mixing of gases such as gas and air for burners.* Rosswell W. Thomas (to Phillips Petroleum Co) U S 1,798,232, March 31 Various structural details are described

Gas washer with spray nozzles. Frederick H. Wagner (to Bartlett Hayward Co) U S. 1,798,822, March 31. Structural features

Apparatus for washing smoke in a stack. John Brdar. U. S. 1,799,084, March 31 Structural features.

Tower for effecting contact between gases and solid materials as in purifying fuel gas. Charles Cooper (to W. C. Holmes & Co., Ltd) U S. 1,798,307, March 31

Tower for effecting contact between liquids and gases as in washing fuel gases. Sven G Styrud (to Koppers Co) U. S. 1,798,563, March 31

Device for mixing fluids such as steam and water in streams flowing together past a baffle. Elving O Nelson (one-third each to Leslie R. Johnson and Charles N. Morrison) U S. 1,798,336, March 31. Structural features.

Modification of a cylindrical container for drawing samples of liquids. S. V Beletinskii Russ. 19,373, Feb 28, 1931. Addn. to Russ. 1855. Structural details.

Emulsifying device suitable for use with pipe or hose lines. Fred E. LeBaron. U. S. 1,799,051, March 31 Structural features.

Apparatus for charging water or other liquids with carbon dioxide. Max A. Guggenbühl. U S. 1,799,295, April 7. Structural features.

Apparatus for carbonating solutions (such as alkaline brines for obtaining sodium bicarbonate). Heinz H Chesny U. S. 1,799,354, April 7 Structural features.

Pressure regulator. Roy E. Joyce U. S. 1,798,377, March 31 Structural details.

High-speed beating mill. Erwin Kramer (to the firm Hartstoff-Metall A.-G) U S. 1,798,886, March 31. Structural features.

Apparatus for treating materials with hydrogen under high temperature and pressure. Deutsche Bergin A.-G für Kohle- und Erdölchemie (Wolfgang Grote and Julius Schierenbec, inventors) Ger 516,993, Nov 8, 1927 The high-pressure vessel and tubes are made of C Fe coated with Be.

Apparatus for liquefying chlorine. Krebs & Co G m b. H. Fr 698,443, July 5, 1930

Apparatus for the decomposition of water. Louis Pomé and Michel Dumas. Fr. 698 113, June 27, 1930 An app is described consisting of 2 vessels one inside the other, the inner vessel contg catalytic materials composed of thin layers of Al alloyed with Sn or Zn and $FeCO_3$ combined with $CaH_2$ for splitting water into H and O

Digesting or extracting plant. JENS W A ELLING Fr 697,406, June 6, 1930. A plant for digesting extg or washing materials is described in which the material is exposed to heat under alternatives of increase and decrease of pressure

Apparatus for washing and flocculating slimes. ANTOINE FRANCE Fr 698,463, July 7, 1930

Apparatus for measuring the opacity of translucent sheets. BROOKS I. HILL. U S 1,798,203, March 31 Various mech , optical and elec features are described

Apparatus for casting various articles from plastic or liquid masses. JENS J. JENSEN (to Boggild & Jacobsen) U S 1,798,326, March 31 Mech features

Photoelectric cells. SOC. DES LAMPES FOTOS (Georges L C L. Déjardin and Maurice P Warin, inventors) Fr 697,330, June 13, 1930 The cathode of a photo-elec cell is composed of a heavy deposit of K covered with a thin layer of Cs It may be sensitized by a luminous discharge in H

Photoelectric cells. SOC DES LAMPES FOTOS (Georges L. C L Déjardin, inventor) Fr 697 331 June 13 1930 In a photoelec cell the K is deposited in a very thin layer on a layer of superficially oxidized Mg

Photoelectric cells. VEREINIGTE GLÜHLAMPEN UND ELECTRICITÄTS A -G Austrian 121,656, Oct 15, 1930 Manipulative details of the manuf are described

X-ray apparatus for examining crystalline substances. N V PHILIPS' GLOEILAMPENFABRIEKEN Fr 697,731, June 20, 1930

Ultra-violet lamp. PALMER H CRAIG U S. 1,798,658, March 31

Producing vacuums in devices such as radio tubes or valves. HUGH S COOPER (to Kemet Laboratories Co ) U S 1 800,131 April 7 For 'cleaning up' gases, there is introduced into the envelope a pellet of powd alloy comprising Mg with 5–30% of an alk. earth metal, followed by evacuating and flashing

Acetylene generator. MESSER & Co G M B H. Ger 516,907, Dec. 3, 1929. The app is designed for $CaC_2$ dust, which falls from a hopper onto a revolving plate, which sprays it into a second hopper whence it is discharged into mechanically stirred water

Acetylene generator. AUTOGENWERK SIRIUS G M B H Ger 520,552, Feb 6, 1930 Addn to 474,145 (*C A* 23, 2855)

High-pressure acetylene generator. LUDWIG ADLER G M B. H and RICHARD CLEMENS. Ger. 522,492, Jan 16, 1930

Acetylene generator (water-to-carbide type.) WILHELM HAAR & Co Austrian 122,019, Nov. 15, 1930.

Thermostatic valve-control device. GASTON A BRUNELLE and CAMILLE BRUNEEL. U. S 1,799,407, April 7. Structural features.

Thermostatic device for control of electric circuits. LEONARD SATCHWELL. U. S 1,798 854, March 31 Structural features

Thermostatic device suitable for use in rectifying lubricating oil. WALTER B CLIFFORD (to Clifford Mfg Co ) U S 1,798,192, March 31 Structural features.

Thermostatic flue damper regulator. ARTHUR C. MCWILLIAMS U. S 1,798,431, March 31. Structural features

Circular five-chamber furnace. A. S FILLIPOV Russ 19,517, Feb 28, 1931. Constructional details

Rotating furnace. RENÉ P É. ROMAN and THÉODORE LAFITTE Fr. 697,373, April 23, 1930 Improved construction is described

Shaft furnaces. SOC. ANON LE NICKEL Fr. 697,962, Sept. 30, 1929 Means is described for heating the air by heat from the combustion products

Furnace with an adjustable inner fire wall. ALFRED NENDZA Ger. 516,904, Mar 16, 1928

Tunnel furnaces. WOODALL DUCKHAM (1920), LTD , and ARTHUR MCD DUCKHAM Fr 697,639, June 18, 1930

Tunnel muffle kiln. LUDWIG RIEDHAMMER. Ger. 516,858, Jan 20, 1929. The firing box is suspended

Grate furnaces. STOCKHOLMS AKTIEBOLAGET PRIVAT (Iwan Arbatsky, inventor) Fr 697,688-89-90-91, June 19 1930 Means and app for lighting and working the furnaces are described

Inclined grate furnace. ERNST VÖLCKER Ger 516,699, Nov. 4, 1926

A charging and drying shaft for inclined grate furnaces. ERNST VÖLCKER. Ger. 516,849, Nov 7, 1926. The fuel is dried and heated by flue gas Cf *C A*. 24, 3932.

Furnaces using powdered coal. ALLGEMEINE ELEKTRICITÄTS-GES. Fr. 697,836, June 24, 1930

Burner for powdered fuel. JAY G COUTANT Fr 698,697, Oct 8, 1929

Regenerative gas furnaces. HERMANN MOLL. Fr 697,749, June 21, 1930

Low-temperature gas burner. FRANKLIN C. CARTER U. S. 1,798,785, March 31.

Burner for liquid fuel. MAX COBLITZ. Fr. 698,077, June 26, 1930

Rotary-plate device for supplying fuel to furnaces, etc. KARL BESTA. Ger. 522,458, July 13, 1929

*Method of rapid charging of furnaces.* HENRI GARREAU. Fr. 698,692, Oct. 7, 1929.

Apparatus for leading heated air to furnaces by tubes located over the fire chamber. SVERRE G SYVERSEN Ger. 516,905, Feb 5, 1928

Rotary annular tray furnace for continuous heat treatment of pulverulent materials such as fuel subjected to low-temperature distillation. FRIEDRICH BARTLING U S. 1,798,649, March 31. Structural features

Heating apparatus suitable for retorts, leers, etc. FRANZ PUENING. U. S 1,799,702, April 7. Structural features of an app in which flow of hot gases is periodically reversed

Combined air, water and flue-gas heat interchanger. ALBERT E. LEEK. U. S. 1,798,330, March 31 Structural features.

*Heat-exchange apparatus suitable for use with gases.* ANTHONY CONEJOS. U. S 1,799,039, March 31. Structural features.

Heat-exchange apparatus suitable for use with liquids. PERCY C. KEITH, JR. (to Refinery Engineers, Inc.). U. S 1,799,626, April 7. Structural features.

Heat-exchange apparatus suitable for use as a reboiling element for fractionating towers. WALTER M CROSS (to Gasoline Products Co ). U. S. 1,799,734, April 7. Structural features.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

*Henry Gall.* LÉON GUILLET *Rev. métal* 28, 183–4(1931).—Biography with portrait. E. H

Emil Warburg's 85th birthday. EDGAR MEYER. *Naturwissenschaften* 19, 241 (1931). B J. C. VAN DER HOEVEN

M. W. Beijerinck, 1851-1931. A. J. KLUIJVER. *Nederland. Tijdschr. Hyg., Microbiol en Serol* 4, 173–81(1931).—An obituary with portrait. J C. JURRJENS

Anne Wilhelm van der Haar. D H. WESTER. *Chem. Weekblad* 28, 272–5 (1931).—Obituary with portrait and list of publications. G. G

Dr. Willy Herzberg. PAUL RÖDERS. *Chem.-Ztg* 55, 317(1931).—Obituary. E H.

Jacobus Henricus van't Hoff. Memorial address on the twentieth anniversary of his death. E. ABEL. *Oesterr Chem.-Ztg* 34, 54–6(1931). Personal recollections of van't Hoff. D BADER. *Ibid* 56–9 E H

Josef Schneider, 1864-1931. JAROSLAV SCHNEIDER. *Chem Obzor* 6, 33–6(1931).—Obituary with a portrait. JAROSLAV KUČERA

*F. W. Semmler.* H BECKER ROSE *Z. angew Chem.* 44, 301–2(1931) —Obituary E H.

Reform of the chemical nomenclature. XI. G SIBONI. *Boll chim. farm.* 69, 891–4, 897–900(1930) XII. *Ibid* 70, 49–58(1931) XIII. *Ibid* 89–90 XIV. *Ibid* 139–40, cf *C A* 25, 240 G SCHWOCH

Should chemistry be taught by the deductive method followed by the empirical-deductive method? W H VAN MELS. *Chem Weekblad* 28, 260–2(1931) G G

The achievements of Josef Jan Frič in polarimetry. K. V. ZIELECKI. *Listy Cukrovar* 49, 353–4(1931) —A review of the contributions of Frič to the construction of polarimeters. FRANZ MARESH

*The distribution of ozone in the atmosphere.* D. CHALONGE AND E. DUBOIS. *Compt rend* 192, 808–10(1931) —It was previously concluded that the $O_3$ of the atmosphere is concd. in a relatively thin layer at a high altitude The present photographic and theoretical study of the solar spectrum, however, indicates that the distribution of $O_3$ in the atmosphere is more complex, and that appreciable quantities of it exist at relatively low altitudes R. H LOMBARD

Thermal energy of water in the Arctic regions. H. BARJOT *Trans. 2nd World Power Conference, Berlin* 16, 3–15(1930). E J. C.

The experimental basis of the international temperature scale in the low-temperature range. W. H. KERSOM. *Z. ges Kälte-Ind* 38, 20–1(1931); cf *C. A.* 24, 2341–2 —

eply to Henning (*C A* 24, 5592) The latter's report causes no change in the standint of the Leyden Inst., which considers the international temp scale to be reproduce to ±0.02° A comparison of more thermometers of various makes is necessary, nd such an international comparison is in process Until the results of this work ecome known, the Leyden Inst will continue to employ the approved method of making a direct calibration of the Pt thermometer used with the gas thermometer F D Rossini

**A physicochemical study of some organic compounds solid at ordinary temperatures, proposed as temperature standards.** F Burriel. *Anales soc espan fis quim* 29, 89–125(1931) —For the prepn of the International Pharmacopeia a set of thermometric standards melting or boiling from ordinary temp to 350° was desired The substances chosen were fractionally crystd, the d was detd by Jena-glass dilatometer and viscosity and superficial tension were detd first by the Poiseuille method, then by capillary rise, both with the same app Heat of combustion was detd by the Bureau des Talons method The substances chosen were salol m 41.68°, benzophenone m 47.85°, b 305.9°, naphthalene m 80.06°, b 217.96°, benzoic acid m 122.45°, b 250.0°, phthalic anhydride m 131.60, b 285.0°, mannitol m 166.00, anthracene m 216.0, b 339.9°, carbazole m 240.3, anthraquinone m 284.8 b 376.8 I. M Symmes

**Application of a squared diagram to the representation and calculation of equilibrium in a gas-liquid reaction.** Pierre Montagne *Compt rend* 192, 677–9(1931) — In reactions of the type, $CO + H_2O = CO_2 + H_2$, the use of a squared diagram permits rapid calcn of equil concns at different temps Don Brolsp

**The polishing of surfaces.** J M Macaulay. *J Roy Tech Coll* (Glasgow) 2, 378–85(1931) —Various theories regarding the nature of surface polish are discussed Exptl data are shown bearing on the theory that in the process of polishing the surface material is actually raised to its melting temp., giving the liquid like finish to the polished surface When $Pb_3O_4$, $PbO_2$ and $CaCO_3$ are used as polishing powders evidence was found that they become changed to lower oxides, PbO, CaO, etc This is considered as more or less direct evidence of high temp during the polishing process A. L. K.

**Color measurement and spectrometric color determinations.** J. A A Ketelaar. *Chem Weekblad* 28, 132–3(1931) F J. G de Leeuw

**Color measurement and color standards.** M J. Schopn, *Chem Weekblad* 28, 133(1931), cf *C A* 25, 1676 F. J G. de Leeuw

**From the atomic weights of Dalton to the isotopes of Soddy.** L. De Ilosvay. *Természettudományi Közlöny* 63, 193–200(1931) —Historical address S S de F.

**Development and present state of our knowledge of the natural system of the elements.** F. Paneth. *Chem. Rundschau Mitteleuropa u. Balkan* 7, No. 15, 98–100 (1930).—A general review. S S. de Finály

**The atomic weights of nitrogen and silver. I. The ratio of ammonia to silver.** Gregory P. Baxter and Charles H Greene. *J Am. Chem Soc* 53, 604–13(1931) — The ratio $Ag:NH_4$ was detd. as 0.33420 by weighing $NH_4$ adsorbed on dehydrated chabazite in a closed tube, causing a suitable quantity of $NH_4$ to evaporate into dil HCl or HBr and measuring the halogen content nephelometrically By using this ratio and that for $NO_3Ag$ the at wt of N was calcd as 14.0078 and that of Ag 107.879. L. P. Hall

**Molecular and atomic volumes. XXIV. Technical experiences in volume measurements of density at low temperatures.** E. Wünnenberg, Werner Fischer, Adolf Sapper and Wilhelm Biltz. *Z. physik Chem*, Abt. A, 151, 1–12(1930); cf. *C. A.* 24, 2343, 4200 —Practical matters concerning the app., temp., filling gas and handling of the materials previously investigated are discussed. The corrections for compression of the filling gas are given in detail, as well as the absorption of the filling gas by various substances. **XXV. The volume occupied by crystalline organic compounds at low temperatures.** Wilhelm Biltz, Werner Fischer and E. Wünnenberg. *Ibid* 13–55 — The vols. of various typical cryst. org compds., contg H, or both O and H, were detd at temps. down to —195° The results are tabulated according to the principles of additivity, effect of constitution (arrangement of atom and at. groups), and equal vols **XXVI. The molecular volumes of several silver and potassium salts of monobasic aliphatic acids.** W. Fischer and Alfred Lemke *Ibid* 56–64 —The densities of 9Ag and 3K salts of normal monobasic aliphatic acids were detd at room temp and at —78°. The measurements were carried out pycnometrically, with toluene as the enclosing liquid The mol. vols of the salts are discussed in the light of Biltz's space theory. **XXVII. The space requirements of several cellulose derivatives and the gas absorption of acetylcellulose.** E Wünnenberg, W. Fischer and W. Biltz *Ibid* 65–70 —The ds and coeffs of expansion of cellulose, cellulose acetate and cellobiose were measured. Some

data of gas absorption (air and $H_2$) by cellulose acetate are given. Air is absorbed about 3 times as much as $H_2$, obeying Henry's law XXVIII. The molecular volumes of several substituted benzoic acids. Li Klemm and Wilhelm Klemm *Ibid* 71–9 — The mol vols. of methyl, hydroxy, amino-, nitro-, chloro- and bromo-benzoic acids were detd Louis Waldbauer

Electron diffraction and molecular structure. R. Wierl. *Ann Physik* 8, 521–64(1931) —It is shown that if one gives to a fast moving electron a wave length according to de Broglie, then the theoretical treatment of Debye on the x ray diffraction by gases may be applied to *electron* diffraction by gases The diffraction pattern obtained on allowing the electron beam to penetrate the vapor of a gas which is forced from a narrow nozzle into the electron beam at right angles is characteristic of the structure of a *single* mol of the vapor under investigation By allowing the time of exposure of the photographic film to be only a fraction of a sec. the theoretical treatment becomes sufficiently accurate to det the form and the at. distances of the mol and thereby gives to the structures of stereochemistry the clearest proof of their spacial reality The results are as follows

| Molecule | At. distances A | U | At. form |
|---|---|---|---|
| $Br_2$ | Br—Br | 2 28 | |
| $CO_2$ | O—O | 2 26 | linear |
| $CS_2$ | S—S | 3 16 | linear |
| $SO_2$ | S—O | 1 37 | angular ? |
| $N_2O$ | N—N | 2 38 | |
| $CCl_4$ | Cl—Cl | 2 98 | tetrahedral |
| $GeCl_4$ | Cl—Cl | 3 43 | " |
| $SiCl_4$ | Cl—Cl | 3 29 | " |
| $TiCl_4$ | Cl—Cl | 3 61 | " |
| $SnCl_4$ | Cl—Cl | 3 81 | " |
| $CHCl_3$ | Cl—Cl | 3 04 | |
| $CH_2Cl_2$ | Cl—Cl | 3 16 | Angular, C — Cl angle about 110° |
| $CBr_4$ | Br—Br | 3 35 | |
| $BCl_3$ | Cl—Cl | 3 03 | |
| $PCl_3$ | Cl—Cl<br>P—Cl | 3 18<br>2 04 | pyramidal |
| $C_6H_6$ | C—C | 1 39 | all C atoms in a plane |
| $C_6H_{12}$ (cyclohexane) | C—C | 1 51 | angular |
| $C_5H_{10}$ (cyclopentane) | C—C | 1 52 | a plane |
| $C_6H_{14}$<br>$C_4H_{12}$ | C—C | 1 5 | tetrahedral angles |

Malcolm Dole

The effective cross section of argon and hydrogen against electrons of 0 2 to 6 volts. H. Gaertner *Ann Physik* 8, 135–62(1931) —The effective cross section of A was accurately detd for various electron velocities The min cross section occurs at 0 4 v instead of 0 7 v as previously reported by Rusch (*C. A.* 20, 3129). The effective cross section in sq cm per cc of gas at a pressure of one mm of Hg at 0° decreases from 24 at 5 5 v to about 1 at 0 4 v and then rises again to 6 at 0 17 v. The effective cross section of $H_2$ rises slowly from 32 at 6 v to 39 5 at 2 5 v and then decreases to 30 at 0.3 v.

P T. Newsome

Refractivity of a binary mixture and its relation to the molecular size of the components Tetsuya Ishikawa *Anniversary Vol Dedicated to Masumi Chikashige* (Kyoto Imp Univ) 1930, 275–91 —Formulas relating $n$ and the compn of a binary mixt are reviewed and discussed For successive members of a homologous series the equation, $\sigma_2 = \sigma_1 \sqrt[3]{\frac{M_2 v_2}{M_1 v_1}}$, is proposed connecting the mol diam, mol wt and sp vol The mol diam of one component of a binary mixt can be calcd from the refractivity provided that of the other is known The equation is strictly true for MeOH, EtOH and $n$ $C_3H_7OH$ nearly so for iso $C_3H_7OH$ and iso-$C_4H_9OH$, but not true for $n$ $C_4H_9OH$ and $n$- and iso-$C_5H_{11}OH$ This suggests that the addn of the $CH_2$-group to the alc. series above $C_3H_7OH$ is not literally an elongation of the C chain Expts on the refractivity of the alcs with benzene and of the alc pairs are described The values of $\sigma$ obtained are compared with those from the expression of Lorentz Lorenz Allen S Smith

X-ray studies of motions of molecules in dielectrics under electric stress. Ralph

D. BENNETT *J. Franklin Inst.* 211, 481–7(1931) —X ray examn of paraffin solidified under elec. stress indicates that the thin flakes of the hydrocarbon crystal with long chains perpendicular to the face of greatest area orient themselves edgewise to the applied elec field (So that the elec field is perpendicular to the plane of the hydrocarbon chain) MALCOLM DOLE

**A general theory of paramagnetic rotation in crystals.** H A. KRAMERS. *Proc Acad Sci Amsterdam* 33, 959–72(1930), cf *C A* 25, 873 —Math analysis shows that in a doubly refracting crystal of slight anisotropy possessing magnetic rotatory power the introduction of a vector of rotation permits the simple description of properties of a luminous beam of any orientation A consideration of the properties of an atomic system with an odd number of electrons in an external field of purely elec origin shows the energy levels are necessarily doubly degraded The magnetization produced in an atom possessing such a degraded field by a magnetic field of arbitrary direction leads to a paramagnetic rotation in a crystal contg such atoms A P SACHS

**Electrical properties of molecules. II.** A. H W. ATEN *Chem Weekblad* 27, 235–6(1930); cf *C. A* 24, 3143 —Dipole moments of org compds are discussed H S v KLOOSTER

**Magnetic rotatory power of halogen derivatives of saturated hydrocarbons in the gaseous state.** R. DE MALLEMANN AND P GABIANO *Compt rend.* 192, 278–80 (1931), cf *C A* 25, 1418 —The magnetic rotation in the gaseous and liquid states for the 578 mμ Hg line was detd for MeCl, EtCl, MeBr, EtBr, PrCl, iso-PrCl, $CHCl_3$, $CCl_4$ and PrBr The mean values of the at. rotatory powers of H, C, Cl, Br and I are 5 5, 10, 33, 66 and 143 × $10^{-3}$, resp., whereas the values ions are 108, 208 and 450 × $10^{-3}$ for Cl′, Br′ and I′ The rotatory power of the ion therefore is greater than that of the corresponding atom The ratio of the ionic to the at rotatory power is 3.2 F W LAIRD

**The dielectric constant of hydrogen chloride from 85° to 160°K.** RICHARD M CONE, GEORGE H DENISON AND JACOB D KEMP *J Am Chem Soc* 53, 1278–82 (1931) —The dielec const for solid HCl changes isothermally from 3 to 10 at the transition point at 98.4°K This behavior is predicted by Pauling's theory of the free rotation of mol in crystals JOHN R HILL

**The dielectric properties of antimony pentachloride and phosphorus pentachloride.** J H SIMONS AND GILBERT JESSOP *J Am Chem Soc* 53, 1263–6(1931) —This work was done with a view to obtaining information regarding the mol structure of $PCl_5$ and $SbCl_5$ The molar polarizations of $SbCl_5$ and $PCl_5$ were measured in $CCl_4$ solns and the dipole moments concluded to be either zero or very small The dielec. consts. of $SbCl_5$ and $PCl_5$ were measured in both liquid and cryst states The specific cond of $PCl_5$ was measured Various structural theories for $PCl_5$ and $SbCl_5$ previously advanced by other authors are discussed The authors conclude from their own data that these compds have a symmetrical structure with a ten-electron shell for the central atom R. H C

**Magnetism and molecular structure. I.** The magnetic susceptibilities of some inorganic sulfides and electronic isomers. S S BHATNAGAR AND S L. BHATIA *Proc. 15th Indian Sci Congr* 1928, 141, cf *C. A* 23, 4857, 24, 5550 —The magnetic consts were detd (at room temp.) of the yellow and red sulfides of As (solids) and also of their colloidal solns in water A modified Wilson's magnetic balance was used The results (not given) show that realgar ($As_2S_2$) is less diamagnetic than orpiment ($As_2S_3$) both in the solid form and in colloidal solns. These differences can be explained on the basis of atomic structure and the valency theory of Langmuir E J. C.

**Electric moment and molecular structure. III.** Double and triple bonds and polarity in aromatic hydrocarbons. C. P. SMYTH AND R. W. DORNTE. *J. Am. Chem Soc* 53, 1296–304(1931), cf *C A* 25, 2032 —The dielec. consts. and ds of dil solns. of the Ph substituted ethylenes and acetylenes were measured between 10° and 70°. The mol. refractions were also detd and the data used to calc. the elec. moments of the mols The Ph substituted ethylenes have small or zero moments according to their symmetry about the double bond The replacement of H on a doubly-bonded C by a hydrocarbon group gave moments of the same magnitude as those resulting from a similar replacement in $C_2H_4$. The large moment for PhC CH and still larger value for PhC : CPh give evidence of unsymmetrical mols, this is explained in terms of a tautomeric equil. between a symmetrical form and an unsymmetrical contg bivalent C, the shift in equil. with temp causing the temp variation of the moment observed H W. L.

**The magnetic susceptibilities of the polyoxymethylenes and formaldehyde solutions.** W. GOOD *J Roy Tech Coll* (Glasgow) 2, 401–9(1931) —The investigations described were undertaken in the hope that measurement of the magnetic susceptibilities of the polyoxymethylenes and of formaldehyde solns would furnish some information

regarding the *constitution of highly polymerized substances* The values found for the polyoxymethylenes are not in agreement with the theoretical values calcd. from the formulas that have been proposed to represent their constitution They seem to lend support to the view that the polymers consist of small elementary units held together by strong crystal lattice forces The values found for formaldehyde solns. support the view that the hydrates HOCH-OH and HOCH OCH$_2$OCH$_2$OH are in equil in formaldehyde solns A. L. KIBLER

Avogadro's number and "mean free path." SATYENDRA RAY. *Proc 15th Indian Sci Congr* 1928, 141 —Millikan calls the mean free path a "hypothetical" quantity It is shown that this mean free path is not related in any intimate manner with the properties of a gas like vol pressure temp or entropy, if the expression usually accepted for it viz $\lambda = 1/\sqrt{2}\pi N\sigma^2$ is correct Instead the fairly close agreement of Avogadro's no for different atoms means that the size of atoms is very nearly identical and that perhaps $\lambda = \sqrt[3]{3} - \sigma$ is a more nearly correct expression for the mean free path than the one usually accepted which makes the value of $\lambda$ infinite when the size of particle is infinitely small L. J. C.

Viscosity, heat conduction and diffusion in gas mixtures. XIII. Diffusion constants of dilute gas mixtures. MAX TRAUTZ AND WILH RIES. *Ann. Physik* 8, 169–84(1931) cf C. A. 25, 2034 —The diffusion consts of $C_6H_6$-$H_2$ and $CCl_4$-$H_2$ mixts were detd at 23 The diffusion const ($D$) was unaffected by changing either the size of the tube or the rate of flow The following values were obtained $D_{C_6H_6-H_2}$ = 0.363 sq cm sec $D_{CCl_4-H_2}$ = 0.342 sq cm /sec P. T. NEWSOME

Methods for measuring the mobilities of gaseous ions. PETER GOLDMARK AND FRANZ KAMMER *Sitzb Akad Wiss Wien*, Abt. IIa 139, 241–53(1930) —By an improvement in the Rutherford Frank method, the mobility of gaseous ions can be measured without extrapolation Math proof and a description of the app are given Sp ionic mobilities ($u$) for atm ions were detd (1) by means of a sine form alternating voltage for the pos ion, $u$ = 1.364 ± 0.000 sq cm /v sec., and for the neg ion, $u$ = 1.811 ± 0.008 sq cm /v sec., (2) by means of an abruptly changing alternating voltage for the pos ion $u$ = 1.369 ± 0.008 sq cm /v sec., and for the neg ion, $u$ = 1.814 ± 0.008 sq cm v sec. DON BROWN

Uniform propagation of flame. N. R. SEN AND H. K. SEN *Nature* 127, 125–6 (1931) —The velocity equation shows the condition for uniform propagation to be $\theta = \frac{\alpha Q}{\rho C}$ where $\theta$ = the ignition temp., $\rho$ = density of the inflammable mixt., $C$ = the sp heat and $\alpha Q$ = the fraction of the total heat of combustion utilized for conduction The above equation takes note of the distribution of temp in every section of the gaseous medium comprising the traveling flame the traveling flame is also considered as a region having temp gradients corresponding with the combustion temp at the rear and the ignition temp at the front In advance of this a progressive fall of temp to that of the cold gas occurs The ratios of flame to ignition temps were for Coal gas + air 2.02, $CH_4$ + air 1.91, $CH_3$ $CH_4$ + air 1.90, CO + air 2.08 FRANK MARESH

Highly dilute flames of alkali metal vapors with hydrogen halides. GÉZA SCHAY. *Z physik Chem*, Abt. B 11, 291–315(1930). cf *C. A.* 19, 3221, 20, 1947, 22, 1898.— The vapors of Na and K under low pressure react with HCl, HBr or HI with displacement of H atoms. These atoms react with H to form $H_2$ and X or NaH to yield Na + $H_2$ with the emission of light. The velocity of the reaction of sodium with hydrogen halides. H v HARTEL. *Ibid* 316–20(1930) —The reaction of Na vapor with HI, HBr and HCl was followed by a diffusion method (*C. A.* 25, 1726) At 240° Na and HI react at every collision, Na and HBr after 6 collisions, Na and HCl after 86 The heats of activation for their reactions were calcd as 200, 1900 and 4500 kg-cal and reaction velocities were detd. as 53 000, 10 000 and 800 mols./sec. × $10^{-12}$, resp A similar heat of activation of Na and HCl was also found from measurements at different temps. L. P. H.

Highly dilute flames. GÉZA SCHAY *Fortschritte Chem Physik physik Chem* 21, 68 pp —A general review of the technic and interpretation of the reaction of dil vapors of alkali metals with halogens H halides, Hg halides and stannic halides. A bibliography is given L. P. H.

The effect of an electric field on flames and their propagation. BERNARD LEWIS. *J Am Chem Soc* 53, 1304–13(1931) —The effects of an elec. field on the flames of 10 hydrocarbon air and CO-air mixts. were investigated The field was applied between fine wire gauze electrodes placed on either side of a stationary flame confined in a Pyrex tube. The flame is invariably pulled toward that electrode on which the charge is neg, thus moving in the direction of the pos ion flow, its propagation is slowed down or

speeded up depending upon the direction of the elec field With appropriate direction and strength of field the flames of all the mixts. could be extinguished. P. H. E.

**Calculation of the specific heats of gases from vapor-pressure curves.** M. Trautz and W. Badstübner. *Ann. Physik* 8, 185–202(1931).—Sp. heats of paraffins, alcs., fatty acids, esters, ketones, aromatic bases, org. and inorg. halogen compds., etc., were calcd. from the relation $C_p = c_p + (\Delta L \cdot \Delta T)$. Known values of $c_p$ were used and values of $\Delta L \cdot \Delta T$ were detd. by application of the Clausius equation to the vapor pressure curves. Good agreement was obtained between calcd. and observed values of $C_p$ for 30 different substances. $c_p$ values were also calcd. for 43 other substances for which the $C_p$ values have not been directly detd. The relation $c_p = c_v - 1.2$ gives good results for $C_p > 20$ and becomes more accurate as $C_p$ increases. P. T. Newsome

**The indices of refraction of liquids.** Morton Masius and W. E. Lawton. *J. Optical Soc. Am.* 21, 252–9(1931); cf. *J. Optical Soc. Am.* 20, 271(1930).—Math. considerations of the use of the av. of the 3 min. deviations and the use of the interpolation formula are given, together with equations from which the $n$ of a liquid enclosed in a hollow prism or of different liquids in the same prism can be calcd. The covers are not necessarily true plates, but the 3 angles of the prism should not differ by more than 10′ from 60°. H. W. Walker

**The influence of elastic waves of thermal agitation on the interior pressure of liquids.** Tokio Takeuchi. *Proc. Phys. Math. Soc., Japan* 13, 17–8(1931).—A math. derivation of a relation between the pressure term in the van der Waals equation of state and the interior pressure of liquids. P. H. Emmett

**The volume of eighteen liquids as a function of pressure and temperature.** P. W. Bridgman. *Proc. Am. Acad. Arts and Sciences* 66, No. 2, 185–233(1931).—*A new method of measuring compressibility and thermal expansion of liquids* is described in which the liquid is enclosed in a "sylphon" (a flexible metal bellows) which is then exposed to external hydrostatic pressure and the vol. change detd. from the change of length of the sylphon. This method is applied to 18 liquids at 0°, 30° and 95° up to a pressure of 12,000 kg. per sq. cm., or to the freezing pressure and the results are collected in extensive tables giving the vol. as a function of pressure and temp. over this range. Compressions as great as 30% were measured. The pressure coeff. $(dp/dt)_v$ is not a function of vol. only and suggestions are made as to the theoretical significance of this. The liquids measured are pentane, isopentane, hexane, 2-methylpentane, 3-methylpentane, 2,2-dimethylbutane, 2,3-dimethylbutane, heptane, octane, decane, benzene, chlorobenzene, bromobenzene, carbon tetrachloride, bromoform, isopropyl alc., butyl alcohol and hexyl alcohol. Check measurements with previous methods used were made with ether, water and water glycerol mixt. (1:1). A. L. Kilber

**The mixing contraction of liquids.** Nikolai Gerasimov. *Physik. Z.* 32, 226–9(1931).—A math. discussion. C. E. P. Jeffreys

**Visible volume change in castor oil and Baku lubricating oil at low temperature and high pressure, studied by increase in viscosity and thus limited by clogging narrow tubes.** G. Tammann and A. Pape. *Z. anorg. allgem. Chem.* 197, 90–2(1931).—An anomalous pressure-vol. change is observed for castor oil at a temp. of −21° and 3000 kg./cm.² which is not found above 0°. The effect is not due to crystn. but is traced to a stopper effect in the small capillary leading to the compression cylinder. The same effect and cause were noted for Baku lubricating oil. R. H. Lambert

**Boiling-point nomograph.** D. S. Davis. *Chemist Analyst* 20, No. 3, 7–8(1931).—A nomograph is shown, based on Trouton's rule applied to the Clausius-Clapeyron equation, which enables one to find at once the b. p. at atm. pressure when given at some other pressure, or *vice versa*. W. T. H.

**Remarks concerning the work of W. Herz on boiling points and vapor-pressure formulas of organic liquids.** E. W. Madge. *Z. anorg. allgem. Chem.* 195, 335(1931); cf. *C. A.* 24, 3554.—It was shown by Herz that the vapor pressure of org. liquids is given by the formula $\log p = -(A/T) + C$ and that for 2 different liquids $(A_1/A_2) = (T_{a1}/T_{a2})$ where $T_{a1}$ and $T_{a2}$ are the abs. b. ps. at one atm. pressure. Madge points out that the latter relation follows from Trouton's law since $A$ is proportional to the heat of vaporization. P. T. Newsome

**Influence of the boiling temperature on the composition of azeotropic mixtures.** B. Kamienski. *Roczniki Chem.* 11, 1–11(in German 12)(1931).—Merriman's qual. rule (*C. A.* 8, 852) concerning changes in compn. of an azeotropic mixt. with change of the boiling temp. does not always hold. Vrevskii's considerations (*C. A.* 7, 3060) are too complicated. K. replaces these rules by a simple differential equation based on thermodynamics. $-Q' = RT^2(1/p'p'_0)(p'dp_0' - p_0'dp')dT$, where $Q'$ is "partial heat of mixing" of 1 mole of a substance, $p'$ its partial pressure over the mixt. and $p_0'$ its satn. pressure

at the temp $T$ With the aid of this equation it is possible to calc any change of min and max of the total pressure of a mixt at any temp if gas equations can be applied, at least approx., to vapors of liquids A mixt of EtOH and $H_2O$ that does not obey Merriman's rule conforms strictly to this new equation Conditions are set which are indispensable for the validity of Merriman's rule J WIERTELAK

**An extension of Ramsay and Young's boiling-point rule.** T. S. WHEELER. *Phil Mag* 11, 441–9(1931) —For single or pairs of liquids to which the integrated form of the van't Hoff isochore is applicable, the following general rule is deduced "the reciprocals of the abs temp for which 2 given powers of the vapor pressure of a liquid or pair of liquids are in a const. ratio, satisfy a linear equation" Cox's rule (cf *C. A.* 17, 2359) is implied in the Ramsay Young rule which is a special case of the above. The rule was tested and found satisfactory for $H_2O$, Hg, S, $H_2$, and $CH_3COOH$ for ratios from 2:1 to almost 1000:1 It was also found satisfactory for pairs of liquids and held for aq NaOH solns with more than 50% $H_2O$ and for unsatd NaCl and $Na_2SO_4$ solns By plotting the reciprocal abs temp for Hg and $H_2O$ satisfying the equation $p_{H_2O} = \sqrt[4]{p_{Hg}} \times 10^7$ it is possible to express the whole range of Hg from —39° to 1300° From the slope of the reciprocal temp curve it is possible to calc the ratio of the latent heats of 2 liquids A. F.

**Viscous flow and surface films.** RONALD BULKLEY. *Bur Standards J. Research* 6, 89–112(1931) —Various fatty and mineral oils do not clog capillary tubes as small as 0.18–0.13 mm in radius provided the liquids are properly filtered The same statement applies to several other liquids if Pt and glass capillaries of radii 0.35$\mu$ and 5.50$\mu$ are used The liquids retain their bulk viscosities up to at least 0.03$\mu$ distance from a solid surface. S BRADFORD STONE

**A new method of comparing viscosities of liquids by oscillating columns.** G SUBRAHMANIAM *Proc 15th Indian Sci Congr* 1928, 86 —It is shown that in the case of a liquid contained in a U tube and making *small and steady* oscillations the rate of decay of such oscillations is related to the coeff of viscosity by the expression: $\nu = b^2\lambda/2\tau$, where $\nu$ is the kinematic coeff., $\lambda$ the logarithmic decrement, $\tau$ the free period and $b$ a const. which is assumed to be the same for the same tube and different *wetting* liquids As the period of oscillations $\tau$ depends only on the total length of the liquid column and the inclination of the arms of the bent tube to the horizontal the above expression leads to a new method of comparing viscosities by noticing the log decrements of equal lengths of different liquids oscillating in a given tube This relation has been verified in the case of 5 different tubes of 0.3–1.0 cm diams and 7 liquids, namely, water, alc., ether, xylene, benzene, turpentine and $CS_2$, and the results (not given) are in perfect accordance with the theory F J C.

**The influence of the proximity of a solid wall on the consistency of viscous and plastic materials. III.** R K SCHOFIELD AND G W SCOTT BLAIR *J. Phys Chem* 35, 1212–5(1931) —"A solid wall may modify the consistency of clay pastes at an appreciable distance from it but the available data are not sufficiently accurate to est. the thickness of the modified layer" A value of $8 \times 10^{-3}$ cm could escape detection because of exptl uncertainties Even if the effective thickness of the modified layer should amount to 20% of the radius of the tube, the construction proposed in the first paper (*C. A.* 24, 2022) closely approximates the mobility of the material in bulk DON BROWNE

**Methods for determining the density of solid substances, particularly of inorganic salts.** PETER WULFF AND ALOIS HEIGL. *Z physik. Chem.*, Abt A, 153, 187–209 (1931) —A series of d detns on CsCl by the pycnometer method showed that, because of the impossibility of completely freeing the salt from occluded air, results are about 1% low. By using the flotation method, measurements of the ds of a series of salts were made with an av error of only 0.2% By the displacement method, the ds of salts too heavy to be detd. by flotation methods could be measured rapidly with an accuracy of about 1% P. H EMMETT

**Compressibility and pressure coefficient of resistance, including single-crystal magnesium.** P. W. BRIDGMAN. *Proc. Am Acad. Arts Sci* 66, 255–71(1931) —Measurements of compressibility at 30° and 75° are reported on 10 materials All except metallic Mg crystallize in the cubic system so that measurements were made on cryst. aggregates Mg crystallizes in the hexagonal system and single crystals were prepd. and the compressibility was measured parallel and perpendicular to the axis The materials measured were NaF, $BaF_2$, $SrF_2$, $CdF_2$, AlSb, CdTe, HgTe, TiN, TiC and Mg The effect of pressure on the elec resistance was measured for TiN, TiC and Mg A L KIBLER

**Recrystallization and coloring of rock salt.** KARL PRZIBRAM *Sitzb Akad Wiss*

*Wien*, Abt IIa 139, 255–70(1930), cf *C. A.* 24, 1295.—The recrystn. time pressure-temp diagram was carried further. The recrystn. velocity, which was measured directly, often remains const. for several hrs. and then changes suddenly. Measurements were carried over a range from room temps., at which the van't Hoff coeff. is valid, to 200°. The influence of weak radiation, formerly considered significant, is of no importance but, on the other hand, the arresting influence of strong radiation upon salt under high pressures was always confirmed. In regard to recrystn., melted crystals behave as if they contain more nuclei, which, however, show less tendency to grow, than the unheated salt. DON BROUSE

Recrystallization of pressed rock salt. GUSTAV ORTNER. *Sitzb. Akad. Wiss. Wien*, Abt. IIa, 139, 271–4(1930).—Rontgen photographs show a marked crystal growth in rock salt after deformation by pressures of 5000 kg. per sq. cm. Molten crystals, on the other hand, display no grain growth after deformation. There is weak recrystn. in powd. rock salt under high pressures. DON BROUSE

Dispersion in mixed crystals miscible in all proportions. G. TAMMANN AND A. RUPPELT. *Z. anorg. allgem. Chem.* 197, 65–89(1931).—Certain mixed crystals such as those of KCl-NaCl show turbidity, on cooling or on heating, at definite temps. A curve of beginning of turbidity can be obtained in either case which has a max. at some mol. fraction. Measurements of such mixed crystals were made for a considerable no. of salt pairs, the data from which together with others obtained from the literature are collected in tabular form and by graphs. The linear rate of turbidity increase was measured by cooling the salt pair in a glass tube after which on cutting the tube at some spot, turbidity increases into the clear portion of the mixed crystal. A very short range in mol. fraction for turbidity exists for LiBr-NaBr. The presence of water greatly affects the amt. of dispersion, the influence of which quickly disappears at about 100°. The salt pair $KPO_3$-$NaPO_3$ shows a eutectic in the diagram for heating not obvious in the cooling curve. Little turbidity is shown. Mention is made of Na- and K-contg. feldspars. Opalescence can be obtained by controlling either rate of cooling or degree of moisture present. A table is given relating the dependence of miscibility on the relative differences in lattice parameters. If this difference is less than 0.115 A. U., unlimited miscibility exists while miscibility practically disappears at, or above, 0.144 A. U.
R. H. LAMBERT

Diffusion of sodium in rock salt. E. REXER. *Physik. Z.* 32, 215–6(1931).—Na was placed in small holes in rock salt crystals, and diffused into the crystals at higher temps. The distribution and size of the particles after diffusion were studied with the ultramicroscope.
C. E. P. JEFFREYS

Melting point curves of the monobasic fatty acids. ANNIE MILLICENT KING AND WM. EDW. GARNER. *J. Chem. Soc.* 1931, 578–80.—The entropy change on crystn. can be accurately represented by the equation $Q/T = 0.002698n - 0.0061 + 0.00475 \sum_{24}^{n} \log_{10} n/(n-2)$, where $n$ is the no. of C atoms. In order to make a calcn. of the m. p. of an unknown acid, it is necessary to be able to det. a value for $Q$. The manner in which the heat of crystn. varies with the no. of atoms in the C chain has not been interpreted theoretically, so that it is only possible to employ an empirical relationship. For acids having more than 12 C atoms, $Q$ increases at the rate of 2.060 cal./g. mol. for every $2CH_2$ groups added to the chain.
C. J. WEST

Lattice energy and the state of combination. WILHELM KLEMM. *Z. physik. Chem.*, Abt. B, 12, 1–32(1931), cf. *C. A.* 25, 11.—The quotient of the exptl. lattice energy by the normal lattice energy, the latter being calcd. on the assumption that the lattice is formed of ions of the rare gas configuration, gives a more useful comparison than their difference when anions and cations are very different in size or for unsatd. compds. A similar quotient for gas mol. energy is described. The stability of compds. can be predicted from these terms. The transformation from coordination to mol. compds. takes place in a homologous series as the cation increases in wt. or as the valence of the cation increases for solids and from ions to atoms in gases. No distinct boundary appears to exist between these types of union from an energy relationship. Most calcns. were made on halogen compds.
R. H. LAMBERT

The arrangement of the microcrystals in white tin deposited by electrolysis. HIDEKI HIRATA, HISAJI KOMATSUBARA AND YOSHIO TANAKA. *Anniversary Vol. Dedicated to Masumi Chikashige* (Kyoto Imp. Univ.) 1930, 261–73.—The cryst. structures in electro-deposited specimens of white Sn, obtained under various conditions, were examd. with x rays, by the so-called "transmission method." The cryst. structure is influenced by at least 2 factors, c. d. and the concn. of the electrolyte. Smaller c. d. and lower concn. of the electrolyte are the more favorable conditions for the growth of large

crystals When these 2 factors are comparatively large, the microcrystals of white Sn tend to be deposited in a fibrous form The microcrystals have a tendency to be electrolytically deposited with the normals to their octahedral faces arranged parallel to a definite common axis ALLEN S SMITH

**The crystal structure of the inert gases. II. Krypton.** A. NASINI AND G NATTA. *Atti accad Lincei* 12, 141–7(1930) The method of powders was used as with Ne (*C A* 24, 3410 4198) The crystal structure of Kr was detd at the temp of liquid $N_2$ It is a face-centered lattice having 4 atoms with side 5 78 A U., vol $193 \times 10^{-24}$ cc., d 2 83 The radius of the atom as detd by x rays was compared with that detd by viscosity measurements for Ne A Kr $N_2$ CO, $NH_3$ $H_2S$, HBr, Xe, $PH_3$, HI, the ratio of the value found by these 2 methods varying from 1 28 to 1 35, indicating that these 2 methods of measurement are concordant A W CONTIERI

**Structural analogies of binary alloys of transition elements and zinc, cadmium and aluminum.** WALTER EKMAN *Z physik Chem*, Abt. B, 12, 57–78(1931) —Powder x ray diagrams were obtained of phases of the systems Fe–Zn, Co–Zn, Ni–Zn, Rh–Zn, Pd–Zn, Pt–Zn and Ni Cd All correspond to the interference photograph of γ-brass. These phases represent a valence electron concn of 21–13, on the assumption that transition elements may be regarded as of zero valence The homogeneous region for an Fe–Zn phase of this type lies between 19 and 23 atom % Fe. The Co–Zn phase and the Ni–Zn phase are homogeneous between 15 and 22 atom % Co and 15–19 atom % Ni, resp C–Zn shows a phase similar to β Mn in structure A phase analogous to β-brass was found in the Co–Al system Calcn of at. vol indicates that contraction accompanies phase formation FRANK URBAN

**Hydroxide systems in iron oxide colors.** HANS WAGNER. *Kolloid-Z.* 54, 310–4 (1931), cf *C A* 25, 221 —X ray photograms showed the following structures for various com colors (*1*) bright ocher $Fe_2O_3$, goethite lattice; (*2*) Mars yellow contg $CaCO_3$ and $CaSO_4$, $CaCO_3$ lattice (*3*) Mars yellow free of chalk, no lattice. (*4*) Tuscany sienna, goethite lattice (*5*) $Fe(OH)_3$ from $FeCO_3$ weathering, goethite lattice, (*6*) $Fe(OH)_3$ from sericite weathering mica lattice Ochers or citron yellows are characteristic of colors composed of monohydrate Microscopic examn reveals *1* and *3* contg very fine needles with a strong tendency to agglomerate, *4* consists of coarse grains, splinters and angular particles which are transparent in a bright field and shine in polarized light *2* and *3* resemble *4* more closely than *1* Ochers may be classified according to the adsorption of basic dyes, such as Brilliant Green, by the ocher substrate, usually a mixt of $Al_2O_3$, $SiO_2$ and $H_2O$ German ochers adsorb the dye irreversibly (chemosorption) and the substrates are $Al_2O_3$–$SiO_2$ gels, French ochers adsorb the dye reversibly (lyosorption) and the substrates are kaolins. The classification is not absolute and transition types of ocher exist ARTHUR FLEISCHER

**The structure of hydrogen sulfide and hydrogen selenide.** G NATTA *Nature* 127, 129(1931) —A cubic lattice was found with face-centered distribution for S and Se atoms The d of $H_2S$ was 1 166, $H_2Se$ 3 45 The side of the cell (*a*) was found to be 5 778 A U for $H_2S$ and 6 020 for $H_2Se$ Considering both as ionic compds, the most probable space group is $O_h^5$, a fluorite type shown by $Li_2S$. FRANK MARESH

**Spinels. III. The titanates of cobalt and of zinc.** L. PASSERINI. *Gazz. chim. ital* 60, 957–62(1930) cf Natta and P., *C A* 23, 4649, 24, 1311, P., *C. A.* 23, 4167, 24, 4439 —The present paper is a continuation of studies of compds. that crystallize in the cubic system with a lattice structure of the spinel type. *Co orthotitanate*, $Co_2TiO_4$, not heretofore described, was prepd by heating rapidly to 900° an intimate mixt. of $TiO_2$ and $Co(NO_3)_2$ (2 mols) The product was a dark-green, pulverulent substance A little $CoTiO_3$ (cf *Bull soc chim* 15, 194(1893)) may be formed $Zn_2TiO_4$ was prepd by the method of Levy (*Compt rend* 107, 421(1888)) Traces of $ZnTiO_3$ are also formed. Its phys properties do not agree with those described by Lévy; *e g*, it is a white, pulverulent substance, with much higher d than the 4 16 of Lévy Both $Co_2TiO_4$ and $Zn_2TiO_4$ were examd by the powder method, with $K_\alpha$ and $K_\beta$ radiation from an Fe anticathode (Philips tube) Both titanates crystallize in the cubic system, with a lattice structure of spinel type (8*f*, 16*c*, 32*b*, spatial group $O_h^7$) For $Co_2TiO_4$, $a = 8\,420 \pm 0\,005$ A U, $V = 596\,94 \times 10^{-24}$ cc., calcd d = 5 12 (for a cell contg 8 mols) The $Co_2TiO_4$ was not sufficiently pure to det the exptl d. For $Zn_2TiO_4$, $a = 8\,410 \pm 0\,005$ A U, $V = 594\,82 \times 10^{-24}$ cc, calcd d = 5 43 C. C. D.

**Comparison of the crystal structures of an addition and a substitution compound.** EDUARD HERTEL AND KURT SCHNEIDER *Z physik. Chem*, Abt. B, 12, 109–14(1931), cf. *C. A* 24, 2924 —The crystal structures of aniline picrate (addn compd.) and 2,4,6-trinitrodiphenylamine (substitution compd) showed an extensive analogy, according to x ray analyses They agreed with respect to the spatial group and 2 main identity

periods The difference in the third period may be due to a sp orientation of the mol in this direction, and to spatial requirements of the $H_2O$ mol., by which addn and substitution compds differ FRANK URBAN

**Crystals of 3,4,3',4',6'-pentamethoxydiphenylmethane-2-carboxylic acid.** E. LENGYEL. *Acta Sci Univ Francisco Iosephinae, Acta Chem., Mineral., Physica* 1, 68–71(1929) Crystallographic description of rhombic crystals S S DE FINÁLY

**X-ray examination of the crystal structure of resorcinol.** A N SARKAR *Proc 15th Indian Sci Cong* 1928, 92 —X ray examns of crystals of catechol, resorcinol (I) and hydroquinone were undertaken with a view to confirm the structure of the benzene nucleus detd by Bragg from the examn of $C_6H_6$ The data obtained from the powder photographs of crystals of I were insufficient for the detn of mol structure, but it was found that the space group is $C_{2v}^{19}$ and the mols are asym From certain observed accidental interference minima, not characteristic of group $C_{2v}^{19}$, certain relative arrangements of the 4 types of mols in the unit all were deduced S's deductions as regards space group and no per cell confirm Bragg's conclusions, but S suggests a different arrangement of mols E J C

**Polymerization in crystal lattice—crystal structure of trinitroresorcinol and trinitrophloroglucinol.** EDUARD HERTEL AND KURT SCHNEIDER *Z physik Chem.*, Abt B, 12, 139–50(1931), cf *C A* 24, 2021 —Picric acid has 4 double mols in its unit cell (cf Brudig and Möller, *C A* 23, 5368) The entrance of a second OH group as in styphnic acid (I) causes the formation of 2 triple mols in the unit cell but the entrance of a third OH as in 2,4,6 trinitrophloroglucinol (II) does not continue the polymerization " I and II are trigonal, probably space group $C_{3v}^3$, but possibly of $D_{3d}^4$ Their crystal structures are almost identical The unit cell of each contains 6 formula weights and has the dimensions for I; $a$ = 12 7, $b$ = 22 0 and $c$ = 10 0 A U and for II; $a$ = 13 4, $b$ = 23 6 and $c$ = 9 6 A U The structure of each is built up of 2 units of 3 $C_6H_2N_3O_8$ or $C_6H_3O_9N_3$ groups in the unit cell Test for piezoelec effects with both was neg In spite of the far-reaching similarity of the cryst structure of both compds they form no series of mixed crystals, the phase rule diagram shows only a eutectic O E S

**The production of residual double refraction by pressure in certain glasses at atmospheric temperature.** F. C. HARRIS. *Phil Mag* 11, 745–8(1931) —A uniform stress was applied for a period of 3 years on glass disks contg 16, 47, 64 and 79% PbO The first 2 glasses had a pos and the last glass a neg stress optical coeff A definite residual double refraction was observed for the last 3 glasses This residual refraction disappeared 1 month after the stress was removed The time necessary to produce the effect decreases with increase in the PbO content, the effect increases with increase in the PbO content. In no case was an increase in the residual double refraction noted during the time the load was continued ARTHUR I LEISCHER

**The birefringence of safrole.** PAUTHENIER AND BART. *Compt rend* 192, 352–3 (1931) —No appreciable residual birefringence was found for com or carefully purified safrole, either in a const or alternating field The Kerr const for pure safrole is $K = 0.82 \times 10^{-7}$ for the green Hg line $\lambda$ = 5460 A U P W. LAIRD

**The nature of "triatomic hydrogen."** EGON HIEDEMANN. *Z. physik. Chem.*, Abt. A, 153, 210–40(1931) —By passing an electrodeless ring discharge through $H_2$ in a glass reaction vessel a gaseous product is formed that is easily condensible in liquid air, and that shows the chem characteristics ordinarily ascribed to the so-called "triatomic hydrogen " Each vol of it, on reacting with Na gives 2 or 3 vols of $H_2$ It reduces $WO_3$ to $WO_2$, reduces $KMnO_4$ soln., decolorizes indigo blue, gives a yellow coloration with Nessler's reagent that is characteristic of $NH_3$, and causes a brown coloration on lead acetate paper. These same chem properties are characteristic of the mixt of Si hydrides obtained from the reaction of Mg silicide and HCl After a crit review of all previous papers, it is concluded that all of the ' triatomic hydrogen" reported in the literature has been either $H_2S$ or a mixt of Si hydrides, in some expts. both gases probably have been present. P H EMMETT

**The electrical resistivity of silicon.** CH BEDEL. *Compt. rend.* 192, 802–4(1931) — Past detn of the elec. resistivity of Si have been vitiated by the difficulty of obtaining compact specimens of pure Si, and of establishing good elec contact with the specimen These difficulties were overcome, and the av resistivity of pure Si contg only 0 1% Fe was found to be 0 267 ohms per cm. The av resistivity of impure Si contg 1 4% Fe was 0 069, and of a ferrosilicon contg 8 5% Fe, 0 035 For poor contacts involving large surfaces, the resistance changes when the direction of the current is reversed, it decreases if the current intensity is increased, but increases with the duration of flow of the current; and it diminishes with increased pressure. Poor contact has been at-

...ed to a thin layer of $NO_2$ or of adsorbed gas. However, it persists after treatment with HF and the deposition of an adherent coating of Cu or Ag. On the contrary, the electrolytic deposition of Zn or Ni by a current of 0.2 amp. provides good contact. Good contact was obtained also by depositing Cu on the Si by immersion in a soln. of $CuSO_4$, then coating the Cu with a Sn amalgam, Hg:Sn = 15:2, and finally applying the metal. The samples were held under pressure between Cu electrodes during the measurements. R. H. Lombard

**Sulfur free from cerium.** M. Picon. *Compt. rend.* 192, 684-6(1931).—"Cerium sulfide ($Ce_2S_3$) can be prepd. at 1550° in a boat of graphite by the action of $H_2S$ on $CeO_2$. This compd. is remarkably resistant to the action of heat, it melts only above 2100° and it volatilizes only at 2250° under a vacuum of about 1/1000 mm. Hg. It resists equally the action of metals and the non-oxygen salts. $CO_2$ causes a special oxidation at 700° in which Ce is transformed into $CeO_2$, S eliminated, and $CO_2$ reduced to CO." Dov Brotas

**Insolation of Pyrex glass after heating in vacuo.** J. H. Mitchell. *Phil. Mag.* II, 748-53(1931).—Pyrex glass on heating in vacuo shows a rapid increase in cond. at temps. from 55° to 80°, the exact temp. varying with the specimen. At 250° to 300° a decrease and at 350° to 400° a marked increase in the cond. were found. On cooling, the cond. again decreases but is much higher than the original value before heating. Cooling to liquid-air temp. did not decrease the cond. Washing the surface of the glass with HF restored the initial low cond. Heating in air at 500° also decreased the cond. but not to the initial value. The glass treated in this way did not increase in cond. on reheating in vacuo. The permanent increase in cond. is a surface effect, probably due to the chem. changes in the outer layers of the glass. Arthur Fleischer

**The adsorption of ions on a surface film.** R. S. Bradley. *Phil. Mag.* II, 449-53(1931).—Math. The potential due to a uniform plane array of dipoles oriented perpendicularly to the surface is calcd. The results are extended for fatty acids in 0.01 *N* HCl. Arthur Fleischer

**Adsorption of gases by glass walls. VIII. Hydrochloric acid gas.** M. Cantelli and E. Mollica. *Atti della accad. Gioenia Catania* 29, 14-37(1931). cf. *C. A.* 24, 3267.—Adsorption of HCl by the glass walls of the flask used to det. the mass of the normal L. and of the app. used to det. compressibility gave $-1.74 \times 10^{-4}$ g. at 760 mm. for a 1 l. flask, as the correction to be applied. The tests confirmed the McBain theory of both absorption, or solid soln. of gas on the glass surface, and adsorption on the surface. The course of both processes can well be expressed by the Freundlich adsorption equation. Results of others are criticized. E. M. Symmes

**The adsorption of certain vapors by activated charcoal. III.** J. N. Pearce and A. L. Taylor. *J. Phys. Chem.* 35, 1091-1103(1931). cf. *C. A.* 24, 3890.—The adsorption of ethyl, *n*-propyl, *n*-butyl and tertiary butyl chlorides on charcoal was detd. from 0° to 4 consecutive temps. The stability decreases with increase in mol. complexity. The amt. of adsorption in general increases with mol. wt., with branched-chain compds. less than with straight chains. The heats of adsorption are less when calcd. from the curves than the exptl. values. The distribution of potential and d. are calcd. according to Polanyi. Garod M. Evans

**Adsorption of sugars by animal charcoal and vegetable decolorizing carbons.** N. Takeyose. *J. Soc. Chem. Ind., Japan* 30, 790-803(1927). *Mem. Faculty Sci. Eng. Waseda Univ.*, 1930, No. 7, 125-6.—The amt. of sucrose adsorbed from aq. solns. by animal charcoal increases to a max. at a concn. of 0.2 mols. per l. Freundlich's equation applies to the dil. solns. The amt. of adsorption is directly proportional to the charcoal added. Grape sugar is also adsorbed by animal charcoal. Sucrose is adsorbed in appreciable amt. by vegetable decolorizing carbons. L. W. T. Crissman

**Effect of gelatin and salts on Congo red.** Harriet L. Davis and John W. Ackerman. *J. Phys. Chem.* 35, 972-87(1931).—Gelatin exhibits an apparent protective action against ppts. by salts on solns. of Congo red, due to a decreased stability and decreased dispersion of the dye. Frank Urban

**The distinguishing features between adsorption by a substance in a hydrated and a dehydrated condition.** M. P. Venkatarama Iyer. *Proc. 15th Indian Sci. Cong.* 1928, 132-3.—It has been found from measurements that benzoic, cinnamic, salicylic and stearic acids, which are generally dehydrated, show hardly any change in the $p_H$ values or the elec. charge when kept in contact with neutral salt solns., whereas stearic acid which is highly hydrated in the colloidal state shows marked changes in the $p_H$ values and elec. charge when similarly treated. Dehydrated substances like the above adsorb their constituent ions very strongly, whereas hydrated substances adsorb any ions without showing any strong preference for the constituent ions. Irreversible coagulation and

finely divided org substance immiscible with water is introduced into a coazervate system the org droplets are taken inside the coazervate drops Only those droplets so taken up manifest a shift in the field of the elec current The direction of this shift is independent of the nature of the org fluid, of the *p*H or the presence of neutral salts, but is detd by the cataphoretic charge of the coazervate drops If the latter are pos. the shift is toward the neg electrode, and if neg the shift is to the pos electrode

S MORGULIS

**The dialysis of sodium bicarbonate solutions.** F CANALS AND J DAUBAIN DELISLE *Bull soc chim biol* 12, 1158-61(1930).—The $CO_2$/Na value of a bicarbonate soln varied from 1.98 to 1.74 during 2 hrs' dialysis C. G KING

**Ultrafiltration as a test for colloidal constituents in aqueous and non-aqueous systems.** J W. MCBAIN AND S S KISTLER. *J. Phys Chem* 35, 130-6(1931).—Cellophane membranes show unusual properties in dialysis, they retain all but the smallest colloidal particles in diffusion It has been possible to demonstrate with these membranes, that colloidal constituents are commonly present in non aq solns. of the electrolytes $AgNO_3$, $NH_4I$, $AgBrO_3$, CdI, etc., which exhibit anomalies in elec cond. and osmotic behavior The non aq media for $AgBrO_3$ and $AgNO_3$ are $LiNH_2$ and piperidine, resp H R MOORE

**Some chemical reactions of colloidal clay.** RICHARD BRADFIELD. *J. Phys Chem* 35, 358-73(1931).—The base-exchange phenomena and the cation-exchange reactions of colloidal clays were studied experimentally Methods are developed for measuring the solid acidity of H clays, and the significance of titratable acidity of electrodialyzed clays is pointed out Changes in the phys properties of clays may be correlated with changes in electrophoretic potential H R MOORE

**Thermo-senescence effect exhibited by gold sols at elevated temperatures and aging at room temperature.** EMLYN JONES AND W C. M. LEWIS. *J Phys Chem* 35, 1168-73(1931).—In general no *sol is in a suitable state for examn* until it has been dialyzed for about 4-5 days and has then been subjected to about 3 hrs' heat treatment. Thermo-senescence may not be attributed to the further removal of impurities, but is due to the contraction of the sol particles as a result of raising the temp The aging effect, however, may well be due to ionic adsorptions and desorptions FRANK URBAN

**Studies on the formation of silver sol prepared by dispersion in the electric arc.** P. S MACMAHON AND S C. VARMA. *Proc 15th Indian Sci Congr.* 1928, 136.—Attempts were made to det. the properties of finely dispersed Ag The deposit obtained by Furth (*C A* 18, 2449) from an elec. arc struck in air between Ag electrodes gave a sol on treatment with water However, this deposit is by no means pure Ag, it contains large quantities of oxide and nitrate. When the dust is ignited, brown fumes are given out in perceptible quantity The dust was prepd by striking the arc between pure Ag electrodes in either air, O or N. Nitrate was found to be produced in O contg as little as 0.2% N or in N contg a little O In pure N practically no deposit was formed, and it is probable that if the gas were chemically dry there would be no formation of dispersed Ag whatever The conditions under which the sol was produced by the addn. of water to the powder were studied at length, but the results are not given. The properties of the solid powder were also investigated There is evidence that this powder exposed to air or O takes up a further small quantity of O, indicating the oxidation of finely dispersed Ag E. J C

**Colloidal platinum and its behavior as a typical acidoid sol.** S. W. PENNYCUICK. *J. Am Chem Soc* 52, 4621-35(1930).—Evidence is presented for the behavior of colloidal Pt as a typical neg hydrophobe or acidoid sol. Deductions are made on the mechanism of retention of acid on the surface, and the fraction of surface covered by acid preferentially $H_2Pt(OH)_6$ appears to be combined at the surface with oxides of Pt, held together by the usual forces of chem affinity. Ionic replacement of $H^+$ by $Ba^{++}$, for example, can occur, and the surface oxide of the sol $[xPt.yPtO_2.zPt(OH)]^{z-}.2zH^+$ which is acidic may combine to form simple and complex salts An extensive study is made of coagulation phenomena which occur freely with bases and salts but are restricted with acids It is shown that HCN increases the charge carried by the colloidal particle, and likewise displaces the surface $H_2Pt(OH)_6$. H R MOORE

**Preparation of lead and lead phosphate sols.** VICTOR COFMAN *Rev gen colloides* 8, 337-57(1931).—Various methods of prepg Pb and Pb phosphate sols are given The effect of several stabilizing agents (gelatin, glucose, $Na_2S_2O_3$ and various salts) was investigated The particle size was detd from the rate of deposition and by means of the ultracentrifuge Striking lowering of the *p*H occurs in the prepn. of colloidal Pb phosphate FRANK URBAN

**Tungstic acid hydrosol.** A R NORMAND AND M C. MUTHANNA *Proc. 15th*

*Indian Sci Cong* 1928, 137.—It has been stated that tungstic acid sol is indifferent to acids, salts and alcs. But a fairly sensitive sol has been obtained by peptizing the tungstic acid both with an acid and an alkali. The sol of tungstic acid prepared in either of these ways is negatively charged and has the characteristic properties of an emulsoid sol. The order of coagulating power of the chlorides of alkali metals (detd. with the aid of the photoelec. cell) is PbCl > KCl > NaCl > LiCl. The protective influence of the neg. ions is Cl < Br < I. E. J. C.

**The stabilization of blue cupric hydroxide.** Harvey A. Neville and Charles T. Oswald. *J. Phys. Chem.* 35, 69–72 (1931).—The blue substance obtained by the action of alkali on a cupric salt is shown by x-ray analysis with the diffraction pattern obtained by $NiO_2$ to be $Cu(OH)_2$ or the hydrated oxide $CuO \cdot H_2O$. A 5% gelatin soln. stabilizes this colloid. H. R. Moore.

**Ion interchanges in aluminum oxychloride hydrosols.** Arthur W. Thomas and Thomas H. Whitehead. *J. Phys. Chem.* 35, 27–47 (1931).—A technic for the prepn. of Al oxychloride hydrosols of colloidal dimensions is presented. The following set of properties of the sols has been established. (1) Neutral salts of the type $K_2SO_4$, KOAc, KCl and $KNO_3$ increase the $p_H$ of the sols from 5 to 6.8, almost to 7.0 approx. (2) Neutral salt titration of $AlCl_3$ sols of different basicities leads to a rate of change of $p_H$ which is a function only of the no. of hydroxo groups, viz. the series $Al(OH)_2Cl \longrightarrow Al(OH)Cl_2 \longrightarrow AlCl_3$. (3) Several anions vary in their "penetration power" toward the basic Al ion, leading to an order for anions. The authors' extension of Werner's theory adequately explains the formation of the sols, their decrease of acidity on aging, increase on heating and the effect of heat on the soly. of Al hydrates. H. P. Moore.

**Surface processes on coagulating precipitates. II. The mechanism of adsorption in electrolytic solutions.** Ludwig Imre. *Z. physik. Chem.*, Abt. A, 153, 127–42 (1931); cf. *C. A.* 24, 2723.—The process of the adsorption of ions on the surface of aging suspension of Ag halides was examd. The changes with lapse of time of the adsorption values are different and depend on the soly. of the compd. of the corresponding ion with the oppositely charged constituent of the lattice. This different behavior leads to conclusions about the process of adsorption. At certain areas of activity on the surface of the aging ppt., the lattice is loosened because of the tendency to crystallize. A process of interchange is possible with the adsorbed ions which are in the immediate vicinity of the lattice. A. Hirsch.

**Equilibrium phenomena in coagulation of colloids.** E. F. Burton and May Applebey. *J. Phys. Chem.* 35, 498–509 (1931).—An ingenious optical study is made of the scattered and transmitted light from aq. soln. of mastic, Au, and $As_2S_3$. Variations in the d. of scattered light are recorded, as well as a curious *zonal effect* in the coagulation of $As_2S_3$. *Coagulation by stages* is observed on adding traces of electrolyte to the sols, and evidence is obtained for equil. states in the coagulation process. The $As_2S_3$ sol probably has a constitution of the type $(nAs_2S_3 \cdot HS)^- + mH^+$, the H ions diffusing as the outer layer of the Helmholtz double layer. H. R. Moore.

**The mechanism of the coagulation of sols by electrolytes. I. Ferric oxide sol.** Harry B. Weiser. *J. Phys. Chem.* 35, 1–29 (1931).—The coagulation process is studied by following the change in compn. of $Fe_2O_3$ sols by adding pptg. electrolytes stepwise to the sol. Cl is released in the reaction $2[xFe(OH)_3 \cdot yFeOCl \cdot FeO]^+ + 2Cl^- + K_2SO_4 \longrightarrow [xFe(OH)_3 \cdot yFeOCl \cdot FeO]_2SO_4 + 2KCl$, and the increase in $[Cl^-]$ may be followed potentiometrically. In micelles of this type thousands of equivs. may exist for each free charge. Several titration curves are obtained with sols of 3 distinct types and with inorg. salts of different valence types as exemplified by $K_2CrO_4$, $K_2C_2O_4$ and $K_4Fe(CN)_6$. A mechanism of coagulation is proposed from these data, postulating *positively charged* micelles as a consequence of the hydrolysis. These micelles vary in size, compn. and charge depending on conditions of hydrolysis. H. R. Moore.

**The influence of electrolytes on the coagulation of ceric hydroxide hydrosol heated to different temperatures.** A. R. Normand and M. C. Muthanna. *Proc. 15th Indian Sci. Cong.* 1928, 135.—The coagulating powers of the chlorides of alkali metals and metals of the alk. earths on pos. $Ce(OH)_4$ hydrosol, heated to different temps., were studied. The time required for each electrolyte to coagulate the sol was followed by means of a K photoelec. cell. The order of the coagulating power of the electrolyte was found to change with different degrees of dehydration of the sol. The order of the coagulating power of the electrolytes is: (1) With sol dialyzed at 28°, LiCl > NaCl > KCl > RbCl. (2) With sol dialyzed at 28° and heated to 70°, LiCl > NaCl > RbCl > KCl. (3) With sol dialyzed at 28° and heated to 100°, KCl > RbCl > LiCl > NaCl. Thus the coagulating power of the different electrolytes depends upon the temp. condition of the sol. F. J. C.

The vapor-adsorption capacity of silica gels as affected by extent of drying before wet-heat treatment and by temperature of acid treatment and activation. HARRY N. HOLMES AND A. L. ELDER. *J. Phys. Chem.* 35, 82–92(1931).—Eleven $SiO_2$ gels showed a decrease in benzene adsorption on aging for a few years. Four $SiO_2$ gels were heated above 800° without causing serious decreases in their benzene adsorption capacities. Increase in temp. of acid treatment of a gel from 30° to 100° increases the porosity of the gel. A 58% adsorption of benzene by weight was obtained with a gel. Chalky gels have high total adsorption capacities at high partial pressures but are not efficient for adsorption at low partial pressures. A. L. ELDER

Adsorption of acids by silica. M. P. LAKHANI. *Proc. 15th Indian Sci. Cong.* 1928, 154.—In view of the controversy between Joseph and Mukherjee (*C. A.* 21, 544) it appeared that the method of prepg. $SiO_2$ detd. whether it would adsorb acid or not. CaSiO$_3$ and $H_2SO_4$ mixts. were distd. at low temp. The gas was collected under water. The ppt. of $SiO_2$ thus formed and dialyzed for 7 days did not adsorb HCl or $H_2SO_4$, as indicated by analytical elec. cond. and *p*H detns. E. J. C.

Adsorption by silica gel from binary mixtures of liquids. BASRUR SANJIVA RAO AND H. M. CHANNABASAPPA. *Proc. 15th Indian Sci. Cong.* 1928, 133.—Silica gel particles have a water envelope, and B. S. Rao (Thesis, London University, 1926) has shown that selective adsorption from binary mixts. of liquids depends on the energy of the interface that this water envelope forms with each of the 2 liquids. The interface between water and $CCl_4$ has the same energy as that between water and $CS_2$. R. and C. detd. at 30° adsorption by silica gel from mixtures of $CCl_4$ and $CS_2$ in different concns. and in conformity with the above view, found no selective adsorption. Detns. were carried out in 2 ways: by a static method in which the gel was treated with liquid mixts. in a thermostat and by a dynamic method in which air bubbled through the liquid and passed over the gel in a closed system, the circulation of air being effected by a double-action pump of special design, working in an air thermostat and consisting of 2 pulsating Hg columns and 4 Hg valves. A Pulfrich refractometer was employed for the analysis of the mixts. E. J. C.

Alcogel of silica. BASRUR S. RAO AND K. G. DOSS. *Proc. 15th Indian Sci. Cong.* 1928, 133.—Adsorption by silica gel is ordinarily dependent on the water envelope in it; attempts have been made to obtain gel with an alc. envelope. Expts. on the complete replacement of the water by alc. carried out by Graham, by Nanhauser and Patrick, and by Firth and Purse give contradictory results. R. and D. extd. with hot alc. silica gel (placed in a Jena glass thimble) in a Soxhlet app., the alc. in the flask being kept anhyd. by addn. of metallic Ca and BaO. On prolonged treatment the water in the gel was found to be about 1% by org. combustion methods suitably modified. Replacement of water was also attempted by a dynamic method in an app. in which air was continuously circulated in a closed system through anhyd. alc. and the gel. Adsorption curves (not given) for silica gel and water-alc. mixts. indicate that replacement of water becomes progressively difficult with decrease in water content of the gel. Complete replacement of water, though it may not be impossible, is extremely difficult to effect. E. J. C.

The density of water adsorbed on silica gel. DWIGHT T. EWING AND CHARLES H. SPURWAY. *J. Am. Chem. Soc.* 52, 4635–41(1930).—Values obtained for the d. of water adsorbed on $SiO_2$ gel were secured by vol. measurements, a gas dilatometer with He as the inactive gas was used. For small quantities of water up to 4.36%, the measurements show that the d. of water adsorbed at 25.02° is greater than the d. of liquid water at the same temp. H. R. MOORE

The growth of lead crystals in silica gels. ROBERT TAFT AND JESSE STARECK. *J. Chem. Education* 7, 1520–36(1930).—Pb crystals were grown in $SiO_2$ gels. The following exptl. factors were varied: nature of the reducing agent, concn. and compn. of the Pb salt, *p*H of the gel and the viscosity of the intercellular liquid present in the gel pores. By using a device equiv. to a voltaic cell, Ag or Cu could be used as reducing agent. Numerous photographs illustrate the crystal growths. ALBERT L. HENNE

The physical state of water bound by organic colloids and by the tissues. N. MARINESCO. *Compt. rend. soc. biol.* 103, 872–5(1930). *Physiol. Abstracts* 15, 274.—The hydrophil coeff. (no. of g. of water dielectrically satd. and adsorbed per g. of colloid) is 15 with dog hemoglobin, 11–13 with egg albumin and 8–10 with gelatin. The coeff. is lowest at the isoelec. point. The micelles of a hydrophil colloid are formed mainly of water, of which only a small part is free in an animal organism. The water in a colloid is not only fixed but compressed. During swelling of colloids heat is given out, which is a measure of the compression. G. G.

Properties of protein-cellulose membranes. LÉON VELLUZ AND JEAN LOISELEUR.

*Compt rend* 192, 306–8(1931).—The prepn of these membranes, which consist of solid solns. of proteins in cellulose esters, is given in *C A* 25, 1723, 1861. That the membranes are very homogeneous is shown by their even staining with dyes. When treated with a soln. of an Au salt and a reducing agent the Au is pptd. in colloidal form in the membrane which then appears red brown by reflected and deep blue by transmitted light. Each component of the membrane retains its particular properties. The cellulose ester being insol. in $H_2O$ and inert, plays a purely mechanical or static part, but the protein through its activity confers on the membrane properties that make it comparable to a certain degree with natural cell membranes. L. E. GILSON

**Certain observations on the Donnan equilibrium.** A. RONCATO. *Boll. soc. ital. biol. sper.* 5, 1103–6(1930).—Isoelec. gelatin was dissolved in 1% concns. in 0.01 *M* to 0.001 *M* solns. $NH_4Cl$ corresponding to $p_H$ 5 to 6.5 and placed in collodion sacs. The H ion concn. of the internal liquid was greater than that of the external, with 0.001 *M* $NH_4Cl$ the difference in $p_H$ between the external and internal liquid was 0.40; with concd. solns. of $NH_4Cl$ approaching the $p_H$ of isoelec. gelatin (4.7), this difference was not so marked. The membrane potential found corresponded to the calcd. theoretical value. If *M*/100,000 to *M*/1,500,000 HCl was used instead of $NH_4Cl$, although the $p_H$ values of the solns. were similar the difference in $p_H$ on both sides of the membrane was markedly less than that of the corresponding $NH_4Cl$ soln. The supposition is made that $NH_4OH$ and HCl, the products of hydrolysis of $NH_4Cl$ reciprocally influence each other, and being simultaneously present change the Donnan equil. which would have been reached had only one of these products been present. The *production of HCl in the stomach* might be interpreted as the result of a concn. of HCl in the interior of the gastric cells brought about by a state of Donnan equil. reached in the presence of $NH_4Cl$. PETER MASUCCI

**Adsorption of ions and sols by freshly prepared precipitates and its influence on the formation of Liesegang rings. II.** A. C. CHATTERJI AND S. C. VARMA. *Z. anorg. allgem. Chem.* 196, 247–56(1931). cf. *C A* 23, 5380.—No adsorption of $CrO_4''$ by $PbCrO_4$ takes place during formation of the latter. However, adsorption of $PbCrO_4$ sol by well-washed $PbCrO_4$ occurs. This adsorption, in the presence of gelatin, is a function of the gelatin concn., it approaches zero at higher gelatin concns. This explains why it is difficult to prep. $PbCrO_4$ rings in such gelatin gels. FRANK URBAN

**Evidence in favor of the existence of silver chromate in gelatin in the colloidal condition. Electric conductivity of silver chromate in gelatin.** A. C. CHATTERJI AND S. C. VARMA. *Proc. 15th Indian Sci. Cong.* 1928, 142–3.—Bolam and Mackenzie (*C A*. 20, 2772) contest the conclusion of Chatterji and Dhar (*C A* 19, 3191) that $Ag_2CrO_4$ exists in the colloidal condition when pptd. in gelatin and maintain that it exists in the ionic state. Expts. were undertaken to det. accurately the elec. cond. of $Ag_2CrO_4$ of different strengths in gelatin of varying concns. at 35°. The $Ag_2CrO_4$ was produced by the addn. of equiv. quantities of $AgNO_3$ and $K_2CrO_4$. The results (not given) confirm the earlier conclusions. From a study of the results of B. and M.'s e. m. f. detns. C. and V. point out that, except in a very few cases, not more than 40% of Ag exists in the ionic condition. Expts. were also undertaken to det. the elec. cond. of $PbCrO_4$ in agar agar soln. E. J. C.

**Kinetic study of Liesegang rings.** L. BULL AND SUZANNE VEIL. *Compt. rend.* 192, 682–3(1931). cf. *C A* 25, 1142.—The speed of formation of both primary and secondary rings varies as the square root of time. Primary rings form first but the secondary rings, forming more rapidly, finally extend beyond the primary. D. B.

**Diffusivity of colloids—a method of determining the diffusion velocity of very slowly diffusing substances, based on a new measuring principle.** H. R. BRUINS. *Rec. trav. chim.* 50, 121–8(1931).—An interferometer method was developed for measuring the speed of diffusion in colloidal solns., by which diffusion consts. 0.01 of those of *the common electrolytes can be measured in 2 days. With a 0.7% starch sol, the results* obtained were reproducible within 1 to 2%, and agree with the diffusion law. J. H. REEDY

**The diffusion of colloidal particles. I. Abnormally high diffusion velocities in hydrophilic sols.** H. R. BRUINS. *Kolloid-Z.* 54, 265–72(1931); cf. preceding abstr.—Diffusion velocities were detd. by the optical method at 20° for a wheat starch, unknown source, I, wheat starch, Merck *amylum solubile*, II, wheat starch, Huron Milling Co., III and gum arabic, 6% ash on dry basis. The velocities and radii of particles calcd. by the Einstein equation are, I, diffusion velocity $0.024 \times 10^{-6}$ sq. cm./sec., radius 8.2 mμ, II, $0.10 \times 10^{-6}$, 1.9; III, $0.15 \times 10^{-6}$, 1.4, gum arabic $0.25 \times 10^{-6}$, 0.85. The low calcd. radii are not compatible with the viscosity and slight diffusivity through membranes shown by the sols. Measurements on the lowering of the b. p. indicate that the

effect is not due to electrolytes. II. A new ion effect in hydrophilic sols. *Ibid* 272–8.—The diffusion velocity of hydrophilic colloids decreases extraordinarily in the presence of low concns. of electrolytes, as shown for wheat starch III, and gum arabic. Expts. in 0.1 *N* solns. of KCl, $BaCl_2$, and $Co(NH_3)_6Cl_3$ showed that the lowering increases with increase in valence of the oppositely charged ion. For a given ion the lowering decreases with increase in valence of the like charged ion, the negative ion in this case. Gum arabic showed the following diffusion velocities times $10^6$: no electrolyte 0.225; 0.001 *N* KCl 0.078; 0.001 *N* $K_2SO_4$ 0.030; 0.001 *N* $K_4FeC_6N_6$ 0.0244; and 0.001 *N* $K_3FeC_6N_6$ 0.0172. The relative lowering is greatest in the dil. electrolyte solns., but the selective effect of the ions is noticeable at 0.020 *N* solns. ARTHUR J. EISCHER

**Note on the Röntgen diagram of collagen.** (Fiber period.) R. O. HERZOG AND W. JANCKE. *Z. physik. Chem.* Abt. B 12, 225–9(1931); cf. *C. A.* 21, 1213, K. Herrmann *et al.*, *C. A.* 25 [illegible]. The value for the fiber period, about 20 Å. U., for collagen and elastin earlier obtained by H. and J. has been questioned by H. *et al.*, on the basis of their work on gelatin which indicates a value of about 9.5 Å. U. H. and J. emphasize the fact that their preps. from stretched neck ligaments and heel tendons of cattle give much clearer diagrams than they could obtain from stretched gelatin. H. and J. obtained sin θ/2 values of 0.107, 0.191 and 0.270. H. finds values agreeing with the first and the third but then considers only the first value in arriving at a fiber period of 9.5 Å. U. OLEN J. SHEPPARD

**Swelling and syneresis of isoelectric gelatin jelly.** E. J. BIGWOOD AND R. MAJMIN. *Compt. rend. soc. biol.* 104, 815–8; *Physiol. Abstracts* 15, 364(1931).—The swelling of gelatin jelly depends on the total concn. of the protein in the setting liquid and the amt. of free and combined ions in the medium. The jelly consists of a solid reticular phase and a liquid interstitial phase. The elasticity of the former is opposed by the osmotic pressure of the latter. The salts influence the distribution of the protein in these 2 phases at the moment of setting, the protein passing more freely into the reticular phase at low ionic concn. and *vice versa*. In the latter case swelling of the gelatin occurs at lower concns. of gelatin. Curves of swelling made for blocks of jelly in acetic-acetate soln.—the same medium as the solvent—of different strengths and at *p*H 4.8 and temp. 11° to 14° show that there is a crit. value of gelatin concn., for which there is no change of vol. in the blocks. A 3% jelly swells at *N*/5 concn. of ions, does not change at *N*/50 and shrinks at *N*/500. G. G.

**Swelling and hydration of gelatin.** J. H. NORTHROP AND M. KUNITZ. *J. Phys. Chem.* 35, 102–34(1931).—A phase rule treatment of gelatin sols or gels adequately accounts for the various types of swelling characteristic of these sols. On the assumption that the gelatin-water system consists of 2 phases and 3 components, satisfactory explanations are obtained for the curves of osmotic pressure vs. concn. in g. per 100 cc. $H_2O$, the various viscosity and hydration effects and finally the swelling and syneresis of isoelec. gelatin. A detailed picture of the gelatin micelles is deduced from the exptl. properties of the sols. H. R. MOORE

**Hydrolysis of gelatin.** B. N. DESAI AND T. R. BOLAM. *Proc. 15th Indian Sci. Cong.* 1928, 144.—The effect of the hydrolysis of gelatin on its power to prevent the formation of Ag $CrO_4$ from solns. of $AgNO_3$ and K $CrO_4$ was studied. It was found that the inhibitive power of gelatin first decreases, then increases and on further hydrolysis again decreases. The *p*H of the gelatin solns. (as measured by the colorimetric method) is increased to a small extent by hydrolysis and shows little variation with the progress of the latter. By bringing the *p*H of hydrolyzed gelatin to that of unhydrolyzed by the addn. of dil. AcOH the inhibitive power of hydrolyzed gelatin is in no way increased, although the addn. of the same quantity of AcOH to the unhydrolyzed gelatin increases its inhibitive power a great deal. E. J. C.

**X-ray study of the gelatinization of nitrocellulose.** DESMAROUX AND M. MATHIEU. *Compt. rend.* 191, 787–8(1930).—X-ray diagrams were obtained and described for films of nitrocellulose which contain various gelatins such as cyclohexanone, nitroglycerin and acetophenone. MALCOLM DOLE

**Spectrochemistry of solutions of boric acid in glycerol.** MORELLO MORELLI. *Atti accad. Lincei* 12, 451–6(1930).—The refractive indexes of solns. of $H_3BO_3$ in glycerol for the α, β, γ-lines of $H_2$ as well as *D* line of Na were detd. for concns. from 1 to 20% $H_3BO_3$ at 20°. The sp. refractivities $(n-1)/d$ and $\frac{(n^2-1)}{(n^2+2)d}$ were calcd., the sp. grs. of the solns. were also detd. The refractivity decreases with increasing concn., and is greater than in equiv. water solns. When $H_3BO_3$ is dissolved in glycerol there is an increase in vol. of the soln., amounting to 1.883 cc. at 20% concn. (vol. of 100 g. soln. calcd. 78.006 cc., measured 79.889 cc.). A. W. CONTIERI

**Reducing action of sodium upon salts in liquid-ammonia solution.** WAYLAND M. BURGESS AND EDWARD H SMOKER *Chem Reviews* 8, 265–72(1931), cf *C A* 24, 5218 Examples are given of the reduction of inorg salts by Na in liquid $NH_3$ Three types of reaction are illustrated (1) the reduction product is the free metal, *e g*, Ag salts are reduced to Ag by Na in liquid $NH_3$ (2) the reduction product is an intermetallic compd *e g* Na reacts with $Zn(CN)_2$ to form a black metallic ppt which appears to be $NaZn_4$ (3) the reduction product takes part in addnl reactions, *e g*, in the reaction of Na with MnI the free Mn formed not only catalyzes the reaction between Na and $NH_3$ but also appears to react with the $NaNH_2$ formed L K

**Properties of solutions of metals in liquid ammonia.** WARREN C JOHNSON AND ALBERT W MEYER *Chem Reviews* 8, 273–301(1931) cf *C A* 24, 1270 —A discussion of (1) the soly of the alkali metals in liquid $NH_3$ (2) mol wt detns of metals in $NH_3$ and (3) the densities activities and elec and photoelec properties of such solns LOUISE KELLEY

**Acid-base equilibria in non-aqueous solvents with particular reference to glacial acetic acid.** NORRIS F HALL *Chem Reviews* 8, 191–212(1931) —In acid base equilibria solvents may be roughly classed as predominantly acidic (*e g*, AcOH), predominantly basic (*e g*, $NH_3$ and amines) amphiprotic (*e g* $H_2O$) or aprotic (*e g*, $C_6H_6$) Acid base reactions in solvents of these 4 classes are discussed LOUISE KELLEY

**The solubility of mercuric bromide in ethyl alcohol.** KISHEN LAL AND H B DUNNICLIFF *Proc 15th Indian Sci Congr* 1928, 168 —The values found by the method of Chugaev and Khlopin (*C A* 8, 1897) are consistently higher than those recorded by Timofeiew No further information is given F J C

**The solubilities of lanthanum oxalate and of lanthanum hydroxide in water The mobility of the lanthanum ion at 25°.** I M KOLTHOFF AND RUTH LAUQUIST *J Am Chem Soc* 53, 1217–25(1931) — Cond measurements of $LaCl_3$ solns gave a mobility of 77 at 25° for La ion (Cl ion 75 8) A colorimetric method for the *detn of traces of La* using Na alizarinate is described The soly of $La_2(C_2O_4)_3$ at 25° detd volumetrically is 2 08 ± 0 03 mg per l The cond method gave 0 6 0 mg, which is low because of dissocn of the dissolved oxalate The soly of the oxide and of the aged hydrous oxide was detd at 0 7 mg of $La_2O_3$ per l at 25° The cond and volumetric methods agreed within 10% J E SNYDER

**Solubility of acids in salt solutions. IV. The solubility of benzoic acid and the activity coefficient of its molecules in aqueous benzoate solutions.** ERIK LARSSON *Z physik Chem*, Abt A, 153, 299–308(1931) cf *C A* 24, 4689 —The soly of benzoic acid in solns of LiCl, RbCl CsCl, $MgCl_2$ KBr, KI, $LiNO_3$, $NaNO_3$, $KNO_3$, the chlorides and nitrates of Ca, Sr, Ba, $NaClO_4$ Na dichloroacetate, Na trichloroacetate, Na benzene sulfonate and Na β naphthalenesulfonate were detd The activity coeffs of the benzoic acid mol are calcd **V. Temperature coefficient of the activity coefficient of benzoic acid molecules in solutions of sodium chloride, potassium chloride and sodium benzoate.** *Ibid* 466–70 —The soly of benzoic acid was detd in KCl and NaCl solns at 0 2° and 25°, in Na benzoate soln at 25° The activity coeffs of the benzoic acid mol were calcd I U

**The solubility and activity of silver benzoate and silver acetate in concentrated salt solutions.** ERIK LARSSON AND BIRGER ADELL *Z. anorg allgem Chem* 196, 354–63 (1931), cf *C A* 21, 3290L—The soly of AgOBz in solns of Na, K and Ba nitrates and of NaOAc and the soly of AgOAc in solns of $NaNO_3$, and NaOAc were measured In each case except AgOAc in NaOAc soln the soly of the Ag salt increases with increased concn of the other salt Calcns of the av activity coeff of these Ag salts in salt solns show that the dependence of the activity coeff upon the 'ionality' of the soln can be computed by means of the Debye Huckel formula, $-\log f = \frac{0.5\sqrt{\mu}}{1+A\sqrt{\mu}} + B\mu$, by choosing values of suitable magnitude for the consts $A$ and $B$ ($f$ = the average of the activity coeff of the 2 ions, $\mu$ = 'ionality') W C FERNELIUS

**Determination of the molecular weight of cane sugar by the vapor-pressure method.** S OGURI, M MATSUI S SHIMIZU AND G MONYA *Rep Tech Chem Lab, Waseda Univ* 1928, No 8, 6, *Mem Faculty Sci Eng Waseda Univ* 1930, No 7, 93 6 —The mol wt of cane sugar was detd by passing dry air through a soln of known concn and pure water, and noting the decrease in wt of each L W T. CUMMINGS

**The lowering of the vapor pressure of water by dissolved electrolytes.** J J. VAN LAAR *Proc Acad Sci Amsterdam* 33, 1140–60(1930) —Existing data are shown to agree with the general formula $(p_0-p)/p_0x = \iota - \varphi x^{1/3} + \rho x - \sigma x^{3/2}$, where $x$ denotes mol fraction concn, $\iota$ van't Hoff's factor (*e g*, $\iota = 2$ for a binary electrolyte) and $\varphi$ a const that can be calcd from the theory of Debye and Huckel (*e. g*, approx 5 for a

univalent binary electrolyte), while $\rho$ and $\sigma$ are individual consts. for the electrolyte in hand. Eventual assocn of the water has no effect on $s$ and $\sigma$, it can only affect the consts $\rho$ etc. L. Onsager

**The measurement of the conductance of electrolytes. IV. The validity of Ohm's law for electrolytes.** Grinnell Jones and Giles M Bollinger. *J. Am Chem. Soc.* 53, 1207–12(1931), cf *C A* 25, 1725.—If errors due to heating, polarization and the secondary effects of inductance and capacitance are avoided, there is no measurable variation in the real resistance of electrolytes with variation in the applied voltage. The applied voltage was varied from 0.01 to 5 v. John R. Hill

**The mechanism of ion conductivity.** Zoltán Gyulai. *Matematik. és Természettud. Értesito* 47, 770–7. German abstract 778(1930).—A soln of $PbCl_2$ contg 0.005 parts KCl does not follow the law of Ohm in an elec. field of 0–100 v./cm. elec. strength. The law of Ohm becomes valid in fields of larger elec. strength or in a soln. of pure $PbCl_2$. Movable K ions probably increase the cond. because of their contrary charge. They are thrown away in elec. charged fields and leave their former place. Addn. of $BaCl_2$ to PbCl soln. did not cause such irregularity. Disturbance can be caused only by an ion whose contrary charge can loosen the ions that conduct the current. S. S. de F.

**The transference numbers of potassium chloride. New determinations by the Hittorf method and a comparison with results obtained by the moving-boundary method.** Duncan A MacInnes and Malcolm Dole. *J Am Chem Soc* 53, 1357–64(1931).—Transference nos. for KCl were detd. at 25° for the concn range 0.02 to 3 *N* by a slightly modified Hittorf method. The results agree with new values obtained by the moving-boundary method but they do not agree with old data obtained by either method. Malcolm Dole

**The electrical conductivity at high temperatures of solutions of common salt and of concentrated sulfuric acid.** I. J Symon. *J Roy Tech Coll.* (Glasgow) 2, 395–401 (1931).—Measurement of the elec. cond. of aq. solns. of NaCl for concns. up to 1.13% and for temp. from 10° to 230° are described. Above 100° the solns. were necessarily under a pressure which rose to about 400 lb. per sq. in. at 230°. The cond. of $H_2SO_4$ from 94 to 99% was also measured for the temp. range 15–50°. Values given in the Smithsonian Tables (1920) for a few dil. solns. of NaCl may be in error by about 4% at 100° and 17% at 218°. A. L. Kibler

**The influence of sucrose on the conductivity of electrolytes.** J Peller. *Listy Cukrovar* 49, 346–52(1931).—The elec. conductivities of 0.01 *N* HCl, 0.01 *N* $H_2SO_4$, 0.01 *N* KOH, 0.01 *N* $Na_2CO_3$, 0.01 *N* $NH_4Cl$, 0.01 *N* $CaCl_2$ and 10% AcOH were measured in the presence of 0, 5, 10 and 15% sucrose. Sucrose decreased the dissocn. of the electrolytes and hence the cond.; the decrease in elec. cond. was proportional to the sucrose present, ranged from 8 to 67%, and appeared smallest for the highly dissocd. acids and alkalies. The order of decreased cond. was HCl<$H_2SO_4$<$CH_3COOH$<$Na_2CO_3$<KOH. Alkalies formed a compd. with sucrose and decreased the Con. The depression of elec. cond. in salts increased with the valence; $NH_4Cl$, KCl, and NaCl were least affected ($CaCl_2$ and $Na_2CO_3$ more) by the presence of sucrose, the depressions of elec. cond. for the salts were greater than for the corresponding acid of equal concn. Salts of $NH_3$ were not affected in direct proportion to the sucrose addn.; the addn. of an aq. sucrose soln. to $NH_4OH$ increased the elec. cond., the max. cond. was reached with 16% sucrose, the original cond. was reached again with 36% sucrose and for further increased sucrose concns., the cond. continued to fall. AcO$NH_4$ and $(NH_4)_2CO_3$ decreased the elec. cond. for all sucrose concns. but not in a direct proportion to the sucrose concn. The decrease in elec. cond. for mixts. of salts with dil. sucrose showed KOH>KOH+KCl>KCl>KCl+HCl>HCl. In the presence of 50–80% sucrose the elec. cond. decreased in the order KOH<$CaCl_2$<$Na_2CO_3$<$NH_4Cl$<AcOK<HCl, dehydration by the sucrose is the cause for the reversal. The dielec. const. of sucrose (55) is high and decreased the dissocn. of, particularly, the weaker acids, this decrease was only a portion of the total decrease in elec. cond. An increased viscosity, hydration of the ions, of the electrolytes, assocns. of sucrose mols., or of their hydrates and a decreased ionic mobility are the causes of the remaining decrease. Chem. combinations may occur between sucrose and KOH, $Na_2CO_3$ or $NH_3$. Frank Maresh

**Aqueous solutions of sodium aluminate. I. Electrical conductivity.** Mata Prasad, S M Mehta and N G Joshi. *J Indian Chem Soc.* 7, 973–80(1930).—The Kohlrausch method was used to measure the elec. cond. of solns. contg. various ratios of $Na_2O$ to $Al_2O_3$. For dil. solns. no conclusion can be drawn as to the existence of aluminates. In concd. solns. a sharp change in equiv. cond. at a ratio of 3 to 1 is interpreted as indicating the formation of $Na_3AlO_3$ in soln. E J Rosenbaum

**Electrical conductivities of mercury amalgams of potassium and sodium.** G. R.

PARANJPE AND BUHARIWALA *Proc 15th Indian Sci Cong* 1928, 74.—The results (not given) of these detns indicate that in the elec cond curves the discontinuities do exist at the same places as those measured by Bhave in the viscosity curve. This also corroborates the discontinuities measured by Bhatnagar and others as regards other phys properties. E J C

**Neutral salt effect in ion reactions. IV. The specific ion effect.** Á. DE KISS AND I BOSSÁNYI *Acta Sci Univ Francisco Iosephinae, Acta Chem., Mineral., Physica* 1, 59–68(1929); cf *C A* 24, 5582.—Neutral salt effect between persulfate and I ions was examd and data contrary to the theory of Brønsted were again obtained as found previously in concd solns. A theory is advanced in explanation. S S DE FINÁLY

**The boundary layer of dilute electrolytes. II.** MAX PLANCK *Sitzb preuss Akad Wiss* 1931, 113–22; cf *C A* 24, 4979.—The e m f at a liquid junction should slowly change with time from that given by Henderson's formula to that of Planck. The former represents a mixt., the latter a stationary state. Since expt does not confirm this, another formula is presented which has a different concn gradient in the original boundary layer. This shows better agreement with expt. G M M

**The electrocapillary curve of mercury.** K BENNEWITZ AND K KÖCHLER. *Z. physik Chem.*, Abt A, 153, 443–50(1931).—The potential of an isolated dropping electrode may differ from that of a shorted electrode. Nevertheless, the existence of an inversion point at 0.5 v was again demonstrable. The addn of $KNO_3$, KOH, KBr, KI, $H_2S$, KCN and KSH caused considerable displacement of the curve. A change in the direction of current flow occurred at the max. The latter does not necessarily indicate a true zero point. FRANK URBAN

**The advances in the potentiometric determination of hydrogen ions.** V ČUPR. *Chem Listy* 25, 79–83, 104–107(1931).—The H, Sb, glass, $O_2$ and oxidation-reduction electrodes are reviewed. Bibliography of 60 references. FRANK MARESH

**Rapid electrometric determination of $p_H$.** J DI GLÉRIA *Mezogazdasági Kutatások* 2, 439–40(1929).—The value of $p_H$ is read directly on a measuring wire with the aid of a regulable rheostat. S S DE FINÁLY

**Hydrogen-ion concentration.** G SCHAY *Kisérlet Közlemények* 31, 187–222 (1928).—A general description. S S DE FINÁLY

**The use of the antimony-antimonous oxide electrode in the determination of the concentration of hydrogen ions and in potentiometric titrations. The Prideaux-Ward universal buffer mixture.** HUBERT T. S BRITTON AND ROBERT A ROBINSON *J. Chem Soc* 1931, 458–73.—The Sb-$Sb_2O_3$ electrode possesses a wide range of applicability in titrimetric work and can rapidly indicate $p_H$ values with a moderately high degree of accuracy. Electrodes made up with various types of Sb and $Sb_2O_3$ were studied. Those found most satisfactory consisted of a clean bar of Sb dipping into a soln contg suspended $Sb_2O_3$. Vigorous mech stirring was necessary to obtain steady potentiometric readings. The electrode was calibrated as follows. To 100 cc of Prideaux-Ward universal buffer mixt (*C A* 18, 1602) was added 0.2 *N* NaOH so that the soln passed continuously through a range of $p_H$ values from 2 to 12. The $p_H$ values were first obtained with a H electrode and with a quinhydrone electrode up to $p_H$ 9.1. A similar titration was then carried out with the Sb electrode and the e m fs thus obtained were converted into the corresponding $p_H$ values. A *N* calomel electrode was used as the half cell and the junction was made with satd KCl. A series of titrations of acids and salts, some of which could not be used with a quinhydrone or H electrode, *e g*., HCN and $H_2SO_3$, was carried out with the Sb electrode and the dissocn consts were detd where possible. In general, the $p_K$ values agreed well with those of other workers. The titration curve of $H_2TeO_4$ shows that it is a dibasic acid as opposed to the hexabasicity required by the formula $H_6TeO_6$. With $H_2SeO_3$ and $H_2SeO_4$, the $p_{K_2}$ values were in good agreement with those of other workers, but the $p_{K_1}$ values could not be detd., probably because of a reaction of the Sb with the acid. The e m fs obtained in the titration of $H_2CrO_4$ with alkali were not reproducible, in some cases the polarity of the cell being reversed. The Sb electrode was also found applicable in the titration of $NaN_3$ with HCl and the $p_H$ values were correct as far as can be judged from previous data. RUTH BERGGREN

**Electrolytic reduction of dicarboxylic acids.** HISAKAZU NAKATA *Anniversary Vol Dedicated to Masumi Chikashige* (Kyoto Imp Univ.) 1930, 49–55.—The electrolytic reduction of oxalic acid was studied in detail and the investigation was extended to malonic and succinic acids. Electrolysis of oxalic acid at 5–7° yields glyoxylic acid as well as substances more highly reduced. On prolonged electrolysis some glyoxylic acid undergoes further reduction, the yield decreasing from 89% in the second hr to 37% in the 6th hr. The presence of HCHO could not be recognized in the cathode soln. The presence of

dihydroxytartaric acid could not be positively confirmed At 60°, the current efficiency decreases but the yield of glycolic acid increases The yield also increases directly with acid concn The influence of the cathode material is very marked at higher temps Hg is most suitable for obtaining glyoxylic acid, and Pb for glycolic acid It was possible to raise the current and material yield to approx 100% by decreasing the c d to approx 4 amp per sq dm with a Pb cathode Under various conditions no reduction could be recognized in the electrolysis of malonic and succinic acids ALLEN S SMITH

**Interaction between hydrated copper oxide and neutral salt solutions.** M P VENKATARAMA IYER *Proc 15th Indian Sci Cong* 1928, 170–1 —Hydrated Cu oxide thoroughly purified by repeated washing and subsequent electrodialysis to remove the last traces of alkali is found by electroosmotic measurements to be pos charged in contact with cond water It develops appreciable quantities of alkali when shaken with solns of neutral salts The $p_H$ developed depends upon the effect of the anion and not very much on the cation used The variation of the elec charge of the substance with various electrolytes can be correlated with the $p_H$ measurements The total quantity of alkali liberated by repeated shaking of a given quantity of the sample with KCl and $BaCl_2$ was found to be a const quantity The $p_H$, after attaining the value 7 6, remains const on subsequent shaking with KCl The sample of the hydrated Cu oxide was shown to absorb alkalies by measurements of the elec cond of the alkali soln before and after adsorption The results obtained strongly support the theory of the nature of the interface put forward by Mukherjee F J C

**The reduction of manganese oxides by carbon monoxide.** TSUNEO NISHIBORI *Anniversary Vol Dedicated to Masumi Chikashige* (Kyoto Imp Univ ) 1930, 295–8 —The chem equil of the reduction of $Mn_2O_3$ and MnO by CO was investigated The equil const of the reaction at 780° was detd in various stages of reduction In earlier stages of reduction the CO added was oxidized completely to $CO_2$ because of the high decompn pressure of the $Mn_2O_3$ In the stage of reduction before MnO the ratio $[CO_2]/[CO]$ suddenly decreased but the reduction could be followed beyond MnO The latter yields on reduction a substance of strong reducing power capable of reducing $H_2SO_4$ to $H_2S$ ALLEN S SMITH

**The mechanism of the oxidation of acetaldehyde and of hydrocarbons.** MAX BODENSTEIN *Z physik Chem*, Abt B, 12, 151–64(1931), cf *C A* 25, 2088.— The reaction scheme for the oxidation of hydrocarbons, previously discussed with reference to AcH, is applied to the oxidation of $C_2H_2$ (cf *C A* 25, 1147) This is a more favorable example since the intermediate reactions lead to 3 different products The expts agree with the theory except in 2 cases where the concn of the reacting gases was very small The theory is also discussed with reference to explosion phenomena that take place in motors C M MURPHY

**Dissociation constants of nitrogen tetroxide and of nitrogen trioxide** FRANK H VERHOEK AND FARRINGTON DANIELS *J Am Chem Soc* 53, 1250–63(1931) —The dissocn const for gaseous $N_2O_4$ and the influence of pressure were measured at 25°, 35° and 45° The const is proportional to the pressure and is 13% greater at 0 1 atm than at 1 atm , the const is unaffected by $O_2$ or $CO_2$ The dissocn const of $N_2O_3$ was measured at 25°, 35° and 45° at different pressures The influence of pressure on the equil consts is due to deviation from the gas laws The true equil consts were detd by extrapolation to zero pressure $\Delta F$, $\Delta H$ and $\Delta S$ are calcd The dissocns proceed according to $N_2O_4 \rightleftharpoons 2NO_2$ and $N_2O_3 \rightleftharpoons NO + NO_2$ S LENHER

**Heterogeneous equilibria between the sulfates and nitrates of sodium and magnesium and their aqueous solutions.** MOHAMMAD A HAMID AND AMBA PARSHAD *Proc 15th Indian Sci Cong* 1928, 169 —The quaternary system $H_2O$—$Na_2SO_4$—$NaNO_3$—$MgSO_4$—$Mg(NO_3)_2$ has been investigated at 25° In addn to the solid phases in the ternary systems at this temp , a new surface appears in the quaternary system which probably represents the satn field of the lower hydrate or hydrates of $MgSO_4$ I J C.

**Role played by adsorbed gases in initiating reaction chains combination of hydrogen and oxygen.** HUBERT N ALYEA *J. Am Chem Soc* 53, 1324–36(1931) —The adsorption of H on glass increases above 450° Adsorbed H initiates reaction chains extending into the gas phase at 500° Cf Alyea and Haber, *C A* 25, 635 S L

**Are resonance phenomena possible in physical chemical periodicity?** N RASHEVSKY *Z Physik* 65, 270–2(1930), cf *C A* 23, 1041 —"Phys chem resonance" is suggested as a possible result of the interaction of 2 periodic reactions such as are assocd with certain nerve phenomena A math treatment yields amplitude equations that are formally identical with corresponding equations applying to elec and mech systems W G LEIGHTON

**Chemical activity and particle size: rate of solution of anhydrite below 70 microns.** PAUL S ROLLER *J Phys Chem* 35, 1133–42(1931).—The soln curves of 6 homogeneous size groups of cryst anhydrite of surface mean diam of 1 96 to 66 9 microns were detd by cond measurements There is an induction period of 0 1 min Below 25 microns the relative rate of soln per unit surface increases to a max of 17 6 at 2 8 microns and then decreases until at 1 96 microns it is 11 6 The soly of natural cryst anhydrite in $H_2O$ is 0 298 g $CaSO_4$ 100 cc at 20° S LENHER

**Statistical treatment of reaction-velocity data. II.** L J REED AND E J THERIAULT *J Phys Chem* 35, 950–71(1931) cf *C A* 25, 2354.—A statistical treatment applicable to unimol rates of reaction is developed This procedure makes it unnecessary to det experimentally the value of $L$ in the unimol formula, $K = [1/(t - t_0)] \ln[(L - 1_0)/(L - 1)]$ $1_0$ and $t_0$ need not be accurately known The usual methods of calcg unimol consts is criticized The least squares values of the velocity consts of decompn of $N_2O_5$ differ by 0 5 to 12 0% from values of Daniels and Johnston The least-squares procedure should be used when a velocity const is detd within an allowable error of 5% S LENHER

**Kinetics of transformation of the various forms and stages of hydration of calcium sulfate.** WALTER FEITKNECHT *Helv Chim Acta* 14, 85–90(1931).—A comparison of Debye Scherrer diagrams indicates that $CaSO_4 2H_2O$ loses water with a change in lat tice, to form a pseudomorph composed of disperse crystals of $2CaSO_4 H_2O$ between $10^{-4}$ and $10^{-6}$ cm diam. (cf Jung *C* 1 19, 1386) With respect to time, the dehydration of pptd $CaSO_4 2H_2O$ *in vacuo* passes through an induction period which at 20°, persists several hrs without appreciable water loss, although the normal aq tension is 12 7 mm. This suggests that dehydration sets in at isolated centers from which the process slowly spreads The further dehydration of $2CaSO_4 H_2O$ to form sol anhydrite proceeds and may even be reversed, without disintegration of the crystals There is an accompanying change in most of the weaker D S lines Partially dehydrated samples yield intermediate diagrams that do not show the two end lattices superimposed It is concluded that the diffusion of water out of the semi hydrate lattice causes contraction without changing the orientation In effect the semi hydrate is analogous to the zeolites, as pointed out by Linck and Jung (*C A* 18, 3566) The polymorphous transition from *sol* to *natural anhydrite* is appreciable only above 300°, although sol anhydrite is the unstable form Here the transition consists of an abrupt change in the lattice, leading at first to a disperse product and followed by a growth in particle size at high temp. The latter fact explains the inertness of dead burned *gypsum* W G LEIGHTON

**The kinetics of the oxidation of copper. The establishment of sorption equilibria.** F J WILKINS *Phil Mag* 11, 422–32(1931), cf *C A* 24, 2365, 5208.—The quant treatment of the reaction kinetics of Cu oxidation by considering oxidation when the oxide O interface is not satd., yet in equil with the gas phase, leads to the equation $(p_0 - p)^2 = |\alpha[p_0(\ln(p_0/p) - 1) + p]/(p_0 - p)^2| + \beta$, where $p_0$ is the initial O pressure, $p$ the pressure at time $t$ and $\alpha$ and $\beta$ are consts. For a series of expts below the limiting pressure the curves are strictly linear after an initial deviation The time at which linear behavior is reached increases with the no of activations of the Cu This is readily interpreted if activation increases the surface and it is assumed that adsorbed O is able to diffuse laterally ARTHUR FLEISCHER

**The measurement of hydrolysis in beryllium halide solutions.** MILDA PRYTZ. *Z anorg allgem Chem* 197, 103–12(1931), cf *C A* 23, 5086.—$BeBr_2$ and $BeI_2$ were titrated electrometrically with NaOH at a series of water concns. and the data obtained were used to calc the hydrolysis const Although no true const was found the best value was that which corresponds to $2Be^{++} + H_2O = Be_2O^{++} + 2H^+$. The assumption previously made that a monohydroxy ion is primarily formed which passes into a stable double compd was confirmed The av values of $K_0$ found were $5\,9 \times 10^{-7}$ and $4\,4 \times 10^{-7}$ for bromide and iodide, resp The soly products for $Be(OH)_2$ were then calcd as $2\,7 \times 10^{-19}$ and $3\,3 \times 10^{-19}$ as compared to $4\,1 \times 10^{-19}$ previously obtained from BeCl. R H. LAMBERT

**The hydrolysis of acetic anhydride. I. Hydrolysis of acetic anhydride in presence of neutral salts.** J E KOCSIS. *Magyar Chem Folyóirat* 37, 41–9(1931).—Chlorides, nitrates, chlorates and bromides diminished but sulfates increased the velocity of hydrolysis. The salt influence law of Grube and Schmid (*C A* 20, 1548) can be applied to the hydrolysis of anhyd HOAc S S. DE FINÁLY

**Interaction of epichlorohydrin and cyclohexene oxide with alkali and ammonium halides.** HEMENDRA K. SEN, CHITTARANJAN BARAT AND PATIT P. PAL. *Proc. 15th Indian Sci Congr* 1928, 146–7, cf *C A* 21, 2668.—When these oxides act upon alkali and $NH_4$ halides a very interesting reaction takes place with the liberation of alkali

hydrazides and $NH_3$. In fact this can be shown as a lecture expt. With an excess of $NH_4Cl$ the velocity of reaction of epichlorohydrin (I) and cyclohexene oxide was detd. I : ratio 1 $NH_4Cl$ 1 mol 10 mols was used in the first expt. (0.925 g. I, 5.35 g. pure $NH_4Cl$ and 20 cc. pure abs. alc. were made up to 250 cc. with distd. water and placed in a thermostat at 35°. At 1 hr. intervals 10 cc. of the soln. was taken out, at once mixed with an excess of cold water and titrated with 0.01 *N* $H_2SO_4$). The velocity const. *K* after 1, 2, 3, 4 and 5 hrs. resp., = 0.2040, 0.1851, 0.1960, 0.2012, 0.2040, for the ratio 1 : 40 *K* after the same periods resp. = 0.5625, 0.5715, 0.5584, 0.5865, 0.6734. For the ratio 1 : 100 *K* = 0.9023 when the vol. of soln. is made up as described before, i. e., made up to 250 cc. If however the vol. is doubled and the same mol. proportion exists between the reactants *K* = 0.4437 when the vol. is quadrupled, *K* = 0.2442. Tables are given for the first 2 expts. (run in duplicate). F. J. C.

Solubilities in the system water, iodine to 200°. F. C. Kracek. *J. Phys. Chem.* 35, 417–22(1931). Water-I solns. above 112.3° form 2 liquid layers, the mutual soly. increasing with temp. At the invariant temp. the liquid layers contain 0.0517 and 99.3 mol. % I, resp. Below this temp. the solns. are satd. with solid $I_2$. The soly. curves were detd. to temps. above 200° by the use of the sealed tube method, by noting the temp. at which the last trace of the dissolving phase disappears. Invariant points were detd. by the method of thermal analysis. H. F. Johnstone.

Lowering of "ideal" eutectic temperature in *n*-component system. Keizô Iwasé and Noburu Nasu. *Anniversary Vol. Dedicated to Masumi Chikashige* (Kyoto Imp. Univ.) 1930, 223–7.—A math. treatment based on the equation of an "ideal" m.-p. curve which holds in all the cases in which the solvent and solute are completely indifferent to one another. $T = T^0_1/(1 - (RT^0_1/q_1) \log X_1)$, $X_1$ is the soly. of the component $s_1$ at temp. $T$, $T^0_1$ is its m. p., and $q_1$ is its heat of fusion. It is concluded that the eutectic point of *n* components is lower than the eutectic point of any *n* − 1 components. Allen S. Smith.

Melting points and saturation points of sodium thiosulfate and sodium sulfate by the conductivity method. Chetan Anand and Har Gobind. *Proc. 15th Indian Sci. Cong.* 1928, 173.—The method was applied to $Na_2S_2O_3$ and $Na_2SO_4$ in aq. solns. These salts have comparatively low m. ps., are highly sol. in water and can easily be obtained in the supersatd. condition. Therefore if transition occurs at the m. p. in the solns., it will be indicated on the graphs. Resistances of various solns. were measured over a range of temps. which went above and below the m. p. of the salts and the satn. points of the solns. The resistance-temp. graphs for $Na_2SO_4$ show at its m. p. (33°) a clear transition point for all concns. and also a second transition point at the satn. point which varies with the strength of the soln. The graphs for $Na_2S_2O_3$ give two transition points. The m. p. varies between 45° and 50° with different concns. The graphs are not given. E. J. C.

Binary systems. III. J. H. Kobrs and F. L. C. Schieffer. *Rec. trav. chim.* 50, 139–48(1931). *cf. C. A.* 25, 628.—A math. treatment of crystn. of binary compds. from their dissocd. products, gaseous and liquid. J. H. Reedy.

Thermal diagrams of the systems silver-strontium and silver-barium. F. Weibke. *Z. anorg. allgem. Chem.* 193, 297–310(1930).—A thermal analysis of the systems Ag–Sr and Ag–Ba was made. The following compds. with their m. ps. and $d_4^{15}$'s were found: $Ag_5Sr$, 781°, 7.985–.994; $Ag_2Sr_3$, 757°, 6.487–.496; $AgSr_2$, 680°, 5.695–.711; $Ag_2Sr_5$, 666°, 5.151; $Ag_5Ba$, 729°, 7.920–.930; $Ag_2Ba_3$, —, 6.693–.700; and $Ag_2Ba_5$, 648°, 6.597–.603. Evidence of the existence of $Ag_5Ba_2$ was also found. The temps. of the eutectics were: Ag-$Ag_5Sr$, 750°; $Ag_5Sr$-$Ag_2Sr_3$, 693°; $Ag_2Sr_3$-$AgSr_2$, 638°; $AgSr$-$Ag_2Sr_5$, 645°; $Ag_2Sr_5$-Sr, 436°; Ag-$Ag_5Ba$, 726°; and $Ag_5Ba$-$Ag_2Ba_3$, 679°. The m. p. of pure Sr is given as 757° ± 1. Exptl. difficulties did not permit the investigation of the Ag–Ba system for concns. of Ba above 60%. H. F. Johnstone.

X-ray study of the copper end of the copper-silver system. Roy W. Dreier. *Ind. Eng. Chem.* 23, 404–5(1931).—X ray examn. of various Cu samples indicates that Ag is not dissolved in the Cu. It is concluded that under ordinary room conditions Ag is not sol. in Cu. M. McMahon.

The system aluminum-silver. Enrico Crepaz. *Atti III congresso naz. chim. pura applicata* 1930, 371–9.—Using the method of thermal analysis the equil. diagram of the system Al–Ag was redetd. Three compds. are formed (*1*) $Ag_3Al$ at the peritectic temp. of 772° (the β form changes into the α-form at 609°), (2) $Ag_2Al$ at the peritectic temp. of 727° and (3) $Ag_2Al_3$ at the peritectic temp. of 698°. The compd. $Ag_2Al_3$ forms a eutectic with a solid soln. of Ag in Al at 567° and a concn. of 26.5% Al (in the text 39.5 is given which must be a mistake since the table and the diagram clearly indicate

26.5%). The soly of Ag in Al at the eutectic temp is given as 45% Ag as derived from microscopic observation of specimens annealed at various temps. for different lengths of time. At room temp the soly is less than 0.5% Ag. These Al rich alloys exhibit the phenomenon of age hardening. The soly. of Al in Ag at room temp. is 4.2%.

H. S. VAN KLOOSTER

A thermodynamic study of the equilibria of the systems: antimony-bismuth and antimony-lead. CHU PHAY YAP. *Inst. Metals Division, Am. Inst. Mining Met. Eng.* (preprint) 1931, 24 pp.—For a long time the Sb–Bi system has appeared to contradict the phase rule in that it has an anomalous solidus always obtained by cooling down from the melt. Otani, by means of the resistance method, showed that it was a normal solidus characteristic of completely isomorphous systems. Y. applied the thermodynamic laws of the depression of f. p. to the system in order to det. the cause of the anomalous solidus. The nonvariant crystn. is probably due to the formation of $Bi_2$, although Sb and Bi should normally be considered diatomic. The heats of fusion of Sb and Bi are calcd. to be 20.0 and 14.2 cal. per gram, which agrees with the most reliable exptl. values obtained by Umino. The Pb-rich end of the Sb–Pb system also was analyzed thermodynamically. In this range Sb is dissolved in molten Pb in the monatomic form, although it is normally dissolved in solid soln. in Pb as $Sb_4$ down to about 150°. Below that temp., Sb is dissolved in the monatomic form. This suggests a transformation either of Sb or the Pb solid soln. at around 150° (probably less). The heat of fusion of Pb is calcd. to be 5.7 cal. per g., which is likewise in good agreement with reliable exptl. values. Attention is called to a new method of calcg. the heat of fusion of a solute.

C. L. MANTELL

Thermodynamic properties of dichlorodifluoromethane, a new refrigerant. II. Vapor pressure. W. K. GILKEY, FRANK W. GERARD AND MILO E. BIXLER. *Ind. Eng. Chem.* 23, 364–6(1931), cf. *C. A.* 25, 2340.—The vapor pressures of $CCl_2F_2$ from —70° to the crit. temp. (111.5°) were measured by a static method. An equation, suitable for thermodynamic calcns., is given $\log_{10} p = 31.6315 - (1816.5/T) - 10.859 \log_{10} T + 0.007175\ T$, where $p$ is the pressure in abs. atms. and $T$ is the temp. in deg. K. The calcd. normal b. p. is —29.8° C., the Trouton and Hildebrand consts. are, resp., 20.0 and 27.1. A table of calcd. vapor pressures at 10° intervals is given. III. Critical constants and orthobaric densities. F. R. BICHOWSKY AND W. K. GILKEY. *Ibid* 366–7.—The orthobaric ds. of $CCl_2F_2$ were measured up to the crit. temp., and the crit. consts. detd. The satd. vapor ds. below 50° were calcd. from the vapor-pressure equation and the equation of state. Above 50° they were obtained by detn. of dew points. Liquid ds. from —40° to 50° were detd. by a dilatometric method, and above 50° by Faraday's method, with glass floats. The crit. temp., pressure and d. are, resp., 111.5°, 39.56 atms., 0.555 g. per cc.

A. L. HENNE

The crystal structures of the compounds formed in the antimony–cadmium system. MASUMI CHIKASHIGE AND TOSHIMICHI YAMAMOTO. *Arrhenius Vol. Dedicated to Masumi Chikashige* (Kyoto Imp. Univ.) 1930, 195–9.—An x ray examn. to distinguish the stable and metastable compds. belonging to the Sb–Cd system was undertaken. The compd. SbCd exists in two modifications, $\alpha$ and $\beta$ which have the same space lattices with respect to type and dimension, belonging to the hexagonal system, the base and axial ratio of which are 4.42 A. U. and 0.78, resp. The so-called metastable compd., $Sb_2Cd_3$ is a eutectic mixt. of $\beta$-SbCd and Cd. Cf. *C. A.* 24, 1558. ALLEN S. SMITH

Crystalline structure of barium tungstate. II. J. PALACIOS AND I. NAVARRO. *Anales soc. espan. fis. quim.* 29, 21–32(1931), cf. *C. A.* 24, 1261.—The position of the O atoms in the elementary crystal prism of $BaWO_4$ was detd. From the position of Ba, W and ionic rays, approx. values of O coördinates can be deduced. The Moll microphotometer (*Proc. Phys. Soc.* (London) 33, 207(1920–21)) was used. E. M. S.

Quantum mechanics of adsorption catalysis. M. BORN AND V. WEISSKOPF. *Z. physik. Chem.*, Abt. B, 12, 206–27(1931). cf. *C. A.* 25, 21.—By a perturbation calcn., the theory of Born and Franck is elaborated to include interaction between the adsorbed mol. and the adsorbing crystal surface. By applying the method of Weisskopf and Wigner (*C. A.* 24, 5602), the order of magnitude of the reaction rate is found as a function of an at. distance and a vibrational quantum no. An appendix discusses some of the math. difficulties connected with the calcn. of the probability amplitudes and the matrix elements.

G. M. MURPHY

Catalytic decomposition of nitrous oxide. M. S. SHAH. *Proc. 15th Indian Sci. Cong.* 1928, 170.—In the analytical investigation of the reaction C + $N_2O$ at various temps. it was found that $N_2O$ decomps. at a lower temp. in the presence of charcoal than when heated alone. This suggests that the behavior of charcoal is catalytic. On examn. of the catalytic influence of $ThO_2$, $Al_2O_3$, $TiO_2$ and Pt a similar lowering in the

temp of decompn of $N_2O$ was observed Comparison of curves for $N_2O$ decompd in an hr against temp in the presence of these substances showed that these substances act as catalysts in the order $ThO_2$ charcoal, $Al_2O_3$ Pt black, $TiO_2$ and Pt foil I J C

**Reactions at the surface of hot metallic filaments. V. Thermionic emission and catalytic activity at the surface of hot metallic wires: $H_2 + CO_2 \longrightarrow CO + H_2O$ at the surface of platinum, platinum coated with barium oxide and thoriated tungsten.** B S Srikantan *Indian J Physics* 5, 687–98(1930), cf *C A* 25, 1149 —The min temp at which thermionic emission from a Pt wire is perceptible was obtained by extrapolation as 975 Interaction of $CO_2$ and $H_2$ starts at 979° Hence, emission of electrons from a surface has an important influence on activation of gases L P Hall

**Reactions of hydrogen and oxygen on platinum wires at low temperatures and pressures** Herbert G Tanner and Guy B Taylor *J Am Chem Soc* 53, 1289-96 (1931) —A study of the catalytic combination of $H_2$ and $O_2$ at low pressures on Pt wires shows that the reaction is much more complex than ordinarily supposed The consumption of excess $O_2$ from 2 : 1 $H_2$ : $O_2$ gas mixts is attributed to the formation of $H_2O_2$ The rate of reaction varies greatly as a function of the temp difference between the catalyst and the wall of the contg vessel Flashing the Pt wire catalyst in $O_2$, $H_2$ or vacuum at 900° induces a temporary superactivation capable of causing reaction at a temp as low as —120° P H Emmett

**Decomposition of diethyl ether in contact with platinum and tungsten.** H Austin Taylor and M Schwartz *J Phys Chem* 35, 1041-53(1931) —Decompn of $(C_2H_5)_2O$ in the presence of heated filaments of Pt and W is identical with the homogeneous reaction The presence of the filament merely furnishes the necessary stationary concn of active mols S Lenher

**Esterification in the gaseous phase with solid catalysts.** N G Gajendragad *Proc 15th Indian Sci Congr* 1928, 148 —The esterification of MeOH and EtOH with AcOH was studied with K alum and silica catalysts at 230° The equil const (not given) was not far from that obtained by other observers in the liquid phase at lower temps I J C

**Active aluminum.** G Sambamurti and N L Narasimham *Proc 15th Indian Sci Congr* 1928, 168 —Al becomes activated by amalgamation and the activated metal serves as a good reducing agent in a neutral medium The activated metal readily oxidizes in moist air having traces of $CO_2$ I. J C

**Catalytic reaction between stannic oxide and lime.** Setsuro Tamaru and Noboru Ando *J Chem Soc Japan* 52, 36–46(1931), cf *C A* 25, 2045 —Cassiterite and artificial $SnO_2$ are acted on by acids and bases with great difficulty, *e g*, they are made sol by melting with NaOH, $Na_2CO_3$, $NaHSO_4$, etc While no change occurs on heating them with lime at about 900–1000° in the presence of some catalytic substances they react with lime easily at these temps, being transformed into an acid sol form H, C, CO S, Zn, SnO and traces of org vapors with reducing power are very effective as catalyzers. It is interesting that a reaction between solids proceeds smoothly at a temp below the m p of each component The optimal conditions are the proportion 1 mol $SnO_2$ + 7 mol CaO + 0.05 mol H or C, reacting temp 900°, heating for 1 hr, and the presence of $H_2O$ From the fact that the curves of catalytic action of H and C resemble those of reduction, it is inferred that reduction takes place as the first stage of catalysis With catalyzers such as C which produce no $H_2O$ as a reduction product, almost no reaction occurs without addn of $H_2O$, but where $H_2O$ is produced the reaction proceeds smoothly The quantity reacting is proportional to the logarithm of the duration of heating and to the no of mols of CaO, the latter effect depends in reality on the surface area of CaO T Irie

**The entropy and free energy of methane.** H H Storch *J. Am Chem Soc.* 53, 1266–9(1931) —The entropy of $CH_4$ at 25° obtained experimentally checks the value 43.39 entropy units previously calcd from sp heat data R. H. Lambert

**The heats of neutralization of eugenol and isoeugenol.** G Gundu Rao *Proc 15th Indian Sci Congr* 1928, 143 —The heats of neutralization of these 2 isomers were detd to study their acidic behavior The value for eugenol at about 25° when a slight excess of alkali was used was found to be 6476 cal per mol and 6790 cal per mol with a large excess of alkali Because of incomplete soln when an equiv amt of alkali was employed and partial pptn of the salt with a large excess, the value for isoeugenol, 6550 cal per mol, is only approx F J C

**Revision of the free energy of formation of sulfur dioxide.** E D Eastman *Bur. Mines Information Circ* 6454, 6 pp (1931) —Recalcns described lead to the following revised equations $2S\ (rhomb) = S_2\ (g)$ $\Delta F^\circ_{298} = 18\,280$ $\Delta F^\circ = 29\,840 - 0.06\,T \ln T + 4.55 \times 10^{-3} T^2 - 39.81\,T$ $^1/_2S_2\ (g) + O_2 = SO_2\ (g)$ $\Delta F^\circ_{298} = -79\,580$ cal,

$\Delta F^\circ = -84{,}905 + 3.21\,T \ln T - 2.272 \times 10^{-3} T^2 + 0.16 \times 10^{-6} T^3 + 0.25\,T$. S (rhomb.) + $O_2$ = $SO_2$ (g) $\Delta F^\circ_{298} = -70{,}440$ cal. ALDEN H EMERY

**The specific heats of sodium sulfate solutions.** MAURICE AUMÉRAS. *Compt. rend.* 192, 359–61(1931). The sp. heats of aq. solns. of $Na_2SO_4$ were detd. at 20° at concns. ranging from satn. to extreme dilns. The detns. were made by means of a calibrated thermophore which was immersed in the solns. and gave check readings on successive detns. The sp. heat–compn. curve obtained in this manner is somewhat higher than that obtained from the data of other investigators but the two curves approach each other at higher dilns. I. W. LAIRD

**Calculation of the heat of distillation.** M. BARTHEL. *J. phys. radium* [7], 1, 411–5 (1930). By math. analysis an expression is obtained for the flow of heat for vapor and binary liquid in which only the compns. of the vapors entering and leaving are considered. L. P. HALL

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The formation of films of drying oils (KAPPELMEIER) 26. Fractional macro- and microsublimation at ordinary and at reduced pressures (ILLARI) 1. Metallic ions as catalysts for the removal of $SO_2$ from boiler furnace gases (JOHNSTONE) 21. Telephone as zero instrument in the electrometric compensating method (HATOS) 7. State of $CH_2O$ in aqueous solutions (WALKER) 10.

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# 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W ALBERT NOYES, JR.

Investigations on the structure of matter. B LANG. *Technika* 11, 69-74(1930).—A general summary S. S DE FENÁLY

A rotating light-quantum (photon) model. HANS BAUER. *Physik Z.* 31, 882-8 (1930) LOUIS WALDHAUER

The nature of the chemical bond. Application of results obtained from the quantum mechanics and from a theory of paramagnetic susceptibility to the structure of molecules. LINUS PAULING. *J. Am Chem Soc* 53, 1367-1400(1931).—The electron-pair bond is discussed and from quantum mechanics a set of rules is presented which describes the properties of the bond with special reference to the strength of the bond and the nature of the single electron proper functions These rules give information about the relative strengths of bonds formed by different atoms, the angles between bonds, properties of tetrahedral atoms with single and double bonds, *cis* and *trans* forms, the no and spatial configuration of bonds and other properties Transitions from electron pair to ionic bonds are also discussed A theory of the magnetic moments of mol and complex ions is also developed. For the transition elements the proper functions involved in bond formation show that compds with CN have electron pair bonds, those with F have ionic bonds, and those with $H_2O$, ion dipole bonds Electron structure, bond angles and other properties of mol and complex ions can also be detd from the magnetic data G M. MURPHY

Avogadro's number and electronic charge. SATYENDRA RAY. *Proc. 15th Indian Sci. Cong* 1928, 69 E. J. C.

The rotating electron. M. N. SAHA. *Proc. 15th Indian Sci. Cong* 1928, 82. E. J. C.

The imaginary character of the "mass equivalence of electricity." SATYENDRA RAY *Proc 15th Indian Sci Cong* 1928, 68 E. J. C.

The conception of the Hall effect. H. ZAHN *Naturwissenschaften* 18, 848-9 (1930).—Z concludes that it is necessary to distinguish between an "electron gas" Hall effect and a structural Hall effect. R. H. FERGUSON

Mean free path of electrons. Answer to a notice by C. Ramsauer. J. S TOWNSEND *Ann Physik* 8, 803-8(1931).—T. defends his indirect measurements against the criticism of Ramsauer F J ROSENBAUM

Method of measuring the effective cross section. Answer to J. S. Townsend. CARL RAMSAUER *Ann Physik* 8, 809-10(1931), cf preceding abstr.—R repeats his criticism of Townsend's measurements F J. ROSENBAUM

The electron-beam discharge in argon. J. DUFFEY. *Proc. Leeds Phil Lit Soc*, Sci Sect, 2, 163-8(1931).—The collapse of the electron beam to a glow surrounding the anode as previously described (cf Whiddington, *C. A.* 24, 2044) is due to the neg charging of the walls of the gun When the tube is lined with Cu gauze the beam has a velocity corresponding to the voltage applied The potential distribution in the discharge was investigated with an exploring electrode With a thermionic current of 0 2 ma., a pressure of 0 002 mm., an anode potential of 242 v and a length of glow of 0 95 cm the following results were obtained (the first figure is the distance from the anode in cm., the next is the space potential in v.) 0, 242, 1 06, 60, 1 04, 54, 1 72, 41 5, 2 31, 34, gauze, 2. The edge of the glow is maintained at 60 v and has a neg. space charge. J B. AUSTIN

The potential of the walls in the cathode dark space. JEAN W. BECK AND K. G. EMELÉUS *Phil Mag* 11, 54-64(1931).—The walls and discharge are at the same potential at one place, *i. e.*, the boundary between the neg glow and the cathode dark space The effect of the walls in Brown and Thomson's (cf *Phil Mag* [7], 8, 918 (1929)) work is not of greater uncertainty than the incomplete knowledge of the effect of dissocn of gases or of the interpretation of the consts of Morse's equation A F.

The capture of electrons by protons. KARL WOLF *Ann Physik* 7, 937-48 (1930), cf Mark and Wolf, *C A* 24, 5600.—The procedure previously described was modified by the adoption of a photometric electrometric method of measurement No selective absorption of electrons by the proton stream could be detected under energy relations predicted by analogy to the conditions described in case of $\alpha$ particles, by Davis and Barnes (*C A* 24, 1029) and Barnes (*C A* 24, 3264) W G LEIGHTON

Capture of electrons from mercury atoms by positive ions of helium. C. F. POWELL AND A M TYNDALL *Nature* 127, 592-3(1931), cf *C A*. 25, 456.—Expts in a new app in He at 20 mm pressure show a peak in the current frequency curve for each

type of ion present The higher frequency peak corresponds to the He ions, while a 2nd, lower frequency peak is observed when a trace of Hg is present, indicating the formation of $Hg^{++}$ formed by electron capture from $He^{+}$ The ratio of mobility of $Hg^{++}$ in He to $He^{+}$ in He is calcd to be 0 55 G CALINGAERT

Experiments on the efficiency of an electron gun. J E TAYLOR *Proc. Leeds Phil Lit Soc*, Sci Sect., 2, 169–73(1931).—An improved type of electron gun is described in which better focusing and higher beam efficiency are obtained by interposing between the filament and muzzle a neg screen with a small central hole This screen has low neg potentials applied to it. The device resembles the soft 3-electrode valve in its action J B AUSTIN

The distribution of space-potential in high-frequency glow discharge. D BANERJI AND R GANGULI *Phil Mag* 11, 410–22(1931) cf *C A* 24, 5012.—In rarefied air and in $O_2$ with a current at a frequency of 10 cycles, the potential difference is sym about the middle point of the discharge tube The extension of the glow outside the electrodes is also a sym reproduction of the phenomena inside, with the difference that after a certain distance the potential is reduced to 0 ARTHUR FLEISCHER

The emissivity of liquid iron alloys. GERHARD NAESER. *Mitt Kaiser-Wilhelm-Inst Eisenforsch Duesseldorf* 12, 365–72(1930).—The radiation temps of metals depart considerably from the true temps A correction of the temps detd optically is therefore always necessary, but, because of the uncertainty of the emissivity, the correction is not reliable Expts. were made by the author to redet the emissivity of liquid Fe-C alloys, of several alloy steels and of several slags. R RUMBACH

Positive-ion emission from thin platinum films on glass. R A. NELSON *Rev Sci Instruments* 2, 173–9(1931).—In continuing expts. with Pt plated glass filaments (*C A* 25, 877) variations in pos. ion current were investigated A uniform electrolysis potential was applied to all parts of the emitting surface of the app Curves were obtained showing the variation of pos. thermionic current with electrolysis potential for K and Na glass, the existence of pronounced max and min with these equipotential emitters is apparent. An explanation of the phenomena is offered based on analogous electron emission from oxide-coated filaments and Cs-coated W M MCMAHON

A method of examination of transient glows and their spectra. H. PARAMESWARAN. *Proc. 15th Indian Sci Congr* 1928, 78.—This is a method suitable for the visual observation, photographic and spectroscopic studies of transient glows observed in some rarefied gases under chem. excitation during and after discharge. The device used consists of a Hg break (mounted on a base that can be rotated by a slow motion arrangement) carrying on its extended spindle a disk with an adjustable aperture in it. The glow is observed through this aperture. E J C.

Investigations of the inertia of gas-filled photoelectric cells. FRITZ SCHRÖTER AND GÜNTHER LUBSZYNSKI *Physik Z.* 31, 897–904(1930).—Photoelec. cells, contg Ne or He and KH, show a certain current after the exciting light has been cut off, due to the ionization by collisions of the 2nd kind of the metastable ions. In metastable A, the energy is insufficient to cause further ionization, while in $H_2$, there are no metastable states. Expts. were made with pure A and KH and with A, KH, and traces of $H_2$ Cells of this type gave identical results when used for television, and gave no lag Cells employing K satd with $H_2$ at operating temp gave satisfactory television results LOUIS WALDBAUER

Photoelectric effect on thin layers of potassium and cesium. R. FLEISCHER *Physik Z.* 32, 217–8(1931).—By using a high-vacuum arrangement, a max. yield of $37.9 \times 10^{-3}$ coul /cal. was obtained for K at 436 mμ. Cs gave a max yield of $17.1 \cdot 10^{-3}$ at 492 mμ. The yields were, resp., 25.7% for K and 10.3% for Cs. C. E P J

*Relation concerning atomic nuclei.* WM. D. HARKINS. *J Am. Chem. Soc.* 53, 2009–11(1931).—Comments on Latimer's paper (*C. A.* 25, 2359). C. J. WEST

Structure of the α-particle. O. K. RICE. *J Am. Chem. Soc.* 53, 2011–2(1931).—Comments on Latimer's paper (*C. A.* 25, 2359). C J WEST

Origin of cosmic radiation. J. H. JEANS. *Nature* 127, 594(1931).—In calcg. the frequency ν of cosmic radiation from its absorption μ, nuclear as well as extranuclear *electrons should be taken into consideration This doubles or more than doubles the* absorbing power of all atoms except H A table showing the absorption (per meter of $H_2O$), for the radiation produced by various processes is given. Agreement between calcd and observed values is excellent. This suggests that the most penetrating constituent may originate in the annihilation of an α-particle and its 2 neutralizing electrons, and the next softer one from 1 proton and its one neutralizing electron. G. C.

The age of the earth—radioactivity methods of its determination. ALOIS F.

$AuCl_3$ is volatilized in the tube without removing the deposit of $Re_2O_7$, the presence of Cl brings out the Re spectrum, although no Au lines are visible The Re doublets are repeated 16 32 and 48 units higher as ReO, $ReO_2$ and $ReO_3$ Re consists of 2 isotopes, 185 and 187, estd photometrically to exist in the ratio 1 1 62 Its packing fraction, estd from line 203 of the $Re^{187}O$ is $-1 \pm 2$, the same as that of Os The calcd at wt is 186 22 ± 0 07 G CALINGAERT

**Methods of investigating the intensities of γ-rays.** C D ELLIS AND D. SKOBELTZYN *Nature* **127**, 125(1931) —The Skobeltzyn method (*C. A* **24**, 1573) of investigating the intensities of γ rays depends on observing by the Wilson cloud method the relative no of electrons ejected within a certain angular range by the Compton effect of the different γ rays the Ellis and Aston method depends upon the photoelec effect γ rays of Ra B and C showed intensities of 0 22, 0 46 and 0 26 by the photoelec method after passage through 3 5 mm Pb the corresponding intensities by the Compton effect were 1 1 8 and 1 19, resp This agreement is as good as can be expected FRANK MARESH

**The question of the disturbance of the equilibrium between radium B and radium C in preparations freed from residual emanation.** KARL MARBACH *Sitzb Akad. Wiss Wien*, Abt IIa, 139, 231 9(1930) — The usual methods of removing emanation from prepns have been questioned as to whether or not they disturbed the Ra B–Ra C ratio (cf Braddick and Cave, *C A* **23**, 1048) Removal of emanation by the usual short time washing with alc heating to 400° or blasting with a strong current of air is believed rarely to disturb the Ra B–Ra C ratio as much as 1% O E S

**Scattering of hard γ-rays. II.** L H GRAY *Proc Roy Soc* (London) **A130**, 524–41(1931), cf *C A* **24**, 5220 —*The relative scattering powers of* Mg, Al, Cu, Zn Cd, Sn and Pb for Ra C γ rays filtered through 4 cm of Pb and for Th C γ rays filtered through 3 cm of Pb have been investigated by observing the ionization produced by radiation scattered within the angular range 10–30° For Ra C γ-rays the decrease of scattering power per extranuclear electron from Mg to Pb is 2%, for Th C γ rays there is a gradual increase of about the same amt , but this is of the order of magnitude of error in the application of the correction for reabsorption of scattered radiation in the scatterer Therefore these measurements establish the fact that the binding forces in heavy elements do not influence appreciably the scattering power of extranuclear electrons for radiations of energy corresponding to $2 \times 10^6$ electron v J E A

**Radioactive metamorphic phenomena in fluorspar from Wölsendorf.** LUISE GOEBEL *Sitzb Akad Wiss Wien*, Abt I, 139, 373 91(1930), cf Mügge, *C A* **17**, 3644 —The radioactive "ball" halos of radioactive fluorspar from Wölsendorf are nothing other than aged ring halos as shown by development series studies and range measurements of α particles The colloidal nature of the pigments in Wolsendorf fluorspar is shown by use of the ultramicroscope The colloidal particles are most frequently Ca particles and the color changes according to the size of the particles, small particles correspond to green, larger to blue, violet, etc The radiations from the radioactive materials probably cause the formation of neutral Ca and F from the fluorspar as "stinking fluorspar" (contg free F and usually dark colored) is rather common O. E S

**Nature of the groupings of radioactive atoms.** E. L. HARRINGTON *Compt. rend* **192**, 414–5(1931) —The conclusion of Jedzrejowski that the formation of aggregates of radioactive atoms is facilitated by impurities, groups forming around the nuclei of impurities, has been confirmed But it is found that the impurities are not essential The absence of aggregates on freshly cut mica is explained in a different way The aggregates are more numerous around scratches, detached scales and along edges Either the groups form at the position observed or they form in the atm Polar mols also aid in the formation of groups The grouping of radioactive atoms which form in mixed gases contg Rn are constituted of the radioactive atoms and polar mols around a nucleus It is usually a stable assocn of ionized radioactive atoms The beds of polar mols have a low vapor pressure The detection of aggregates depends on the no of radioactive atoms as well as the no of polar mols L D ROBERTS

**The scintillation of calcium tungstate.** BERTA KARLIK. *Sitzb. Akad. Wiss. Wien*, Abt IIa, 139, 319–26(1930) —The scintillation of a no of specimens of artificial Ca tungstate under α and γ-rays was investigated at various pressures With α-rays the brightness of the scintillated light as measured by a photoelec cell is proportional to the residual range of the α-rays but reaches a satn value for very small bodies The decompn with γ-rays is of the same order as that of ZnS but is unusually small with α rays giving Ca tungstate a unique position as a scintillating substance E A FLOOD

**Quantitative investigations on the photographic action of α- and H-particles.**

MARIETTA BLAU *Sitz. Akad. Wiss. Wien*, Abt. IIa, 139, 327–47(1930).—From the tracks produced by α and H particles striking a photographic plate at an angle (20–24°) the no. of particles and distribution ranges were detd. and found to agree with the values obtained with a tube electrometer. The α particles were from Th C and the H particles from paraffin. "Agfa x-ray dental film" and "Imperial process" plates were used. The range distribution showed a displacement toward smaller values, due to scattering in the emulsion. The no. of H particles obtained on using the dental film was only half that obtained by the "Imperial process" plate or by the electrometer. The apparent distance between the AgBr grains of the dental film for H rays was twice as great as for α rays. F. A. FLOOD

The mechanism of separation of radon from radioactive minerals in liquid medium. V. I. SPITSYN. *Trav. radium et minerais radioactifs acad. sci. U. R. S. S.* 2, 264–71; cf. *C. A.* 23, 1048.—The basic purpose of this investigation was to find general laws which govern the process of transition of Rn from minerals into liquid media so that with their help the variation in radioactivity of various springs could be explained. As far as the qual. side is concerned, the results obtained permit the making of satisfactory conclusions. Thus only tonarite, a mineral which is found comparatively rarely, has no pos. temp. coeff., and therefore it could be said with a sufficient degree of probability that hot springs will be placed in more favorable conditions as to the absorption of Rn than cold ones. This conclusion could not be obtained by the observation of springs proper because several factors act simultaneously which combine to complicate the situation. No results were obtained on chem. compn. of mineral water and radioactivity. It is shown that with typical, purely uranium minerals the concn. of NaCl soln. increases considerably the rate of sepn. of Rn. Samarskite and tonarite liberate in NaCl soln. the same amt. of Rn as in water. In no case is there a considerable decrease in the rate of sepn. of Rn. A. C. NOË

The formation of molecular aggregates in radon-gas mixtures containing polar molecules. E. L. HARRINGTON AND O. A. GRATIAS. *Phil. Mag.* 11, 285–96 (1931); cf. *C. A.* 23, 230.—The formation of aggregates of active deposit atoms in gases contg. radon in the presence of HCl, $SO_2$, EtOAc, *o*-nitrotoluene, *p*-nitrotoluene, $CHCl_3$, $CCl_4$, MeOAc and acetone was studied by the centrifuge, the photographic and the ultramicroscopic methods. The previous work on air radon, $H_2O$ and water free air radon mixts. was confirmed. Aggregate formation in the presence of HCl is of av. magnitude; it is very large in the presence of *o*-nitrotoluene. Polar mols. favor the formation of aggregates in radon gas mixts. ARTHUR FLEISCHER

The absorption of scattered x-rays and Compton's theory of scattering. S. R. KHASTGIR. *Proc. 15th Indian Sci. Cong.* 1928, 88–9.—The most significant feature in the comparison of the absorbabilities of the secondary (scattered) and primary x-rays by the method of Barkla and K. (*C. A.* 20, 146) is the constancy, over a wide range of wave lengths, of the ratio of the ionizations produced by the secondary and primary beams, when the beams are either *unintercepted* or *intercepted* by similar sheets of an absorbing substance. The 2 alternative cases recorded are: *A* (not considered here) in which discontinuities in the "intercepted" ratio $S'/P'$ are obtained and *B*, the only case giving results at all capable of explanation in terms of Compton's theory of wave-length change on scattering, in which the values for the "unintercepted" ratio $S/P$ and the "intercepted" ratio $S'/P'$ for various wave lengths are found to lie on 2 parallel horizontal lines without the slightest sign of any discontinuity. Calculations of the ratio $S'/P'$ were based on C. T. Ulrey's energy-distribution curves (*C. A.* 12, 1530). From these curves of U, corresponding curves were then constructed for both primary and scattered beams intercepted by an equal thickness of an absorbing material. In the case of the scattered beam, the increased value of the absorption coeff., corresponding to Compton's wave length change was used. The presence of an unmodified radiation in the scattered beam was also taken into account. Thus for 6 voltages, 6 pairs of distribution curves for the *intercepted* scattered and primary beams were obtained, the ratio of the areas of each pair giving the value of $S'/P'$ for each voltage. Al and Au were used as absorbers. In both cases, the computed curves (not given) for $S'/P'$ did not agree with the exptl. results of B. and K. E. J. C.

A note on the Compton effect. SATYENDRA RAY. *Proc. 15th Indian Sci. Cong.* 1928, 69. E. J. C.

Röntgen-ray equipment of the Institute for Experimental Physics of Royal Joseph University for Technical Sciences at Budapest. B. POGÁNY. *Technika* 11, 74–80 (1930). S. S. DE FINÁLY

Quantitative x-ray analysis. Copper-silver and copper-zinc alloys. HENRY TERREY AND ERIC GEORGE VICTORY BARRETT. *J. Phys. Chem.* 35, 1156–67(1931).—

The intensities of the $K_\alpha$ radiation in the x ray emission spectra of Cu Ag alloys are detd by measurement of their ionizing power, and of Cu Zn alloys by both the ionization and the "wedge camera" methods The compn of an alloy can be detd. quantitatively by these intensity measurements only when (1) the elements in the alloy are adjacent to one another in the periodic system, and (2) the emission spectrum of any one constituent metal does not fall within the absorption region of any of the others. The $K_{\alpha 1}$ line of Ag falls within the absorption region of Cu thus causing a diminution in the intensity of the Ag radiation and a strengthening in the Cu radiation intensity. No absorption of the $K_{\alpha 1}$ Zn line occurs in the Cu Zn alloys For Cu Ag alloys the relation between intensity and at. concn may be represented over a wide range of concn. by: $I_{Ag}/I_{Cu} = MC_{Ag}/(C_{Ag} + C_{Cu})$ for Cu Zn alloys the relationship is linear The so-called "wedge camera method is developed by the authors for detn. of the relative intensities of lines in an x ray spectrum, being dependent on the measurement of their penetration of an Al wedge J BALOZIAN

**The photographs of powders in relation to the physical and chemical purity of the substance.** GIORGIO R. LEVI. *Atti III congresso naz chim pura applicata* 1930, 118–21.—L claims that soft x rays (2.3 to 1.5 A. U.) are sensitive to surface alteration Thus $Ag_2O$ incipiently reduced but showing no free Ag by chem analysis shows Ag lines in the powder diagram When 20% reduced only the Ag lines are observed. Hard rays (0.75 to 0.60 A. U.) are less sensitive For mixts the powder diagrams give qual but not quant results J B ARDEN

**A note on the relative absorption of the primary and scattered x-rays by silver and tin.** S. R KHASTGIR. *Proc 15th Indian Sci Cong* 1928, 83.—The results (not given) of a few absorption expts not only show that the theory of wave length change on scattering is untenable but that the greater absorbability of the primary radiation, as observed by Gray (*C. A.* 17, 2229) is most certainly due to the *J* transformation in Ag E. J. C.

**X-ray interference by di- and tri-atomic molecules of light gases.** H. GAJEWSKI. *Physik. Z.* 32, 219–21(1931).—Scattering expts were made, with a Cu radiator, on $N_2$, $O_2$, $CO_2$, $NH_3$, and the vapors of $CS_2$ and $H_2O$ Interatomic distances calcd from the data were compared with those from other types of detns The expti scattering curves were compared with the theoretical curves from the Debye scattering formula C. F. P. JEFFREYS

**X-ray dispersion in copper sulfate crystals.** L. JÓZSEF NAGY. *Matematik. és Természettud. Értesitö* 47, 70–7(German abstract 78)(1930).—The absorption limits of the Cu *K* line were studied by means of a Seemann app on 3 different oriented surfaces of $CuSO_4$ crystals Not only the grating space but also the dispersion changes with the reflecting surface Larger dispersion belongs to larger grating space. No dispersion data agreed with the theoretical value of $\delta = 3 \times 10^{-5}$ S. S. DE FIÁLY

**Absorption of x-rays by colloidal solutions.** KAILASH NATH MATHUR AND HARI RAM SARNA. *Proc 15th Indian Sci Cong* 1928, 79 E. J. C.

**"Ghost lines" caused by an adsorbed layer on the grating surface.** SATYENDRA RAY *Proc 15th Indian Sci Cong* 1928, 90–1.—The "ghost lines" are supposed to be caused by a periodic irregularity in the grating ruling To test another theory of the lines R washed the surface of the grating, while in its place on the spectrometer table for viewing the "ghost lines," by means of ale and gasoline, resp In both cases lines more widely spaced than the ghost lines appeared with the film of the liquid on the grating surface, the distance between the lines closing up with evapn of the *film and finally collapsing into the ghost lines as a "limiting position" of sorts* The "ghost lines" for the green line of the Hg lamp were also found with subjective observation to appear violet in color on looking obliquely through the eye piece. E. J. C.

**The temperature radiation of thallium vapor.** K. MAJUMDAR AND P. K. KICHLU. *Proc. 15th Indian Sci Cong* 1928, 84.—The emission spectrum of hot Tl gas contained in a vacuum furnace with temp varying from 1500° to 2300° was investigated with the aid of a small quartz spectrograph No emission line was obtained at 1500°. Emission begins at 1800° At 1900° the $2p_2-3s$ line (5350) was obtained in emission, while $2p_1-3s$, (3775) was obtained in absorption Even at 2300°, the latter could not be obtained in emission E. J. C.

**Spectra of the helium glow discharge.** H. MCN. COWAN, W. L. BROWN, K. G. EMELEUS *Nature* 127, 593(1931).—In the cold cathode glow discharge, the line 4713 of the He spectrum is much feebler than the 5016 line in the neg glow, while the 2 are of comparable intensity in the anode glow From the current voltage characteristics of the probe wire, the distribution of velocities among the electrons is found to be not Maxwellian in the neg glow. It can be fairly well represented by the superposition

and 7 satellites, resp. The line 6907 consists of not less than 5 components and 6234 of not less than 7. On account of the complicated structure the measurements made on the patterns obtained in the 2 quartz Hg vapor plates have not been enough to fix the wave-length intervals of these 2 lines without ambiguity. By assuming that the fine structure of Hg lines is due to quantized nuclear rotation and taking the resonance line 2536 A. U. to consist of 5 components, the $^1S_0$ term gives only one fine structure level and the $2^3P_1$ level splits into 3 levels $n+1$, $n$ and $n-1$, where $n$ is the nuclear impulse moment in units of $h/2\pi$. Hence there can only be 3 components for 2536 A. U. on the assumption that all atoms of Hg have the same nuclear moment. O. C.

**Fine structure in the mercury singlet terms.** S. Tolansky. *Proc. Roy. Soc.* (London) A130, 658-78(1931). Fine structures of singlet and intercombination lines in Hg were investigated to obtain information as to the structure of singlet terms. A high frequency electrodeless discharge in Hg vapor at a pressure of 0.001 mm. was used because in this source the singlet combinations are produced with high intensity without reversal. The observations were made with a Fabry Perot interferometer, with plate separations of 1 to 100 mm. crossed with a Hilger $E_1$ spectrograph. The following structures were found: $7^1S_0$ $8^3P_1$ sextet, $7^1S_0$ $9^3P_1$ septet, $6^1S_0$ $8^3P_1$ octet, $7^1S_0$ $9^3P_1$ septet, $6^1P_1$ $8^1S_0$ quintet, $6^1P_1$ $9^1S_0$ triplet and $6^1P_1$ $10^1S_0$ doublet. Information as to the structures of the $7^1S_0$, $7^3S_1$, $8^3P_1$, $8^1P_1$, $9^3P_1$ levels is derived from the line structures. The structures found for $^1P_1$ — $^1S_0$ lines necessitate more than one value of the spin quantum no., $s$, of the nucleus and this conclusion is supported by the fact that the $7^1S_0$ level is at least double. The septet character of $7^1S_0$ $8^3P_1$ can be accounted for by 3 values of $s$, one of which is 0, the other 2 being greater than $\frac{1}{2}$. The 0 value is probably associated with the even isotopes (196, 198, 200, 202, 204) and the other 2 with the 2 odd isotopes (199, 201). W. F. Meggers.

**Lommel's analysis and continuous spectra.** Nalini N. Bose. *Proc. 15th Indian Sci. Cong.* 1928, 70. Continuous spectra can be explained by resorting to Lommel's analysis, which is capable of giving a continuous train of waves corresponding to a monochromatic radiation. No details are given. F. J. C.

**Rotational structure of light molecules.** W. Weizel. *Physik. Z.* 31, 880-2 (1930). The rotational energy, which may be obtained from the band structure, indicates the electron configuration of light mols. Louis Wolfbauer.

**The anomalous dispersion of crystalline lead chloride in the region of its first ultra-violet frequency.** Karl Hecht. *Z. Physik* 66, 339-41(1930). S. B. S.

**The resonance spectra of sulfur vapor.** J. Pantchechnikoff. *Comp. rend.* 192, 737-9(1931).—S vapor excited by the Hg arc lines at 2968, 3126 and 3132 A. U. shows a resonance spectrum consisting of doublets or quartets in the blue and green. W. F. Meggers.

**Molecular spectra of mercury, zinc, cadmium, magnesium and thallium.** H. Hamada. *Nature* 127, 555(1931). W. F. Meggers.

**Magnetic susceptibility and absorption spectra of complex cyanides.** L. Sacco and F. Gatinelli. *Gazz. chim. ital.* 60, 646-57(1930). cf. Cambi and S., *C. A.* 24, 3021, 3123. In all Fe complexes studied up to now there is a close relation between the magnetic and the optical properties, *i. e.*, in the paramagnetic state the absorption spectrum is richer in bands than is that of the diamagnetic compds. Other cyanides, including those of Cr, Mn, Co and Ni, have now been studied. Measurements of the magnetic susceptibility were made by the method of Gouy as modified by Shaffer and Taylor (cf. *C. A.* 20, 1752), and of the absorption spectra with the app. already described (cf. *C. A.* 25, 1624). $K_3Cr(CN)_6$ is paramagnetic (cf. Hiltz, *C. A.* 22, 4017), with 10 Weiss magnetons, and it has 2 absorption maxima at $\nu \times 10^{-11} = 800$ and 1150, resp. (the latter of great intensity). $K_4Cr(CN)_6$ was too unstable to obtain such reliable data, but its magnetic moment is greater than that of $K_3Cr(CN)_6$. $K_3Mn(CN)_6$ and $K_4Mn(CN)_6$ are paramagnetic with 16 and 10 magnetons, resp. (cf. Hiltz, *loc. cit.*; Freed, *C. A.* 24, 4700). The former shows a strong band at $\nu \times 10^{-11} = 921$, and $K_4Mn(CN)_6$ a band at $\nu \times 10^{-11} = 1271$. The extreme instability of $K_4Mn(CN)_6$ (cf. *C. A.* 22, 2522) made it impossible to measure its magnetic and optical properties. $K_3Co(CN)_6$ has electronic properties like those of $K_3Co(CN)_6$; it is diamagnetic, and its absorption spectrum has 2 maxima $\nu \times 10^{-11} = 975$ and 1162, with low $\epsilon$ values. Contrary to Hiltz, $K_4Co(CN)_6$ is diamagnetic, in spite of the odd no. of electrons in the central atom, which gives origin to a magnetic spin (cf. Lewis, *C. A.* 18, 3511). $K_4Co(CN)_6$ is more active optically than $K_3Co(CN)_6$ and has 2 absorption maxima at $\nu \times 10^{-11} = 932$ and 1070, with $\epsilon$ values 10 times greater than those of $K_3Co(CN)_6$. Accordingly, a notable variation in the optical behavior does not correspond to any appreciable difference in magnetic moment. An electronic explanation of this incon-

gruity is offered The behavior of Ni complexes is still more complex than that of the Co compds $K_2Ni(CN)_4$ is an exception to the general rule (cf Stoner, *Magnetism and Atomic Structure*, C A 21, 859), since it is isoelectronic with $K_2Mn(CN)_4$. Neither does the magnetic susceptibility of $K_2Ni(CN)_4$ vary, and it is diamagnetic in spite of 33 electrons, which by theory should mean a strongly paramagnetic compd To explain these phenomena, different hypotheses are considered Other studies of various Ni complexes make it doubtful whether these incongruities depend only upon the central atom That the diamagnetism does not result from the same causes as that of $K_4Fe(CN)_6$ and $K_3Co(CN)_6$ is proved by the absorption spectra $K_2Ni(CN)_4$ shows 3 bands $\nu \times 10^{-13} = 962$, 1050 and 1125, with very high $\epsilon$ values. The same maxima appear in the spectrum of $K_3Co(CN)_6$, which shows a notable variation in the absorption only in the visible field, where the extinction is approx 10 times that for $K_2Ni(CN)_4$. In general, the magnetic properties of neither the cyanides of $Co^{++}$ nor of $Ni^{+}$ and $Ni^{++}$ satisfy the electronic theory which in the past has been applied to these complexes, and there are great differences between the magnetic and optical behavior in that a diamagnetic state corresponds to great optical activity. Other complexes are being studied C. C. Davis

The mercury band system in the neighborhood of the resonance line. Rayleigh. *Nature* 127, 125(1931).—In spectrograms of a water-cooled Hg are the usual bands at 2540 and 2536.52 A U were observed, addnl bands at 2540.37, 2538.44 and 2537.32 A U shaded from the red were also measured, the bands 2535.62 and 2535.35 on the other side of the resonance line (2536.52) shaded toward the red were also measured. Frank Maresh

A new band system of copper hydride. P. C. Mahanti. *Nature* 127, 557(1931).—A band system consisting of 6 band heads has been found in the region 2900–2200 A U It is different in nature from the 2 systems previously known (*C. A.* 24, 3951). The bands are double headed, indicating that their emitter consists of an odd no of electrons; they have therefore been attributed to the $CuH^+$ mol The band structure has been analyzed and assigned to a $^1\Pi \longrightarrow {}^1\Sigma$ transition W. F. Meggers

Band spectra of bismuth hydride. A Heimer and E Hulthén *Nature* 127, 557(1931).—When a quartz discharge vessel fed with 0.5 amp., 1200 v. d. c. is used with Bi vapor distg at 900° through a narrow end-on tube, a band spectrum near 4722 A. U is excited with great intensity. This band is composed of *P* and *R* branches, the system being assigned to a $^1\Sigma \longrightarrow {}^1\Sigma$ transition in the BiH mol W. F. M

New bands in the secondary spectrum of hydrogen. Dattatraya Shridhar Jog *Phil Mag* 11, 761–86(1931).—A review of the principles underlying the detn. of the theoretical electronic terms of the H mol in its various states of excitation is followed by a presentation of the bands which, as previously announced (*C. A.* 24, 3435), have been found to represent the forbidden transition $3p^3\Pi \longrightarrow 2p^1\Sigma$ The vibrational and rotational structures of $3p^3\Pi$ are known from the work of Richardson and Das (*C. A.* 23, 2096), and those of $2p^1\Sigma$ from Richardson and Davidson (*C. A.* 23, 2883, 3163, 3405) The bands presented in this analysis satisfy the structures of the initial and final terms C. C. Kiess

Fine structure in the hydrogen band lines. O W. Richardson and W. E Williams. *Nature* 127, 481(1931), cf *C A* 24, 1576, 2049.—By examg. the spectrum of $H_2$ with a large Hilger quartz spectrograph crossed by a reflection echelon R and W. find that the alternate strong lines of 2 typical bands which end on the $2p^3\Pi_{a,b}$ levels are all double with the weaker component on the long wave length side The observations establish a correlation between the spectra of $H_2$ and He H W. Leahy

A study of the widths of the lines in the *B* band, due to atmospheric oxygen, in the solar spectrum. R. van der Riet Woolley *Astrophys. J.* 73, 185–93(1931).—The relative widths of 28 lines in the *B* band (6870 to 6920 A. U.) in the solar spectrum, due to $O_2$ in the earth's atm., were accurately measured to det. experimentally the relation between line width and the no of atoms effective in forming the lines. Measurements were made on spectrograms secured at different altitudes of the sun for $r = 1/10$ and $1/4$, where $r$ is the ratio of the intensity of the light at some point inside the line to that of the continuous background just outside the line. The results show that the line widths are approx proportional to the $1/4$ power of the no of atoms in the air path traversed by the sun's rays, which is a small but definite deviation from Unsold's formula in which the widths are proportional to the square root of the no of atoms. C. C. Kiess

Raman effect and ionization in electrolytes. Leonard A Woodward *Physik. Z.* 32, 212–4(1931).—Raman spectra for solns of $HNO_3$, $H_2SO_4$, $CH_3COOH$, $HIO_3$ and HCl were studied. All except HCl solns gave intense spectra excited by the

4358 A U. line of Hg The Raman line ascribed to $NO_3^-$ was found to increase to a max of intensity with increasing concn, then decrease. The $H_2SO_4$ lines also showed such anomalous intensity effects. C E. P. JEFFREYS

Polarization of the Raman spectrum of water. C. RAMASWAMY *Nature* 127, 558(1931).—The Raman spectrum of pure water was studied by the original method of Raman Polarization photographs were taken and the intensities of the bands were estd from a plate contg a series of graded exposures of the Hg spectrum. Conclusion. Three different Raman bands excited by the same incident line are differently polarized, and the degree of polarization appears to increase as the intensity of the band increases W F MEGGERS

The Raman effect in pure water and in several solutions. R BRUNETTI AND Z OLLANO *Atti accad Lincei* 12, 522–9(1930).—Pure water exposed to the Hg arc light gives 3 bands in the visible region green (5050 to 5150 A U), blue (4645 to 4745 A. U) and violet (4135 to 4220 A U), excited by the 4358, 4047 and 3650 A U lines of Hg. The differences in frequency of these bands from the exciting lines are 3225, 3469 and 3589 cm$^{-1}$ In the presence of $Cl^-$ (HCl 50 and 25%, CeCl$_3$ 2 6 and 1.3 *M*) the 3225 and 3589 cm$^{-1}$ bands diminish in intensity, while 3469 cm$^{-1}$ appears to be intensified The following $NO_3^-$ solns were also investigated $HNO_3$ (6 5, 3 5, 2 6), $NaNO_3$ (9 8), $NH_4NO_3$ (12 5), $KNO_3$ (3 96, 1 98), $Ba(NO_3)_2$ (0 64), $Al(NO_3)_3$ (1.86), $La(NO_3)_3$ (1 67), $Ce(NO_3)_3$ (3 1, 1 5) and $Th(NO_3)_4$ (1 65), all expressed as moles per l Contrary to the effect of $Cl^-$, the 3589 cm$^{-1}$ band is intensified, while the 3225 cm.$^{-1}$ band fades till it disappears entirely in the more concd solns A W C

Raman effect of hydroxyl ions. LEONARD A WOODWARD *Physik Z* 32, 261–2 (1931).—10 4 *N* NaOH and 12 6 *N* KOH were investigated with radiation of wave lengths 3654 8 and 3650 2, 4046 8 and 4358 3 A U and showed a common frequency, $\Delta\nu$, of 3615 ± 25 cm.$^{-1}$ This agrees with $\Delta\nu$ for solid NaOH of 3630 cm$^{-1}$ A short discussion is given WILLIAM E VAUGHAN

Energy measurements in the visible and ultra-violet. F BENFORD AND RACHEL F HOWE *Trans Illum Eng Soc* 26, 292(1931).—The photographic, the filter and the monochromator methods of measuring energy throughout the visible and ultra-violet spectra are described The inherent limitations of each method for sunlight and some of the more common sources of light are discussed W T CLARK

The absorption and scattering of light in opal glasses. G M DRESSER *Phil. Mag* 11, 801–46(1931).—Absorption and scattering by a mastic sol with acid fuchsin added was studied since it is not possible to vary $\kappa/\sigma$ for glasses, $\kappa$ = absorption coeff, $\sigma$ = scattering coeff. Intensity measurements were made with a Glan spectrophotometer by substituting a photographic wedge for the Nicol prism, and thereby decreasing the time and labor involved and increasing the range of intensity ratios determinable For a parallel incident beam and over a wide range of concn, the equation $I = I_0 e^{-\sigma x}$ was found to apply, where $I$ = transmitted light, $I_0$ = incident light, $x$ = concn on an arbitrary scale and $\sigma$ includes the thickness of the layer For optically thin layers the coeffs of scattering and absorption affect the directly transmitted light independently and the equation becomes $I = I_0 e^{-(\kappa+\sigma)x}$ For optically thick layers at high concns more light is transmitted than given by the exponential formula, due to the reënforcement of the direct pencil of light by repeatedly scattered light The repeatedly scattered light is detd by measurement of the light intensity at several small angles to the normal The proportion of repeatedly scattered light diminishes as the direction of the parallel rays becomes more definite and measurements carefully made in the same direction Schuster's theory is extended for milk glass with particles of the order of dimensions as the wave length of light For the thick layers the variation of transmission with the optical thickness was found to be exptly and theoretically the same for a parallel as for a diffuse incident beam The advantage of the diffuse beam is the greater intensity obtainable The ratio of $\kappa/\sigma$ for Leerdam opal glass bulbs and Philips Argenta bulbs was found to be small ARTHUR FLEISCHER

The Becquerel effect of copper oxide in alkaline solution. II. YOGORO KATO AND NAGAO HAYAMI *J Chem Soc Japan* 52, 8–19(1931).—A study was made of the Becquerel effect of $Cu_2O$ and CuO prepd by the authors' special method, in alk soln. *The time effect of the Becquerel effect and change of wt of CuO in the soln.* when it was and was not exposed to light were detd The Becquerel effect is said to be due not to photoelectricity but to photochem change The decrease of the wt of CuO when it is exposed to light is proof of this conclusion The Becquerel effect changes with time and for this reason the results of other investigators do not agree R. SAITO

The theory of anisotropic liquids. XIII. The optical activity of twisted structures. C. W. OSEEN *Arkiv Mat Astron Fysik* 22A, No 17, 12 pp (1931), cf *C A.* 24,

3409, 25, 10.—Math. The analytical soln. of the problem of the optical properties of twisted structures in the spectral region outside the limits of iridescent colors is presented. Twisted structures possess no rotatory power in the ordinary sense. An incident linear polarized light wave after transition through a layer leaves as an elliptically polarized wave. The usual method of measuring the optical rotation of a nematic substance, by measuring the rotation of a very thin layer and reducing to a 1-mm. layer, is not applicable to substances with twisted structures. The optical activity of a twisted structure depends on the angle which the vibration direction of the incident light makes with the direction of the mol. axis in the lower boundary layers. XIV. The possible structures of nematic substances. *Ibid.* No. 18, 19 pp.—Math. A. F.

**Light emission from alkali halide phosphors.** Walter Bünger. *Z. Physik* 66, 311–27(1930).—Unity to 80% of the light quanta absorbed from the long wave length absorption band appear in the fluorescent band of a TlCl–KCl phosphor. The max. of this band lies at $\lambda = 300$ mμ. The missing portion is to be sought in a visible emission band with a max. around 470 mμ. The short wave length absorption band gives similar results. At high TlCl concn. there is a retention of 4.5–5.0% of the absorbed light quanta. No photochem. discoloration was observed. S. Bradford Stone.

**New laws of phosphorescence.** Pál. Erdélyi. *Matematik és Természettud. Értesítő* 47, 79–93(German abstract 96)(1930).—Photoelec. expts. with gelatinous soln. of Rhodamin B proved that its phosphorescence bands are polarized. The phosphorescence band emitted by the dye mol. is partially polarized. S. S. de Inály.

**The relation of the intensity of fluorescence to the concentration in the case of solid solutions.** A. A. Dixon. *J. Optical Soc. Am.* 21, 250–8(1931).—Measurements were made for liquid and solid solns. of rhodamine B in collodion, 4 parts of alc. to one of collodion being used. The app. and exptl. procedure with the Hg arc and W lamp as exciting sources are described. Results show that for both liquid and solid solns. the intensity of fluorescence increases exponentially with a decrease in concn. There is evidence of a const. value for the fluorescence power at low concns. The value for liquid solns. is about 2.9 times as large than for solid solns. H. W. Walker.

**Fresh evidence in support of the chemical theory of fluorescence.** S. S. Bhatnagar and Krishna Gopal Mathur. *Proc. 15th Indian Sci. Cong.* 1928, 141–2.—In suport of Perrin's view of the chem. nature of fluorescence, small changes in the *n*s of eosin, fluorescein and acriflavine in their aq. solns. were observed on exposing them to a concd. beam of light from an arc lamp. The changes in the *n*s were detd. by means of the Rayleigh interference refractometer, by which a change in *n* of 1 in 100,000 could be ascertained with accuracy. Expts. were performed at various mol. concns., and the values obtained for the changes in the *n*s were found to diminish at higher concns. as the intensity of the fluorescent light decreased. In the presence of gelatin and NaOH the values for the changes were again observed to diminish, evidently on account of a retarding influence on the photodecompn. of these fluorescent substances. The values are not given. E. J. C.

**Colors of inorganic salts.** M. N. Saha and S. C. Deb. *Nature* 127, 485(1931); cf. *C. A.* 24, 2377.—In continuation of previous work S. and D. have measured the absorption spectra of $CrCl_3$ and $FeCl_3$ between 1000° and 1400° in a vacuum furnace. $CrCl_3$ was found to yield a no. of bands at 4100 A. U., and $FeCl_3$ at 4350 A. U. These bands are ascribed to $Cr^{+++}$ and $Fe^{++}$ and are due to the magnetic transitions in the $d^3$ and $d^6$ shells of the elements. The continuous absorption from 3000 to 2200 A. U. is ascribed to $Cl^-$. H. W. Fahy.

**The absorption of aqueous solutions of tartaric acid.** G. Bruhat. *Compt. rend.* 192, 489–90(1931).—According to B.'s best results these solns. follow Beer's law. The careful measurements of Lucas and Schwob (*C. A.* 25, 2052) indicate a weaker absorption and an increase in mol. absorption with decrease in concn. Both sets of results contradict the conclusion reached from the classical hypothesis that 2 forms of tartaric acid exist in soln., namely, that the mol. absorption in the region 2800–1500 A. U. should diminish as the concn. diminishes. Janet P. Austin.

**The absorption of liquid and solid solutions of rhodamine B in a mixture of alcohol and collodion.** A. A. Dixon. *J. Optical Soc. Am.* 21, 259–61(1931).—By plotting values of $kd$ from the equation $I = I_0e^{-kdc}$ (where $I_0$ and $I$ are the intensities of the incident and emergent light, $d$ is the thickness of the absorbing layer, $c$ the concn. and $k$ the absorption const.) against $\lambda$, absorption curves for liquid and solid solns. at different concns. are obtained. $\lambda$ varies between 5100 and 5900 A. U. In each case there is a shift in the crest of the bands toward longer wave lengths as the concn. is increased. H. W. Walker.

**Electron diffraction in 1,2-dichloroethane.** Ernst Bergmann and Leo Engel.

*Physik Z* 32, 263–4(1931)—Comment on work of R Wierl (*C A* 24, 3439), who claims that 1,2 dichloroethane is a mixt of 2 stereoisomers, and comparison with evidence to the contrary WILLIAM E VAUGHAN

**The absorption of the carbonyl chromophore in the short-wave ultra-violet region.** H LEY AND B ARENDS *Z physik Chem*, Abt B, 12, 132 8(1931)—A min in the absorption curve of pure acetone was found at 2115 A U In a hexane soln of acetone, the max of the short wave band was located at 187 mμ Water causes displacement toward short waves The photolysis of acetone became pronounced below 200 mμ The long wave band cannot be attributed to the C electrons of the chromophore The increase in photolysis below 200 mμ appears to confirm the ideas of Wolf (*C A* 23, 4189) The results also reopen the discussion of results obtained with *compds contg 2 chromophores, i e* carbonyl and ethylene groups FRANK URBAN

**Significance of the structure of the hydrocarbon residue for the velocity and equilibrium position in organic reactions** W HEROLD AND K L WOLF *Z physik Chem*, Abt B, 12, 194 205(1931) cf *C A* 23, 4189, Meerwein *C A* 23, 97—The displacement of the absorption band of a chromophore with respect to its normal position or the displacement of the absorption bands of the group itself is taken as a measure of the effect of the structure of hydrocarbon chains on reactions of org dipolar mols The dipole moment of the group may be increased or a spatially enclosed or electrostatically screened dipole may be set free to increase activity to form suitable complexes Various ketones are studied in MeOH and in aq soln and various ales in EtCHO and $Me_2CO$ soln The consts of esterification and sapon of a no of esters are also correlated with absorption data as are also consts of various other reactions It is shown that a variation of structure of solvent mol which by formation of solvation complexes, changes the velocity and equil position in org reactions also exerts a similar influence on the displacement of the absorption bands Comparison of various series of measurements of this kind with the spectroscopic data in regard to spatial relations of groups should give us a better insight into the space packing of groups O E S

**The photochemical reaction of iodine with hydrogen.** NOBUJI SASAKI AND KENJI NAKAMURA *Anniversary Vol Dedicated to Masumi Chikashige* (Kyoto Imp Univ) 1930, 299–302—Preliminary results on the formation of HI by ultra violet rays of 1800 A U are reported No trace of HI production could be detected with rays longer than 3100 A U It is possible that H atoms are produced by collision of the 2nd kind between $H_2$ and $I_2$ excited by radiation of λ about 1800 A U These H atoms may then react with normal $I_2$ mols ALLEN S SMITH

**The chemical action of ultra-violet light on the alkyl iodides.** GUY EMSCHWILLER *Compt rend* 192, 799–802(1931), cf *C A* 24, 5634—The action of ultra violet light on the liquid alkyl iodides which contain 4C atoms or less liberates I and produces a gas MeI gives $CH_4$ as the gas, EtI, $C_2H_4$ and $C_2H_6$, PrI and iso-PrI, $C_3H_6$ and $C_3H_8$, *n* BuI, *sec*-BuI and iso-BuI, $C_4H_8$ and $C_4H_{10}$, *tert* BuI, $C_3H_6$, $C_2H_4$, $C_3H_8$ and $C_2H_6$ The results are obviously similar except for MeI and *tert* BuI The decompn usually gives I, an olefin and a satd hydrocarbon, it may be formulated thus $2RI \longrightarrow (R-H)+(R+H)+I_2$ A mol of RI loses an atom of H and of I, and the R − H rearranges to give olefins The atoms of H and I act, singly or in combination, on a 2nd mol of RI to give R and $I_2$ These photochem decompns are interpreted to reveal the existence of a H atom of singular properties in the alkyl iodides, attached to the same C as is the I, except, of course, in the tertiary iodides The behavior of this H atom is intimately related to that of the I atom This conception appears to account for certain properties and complex reactions of the alkyl iodides, especially in the syntheses of Wurtz R H LOMBARD

**The photochemical decomposition of nicotine salts.** I PLOTNIKOV AND K. WEBER *Chem-Ztg* 55, 237–9(1931)—Aq solns of nicotine, as free base, salicylate, tartrate or malonate, were treated with org and inorg substances known to be catalysts for photochem reactions, and exposed to sunlight Many substances activate the decompn, particularly $K_2CrO_4$, $AuCl_3$, $Fe(NO_3)_3$, I and chlorophyll The same substances are active toward the tobacco itself, although the rate of decompn is much less Orange-red light (O G filter from Schott & Gen) was most active in the decompn of nicotine in tobacco GEORGE CALINGAERT

**Hydrolysis of acetone in ultra-violet light.** M QURESHI AND N A TAHER *Nature* 127, 522(1931)—For the hydrolysis of acetone in ultra-violet light a direct proportionality has been found between incident light intensity and reaction velocity When an aq soln of acetone in a quartz vessel is illuminated by a Hg arc, HCHO as well as AcOH has been found as a hydrolysis product E J ROSENBAUM

**The photochemical decomposition of nitrous acid.** K S MURTY AND N. R. DHAR.

*J Indian Chem Soc* 7, 985-90(1930).—The kinetics, temp coeff and quantum efficiency of the photochem decompn of $HNO_3$ were studied at wave lengths of 4725, 5650, 7304 and 8500 A. U., according to the method of Bhattacharya and Dhar (*C A* 23, 2887). Explanations are given for the increase with temp of the temp coeff of the thermal reaction and the fact that the temp coeff of the photochem reaction is less than unity. The velocity of the decompn of $HNO_3$ is proportional to the cube root of the light intensity. The Einstein equivalence law does not hold for this reaction. E J Rosenbaum

**The function of $Br_2$ and $I_2$ ions and the influence of Cl ions in some oxidation reactions in light.** R M Purkayastha *J Indian Chem Soc* 7, 991-6(1930).—The kinetics and mechanism of the reaction of lactic and mandelic acids with $Br_2$ in the presence of KBr were studied. Zero mol consts were obtained when radiation of wave lengths 542, 488, 448, 408 or 365 microns was used. Cl ions were found to retard the reactions. The semi mol consts obtained by Dhar (*C A* 23, 5414) for the oxidation by $I_2$ of the Na salts of org. acids in the presence of KI are interpreted as resulting from combined light and thermal effects. The light reaction is calcd. to be of zero order. E J Rosenbaum

**Change of susceptibility of paramagnetic salts under the influence of light.** D M Bose and P K Raha *Nature* 127, 520-1(1931), cf *C A* 24, 3453.—From theoretical reasons it can be expected that activation of an ion of the transition group elements leads to a lowering of the magnetic susceptibility of the soln. B and R obtained qual. evidence of a definite lowering of the magnetic susceptibility when light of wave length 4358 or 5790 mμ was allowed to fall on a green $CrCl_3$ soln. E J Rosenbaum

**The action of light on silver bromide.** P. S MacMahon and A. C. Chatterji *Proc. 15th Indian Sci Cong* 1928, 138-9.—Pure AgBr was sealed in a tube contg. pure ppt of Au as absorbent for Br in an atm of dry O and exposed to sunlight for lengthy periods. Absorption of O in all cases took place in approx. the same amt. as that observed in the case of AgCl. It is suggested that the phenomenon is due not to photochem. synthesis of an oxy compd., but to the direct absorption of O by the dispersed Ag produced in the photochem. decompn. of the Ag halide. F J C

**Ultra-violet absorption spectra of the nitriles and amides of 2-methyl-3-pentene.** A Castille and E Ruppol *Bull sci acad roy Belg* [5], 16, 1129-33(1930).—The absorption spectra of the 2 geometrically isomeric 2 methyl-3-pentene 5-nitriles (I) in hexane soln. and their corresponding amides (in alc. soln.) prepd. by Bruylants and Minetti (cf. *C A* 25, 2909) were detd. and the curves plotted. *trans*-I absorbs more than *cis* I, while the values for their respective acid amides are reversed, that for the acid amide of *cis* I being greater. The crotonic nitriles and acid amides behave in this same fashion (cf. *C A* 20, 708). Odpn F Sheppard

**The absorption of radiation in the lower atmosphere and the amount of ozone.** Ch Fabry and H Buisson *Compt rend* 192, 457-61(1931).—$O_3$ present in the atm. may absorb the radiation of short wave length from the light of the stars. The value 0.0022 cm. of $O_3$ per km. of air at atm. pressure, calcd. from optical absorption measurements, is of the same order of magnitude as that obtained by chem. analysis. The higher layers of the atm. must be richer in $O_3$, since measurements of absorption give values 20 times the amt. calcd. on the assumption that all layers contain the amt. given above. Janet F Austin

**Formation of hydrocyanic acid in the electrical discharge.** Kurt Peters and Hans Köster *Brennstoff Chem* 12, 122-7(1931), cf *C A* 25, 1737.—Yields of 70% HCN have been obtained when 1:1 mixts. of $CH_4$ and $NH_3$ were subjected to the elec. discharge at diminished pressures and rapid gas-flow rates. Increases in the reaction yields resulting from increases in discharge potentials agree with the calcd. thermal equivs. With 15% or less of either $CH_4$ or $NH_3$ the yields of HCN become quant. when calcd. for the smaller constituent of the mixt. Under high charges, excess $CH_4$ and $NH_3$ form $C_2H_2$ or decompose into $N_2$ and $H_2$ resp. With a 3:7 $CH_4$:$NH_3$ mixt. a good yield of pure cryst. $NH_4CN$ results. The addn. of $NH_3$ in the $C_2H_2$ formation from $CH_4$ prevents hydrocarbon formation without diminishing the yield of $C_2H_2$, both tar and hydrocarbons reacting with $NH_3$ to form HCN. The influence of elec. charge, gas flow rate and compn. upon HCN yields is shown in tables and diagrams. The reaction mechanism is discussed at length. F W Jung

**The decomposition of hydrocarbons in the positive-ray tube.** H R. Stewart and A R Olson *J Am Chem Soc* 53, 1236-44(1931).—By the use of a specially designed tube it is shown that the decompn. of the hydrocarbons in pos.-ray analysis is due to dissocn. by the ionizing electrons or to the secondary reaction between ions and neutral mols. Previous expts. with H and $C_2H_4$ gave ambiguous results, since

part of the products reported were found to decompose in the process of analysis. Selective absorption of hydrocarbon ions by propane and butane is observed. *H. W. L.*

**Chemical action in the glow discharge. VI. The oxidation of carbon monoxide.** A. KEITH BREWER AND PAUL D. KLEIN. *J. Phys. Chem.* 35, 1281-92(1931); cf. *C. A.* 25, 32.—The oxidation of CO in a glow discharge has been carried out at pressures as high as 30 mm. of Hg. In the neg. glow the rate of oxidation is proportional to the current and nearly independent of the pressure; it is increased by an excess of CO and retarded by an excess of $O_2$. In the pos. column the rate is proportional to the current and independent of the pressure below 10 mm., but at higher pressures increases to the ignition point. $CO_2$ synthesized in the neg. glow reaches the wall as pos. ions, that formed in the pos. column is deposited as neutral mols. The bands of the first neg. group of CO appear with about equal intensity over a wide pressure range. The data are interpreted as indicating a simple ion cluster mechanism for the neg. glow and an ion chain mechanism for the pos. column. $CO^+$ ions appear much more effective in initiating the reaction than $O_2^+$ ions. An estn. of the rate of production of pos. ions in the neg. glow yields a ratio of *M*/*N* of 2 for the no. of mols. synthesized to pos. ions formed. VII. **The dissociation and oxidation of methane.** *Ibid.* 1293-1302.—$CH_4$ is converted quantitatively into $C_2H_4$ and $H_2$ in the glow discharge at liquid air temps. *Approx. one $C_2H_4$ mol. is formed per $CH_4^+$ ion.* $CH_4$ *in a* 1:2 $CH_4$:$O_2$ *mixt.* is oxidized completely to $CO_2$ and $H_2O$. Reaction seems to be initiated primarily by $CH_4^+$ ions being accelerated by excess $CH_4$ and retarded by excess $O_2$. The max. rate of $CH_4$ oxidation occurs with a 1:1 $CH_4$:$O_2$ mixt. The oxidation reaction is most pronounced in the neg. glow, negligible in the dark spaces and small but fairly const. throughout the pos. column. The efficiency of the pos. column in terms of electron volts per mol. increases rapidly with the pressure above 5.5 mm., indicating the presence of ionic chain reactions. P. H. EMMETT

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Electrolytic phenomena in oxide-coated filaments (BECKER) 4. Absorption spectra of the fractions of serum albumins (FALTIN) 11A. Magnetism and molecular structure (BHATNAGAR, BHATIA) 2. A low-density Cd-vapor lamp (VENKATESACHAR) 4. Reactions at the surface of hot metallic filaments (SRIKANTAN) 2. Irradiating medicaments, foodstuffs, etc. (Austrian pat. 121,657) 17.

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BLEIBAUM, IRMA. *Quantitative Strahlungsmessungen an künstlichen und natürlichen Strahlungsquellen.* Jena: Fischer. 88 pp. M. 6.

*HAAS, ARTHUR. Quanta et chimie. Translated from the German by Jeanne* Perrenot and F. Esclangon. Paris: Gauthier-Villars et Cie. 69 pp. F. 15.

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**Electron-emission element.** SAMUEL RUBEN (to Ruben Patents Co.). U. S. 1,799,645, April 7. In a low-pressure elec. device which functions through an elec. discharge, a cathode is used contg. a mixt. of ferrosoferric oxide, chromic oxide and SrO, fused and cast into suitable form. Cf. *C. A.* 24, 757.

**Identifying crystals such as precious gems by optical analysis of emitted rays.** FAYETTE P. READ. U. S. 1,799,601, April 7. App. is described.

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## 4—ELECTROCHEMISTRY

COLIN G. FINK

**A survey of electrochemical industries of Japan.** YOCOCO KATO. *Trans. 2nd World Power Conference* (Berlin) 1, 306-10(1930).—Brine is electrolyzed to form NaOH, bleaching powder and bleaching liquors. By product $H_2$ is used for the hydrogenation of oil from fish and soy beans. $H_2$ from the electrolysis of $H_2O$ is used for $NH_3$ synthesis, $O_2$ for synthetic AcOH and for oxyacetylene welding. Cu and Fe are purified electrolytically. Electrolytic Zn is produced. Metallic Na is made by the electrolysis of fused NaOH. Au, Ag, Ni and Cr are electroplated. The electrothermic industries are occupied in the production of $CaC_2$, cyanamide, ferro Si, ferro-Mn, ferro Cr, elec. steel, etc. Synthetic AcOH is made from acetylene. Methanol production is partly commercial. Pb storage batteries and dry cells are made. ALDEN H. EMERY

**The new electrochemical laboratories of the University of Grenoble.** R. SEVIN. *J. four elec.* 40, 45-8(1931), 2 illus. C. G. F.

**The new carbide-cyanamide plant at Wingles (France).** RAYMOND SEVIN. *J.*

*four elec* 40, 51–8(1931), 10 illus —The two 6000 kw carbide furnaces employ the Miguet electrode Details of installation are given C G F.

Industrial electric heating XV. The heating and cooling of metals. N R Stansel and S L Hoyt *Gen Elec Rev* 34, 302–9(1931), cf *C A* 24, 4225 —A review C G F

Two-thousand-kilowatt seventy-five-ton furnace anneals large castings A G Hotchkiss *Elec World* 38, 768(1931) —A 2000 kw car bottom type elec annealing furnace with a max loading capacity of 75 tons has heating units of Ni Cr ribbon resistor type W. H Boynton

Automatic electric apparatus for the sterilization of solutions by direct heat without alteration of the titer B Angeli *Boll chim farm* 69, 809–10(1930) G S

The determination of the transport numbers of metals on electrolyzing their alloys Richard Seinger and Richard Irina *Monatsh* 57, 112–64(1931) —Molten alloys were electrolyzed by the method of Kremann, Muller and Kienzl (*C A* 19, 5, 1379) Longer tubes were used in order to obtain an intermediate layer of unchanged compn The 19 alloy pairs investigated could be divided into 3 groups With K Hg, Pb Hg Sn Hg Sn Pb Sn Sb, Bi Sn, Bi Cd and K Na, one of the metals migrated toward the anode and the other toward the cathode With Na Hg, Bi Hg, Sn Zn, Sn Al, Ag Al, Ag Bi, Zn Sb and Sn Cd, either this same behavior was noted, or else both metals migrated toward the anode, depending upon exptl conditions No definite relation could be established between exptl conditions and the direction of migration except that frequently migration of both metals toward the anode took place at higher c ds With Ag Sn Ag Sb and Pb Na both metals migrated toward the anode It is concluded that in order to det transport nos for molten alloys such as Hittorf obtained for aq solns, many sources of exptl error must be eliminated C L W

The galvanic tension of lead-gold alloys Franz Grengl and Robert Baum *Monatsh* 57, 165–76(1931) —The galvanic tensions of the cells Hg | HgCl | satd KCl | 0.1 *N* HCl satd with $PbCl_2$ | $Au_xPb_{(1-x)}$ were measured at 25° on an Ostwald capillary electrometer With increasing Au concn, the potential remained practically that of Pb at 40% Au it dropped and attained a min at 60% Au, then rose gradually to that of Au It is concluded that the potentials of the 2 compds $AuPb_2$ and $Au_2Pb$ lie close to that of Pb Curtis L Wilson

The cathodic behavior of pyrite and chalcopyrite. Atsushi Matsubara and Jitsutaro Takubo *Anniversary Vol Dedicated to Masumi Chikashige* (Kyoto Imp Univ) 1930, 311–39(in German) —The elec reactions of Fe and Cu pyrites as cathodes were quantitatively investigated The app used permitted measurement of the gases evolved and electrolyte used and sampling of the cathode soln The cathode was prepd by sealing a crystal of the pyrites in a glass tube Expts were made at 6 v and at 20 v Fe pyrites is dissolved in dil $H_2SO_4$ with the evolution of $H_2S$ by passage of current If the sample is anodically polarized either dry or in the electrolyte, a relatively large amt of H is evolved in comparison to the quantity of current consumed in the subsequent cathodic polarization in dil $H_2SO_4$ Pretreatment by cathodic polarization shows the opposite effect Cu pyrites is decomposed, forming $H_2S$, $Cu_2S$ and $FeSO_4$ With preliminary anodic polarization and subsequent cathodic, a relatively small amt of H is evolved and a large amt of the decompn product The effect on the mineral is opposite with preliminary cathodic polarization A greater amt of decompn product was found than would correspond to the current consumption owing to the action of the acid If the cathodic polarization proceeds further, metallic Cu is sepd A theory of ionization of the 2 minerals is advanced to explain the exptl results A S S

The electrolytic preparation of white lead. J F Sacher *Chem.-Ztg* 55, 189–90 (1931) —Various patented processes are reviewed While the electrolytic process possesses the advantages of avoiding dusting and of being continuous and labor saving, there are serious disadvantages such as the difficulty of producing a purely basic Pb carbonate, higher installation cost, complicated chem control and the danger of discoloration by impurities from the electrodes It is claimed that the electrolytic process has not attained the reliability of the corroding process, and probably never will (cf the Sperry process (U S 1 452,620), *C A* 17, 2197) Curtis L Wilson

Electrochemistry of magnesium Sven Bodforss *Z physik Chem*, Abt A, 153, 83–106(1931), cf *C A* 21, 524, 22, 719 —The change of potential of a Mg electrode with time was detd in $MgSO_4$ and $MgCl_2$ solns The effect of varying the acid content and varying the buffer in the presence of neutral salts and $NH_4$ salts or of hydroquinone, resorcinol succinimide, pyrocatechol, CO, $CO_2$ and $H_2$ was detd Mg becomes less noble as the H ion concn of the soln is increased, till a max is reached.

This is explained by the reaction $Mg \cdot \cdot \cdot Mg(ion) + e$ or $2Mg \rightleftharpoons Mg_2(ion) + 2e$ ARTHUR FLEISCHER

**Direct electrochemical production of permanganic acid from manganous salt solutions.** LÁSZLÓ DE PUTNOKY *Matematik es Természettud Értesitö* **47**, 732–48 (in German 749–50)(1930) $MnI_3$ is formed on the anode during the electrolysis of $MnSO_4$ soln with a diaphragm in the presence of $H_2SO_4$ and HI The primary product of anodic oxidation is $HMnO_4$, which reacts with $MnSO_4$ and HI to form $MnI_3$ Only after all the $Mn^{\cdot\cdot}$ salt has been oxidized to $Mn^{\cdot\cdot\cdot}$ can the $HMnO_4$ remain as the final product *$HMnO_4$ is then formed by the oxidation of $MnI_3$, which therefore decreases in amt during electrolysis* The $MnI_3$ could not be detected, probably because it is instantly oxidized S S DE TINÁLY

**Series refining of copper and the economics of the process.** A GLAZUNOV AND N CHVORINOV *Chem Obzor* **6**, 11–7, 62–6(66 English)(1931) The multiple and series systems are described and on the basis of the charts given it is concluded that the series system is more economical only when the price of Cu is high and the anodes contain but a small percentage of impurities J KUČERA

**The Nernst equation I. A new equation for electrode potentials.** MARTIN MEYER *Chem News* **142**, 170–83(1931) Some e m f data were graphically examd A new equation for the e m f of a single electrode or concn cell is derived on the basis of van der Waal's gas equation It is predicted that the function $f = [e\ m\ f - \phi RT \log(P/p)] \div \phi(P - p)$ ($\phi$ = numerical coeff $R$ = universal gas const $T$ = Abs temp, $P$ = soln tension of ions $p$ = soln pressure of metal) should be a const for any substance where intermol attraction can be assumed to be equal to 0 R H CHERRY

**Irreversible phenomena of electrolysis (overvoltage and passivity of the electrodes)** ERNESTO DI NINA *Atti III congresso naz chim pura applicata* **1930**, 414–9.—Review of electrolysis and polarization phenomena G M MURPHY

**Electrodeposition of metals from nonaqueous solvents.** I I AUDRIETH AND H W NELSON *Chem Reviews* **8**, 335–52(1931) Electrodeposition of metals from $C_5H_5N$ HCONH$_2$, AcNH$_2$, liquid NH$_3$ and other nonaq solvents offers many interesting possibilities LOUISE KELLEY

**Chemicals—their functions in electroplating** L C PAN *Brass World* **27**, 79–81(1931) The metal compd, the conductor the anode depolarizer the brightening agent and the buffer and the parts they play in electroplating solns, are briefly discussed W H BOYNTON

**Recovery of silver and gold from plating solutions.** K BIHLMAIER *Metallwaren Ind u Galvano Tech* **29**, 143–5, 169–71(1931) Waste solns are disposed of in 3 ways (1) the solns are given directly to a pptn plant (2) the preliminary pptn is done at the plating plant and the final recovery at the pptn plant, (3) the entire work of recovery is done at the plating plant itself Chem methods of recovering Au and Ag from acid and alk solns, and from liquids which contain the noble metals in the form of dust, are described CURTIS L WILSON

**Work supervision and testing of plating baths.** H KRAUSE *Metallwaren-Ind u Galvano-Tech* **29**, 145–7(1931), cf *C A* **24**, 3445 CURTIS L WILSON

**Electromotive behavior of cupric oxide.** BASRUR S RAO AND N G CHORANNA *Proc 15th Indian Sci Cong* **1928**, 115.—The half cell Pt CuO, Cu$_2$O, *N* NaOH has been observed to give an inconst potential difference by Allmand (*C A* **4**, 1947) and by Maddison (*C A* **20**, 1023) no satisfactory explanation has hitherto been available R and C carried out measurements with cells in which the CuO used had been first warmed to dryness with an alc soln of NaOH and then heated at different temps with suitable precautions Such heating was found to cause an aging effect which tends to give const potential values No appreciable aging effect was noticed with Cu$_2$O under similar treatment F J C

**A low-density cadmium-vapor lamp.** B VENKATESACHAR *Proc 15th Indian Sci Cong* **1928**, 67.—A Cd lamp with a hot solid Cd cathode and a water cooled Cd anode was designed A study of the photographs confirms the results obtained with Hg Particularly striking is the appearance of the higher members of series lines and of the so called "forbidden lines" at a pressure of about 2 mm of Hg Description of the lamp and detailed results are not given I J C

**Electrolytic phenomena in oxide-coated filaments.** J. A BECKER *Trans Electrochem Soc* **59** (preprint), 15 pp (1931) cf *C A* **24**, 4218.—A critical survey of the literature shows that the current through the oxides in oxide-coated filaments is carried by electrons, negative oxygen ions and positive barium ions The proportion of current carried by each depends upon the exact composition and method of preparation of the oxide coating, on the heat treatment and on previous electrolytic effects Pre-

sumably the conductivity is greatly affected by Ba and O dispersed through the oxide. New experimental results show that for a particular BaO + SrO filament, the cond. was given by $1.71 \times 10^{4} e^{-1.73 \times 10^{4}/T} + 5.55 \times 10^{-3} e^{-0.62 \times 10^{4}/T}$. The current is proportional to the voltage only so long as the current is small, otherwise the products of electrolysis alter the cond. Polarization currents are caused by the Ba and O which are produced by electrolysis. These currents decrease rapidly even at temps. near 500° K., thus showing that Ba and O diffuse at low temps. C. G. F.

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The arrangement of the microcrystals in white Sn deposited by electrolysis (Hirata, *et al.*) 2. The steam and electric power plant of Imperial Chemical Industries, Ltd., at Billingham (Humphrey, *et al.*) 13. Ni cast iron and its uses in the electrical industry (Hirsch) 9. Comparison of rust protection of Fe by Zn, by Cd and by Zn-Cu alloys and the electrodeposition of such alloys (Mathers, Hardy) 9. Cu extraction from ore (U. S. pat. 1,798,255) 9. Electric furnace for glass manufacture (U. S. pat. 1,799,371) 19. Sealing composition [for electric condensers] (Can. pat. 309,681) 18. Potting compositions (Can. 311,044) 18. Drying storage battery plates with heated gases (U. S. pat. 1,799,248) 13. Working up cyanide solutions to give K ferrocyanide and the preparation of K ferrocyanide by treatment with compressed air and subsequent electrolytic oxidation (Gloud, *et al.*) 18.

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Accumulators. Compagnie générale d'électricité. Fr. 697,390, May 24, 1930. The edges of fibrous separators for accumulators are coated with a substance resistant to the electrolyte.

Accumulators. Ernst Bergmann. Austrian 121,757, Dec. 15, 1929. Sulfation is prevented by adding $(NH_4)_2SO_4$, $Al_2(SO_4)_3$ and a little org. acid to the $H_2SO_4$ filling. The salts must not be added in alum forming proportions. The org. acid may be added in the form of a salt. A suitable filling contains distd. water 755 and $H_2SO_4$ 240 cc., to which are added anhyd. $Al_2(SO_4)_3$ 18, $(NH_4)_2SO_4$ 4 and basic $Al(OAc)_3$ 5 g. The invention is particularly applicable to starting batteries for automobiles, etc.

Electrodes for accumulators. P. Palánky. Hung. 102,071, March 10, 1930. Positive electrodes for alk. accumulators are made of MgO, $Mg(OH)_2$ or $MgCl_2$ mixed with CuO and 3–15% powd. graphite, charcoal, coke or anthracite. Negative electrodes are formed of the above Mg compds. and ZnO contg. a little HgO. These mixts. are added to powd. resin or pumice, formed into electrodes and heated to redness.

Making electrodes for selenium cells from colloidal graphite. Telefunken Ges. für Drahtlose Telegraphie m. b. H. (Fritz Michelssen, inventor). Ger. 522,291, Feb. 14, 1929.

Selenium cell. Emerich Spielmann. Austrian 121,671, Oct. 15, 1930. Structural features are described.

Selenium cells. Telefunken Ges. für Drahtlose Telegraphie m. b. H. (Otto von Bronk, Fritz Michelssen and Fritz Schroeter, inventors). Ger. 522,002, Dec. 2, 1928. Se cells sensitive to ultra red rays are formed in an atm. of inert gas, *e. g.* A.

Modified Bunsen cell. L. Jeszenszky. Hung. 102,192, Dec. 24, 1929. NaOH or KOH is used as electrolyte with (1) $KMnO_4$ dissolved in $H_2SO_4$ contg. water (potential 2.7 v.), or (2) Na or K dichromate (2.5 v.), or (3) concd. $HNO_3$ (2.4 v.), or (4) $H_2SO_4$ contg. HgO (1.9 v.) or (5) pyrolusite powder moistened with acid water (1.8 v.), as depolarizing liquid.

Electrochemical condenser. Léon Segal and Henri André. Fr. 698,698, Oct. 9, 1929. A Ni-alkali (potash or soda) Sn combination is used.

Electroplating apparatus. John J. Wialin (to General Elec. Co.). U. S. 1,798,994, March 31. Structural features.

Apparatus for electroplating jewelry chains, etc. Max Tessler. Fr. 697,885, June 25, 1930.

Electrolytic metal deposition. Ernst Kelsen (Franz Halla, inventor). Austrian 121,986, Nov. 15, 1930. The electrolytic manuf. of metals is conducted under the influence of high frequency sound waves. Cf. *C. A.* 22, 721, 23, 1573.

Covering metals with aluminum. Soc. anon. pour l'ind. de l'aluminium. Fr. 698,748, July 8, 1930. Metals such as Fe or light alloys are given an adhering coating of Al, by electrolysis. The base metal serves as cathode, and the electrolyte has a m. p. lower than that of Al. One or more metals more noble than Al is pptd. in small quantities at the same time as the Al at the anode, *e. g.*, small quantities of Pb. Before commencing the pptn. the cathode is allowed to function as anode.

**Chromium plating.** Auguste Hollard (to Soc. nouvelle de l'orfèvrerie d'Ercuis). U. S 1,799,851, April 7. See Fr. 661,182 (*C. A.* 24, 28).

**Removing mistiness in electrolytic baths during chromium plating.** Wilhelm Steinhorst. Ger 504,815, May 25, 1927. The mist is dispelled by a high tension electrostatic field applied by pointed conductors outside the bath

**Chromium-stripping bath.** John F. McCullough (to The Ternstedt Manufacturing Co) Can 311,131, May 5, 1931 An electrolytic bath for stripping Cr-plated articles, with the article acting as an anode, comprises an aq soln. contg 60–120 g oxalic acid per l A temp of 77–85°F. and a potential of approx 12 v. are used

**Electrodeposition of the metals of the platinum group.** Baker & Co, Inc. Fr. 698,153, June 27, 1930 See U S 1,779,436 (*C A.* 25, 38)

**Electrolytic production of metallic powders.** Eugene Drouilly (to Soc. anon Trefileries & Laminoirs du Havre, anciens établissements Lazare Weiller, Soc coöperative de Rugles et la canalisation electrique reunis) U S 1,799,157, April 7 Metallic powders such as Cu are produced by electrolyzing a soln of a metal salt such as $CuSO_4$ contg the carbonaceous reaction product of glucose and $H_2SO_4$ substantially in colloidal dispersion

**Electrolytic production of unstable products.** Österreichische Chem. Werke G m b. H Austrian 121,750, Oct 15, 1930 The electrolytic manuf of persulfuric acid or its salts is effected in a cell having a diaphragm arranged close to the anode The anolyte is caused to flow rapidly through the cell in a thin layer, while the main body of electrolyte is cooled and passes slowly through the cell, preferably in counter current to the anolyte Other electrolytic processes yielding unstable end products are similarly conducted, the diaphragm being located close to the electrode yielding the unstable product. Details of the app are described

**Electrolytic cell suitable for caustic-soda production from brine.** Herbert I Allen and Douglas B. Ayerst (to Electron Chemical Co). U S 1,798,575, March 31. Structural features.

**Purifying solutions.** I G. Farbenind A.-G. Fr. 697,900, June 25, 1930 Solns are purified electrolytically by causing a current to act on foreign substances dissolved in low concn. in an electrolyte, the electrolyte being caused to pass through electrodes of metallic gauze, the openings of which are very small Examples are given of the removal of As from $H_3PO_4$, $H_2SO_4$ and AcOH, and Hg from AcOH

**Apparatus for electrolytic decomposition of water or other liquids or solutions under high pressure.** Jacob E. Noeggerath. U. S 1,799,116, March 31 Structural and elec. features.

**Electrometallurgical products.** François C. S Mizgier. Fr. 698,492, Apr. 7, 1930. Electrometallurgical products are made by using primary materials powdered and agglomerated by any means. The current is brought to the furnace by electrodes made of the material to be treated The plasticity of the products before cooling is used for molding the electrodes

**Tantalum.** Clarence W. Balke (to Fansteel Products Co). U S 1,799,403, April 7. Ta is obtained by electrolyzing a fused bath contg tantalic oxide and K fluotantalate.

**Ozone.** Eugène Royer. Fr 697,930, Sept. 25, 1929 Ozone is produced under pressure by a magnetic field created by the dielec liquid of an annular reservoir in a tight chamber having a central metallic mass and receiving the gaseous mixt. under pressure.

**Protective layers on metallic or other electric conductors.** Jonas H Mellquist. U. S. reissue 18,030, April 7 Reissue of original pat. No 1,595,675 (*C. A.* 20, 3271).

**Chemical reactions under electric waves.** Institut für physikalische Grundlagen der Medizin Fr 697,547, June 17, 1930. In chem reactions under a luminous elec. wave of continuous current, the interior of the reaction chamber is such that the vol. of the space occupied by the cathodic fall is approx equal to the vol of the space between the electrodes The reaction is carried out under reduced pressure

**Rotary electric furnace.** Gottfried Trümpler. Ger. 522,004, May 1, 1928.

**Electric resistance furnace.** Gottlieb Keller (to Akt. Ges Brown Boveri & Cie). U. S. 1,798,678, March 31. A system of power-input control is described.

**Electrically heated furnace suitable for dental work.** Paul Manternach. U. S 1,799,695, April 7. Structural features

**Iron-coupled electric induction furnaces.** Hirsch, Kupfer- und Messingwerke A.-G. (Manuel Tama, inventor). Ger. 522,198, Nov. 15, 1927. Elec. features are described.

**Electric annealing, etc., furnace.** SIEMENS-SCHUCKERTWERKE A.-G. (Hans Gerdien and Werner Juhatz, inventors) Ger. 522,081, Jan. 12, 1928.

**Electrically heated annealing apparatus for coiled iron bands.** HIRSCH, KUPFER- UND MESSINGWERKE A. G. (Franz Linnhoff, inventor) Ger. 522,199, Nov. 25, 1928.

**Hardening high-speed steel.** HERAEUS VACUUMSCHMELZE A. G. and WILHELM ROHN. Ger. 522,003, July 9, 1929. Hardening is effected in an electrically heated tube of cast Cr, to which current may be conveyed by water cooled tubes of Ni or Fe welded on to the Cr tube. The tube may be closed at one end and filled with a protective gas.

**Heating charges such as tungsten filaments and supports in electric furnaces.** LLOYD C. KELLEY (to General Elec. Co.). U. S. 1,799,102, March 31. The charge in the furnace is heated to the furnace temp. and is then kept in the furnace while further heated by heat generated in the charge itself (as by a high frequency coil) independently of the furnace temp. App. is described.

**Heat-exchange apparatus suitable for use as a jet heater in electrolytic copper refining.** JOHN P. RAHBEN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,799,391, April 7. Structural features.

**Packing crucibles of electric metal melting furnaces.** MAGNUS UNGER (to General Elec. Co.). U. S. 1,800,031, April 7. In packing crucibles to prevent leakage, the crucible is surrounded with a layer of granulated, refractory, heat insulating material which is agitated while being applied to the crucible so as to compact it tightly against the crucible.

**Gas rich in hydrogen from carbide furnace.** KATUZI HIBI. Japan 90,215, Feb. 9, 1931. Gas contg. about 80% of $H_2$ is manufd. by introducing $H_2O$ vapor into the mixt. of CaO and C in the $CaC_2$ furnace. The process has no bad effect on the quality of $CaC_2$ produced.

**Head construction for electric resistance detectors for combustible gases.** ALBERT N. ERICKSON (to Union Carbide Co.). U. S. 1,798,977, March 31.

**Gas purification.** METALLGESELLSCHAFT A.-G. (Jakobus R. Gies, inventor). Ger. 516,763, Jan. 3, 1930. An elec. gas purifying plant in which a gas canal is arranged between two filter groups is described. *Cf. C. A.* 25, 2061.

**Cleaning gases electrically.** SIEMENS SCHUCKERTWERKE A. G. (Carl Buff, inventor). Ger. 522,166, Dec. 5, 1928. The cleaning of the insulators, *e. g.*, by a rinsing gas, is automatically regulated in accordance with the amt. of dust that has settled on them. *Cf. C. A.* 25, 463.

**Cleaning furnace gases electrically.** METALLGES. A.-G. (Hermann Fiesel, inventor). Ger. 522,389, Apr. 19, 1929. The electrically neutral gases are supplied to the electrofilter at a temp. above 150°, *e. g.*, 200–250°, and at a relatively low velocity generally less than 1 m. per sec. The tension in the electrofilter may increase in the direction of flow of the gases. The method is particularly intended for *rotary cement kiln gases*.

**Apparatus for electrical precipitation of suspended particles from gases.** HARRY A. WINTERMUTE and CARL W. J. HEDBERG (to Research Corp.). U. S. 1,798,964, March 31. Structural features.

**Apparatus for electrical precipitation of suspended particles from gases.** HARRY A. WINTERMUTE and CARL W. J. HEDBERG (to Research Corp.). U. S. 1,798,511, March 31. Structural features.

**Precipitating electrode for electric gas cleaner.** "ILGA" ELEKTRISCHE GASREINIGUNGS G. M. B. H. Ger. 522,479, June 26, 1926.

**Electrode support for dust precipitators.** HOWARD D. SALISBURY. U. S. 1,798,761, March 31. Structural features.

**Arc lamp electrode.** STEPHEN W. ORNE (to The Canadian National Carbon Co., Ltd.). Can. 310,628, Apr. 21, 1931. A cored electrode in which the shell is made of a slowly burning form of C, as petroleum coke, contains small quantities of $H_3BO_3$ with a suitable binder, and the core consists of 10 parts of rare earth fluorides, 60 parts $CaI_2$, 30 parts high grade carbon flour and sufficient tar to serve as a binder. Instead of rare earth fluorides other compds. may be used as oxides, chlorides, silicides or carbides. *Cf. C. A.* 25, 885.

**Incandescent electric-light bulb.** SAMUEL LYMAN. U. S. 1,798,745, March 31. The base of the bulb has a reentrant portion provided with a silvered reflecting surface. Various details of construction are described.

**Electric incandescent lamp filament.** TED E. FOULKE (to General Elec. Co.). U. S. 1,800,012, April 7. Structural features.

**Getter for incandescent electric lamp.** EWALD DIETZ (to The Canadian Westing-

house Co., Ltd.) Can 310,383, Apr 14, 1931 Residual deleterious gases in an incandescent elec lamp are cleaned up by effecting the thermal decompn therein of copper phosphide A getter compn for evacuated incandescent elec lamps comprises cryolite contg about 0.3–40% phosphorus as copper phosphide

## 5—PHOTOGRAPHY

E P WIGHTMAN

**Early history of photography.** E STENGER *Phot Ind* 29, 32–5(1931).—English photographic literature from 1839 to 1870 is covered It is essentially a bibliography treated chronologically C E MEULENDYKE

**Mechanism of the photographic process** H BAINES. *Chemistry and Industry* 50, 256–60(1931) A review (without references) is given of the more recent theories of photographic sensitivity and latent image formation, with a brief discussion of some other phases of the photographic process, such as development and fixation F P W

**Photographic emulsion for dry plates** MICHIO MIYATA AND A SASAKI *Rep't Imp Ind Research Inst., Osaka, Japan* 11, No 18 (1931).—The method of prepn of the photographic emulsion together with the effect of the concn of halogen salt and gelatin is given F I NAKAMURA

**Measurement of sensitivity of emulsions and a comparison of the results of the various methods.** L LOBEL AND M DUBOIS. *Photographe* 18, 85–6, 108–11(1931).—Twenty one emulsions were compared for sensitivity by the methods of Hurter and Driffield, Scheiner, Jones and Russell, and Labussière and a practical test is made under standardized conditions for min exposure For the emulsions tested, which were mainly orthochromatic and compared at a gamma 1.6, the H & D inertia method gave values which agreed best with the practical exposure test, but generally were of lower value W WESTWATER

**Toning of photographic pictures by sulfur and selenium.** J MILBAUER AND F MASIN *Chem Obzor* 6, 17–20(20 English)(1931).—By controlling all methods of direct as well as indirect S and Se toning on images obtained by the development of AgCl AgBr and AgBr papers, it was found that the direct toning is most readily accepted by images obtained by colored development, *e. g.*, to brown tones A series of new methods, direct and indirect, is described by using a combined bath of thioarsenate and thioantimonate and a very efficient bath with $H_2SeO_4$ Thiostannates, thiomolybdates and thiotungstates cannot be applied for toning, as such baths give permanent colors to the light parts of images The same is true for the sol arsenates and antimonates of Se Colloidal solns of Se do not attack practically the Ag granulation, thus differing from the S solns Images toned by Se can be bleached by using a bath of $KMnO_4$ + KBr, acidified with a trace of HCl, and then retoned J KUČERA

**Conversion of Scheiner speeds into H. & D.** M BILTZ *Phot Ind* 29, 95(1931).—An exact conversion is not possible because of fundamental differences in the 2 methods of detg speeds In a practical way, B has separately detd the 2 speeds for a large no of com plates and films He plotted the Scheiner speeds as abscissas and H & D speeds as ordinates The wide errors resulting from the use of conversion tables are apparent C E MEULENDYKE

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New photoelectric recording microphotometer (CARROLL, MOSS) **1.** Quantitative investigations on the photographic action of $\alpha$- and H-particles (BLAU) **3.** Energy measurements in the visible and ultra violet (BENFORD, HOWE) **3.** The action of light on AgBr (MACMAHON, CHATTERJI) **3.** Films (Fr pat 698,727) **23.**

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**Color photography.** SPICERS, LTD Fr 698,145, June 27, 1930. Photographic prints are obtained in natural colors by exposing to light a printing material contg a photographic emulsion on a screen carried by a translucid detachable support, the emulsion being away from the source of light After development of the image, the print and the roller are transferred by inversion to a 2nd support, the translucid detachable support being detached before or after this transfer Cf. *C A* 25, 2653 and following abstrs

**Color photography.** SPICERS, LTD *Fr. 698,220, June 30, 1930* A film of celluloid, viscose, cellulose nitrate, etc., for use in color photography is coated (1) with a layer of insulating material, such as a soln of cellulose acetate with or without plastifiers,

to prevent the penetration into the support, of the film of dye solns and agents for removing dyes, (2) with a layer of material compatible with the dyes and removers, such as cellulose nitrate, collodion or regenerated cellulose and (3) with a multicolor screen

**Color photography.** Siccus, Ltd Fr 698,258, July 1, 1930 Multicolored screens are applied to a film of cellulose acetate, nitrocellulose, etc., by applying on the surface of the film a constituent of coloring material and afterward printing successively on the surface of the film lines or other geometric designs, by means of one or more agents each contg a compd capable of reacting with the said constituent to form a differently colored dye

**Photographic developers** Gustav Reddelien and Werner Müller (to Agfa Ansco Corp) U S 1,799,648, April 7. Photographic developers contg as a developing agent a *N* monohydroxyethyl deriv of nuclear substitution products of 4 amino-1 hydroxybenzene are stable very sol and capable of developing the latent photographic image in a Ag halide emulsion without formation of fog, even in solns free from KBr Examples are given of developers contg 4 hydroxyethylamino-2-chloro-1 hydroxybenzene, 4 hydroxyethylamino-3 methyl 1 hydroxybenzene and 4 hydroxy ethylamino 1 hydroxybenzene 2 carboxylic acid *Cf C A*, 24, 3186, 25, 1749

**Developing light-sensitive layers with gases such as ammonia.** Emil Grovau (to Eugene Dietzgen Co) U S 1,798,411, March 31. During development with a gas such as $NH_3$, the paper being developed is slightly moistened with a liquid such as water contg the developing gas App is described

## 6—INORGANIC CHEMISTRY

A R Middleton

**Advances in the preparation and utilization of a few rare elements.** Walter Noddack *Metallborse* 21, 1683–4 1751 2(1931).—A brief summary covering Ge, Hf, protoactinium, W, I, Re and the Pt group Re is obtained from molybdenite by soln in $HNO_3$ Pptn of $(NH_4)_3PO_4 \cdot 12MoO_3$ leaves Re in the filtrate, from which it is removed as the sulfide The process, repeated many times, finally yields a 1% Re concentrate This is oxidized and the oxide removed by sublimation Reduction in H leaves the metal as a heavy, gray powder, m slightly above 3400° Abs Analytically Re belongs to the $H_2S$ group, pptg as $Re_2S_7$ from aq solns of $ReO_4^-$ This ion is not readily reduced B A Soule

**Rhenium.** Ida Noddack and Walter Noddack. *Z angew Chem* 44, 215–20 (1931), *cf C A* 24, 3959.—A review covering the chem properties of Re, its detection and detn and the prepn of $HReO_4$ and $ReO_2$ To recover Re from residues, these are dissolved in dil $HNO_3$, boiled down and converted into chlorides by treating with HCl The soln is evapd to dryness, the salts are dissolved in water, the soln is made slightly alk with KOH, treated with $(NH_4)_2S$ and then acidified with dil $H_2SO_4$ After standing 1 day the supernatant soln is again treated with $(NH_4)_2S$ and $H_2SO_4$ to ascertain whether the pptn was complete The ppt is filtered, washed with 5% $H_2SO_4$, then hot water, dried washed with EtOH, then $Et_2O$ and dried again The product is then pulverized and treated for 1 day with $CS_2$, which dissolves the excess S The residue is again pulverized and then added slowly to 4 parts of a 1 1 molten mixt of KOH and $KNO_3$ in a Ni or Ag crucible The cooled mass is dissolved in an excess of water and the soln is filtered After concn and cooling the Re seps as a heavy cryst powder of $KReO_4$ very sparingly sol in KOH This is filtered, washed with a little water and 96% EtOH The KOH soln contains not more than 0.1 g of $KReO_4$ per l A test has shown that when the alk soln contains 100 times as much Cr, Mo, W, Cb, Ta, Ru Os, Zn Ga, Ge, As or Pb as Re, the first crystn yields $KReO_4$ which contains not more than 0.2% of any of these elements Georges Calingaert

**Zirconium II. Zirconium oxalate and diphenyldinitrogen zirconium.** Howard S Gable *J Am Chem Soc* 53, 1276–8(1931), *cf C A* 24, 4996.—The use of MeOH solns allows Zr compds to be prepd without danger of hydrolysis Normal $Zr(C_2O_4)_2$ (I) has been prepd for the 1st time by the interaction of solns of $ZrCl_4$ and oxalic acid in MeOH The white gelatinous ppt is quite sol in water, the basic salts of other workers being insol Jefferson's work (*J Am Chem Soc* 24, 540,(1902)) on the pptn of Zr salts by aniline was repeated with identical results in water or MeOH, the reaction being $2C_6H_5NH_2 + ZrCl_4 \longrightarrow C_6H_5N{=}Zr{=}NC_6H_5$ (II) $+ 4HCl$ The solubilities of I and II were observed as follows $CCl_4$, $CS_2$, MeOH, EtOH, $NH_4OH$ and HCl, both I and II insol, $C_6H_5NH_2$, I slightly sol, II insol, HCOH, I and II react,

$H_2O$, I very sol, II insol. AcOH, I slightly sol, II insol $Me_2CO$, I slightly sol, II insol $HNO_3$, I insol II sol ALBERT THOMAS FELLOWS

**Synthesis of gas-metal compounds by sputtering.** L. R INGERSOLL. *J. Am. Chem Soc* 53, 2008–9(1931).—Ni sputtered in N under special conditions gives a nitride film, decompd by heating at 350°, on heating to 150° in H, $NH_3$ and Ni are formed. Compds of Co and Fe with N and of Ni and H have also been prepd C J WEST

**Higher oxygen compounds of the eighth group of the periodic system. II. Compounds of nickel.** D K GORALEVICH *J Russ Phys-Chem Soc* 62, 1165–88(1930), cf *C A* 25, 654.—In the fusion of NiO with $KNO_3$ or with $KClO_3$ in the presence of alkali, there is formed aside from $K_2NiO_4$, a small amt of a gray-green material which liberates $O_2$ on treatment with hot $H_2O$ or with $H_2SO_4$ or $HNO_3$. This material is sol in hot concd HCl without decompn but seps from the acid on cooling. Large yields of this material can be obtained by fusing in a silver cup a mixt of NiO and $KNO_3$ and then adding to the hot fused mass $K_2O_2$, heating further, cooling, powdering and washing the product with ice water on a filter paper. The same reaction was repeated by fusing NiO with $NaNO_3$ and $Na_2O_2$, also with $Ba(NO_3)_2$ and $BaO_2$. The product of the reaction with Na compds behaves in the same manner as the product with K compds in regard to hot $H_2O$ or $HNO_3$, $H_2SO_4$ or HCl. The product of the reaction with Ba compds is not decomposed by hot $H_2O$ or by heating to redness, but $HNO_3$ and $H_2SO_4$ liberate $O_2$ from it. When concd HCl is added, $Cl_2$ is liberated on prolonged heating. Analysis of the fusion products showed them to be mixts of compds. After repeated washing of the mixts with dil AcOH the residue remaining on the filter paper was a definite compd., *e. g.* in the case of the Ba fusion it was $BaO_2 Ni_2O_3$, in which Ni is octavalent. The pure $BaNiO_3$ is completely sol in warm concd HCl. On heating $Na_4NiO_5$ in concd HCl there forms a green ppt of $Ni_2O_3$ which is unstable and decomposes into NiO and $O_2$. $K_2NiO_3$ and $BaNiO_3$ behave similarly. On careful heating of $Ni_2O_3$ with concd HCl a white unstable compd $NiO_4$ forms, which decomposes in air into NiO and $O_2$. III. **Nickel oxides.** *Ibid* 1577–1625.—Expts were conducted to establish the existence and phys and chem properties of various Ni oxides, in regard to which there is confusion in the literature. (1) Oxides of Ni prepd by electrolysis of powdered metallic Ni in strongly alk. Na pyrophosphate soln contained Ni 67–73%, O 27–34%, no $H_2O$ of crystn., active O by action of $H_2O$ at 50° 6–16%, active O by action of $H_2SO_4$ 7–16%. Heating caused decompn to NiO. (2) *Hydrated NiO oxidized in alk. soln. in which $Cl_2$ was liberated electrolytically* gave a product contg Ni 66–73%, O 27–34%, active O by action of $H_2O$ at 50° 5–16%, active O by action of $H_2SO_4$ 7–16%. (3) Ni salts, including chlorides, oxidized by means of $K_2S_2O_8$ in the presence of alkali gave products contg $H_2O$ 9–10%, Ni 64%, O 26%, active O in $H_2O$ at 50° 9%, active O by action of $H_2SO_4$ 9% and Ni 66–73%, O 27–34%, active O by action of $H_2O$ at 50° 7–16%, active O by action of $H_2SO_4$ 7–16%. (4) NiO oxidized by gentle heating with dry $KNO_3$ gave a product contg Ni 67–72%, O 28–34%, active O by action of $H_2O$ at 50° 8–15%, active O by action of $H_2SO_4$ 7–15%. Heating NiO with $KClO_3$ gave a product contg Ni 66–70%, O 30–34%, active O in $H_2O$ at 50° 11–16%, active O in $H_2SO_4$ 10–17%. (5) Heating $Ni(NO_3)_2$ or $NiCO_3$ gave products contg Ni 71%, O 29%, active O by action of $H_2SO_4$ 9.5–10%. From these expts the following oxides were established $NiO$, $Ni_2O_3$, $Ni_3O_4$ and $NiO_2$. In addn some evidence was found for the existence of the following composite and less stable oxides $Ni_4O_5 = 4NiO_2 \cdot NiO$, $Ni_6O_{11} = 5NiO_2 \cdot NiO$, $Ni_3O_5 = 2NiO_2 \cdot NiO$, $Ni_8O_{17} = 8NiO_2 \cdot NiO$, $Ni_7O_{12} = 5NiO_2 \cdot 2NiO$, $Ni_8O_{15} = 7NiO_2 \cdot NiO$, $Ni_4O_8 = 3NiO_2 \cdot 2NiO$, $Ni_{11}O_{17} = 6NiO_2 \cdot 5NiO$, $Ni_9O_{16} = 7NiO_2 \cdot 2NiO$, $Ni_{17}O_{23} = 6NiO_2 \cdot NiO$, $Ni_2O_5 = NiO_2 \cdot Ni_2O_3$, $Ni_8O_{11} = 2NiO_2 \cdot 3Ni_2O_3$, $Ni_2O_7 = 2NiO_2 \cdot NiO$, $Ni_4O_7 = NiO_2 \cdot NiO$, $Ni_2O_3 \cdot H_2O = NiO_2 \cdot NiO \cdot H_2O$ and $NiO \cdot Ni_2O_4 = NiO_2 \cdot 2NiO$. Structural formulas for these compds are suggested. S L MADORSKY

**The preparation and structure of lower oxides of tungsten.** J A M VAN LIEMPT. *Rec trav chim* 50, 343–6(1931).—An investigation to det which oxides between W and $WO_3$ are stable was made by passing mixts of CO and $CO_2$ and of H and $H_2O$ over $WO_3$ at fixed temps. Analysis of the products formed showed that of the lower oxides only $WO_2$ (brown) and $W_4O_{11}$ (blue violet) are stable. The latter is somewhat volatile. The heats of combustion of each of these oxides ($WO_2$ = 64,520 g cal per g mol, $W_4O_{11}$ = 61,380) show that the structure is in fair agreement with the structural formulas proposed by Spitzin (*C A* 21, 544). M MCMAHON

**The structure of ferric thiocyanate and the thiocyanate test for iron.** H I SCHLESINGER AND H B VAN VALKENBURGH *J Am Chem Soc* 53, 1212–6(1931).—In aq. solns of $Fe(CNS)_3$ the color migrates to the anode during electrolysis. The absorption spectra of aq. solns of $Fe(CNS)_3$, of aq. solns contg $[Fe(CNS)_4]^{---}$ and of ether

solns of anhyd $Fe(CNS)_3$ are identical In ether and benzene ferric thiocyanate has twice the mol wt of the simple salt On the basis of these results the authors conclude that the red color in the thiocyanate test for Fe is due to $[Fe(CNS)_4]^{---}$.
B I TIFFANY

Ammoniates of salts of the oxygen acids. M A RAKUZIN *Bull. soc. chim* [4], 49, 363–6(1931).—By the action of dry $NH_3$ gas on dehydrated sulfates R has prepd a no of ammoniates $MnSO_4 4NH_3$ (brown), $ZnSO_4 5NH_3$ (white), $CuSO_4 5NH_3$ (blue) $NiSO_4 6NH_3$ $CoSO_4 6NH_3$ (white with a reddish tint), $CdSO_4 6NH_3$ (white), $Ag_2SO_4 2NH_3$ *Except with* $MnSO_4$ *and* $Ag_2SO_4$ *the reactions are energetic.* $MgSO_4$ does not react With the exception of $CuSO_4 5NH_3$, which forms $CuSO_4.4NH_3.H_2O$, $H_2O$ decomposes all of the ammoniates with the formation of the oxide or hydroxide of the metal These ammoniates lose $NH_3$ when exposed to the air and more rapidly on heating $Ag_2SO_4 2NH_3$ on heating gives some $(NH_4)_2SO_4$ as well Although $AgNO_3$ forms $AgNO_3 6NH_3$ dry $NaNO_3$ and $Ba(NO_3)_2$ do not react with $NH_3$ $Cu_3(PO_4)_2$ and $K_2Cr_2O_7$ likewise do not react.
W C EBERTLIUS

High-carbon carbides of the iron group. F. FISCHER AND H BAHR *Ges Abhandl Kenntnis Kohle* 8, 255–69(1928).—When CO is passed at 270° over finely divided Co or CoO there is obtained a mass which appears to contain the carbide $Co_3C_2$ This substance is decompd by H at 270°, half the C (presumably derived from the carbide $Co_3C$) being evolved as $CH_4$ Similar addn of C to an equimol mixt of CuO and $Fe_2O_3$ affords the carbide $Fe_3C_4$ in addn to Fe carbonyl H liberates $CH_4$ in proportion corresponding with the formula $Fe_2C$, formed apparently by separation of C from the unstable carbide $Fe_3C_4$ Small quantities of hydrocarbons are also formed The Fe, but not the Co, carbide affords, when treated with acids, a mixt of hydrocarbons
B C A

The sulfides of carbon. KENNETH A KOBE *J Chem Education* 8, 867–74, (1931), cf *C A* 25, 889.—K has reviewed the literature concerning these compds and called attention to the similarity of the sulfides and the oxides of C Unlike O, S exists on the surface of charcoal both in an adsorbed state and chemically combined The phys properties of COS are midway between those of $CO_2$ and $CS_2$ Thirty-two references are given
E R SCHIERZ

Phosphonates. II. Action of phosphine upon aluminum and beryllium halides. ROBERT HÖLTJE AND FRITZ MEYER *Z anorg allgem Chem* 197, 93–102(1931); cf *C A* 24, 3721.—Mol compds of $PH_3$ are quite similar to the corresponding thiohydrates, and salts which add on $H_2S$ are also capable of taking up $PH_3$. By heating $AlCl_3$ and $AlBr_3$ with $PH_3$ at 70°, $AlCl_3.PH_3$, m 81–3°, and $AlBr_3.PH_3$, m 114–8°, were formed. In the case of $AlI_3$, it was necessary to raise the temp to 120–30° to obtain $AlI_3.PH_3$, m. 148–50° *In no case was the amt. of* $PH_3$ *taken up increased* by increasing the pressure Similar compds. with $PH_3$ were not obtained in the case of Be halides The phosphonates mentioned above are white cryst. compds which readily sublime and are decompd by water to give $PH_3$ and the Al salt These compds are readily fused, and in fusing they deposit a small quantity of a yellowish red solid assumed to be $P_{11}H_4$ Vapor pressure detns showed that $PH_3$ was firmly held in these compds., this high degree of stability being attributed to the great deformability of $PH_3$
H STOERTZ

Calcium oxalate from calcium cyanamide GEORGE BARSKY AND G H BUCHANAN *J Am Chem Soc* 53, 1270–6(1931).—Autoclaving $Ca(CN)_2$ and $CaCN_2$ with water gives $CaCO_3$, $CaC_2O_4$ and $Ca(COOH)_2$ and if the $H_2O$ is replaced by $Ca(COOH)_2$ solns. increased yields of oxalate are obtained Although the yield of oxalate from cyanide is low, the process has com value because small amts of cyanide can be added to cyanamide which is being autoclaved for $NH_3$, as all the N of both compds is liberated as $NH_3$ and a part of the C of both compds is converted to valuable by products Simple treatment of the ordinarily discarded autoclave solids yields $CaC_2O_4$ The process is protected by U S P. 1,717,353, (Am Cyanamide Co; *C A* 23, 3933) The reaction taking place is represented $2CaCN_2 + Ca(CN)_2 + 10H_2O = 6NH_3 + 2CaC_2O_4 + Ca(OH)_2$, the mechanism being a sort of mixed polymerization, $H_2NCN$ and HCN reacting with each other, the reaction velocity being dependent upon the H ion concn. of the soln., just as cyanamide reacts with itself to give dicyanamide (cf *C A* 24, 1085) and HCN reacts to give azulmic compds This reaction is thus represented $H_2NCN + HCN \longrightarrow H_2NCNH\,CN$ (hypothetical), $H_2NCNH\,CN + 4H_2O \longrightarrow (NH_4)_2C_2O_4 + NH_3$
ALBERT THOMAS FELLOWS

Copper quadrantoxide. M J. MURRAY *J Phys Chem* 35, 1011–24(1931).—By a study of the rate of reduction of CuO in $H_2$, it is shown that Cu quadrantoxide

does not exist Conclusion The olive-green ppt reported in the literature is probably a mixt of metallic Cu and hydrous or anhyd $Cu_2O$ B E TIFFANY

**Anhydrous copper halide carbonyls.** OTTO H WAGNER *Z anorg allgem Chem* 196, 364–73(1931).—The reaction between solid cuprous halides and CO was studied at elevated pressures and the existence of $Cu_2Cl_2$ 2CO and $Cu_2Br_2$ 2CO was established In the case of the iodide, the reaction was so sluggish that less than 1 mol of CO was taken up per atom of Cu The absorption of CO occurred even in the complete absence of water, although water does exert a catalytic effect upon the reaction velocity H STOERTZ

**Iron titanates.** B PESCE *Gazz chim ital* 61, 107–11(1931).—A survey of the literature shows that $FeTiO_3$ (ilmenite) is the only Fe titanate the prepn, compn. and properties of which are definitely known A systematic study was therefore begun of Fe titanates, and as a beginning $FeTiO_3$ was prepd in a new way A mixt of $FeC_2O_4$ (free of $Fe_2O_3$), $TiO_2$ (calcd quantity) and NaCl (3 times as much) was heated 1.5 hr at 900° in a current of $CO_2$ and cooled in the absence of air, the product was digested in water, treated with very dil HCl and washed until there was no longer a reaction for Cl A black powder of the compn $FeTiO_3$ was obtained The method of Rossi for the detn of Ti (pptn by boiling of $H_2TiO_3$ in a current of $SO_2$) was used The $FeTiO_3$ was dissolved by treatment with $KHSO_4$ Under the same conditions but with proportions of $FeC_2O_4$ and $TiO_2$ corresponding to 2FeO $TiO_2$, a black powder was obtained, which analysis showed to be *ferrous orthotitanate*, $Fe_2TiO_4$ Likewise $TiO_2$ (2 mols), $Fe_2O_3$ (3 mols) and NaCl heated at 1000° and washed free of NaCl yielded *ferric orthotitanate*, $Fe_4(TiO_4)_3$, dark maroon red, birefringent, yellowish by transmitted light Attempts to prep $Fe_2(TiO_3)_3$ under the same conditions gave in all cases mixts of $Fe_4(TiO_4)_3$ and $TiO_2$ $Fe_2TiO_4$ was described by Doss (*Z Krystallographie* 1892, 566) and its structure confirmed by Pauling (*C A* 24, 2693) By using for its prepn the method with $Fe_4(TiO_4)_3$ (*loc cit*), the results obtained were neg The results in general show that of all the titanates, $Fe_4(TiO_4)_3$ is the most easily formed The compd obtained by Hautefeille (*Ann chim phys* 4, 172(1864)) was probably $Fe_4(TiO_4)_3$ By following the procedure used by Konig and von der Pfordten (*Ber* 22, 1405(1889)) only complex mixts contg chiefly $Fe_2O_3$ were obtained X ray examn (powder method) of $Fe_4(TiO_4)_3$, $FeTiO_3$ and $Fe_2TiO_4$ showed that all 3 are definite compds rather than mixts The rontgenographs are shown in simplified form C C DAVIS

**Ferrous ferrite. I. Ferrous ferrite from ortho- and meta-ferric hydroxide.** ALFONS KRAUSE AND J TULECKI *Z anorg allgem Chem* 195, 228–38(1931).—Ferrous ferrite was made at 18° from metaferric hydroxide, dispersed in 0.01 *N* HCl, and $FeCl_2$ soln. by the addn of $NH_4OH$ (I) or from $FeCl_3$ and $FeCl_2$ solns with excess $NH_4OH$ (II). Two types of compds result, (I) being blue black in color, stable in the air and approaching $Fe(FeO_2)_2$ aq in compn (FeO $Fe_2O_3$ $H_2O$, 1.1:13.0:5.4), while (II) varied considerably in compn in consequence of oxidation, contained more water, and was brownish black All ferrous ferrites prepd were magnetic L P. HALL

**Potassium chlororhenate.** E ENK *Ber* 64B, 791–7(1931).—$K_2ReCl_6$ is prepd according to the reaction $KReO_4 + 3KI + 8HCl = K_2ReCl_6 + 2KCl + 3I + 4H_2O$ This salt is analogous to others of the type $M^I_2M^{IV}X_6$ It cryst d in yellow-green octahedra with the following physical consts $d_{18}$ 3.34, sp cond at 25°, *N*/32 soln., $3.47 \times 10^{-3}$ $\Omega^{-1}$, equiv cond 119.7 $\Omega^{-1}$ It is but slightly sol in water It dissociates into $2K^+$ and $ReCl_6^{--}$ MARY F LEAR

**The reduction of potassium perrhenate.** HENRY V A BRISCOE, PERCY L ROBINSON AND ERIC M STODDART *J Chem Soc* 1931, 666–9.—The reduction of aq $KReO_4$ solns by Zn, hydrazine hydrate and other reducing agents is reinvestigated, previous workers gave conflicting results It was shown that the first product of reduction of $KReO_4$ with Zn or hydrazine hydrate is a yellow colloidal soln, most probably of hydrated $ReO_3$ From these solns the black $ReO_2$ $2H_2O$ is then pptd This material can be quantitatively pptd and, also, can be dehydrated without decompn The charge on the colloid is shown to be pos J BALOZIAN

**Formation of sodium hydrosulfide from sodium sulfide.** M O KHARMANDARYAN AND K I BRODOVICH *Zhur Prikladnoĭ Khim* 3, 1023–30(1930).—For $Na_2S$ (in water soln) + $H_2S \leftrightarrows$ 2NaHS the const of the reaction is 0.0126 The max yield of NaHS is 89.7% Adsorption of $H_2S$ by cryst $Na_2S$ yields pure NaHS in soln, but its crystn. is difficult Adsorption of $H_2S$ by dried $Na_2S$ yields dry NaHS The reaction is speeded up if $Na_2S$ is wetted with NaHS soln V. KALICHEVSKY

**Reactions with sodium nitroprusside.** TITO PAVOLINI. *Boll. chim.-farm* 69,

713-6, 719-22(1930).—P reviews the reactions given by Na nitroprusside (I) + alkali with the following groups of compds: alkali sulfides, sulfites, derivs of $NH_2NH_2$ and $H_2NOH$, aldehydes and ketones, hydantoin and derivs., pyrrole and indole and some cyclic dinitro derivs. He reports original work with compds of these and some other groups. The blue color given by alkali hydrosulfides is caused by colloidal Berlin blue, which is formed by the interaction of I with $H_2S$. $Na_2Se$ gives a deep blue green color with I, the soln. decolorizes rapidly and a red ppt. of amorphous Se appears. With $Na_2Te$ black, amorphous Te is pptd. The Bödecke reaction is not only very sensitive but is specific for sulfites. The aliphatic α diketones give pos. reactions, the liquids rapidly turn yellow since in the presence of alkali the α diketones are converted into *p*-quinones. With β- and γ-diketones reddish violet colors which then turn to bright red were observed. Paraldehyde, metaldehyde, chloral, glucose and fructose do not react with I. Carvone, pulegone, ionone and citral gave red colors of various hues, while the results with camphor, fenchone, menthone and citronellal were neg. This difference in behavior is explained by the assumption that double bonds in the close vicinity of the CO group favor the occurrence of the reaction. $Me_2CO$ in the presence of I and piperazine gives a rose violet color, with piperidine and I there appears an intense red color, which becomes purple with AcOH. This reaction allows the differentiation between $Me_2CO$ and AcH, because the latter gives an intense dark blue color with I and piperidine. Expts. with compds. with a structure similar to that of hydantoin showed that pos. reactions are given by uracil, 4 methyluracil, 5-methyluracil and allantoin. Barbituric acid and veronal gave neg. results. Neg. results were obtained with α methylindole, β methylindole, oxindole, dioxindole, carbazole, acridine, diphenylamine, pyridine, quinoline, benzimidazole, furan and thiophene. On the basis of these results P. concludes that the reaction is characteristic for the grouping —C(=)C NH.CH CH

Some cyclic dinitro derivs. with the $NO_2$ groups preferably in the *m* position, *e. g.*, *m* $(O_2N)_2C_6H_4$, react with I and alkali. *o*-, *m*- and *p*-$O_2NC_6H_4OH$, $(O_2N)_3C_6H_2OH$ and *o*-$O_2NC_6H_4CHO$ do not react. $(O_2N)_2C_6H_2Me$ in alc. soln. gave a rose-violet color on addn. of KOH alone. Thiourea, diphenylthiourea, *o*-phenylenethiourea and to a less degree also thiosinamine in alc. soln. give red violet colors with I and alkali. This reaction is due to the decompn. of the compds. by the addn. of alkali with the subsequent formation of alkali sulfide. The reaction is neg. with KCNS, $NH_4CNS$ and $Et_2S$. Some polyhydric phenols give color reactions with I and alkali. Intense green colors were obtained with pyrocatechol and resorcinol, while green colors of various hues, generally with a tendency toward brown, were observed with hydroquinone, pyrogallol, phloroglucinol and hydroxyhydroquinone; the color changed to a bluish green on addn. of AcOH. The reactivity of I is especially due to the tendency of Fe to become bivalent, and of the coordinated nitroso group to convert itself into a nitrito group by the absorption of O. Thus in the case of the formation of Na nitritopentacyanide the reaction takes the course $Na_2Fe(CN)_5NO + 2NaOH = H_2O + Na_4Fe(CN)_5(NO_2)$. This latter compd., which crystallizes with 10 mols $H_2O$, has a certain analogy with the alkali ferrocyanides, even with respect to the color. The bright red compd. obtained in the Bodecke reaction was analyzed and its compn. was established as $Zn_2Fe(CN)_5NO \cdot SO_3$. The reaction mechanism between I and aldehydes and ketones was studied in particular. A pos. color reaction requires at least the presence of the structure > CH CO and occurs as a rule with compds. with short chains or with a double bond in the immediate vicinity of the CO group. From a mixt. of I + NaOH in concd. aq. soln. and $Me_2CO$ or AcH in abs. alc., P. succeeded in pptg. the colored compds. by addn. of an excess of alc. A pos. reaction was obtained with I and ether which had been exposed to light, this is due to the presence of a small quantity of $H_2C(OH)CHO$, which is formed by photooxidation of the ether. In general there must exist a certain relation between the compds. giving a pos. reaction with I and the facility with which they are transformed into the enol form, *e. g.*, AcH ⟶ $H_2C{=}CHOH$, $Me_2CO$ ⟶ $Me(HO)C{=}CH_2$. The same color reactions observed with I, alkali and AcH or $Me_2CO$, resp., were also obtained by treating Na nitritopentacyanide with AcH or $Me_2CO$, resp., in alc. soln., the reaction with $Me_2CO$ is rather slow. Both reactions are accelerated by the addn. of a small quantity of alkali. G. Schwoch

Nitrogenation of chromium. L. Duparc, P. Wenger and W. Schusselé. *Helv. Chim. Acta* 13, 917-29(1930).—By following the same procedure used in the prepn. of the nitrides of Mn (*C. A.* 23, 4604), the nitrides of Cr were investigated, 2 different samples of Cr were used. The absorption threshold, optimum temp. and max. amt. of N fixed varied with the Cr employed. The absorption thresholds for the 2 samples

examd. were 650° and 750° The amt of N fixed was independent of time but increased with pressure *$Li_3N$ used as a catalyst lowered the absorption threshold but appeared* to diminish the fixation of N, possibly on account of the formation of an easily dissociable Cr-Li-N complex C H PEET

The action of sulfuric acid on copper. F DE CHAVES. *Anales soc españ fis quím* 29, 177–81(1931).—Pure, concd $H_2SO_4$, free from As, was caused to react with electrolytic Cu at 55° for 6 hrs The residue contained anhyd $CuSO_4$, S and a deposit contg S 8 5 and Cu 69 7, the balance being O or O and H The deposit does not correspond to the Maumene oxysulfides or to any known Cu ores E M S

The decomposition of carbonyl chloride by heat. II. ALFRED STOCK, WERNER WUSTROW, HERMANN LUX AND HANS RAMSER *Z anorg allgem Chem* 195, 140–8 (1931), cf *C A* 19, 3228.—$COCl_2$ was heated at 400° in a glass tube with and without catalysts. Decompn to CO and $Cl_2$, detd from the resulting CO content, was 23 6% in 143 hrs in glass alone, 23 6% on $AlCl_3$ in 90 hrs., 23 3% on $SiO_2$ in 115 hrs No decompn to $CO_2$ and $CCl_4$ was observed in these cases. On activated charcoal the decompn CO was 22 7% in 88 hrs $CCl_4$ was formed by a secondary reaction of C and Cl An attempt to produce $COCl_2$ from $CO_2$ and $CCl_4$ at 400° to 500° was unsuccessful L P HALL

The thermal decomposition of silver subfluoride. R SCHOLDER AND K TRAULSEN *Z anorg allgem Chem* 197, 57–64(1931).—An improved method of manufacturing $Ag_2F$ is given as follows Add silver carbonate to a hot 40% HF soln until no more dissolves Add 2 g of $NH_4F$ and filter in the dark Electrolyze the filtrate in a 100 cc Pt dish at 50° with a silver anode, 1 4 v tension and 0 07–0 10 amps In 48 hours 20 g of pure cryst $Ag_2F$ is obtained Dry the crystals on filter paper $Ag_2F$ decomposes into Ag and AgF between 100° and 200°, no F is evolved, even at 700° A L HENNE

The reduction of nitric oxide. M L NICHOLS AND C. W MORSE *J Phys Chem* 35, 1239–52(1931).—NO dissolves in water to form nitrohydroxylamic acid ($H_2N_2O_3$) or a compd of the same constitution The authors studied the reduction of NO in soln by $SnCl_2$ and $TiCl_3$ $H_2N_2O_2 \longrightarrow H_2N_2O_2 \longrightarrow H_4N_2O_2 \longrightarrow NH_2OH \longrightarrow NH_3$ At temps above 0° the reduction by $SnCl_2$ depends on the rate of formation of $H_2N_2O_2$. At temps below 25° the rate of reduction by $TiCl_3$ depends on the rate of the reducing reaction, while at temps. above 25° the rate of formation of $H_2N_2O_2$ is the limiting factor $NH_2OH$ is apparently the end point of the $SnCl_2$ reaction Some observations were made on the catalytic effects of reagents or their oxidation products. B. E TIFFANY

A complex cyanide of quadrivalent vanadium. AL. YAKIMACH *Compt rend.* 191, 789–90(1930).—Addn of concd $V(OAc)_4$ to KCN of the same concn., with stirring, causes the soln to become green, and after several weeks, green tetrangular prisms are obtained The crystals decompose rapidly; so they are washed with EtOH. An excess of $V(OAc)_4$ destroys the compd., as does an excess of the KCN (albeit more slowly) The crystals decompose at 150° with blackening; they also decompose on soln in water Detns. of K, V and $(CN)_2$ gave the formula $K_3V(CN)_6$. I J PATTON

## 7—ANALYTICAL CHEMISTRY

W T HALL

Hydroxylamine as a precipitating agent. JOSÉ CASARES ROLDÁN *Anales soc españ fis quím* 29, 158–61(1931) cf *C A* 25, 261.—$NH_2OH$ reacts with $Cu_2Fe(CN)_6$ to discharge the color and give a beautiful fluorescence. A complex of $K_4Fe(CN)_6$ $NH_2OH$ and $NH_3$ with Cu salts is being investigated. E M SYMMES

Studies concerning the relations between reaction sensitivity and molecular size in the case of organic reagents. JOSEF V TANCHYNA *Mikrochemie* 3, 229–41(1931).—The tests for Cu and for molybdate with xanthogenates and the test for Ag with derivs of rhodanic acid were studied It was found that by increasing the mol wt., the solv of the resulting compds. was diminished so that the test became more sensitive In the tests with various rhodanates there was also a marked deepening of the color which also made the test much more sensitive The general conclusion is drawn that increase of mol wt. increases the sensitiveness and the introduction of the benzene ring increases the depth of color. W T. H

Systematical qualitative analysis by means of modern drop reactions. C. J. VAN NIEUWENBURG *Mikrochemie* 3, 199–219(1931).—A method is given of systematic

examn by means of drop tests suitable for the detection of about 0.5% of 25 cations and 18 anions not over 0.2 g of substance is used for the complete analysis. Attempts to avoid the use of $H_2S$ as reagent proved unsuccessful, in the sepn of the sulfides pptd in acid soln the use of KOH is preferred to alk polysulfide. Another new feature is the pptn of Al and Zn from alk solns by neutralizing to $p_H$ 8.5 with thymol blue as indicator. The advantages gained by the use of the centrifuge in place of ordinary filtration are also emphasized. The procedure in the hands of students has shown that the time required for a complete qual analysis is at least halved. The following tests are recommended. For Ag the fresh ppt of AgCl is treated with a 0.03% soln of rhodanine in acetone a red color results. Hg gives the same test but cannot be present when the chloride ppt has been properly treated; a little KCN prevents interference by Hg. For Hg the HgS ppt is dissolved on the spot plate in a drop of Br aq., the excess Br is removed by treatment with $H_2SO_4$ and phenol and a small drop of 1% diphenylcarbazide soln in alc. is added; a blue color results. For Pb the hydroxide or sulfate is treated on the spot plate with NaOH and $H_2O_2$; the supernatant liquid is removed from the dark brown $PbO_2$ by filter paper after which $NH_4Cl$, a drop of dil. AcOH and a drop of 0.5% tetramethyl diaminodiphenylmethane soln in alc. + 5% AcOH is added, a bright blue color results. For Bi the alk. stannite test is used in the presence of a little $Pb(OAc)_2$, which accelerates the reduction to metallic Bi. For Cu, to the soln on the spot plate a drop of 10% $ZnSO_4$ soln is added and a white ppt (bluish violet in the presence of Cu) of Zn Hg thiocyanate formed by adding a soln 30 g $HgCl_2$ and 33 g $NH_4CNS$ in 100 cc of water. Cd is detected by heating in a closed tube with soda, collecting the sublimate in a restriction of the tubing and converting it into CdS by passing S vapors over it. As is detected by the Gutzeit test and Sb by the deposit formed on Sn. Sn is proved present by reducing the HCl soln with Al and adding a little 0.25% soln of cacotheline, a brown violet color results. For Al, the tests with alizarine S and with the $NH_4$ salt of aurinetricarboxylic acid are both recommended. For Fe, the thiocyanate test is used. Cr is detected by converting the hydroxide to chromate with KOH and Br and adding a 1% soln. in alc. of diphenylcarbazide after removing excess Br with phenol. U is detected by the $K_4Fe(CN)_6$ test and Co by the reaction of Vogel or by the von Knorre test with α nitroso-β-naphthol. For Ni the familiar glyoxime test is used and for Mn the red color formed in AcOH soln with a 1% soln of benzidine acetate in dil. AcOH. The formation of $MnO_4^-$ by the persulfate reaction in the presence of $Ag^+$ is also recommended. Zn is detected by adding a trace of $Cu^{++}$ and testing with the $NH_4$ Hg thiocyanate soln used in the test for Cu. Mg is detected by boiling an alk. suspension of $Mg(OH)_2$ with a little titan yellow. For Ba, Ca, Sr, Na, K and $NH_4$ the usual tests are recommended. The tests for the anions involve well known procedures, but particular attention is paid to distinguishing between nitrite and nitrate, formate and acetate and the various forms in which S can exist. Blow pipe tests, flame tests and closed tube tests are used to an extent that will please all the older chemists. The procedure for making a complete qual. examn. is given in detail.

W. T. H

**New method to decompose rocks containing sulfur.** T. Gerecon. *Magyar Chem. Folyóirat* 37, 71–4(1931).—Mix 1 g of the sample with 6–8 g of a mixt. contg equal parts of $Na_2CO_3$, $KMnO_4$ and MgO, cover with 3 g of the above mixt. and heat the crucible gently on an asbestos plate for 15 min. Then apply the full flame of a Bunsen burner for 6–8 min. Cool, leach out the contents of the crucible with hot water and reduce any $MnO_4^-$ by adding a few drops alc. Filter, make acid with HCl and det $SO_4^{--}$ by pptn with $BaCl_2$ as usual. The method was tested with bauxite and with coal, the results agreed with those obtained by 7 other standard methods.

S. S. de Finály

**Use of grid electron valves for potentiometric titration.** G. Hatos. *Kisérlet Közlemények* 31, 299–307(1928).—The method of Treadwell was used with the help of a Philips A 409 valve with good results. *Ibid* 32, 654–62(1929).—Results obtained with the method of Treadwell and Kohlrausch were quite as exact as those obtained by the app. of Kohlrausch.

S. S. de Finály

**Telephone as zero instrument in the electrometric compensating method.** G. Hatos. *Kisérlet Kozlemenyek* 33, 17–9(1930).—A 4000 ohm telephone was used with 1000-mm app. Data agreed to 0.1 $p_H$ in case the inner resistance of the app. was not larger than 12 000 ohms.

S. S. de Finály

**Electroanalytical separations in ammoniacal fluoride solutions. I. Separation of copper from arsenic and antimony.** N. Howell Furman. *Ind. Eng. Chem., Anal. Ed.* 3, 217–8(1931).—Dissolve the mixt. of Cu, As and Sb in 3 to 5 cc of 48% HF and 25 cc of $HNO_3$ (1 vol. of acid of d. 1.42 and 4 vols. $H_2O$). Add 1 to 2 g of $K_2S_2O_8$. Boil the acid soln. 2 to 3 min. and neutralize immediately with $NH_3$. Sb and As are thus

brought to a quinquevalent state and will not be reduced during the electrolysis of the cold, strongly ammoniacal solution the correct amount of Cu is deposited A. L. H.

**Microchemical determination of nitrogen.** I. Fleischner. *Kisérlet Közlemények* 32, 113–22(1929).—Description of present methods and data. S. S. de F.

**Colorimetric determination of phosphorus.** László Urbanek. *Mezögazdasági Kutatások* 4, 39–59(1931).—Factors influencing the detn of P by the blue color of reduced phosphomolybdic acid are discussed The development of the color depends also on the $p_H$ of the soln and on the duration of the reaction Generally it takes 2 hrs to reach the final color Oxalic and citric acids retard the reaction materially, $HNO_3$, HCl, $H_2SO_4$ and $CCl_3CO_2H$ have little effect and AcOH has practically none Salts do *not affect the reaction except by their buffer effect The influence of reducing materials* is annulled in 2 hrs Z. I. Kertesz

**Determination of iodine in morganic material by microchemical methods.** Gulbrand Lunde *Mikrochemie* 7, 337–66(1929).—A description is given of the many papers published on this subject from 1876 to the present time W. T. H.

**Influence of nitrites, thiocyanates and some organic substances on the iodine-starch reaction.** Z. Ernst *Biochem. Z.* 232, 346–51(1931).—The acid nitrite-starch reaction for detecting I is much more sensitive with saliva than with pure aq. solns because of the presence of KSCN in the saliva The I starch reaction in an acid soln is inhibited by nitrite, and the inhibiting action is removed by thiocyanates Uric acid, peptone and to a lesser degree also leucine, trypsin and serum albumin act like the thiocyanates S. Morgulis

**A color test for cobalt.** M. Gutiérrez de Celio *Anales soc. espan. fis. quim.* 29, 262–3(1931).—The blue color resulting from the formation of a double thiosulfate of Co and Na can serve as a sensitive test for Co As little as $2.3 \times 10^{-4}$ mg. of Cr can be detected E. M. Symmes

**Reactions of the nitroso derivative of R salt with various inorganic salts.** A. Bernardi and M. A. Schwartz *Ann. chim. applicata* 21, 45–50(1931).—R salt has been proposed as a reagent in the identification of Co (van Klooster, *C. A.* 15, 1671) It has been found that the following compds. of Pb, Ag, Ba and Ca are also obtained from aq. solns of R salt on adding the nitrates of the first two, and Ba and Ca as chlorides: $(C_{10}H_4O_4NS_2Na_2)_2Pb$ $Pb(NO_3)_2$ (red), $(C_{10}H_4O_4NS_2Na_2)Ag$ $AgNO_3$·$5H_2O$ (lemon-yellow), $(C_{10}H_4O_4NS_2Na_2)_2Ba$ $BaCl_2·6H_2O$ (orange), and $(C_{10}H_4O_4NS_2Na_2)_2Ca$ $CaCl_2$ (green) The Ba salt is insol. in HCl solns as well as EtOH solns., while the Ca salt is sol. in HCl, but insol. in alk. ($NH_4OH$) EtOH soln. In this way these 2 elements can be sepd A. W. Contieri

**Determination of manganese in ferrosilicons by the volumetric method.** J. H. D. Bradshaw. *Foundry Trade J.* 44, 311(1931).—Fe-Si alloys with not over 18% of Si can be attacked satisfactorily by a mixt. of 30 cc. HCl, 15 cc. $HNO_3$ and 5 cc. of $H_2SO_4$. After fuming, to remove HCl and dehydrate $SiO_2$, the silica can be detd and the persulfate method for Mn applied to the filtrate from the $SiO_2$ With higher Si contents, the original material must be fused with alkali carbonate at the start W. T. H.

**Analyzing chromium solutions.** I. L. Newell and W. H. Keefe. *Metal Ind.* (N. Y.) 29, 206–7(1931).—A complete scheme of analysis is given for analyzing plating solns. for $CrO_4^{--}$, $Cr^{+++}$, $SO_4^{--}$, $Cu^{++}$, $Fe^{+++}$, $Ni^{++}$ and $Zn^{++}$. The $CrO_4^{--}$ is detd by taking 1 ml. of the soln., adding 400 ml. of water, 5 ml. of 85% $H_3PO_4$ and 0.6–0.8 ml. of a soln. obtained by dissolving 0.1 g. of diphenylbenzidine in 10 ml. of concd. $H_2SO_4$ and 90 ml. of AcOH After a few min. add 3 g. of NaOAc and titrate with 0.2 *N* soln. of Mohr's salt to the disappearance of the blue color To det. $Cr^{+++}$, dil. 25 ml. of the soln. to 200 ml. and ppt. with $NH_4OH$ Dissolve the $Cr(OH)_3$ ppt. in $H_2SO_4$ and oxidize to $CrO_4^{--}$ by adding $Na_2O_2$ After boiling to decompose excess $Na_2O_2$, treat as described above for detg. $CrO_4^{--}$ To det. $SO_4^{--}$, dil. 10 ml. of soln. with 20 ml. of water, add 7 ml. of HCl, 25 ml. of AcOH and 15 ml. of alc. Boil 30 min. and add 10 ml. of $BaCl_2$ reagent To det. Cu, take 10 ml. of soln., dil. to 200 ml., add an excess of $Pb(NO_3)_2$ soln. and filter off the $PbCrO_4$ To the filtrate add an excess of $Na_2O_2$ and filter off insol. hydroxides of Cu, Fe, Ni, etc., using the filtrate for the Zn detn Dissolve the ppt. in HCl and $H_2SO_4$, sat. with $H_2S$ and filter off the CuS ppt. Dissolve this in $HNO_3$ and det. Cu electrolytically Det. Ni in the filtrate from CuS by the dimethylglyoxime method after first pptg. Fe as $Fe(OH)_3$ and weighing as $Fe_2O_3$ In this final filtrate, combined with the filtrate from the $Na_2O_2$ treatment in the detn of Cu, det. Zn as phosphate W. T. H.

**The determination of germanium.** W. Geilmann and K. Brünger. *Z. anorg. allgem. Chem.* 196, 312–20(1931).—The smallest amt. of Ge which could still be detected spectroscopically was 0.25γ in 0.025 cc. of soln. The *C electrodes* (boiled in HCl) used

*in obtaining spark spectra* at 12 000 v a c were superior to Au and Pt electrodes, which decreased the sensitivity 75 times A table shows the *changes in the Ge spectrum with concn* (1.0–0.001 g of Ge in 100 cc) Ge could be concd by pptg it in 3–4 *N* HCl soln with $H_2S$ and redissolving the ppt in *N* KOH When As, Se and Sb were present, *Ge was sepd* by distn from 3–4 *N* HCl in a current of Cl, into 3–4 *N* HCl at 0°. Ge in the latter soln was concd by pptn with $H_2S$ in the presence of $Na_2SO_3$ The colloidal S formed brought about better pptn of GeS Suitable methods for the detn of Ge in oxides silicates cassiterite sulfide ores and metals are outlined FRANK URBAN

**Tests for sodium with the Streng-Kolthoff reagent.** R MONTEQUI AND R. DE SINADA *Anales soc españ fis quim* 29, 255–61(1931) —The Streng Kolthoff reagent is (1) 1.0 $(C_2H_3O)_3$, 10 30% AcOH 6, $H_2O$ to make 50 cc. and (2) $Zn(C_2H_3O_2)_2$ 30, 30% AcOH 3 $H_2O$ to make 50 cc 1 and 2 being mixed hot and filtered after standing 24 hrs To det Na in a sol salt dissolve 0.15 g of sample in 0.5 cc of $H_2O$, add 1.5–2.0 cc of $Zn(ClO_4)_2$ soln, stir and filter This serves to remove $K^+$, which is likely to ppt with Na when much K is present Add 2 cc of the Streng Kolthoff reagent to 0.5 cc of the filtrate Turbidity of pptn begins in a few min Microscopic examn shows typical crystal formation Detns are accurate on 0.15 g KCl in 0.2 cc of 0.01 *N* NaCl F M SYMMES

**Use of phenolic acids in the detection, separation and estimation of metals. V. Separation of copper from cadmium, and their subsequent estimation.** PARITRA NATH DAS GUPTA AND HARIDAS SAHA *J Indian Chem Soc* 8, 19–21(1931) — By adding a 1% soln of gallic acid to the boiling soln of Cu and Cd in the presence of alk acetate, a voluminous brown ppt is formed which can be filtered off and ignited to CuO The ppt is bulky and can serve for the detn of small quantities of Cu The Cd is not pptd by gallic acid under these conditions W T. H

**Delicate microchemical reaction of copper salts and certain of the other heavy metals.** I M KORENMAN *Pharm Zentralhalle* 72, 225–6(1931) —The delicate test for picric acid by pptn with Cu salts in the presence of $NH_3$ as suggested by Rymsza is reversed in testing for Cu Ag Co Ni Cd Hg, Au and Pb The reagent consists of 2 parts of a satd aq soln of $C_6H_2(NO_2)_3OH$ to 1 part 10% $NH_3$ This reagent produces in highly dild solns of Cu salt a bright greenish yellow ppt of characteristic type The test is delicate to 0.05$\mu$ g Cu (1$\mu$ g = 0.000001 g = 1 microgram) With Ag, Co, Ni, Cd, Hg, Au the test is sensitive to 20$\mu$ g, 0.3$\mu$ g, 0.1$\mu$ g, 1$\mu$ g, 0.15$\mu$ g and 0.2$\mu$ g, resp W O F

**Quinoline as a microchemical reagent for certain heavy metals.** I M KORENMAN. *Mikrochemie* 3, 223–8(1931) —See *C A* 25, 557. W T. H

**Rapid industrial methods for the analysis of metallurgical products.** ROGER ARZENS *Bull assoc tech fonderie* 5, 31–8(1931) —A general review is given of rapid methods for plant control in the analysis of steel for Si Mn, P, S and C. The advantages of using factor weights and reagents in the form of compressed lozenges are emphasized W T. H

**Determination of titanium in alloy steels.** J AREND AND H SCHNELLENBACH. *Arch Eisenhüttenw* 4, 265–7(1930) —The sepn of Ti from Fe'', Cr, Mn, Co and Ni is accomplished by pptn with $BaCO_3$, filtering and washing the ppt. with hot AcOH The remaining alloy constituents are removed by fusion with $NaKCO_3$ and $NaNO_3$ The residue, contg Ti as the metatitanate, is dissolved in concd HCl, the soln made ammoniacal and traces of Fe and Cu removed by pptn with $H_2S$ in the presence of tartaric acid Finally, the Ti is pptd with o-hydroxyquinoline, ignited and weighed as $TiO_2$ Colorimetric estn may be substituted for the gravimetric after sepn of the alloy constituents If only Cr and Ni are present the colorimetric method eliminates the sepn with $BaCO_3$ as the former may be removed by decantation as chromate and Ni up to 5% and Cu up to 0.5% have no effect on the detn H F JOHNSTONE

**Determination of chromium in special steels.** P KLINGER *Arch Eisenhüttenw* 4, 7–15(1930), *Stahl u Eisen* 50, 1166–7(1930) —The Cr contents of 12 special steels with 1.5–12% Cr have been detd by 9 different methods. Methods involving alkali fusions give the best results when the Cr is detd iodometrically, and of those based on soln of the steel in acids followed by oxidation to chromic acid the persulfate-$AgNO_3$ procedure is the most satisfactory The effect of other metals on the results given by the various procedures is briefly discussed B C. A

**Data on the determination of boric acid.** G VASTAGH *Magyar Chem Folyoirat* 37, 55–71(1931) —The titration of $H_3BO_3$ in neutral solns contg 1% of mannitol was studied Acids (except $H_3PO_4$ and $SiO_2$) do not interfere if neutralized previously with KOH in the presence of methyl red It was found that 2 distns with $H_2SO_4$ and MeOH served to remove $H_3BO_3$ from cations, 0.06 mg of $H_3BO_3$ could be detected in 2 g of

$Al_2(SO_4)_3$ crystals The macro and microchemical detn of $H_3BO_3$ is described in detail S S DE TINAIY

A rapid and sensitive method for the volumetric estimation of phosphoric acid. R BIAZZO *Ann chim applicata* 21, 75–81(1931) —Phosphate is detd volumetrically by adding an excess of a standardized soln of $(NH_4)_2MoO_4$ and titrating the excess with $Pb(OAc)_2$ soln These solns are standardized by means of solns of known phosphate concn Tannic acid is used as an outside indicator for the titration Amounts of phosphate from 0 1 to 1 0 cg may be detd within less than 2% by the above method A W CONTIERI

The measurement of cuprous oxide with permanganate solution G BRUHNS *Centr Zuckerind* 39, 13(1931) —The possible advantages of Müller's soln in the detn of invert sugar are discussed J F LEETE

Manometric determination of hydrogen peroxide. AKIJI FUJITA AND TAKESHI KODAMA *Biochem Z* 232, 15–9(1931) —$H_2O_2$ is detd manometrically either by decompg it in a strongly acid medium with $KMnO_4$ or with catalase By using vessels of 15–20 cc capacity the O evolution $X_0$ is measured by Warburg's method from the rise in level of the manometer fluid By both methods an accuracy of about 3% is attained S MORGULIS

The determination of moisture in liquid sulfur dioxide. A L FLENNER AND W R CAVERLY *Refrigerating Eng* 21, 344–5(1931) —The moisture in $SO_2$ is detd by passing the $SO_2$ through $P_2O_5$ contained in a chain of Fleming absorption jars The method may be used for the detn of very small amts of $SO_2$ of the order 0 002% The exptl error is not greater than 0 0002% absolute A H JOHNSON

Use of buffered ammonia in the iodometric thiocyanate determination. H ARMIN PAGEL AND HERMAN J KOCH *J Am Chem Soc* 53, 1774–8(1931) —To the neutral soln of $CNS^-$ in a vol of 150–300 cc, add $NH_4OH$ until faintly alk to litmus if heavy metals forming insol hydroxides with $NH_4OH$ are present As buffer soln add 1 g of $NH_4$ sulfate, chloride or nitrate dissolved in 20 cc of *N* $NH_4OH$ and treat with standard I soln, using a min excess of 5 cc After 4–5 min add 5 cc of 6 *N* HCl and titrate with standard $Na_2S_2O_3$ Before acidification the products of the reaction between $CNS^-$ and $I_2$ are $SO_4^{--}$, $I^-$, $H_2O$ and ICN but upon acidifying the ICN, reacts with $I^-$ liberating free $I_2$ so that the complete reaction can be expressed by the equation $CNS^- + 3I_2 + 4H_2O \longrightarrow SO_4^{--} + CN^- + 8H^+ + 6I^-$ Certain modifications are necessary if $KIO_3$ is used as a source of $I_2$ W. T. H.

Determination of mercurous ions with potassium chloride solution. L DE ZOSBORY *Acta Sci Univ Francisco Iosephinae, Acta Chem., Mineral., Physica* 1, 1–4(1928) —A 0 4% soln of Na alizarinsulfonate is added to a 0 1 *N* soln of KCl and is used in titrating the $Hg^+$ soln to be tested The results agree with gravimetric data S S DE F.

Reactions of harmine. O FERNÁNDEZ AND F E RAURICH *Anales soc espaÑ fis quim* 29, 74–6(1931) —Harmine is oxidized to *m* nitroanisic acid, which is reduced to amine, then converted into a diazo compd which gives a purple color on treatment with β naphthol Another test is the development of a carmine color when hydroharmine, obtained by hydrogenation of harmine with Na and EtOH, is acted upon by *p*-nitrodiazobenzene chloride E M SYMMES

*Quantitative estimation of mixtures of isomeric unsaturated compounds. III.* Review of the iodometric methods and a new bromometric method. REGINALD P LINSTEAD AND JASON T WM MANN *J Chem Soc* 1931, 723–5 In a mixt of 3 C tautomerides, the iodometric method is likely to require modification because the introduction of negative groups into the β-γ acids greatly diminishes the activity toward I For the analysis of a mixt of itaconic and mesaconic acids, consistent results can be obtained by the following empirical method provided the temp is kept const and the titrating reagent is standardized in the same way against known mixts of these acids. As reagent, 0 05 *N* Br dissolved in 40% KBr soln is recommended First det. the Br equiv by adding 25 cc. of the reagent to 10 cc of water in a glass-stoppered bottle and after 10 min in the dark add 10 cc. of 10% KI soln and titrate with 0 05 *N* $Na_2S_2O_3$ In titrating known and unknown mixts of itaconic and mesaconic acids, use 10 cc. of 0 067 *N* soln of the acids in place of the $H_2O$ and add an equiv quantity of Br. A temp of 16 8° was used in testing the procedure W. T. H.

Detection of very small quantities of acetylene. E PIETSCH AND A. KOTOWSKI *Z. angew. Chem* 44, 309–12(1931) —By means of a soln prepd by dissolving 1 g. of blue vitriol in 8 cc. of 10% $NH_3$ soln, adding slowly 3 g of $NH_2OH$ HCl and dilg to 50 cc, it is possible to detect as little as $3\,7 \times 10^{-4}$% by vol, or $1\,7 \times 10^{-5}$ g of $C_2H_2$ in 4 l of gas which is allowed to stream through the reagent under normal pressure at the rate of 1.7–1 9 l per hr. The sensitiveness of the test is increased by adding 3–5 sq mm of

filter paper with fibrous edges, the colloidal ppt. of $Cu_2C_2H_2O$ being adsorbed by the fibers of paper and made more visible. W. T. H.

New gravimetric determination of benzidine and its homologs. Some new complex salts of these bases. W. Herz. *Chem. Fabrik Marquardt & Salzer*, No. 15, 1–9 (1931).—A complex salt is produced by adding 7% $HgCl_2$, $HgBr_2$ or $HgI_2$ soln. and filtering the ppt. on a sintered glass filter. Results with benzidine and o-tolidine were satisfactory. S. S. DE FINALI

The estimation of pyruvic acid. B. H. Krishna. *Proc. Indian Acad. Sci.*, *Chem.* 1935, 164–4, method suitable for estn. of small quantities of pyruvic acid (2–3 mg.) in biol. fluids consists in reducing the acid by Zn and $H_2S$ in the presence of a trace of $CuSO_4$, and oxidizing the resulting lactic acid to AcH which is estd. by Clauser's method of titration against I. By means of the condensing unit used the aldehyde can be transferred into the receiver by aeration with $CO_2$ without any water's passing into the receiver. J. J. C.

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Reactions with Na nitroprusside (Tavilov) 6. Ru (Noddack, Noddack) 6. Thiocyanate test for Fe (Schlesinger, Van Valkenburgh) 6. The separation of elements in analysis of small quantities (Treadwell, Philipp) 3. The use of the Sb–Sb$_2$O$_3$ electrode in the determination of the concentration of H ions and in potentiometric titrations (Britton, Robinson) 2. The solubilities of La oxalate and of La hydroxide in water (Kolthoff, Elmquist) 2.

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Schmittan, F. Gasanalyse in der Technik. Leipzig: S. Hirzel. 79 pp. M. 5.

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Titration tablets. Fay H. Gifford (to The Electric Smelting and Aluminium Co.). Can. 310,651, Apr. 21, 1931. The oxidation value of a hypochlorite soln. is estd. by rendering the soln. acid in the presence of available combined I and measuring the quantity of free I released by the addn. to the soln. of tablets, each containing a standard quantity of a thiosulfate of an alkali metal with $NaHCO_3$. The tablets are added one by one at intervals long enough to enable disintegration of the tablets and agitation of the soln. by the escape of gas from the soda, whereby the strength of the hypochlorite soln. will be indicated by the number of tablets required to eliminate the color caused by the free I.

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## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Sulfur crystals from Ajka and Pilis-Szent-Ivan. Sándor Koch. *Ann. Hist. Nat. Musei Nationalis Hungarici* 25, 451–3 (Hung.), 454–5 (Ger.) (1928). *Mineralog. Abstracts* 4, 330.—Small S crystals, showing 15 forms, were produced by burning heaps of lignite. J. F. SCHAIRER

A notable example of Spanish pyrite. F. Díaz Tosaus. *Mem. soc. españ. hist. nat.* 15, 13–5 (1929). *Mineralog. Abstracts* 4, 330.—Acicular pyrite crystals occur at Mercadal. J. F. SCHAIRER

Notes on some Spanish arsenopyrite crystals. Julio Garrido and Carlos Valenzuela. *Mem. soc. españ. hist. nat.* 15, 123–34 (1929). *Mineralog. Abstracts* 4, 331.—Crystallographic. J. F. SCHAIRER

Some bismuth minerals of Vaskő (Hungary). Sándor Koch. *Matematik. es Termeszettudomanyi Ertesito* 47, 219–25 (German abstract 257) (1931).—Analyses of bismuthinite gave: S 18.45, 18.62, Cu 0.57, 0.93, Pb 0.69, 3.29, Fe 0.42, 0.11, Bi 80.04, 76.74, $SiO_2$ —, 0.45; sums 100.16, 100.12%. Cosalite showed: Ag 0.32, Cu 3.41, Pb 37.68, Fe 0.68, Bi 41.75, S 15.92, sum 99.76%; formula $Pb_2Bi_2S_5$ or $2PbS.Bi_2S_3$ (Fe content deducted as chalcopyrite). Analyses of rezbanyite gave: Cu 4.17, 4.09, Pb 14.38, 15.10, Fe 0.46, 0.42, Bi 59.23, 59.22, S 17.55, 17.80, $SiO_2$ —, 0.12; sums 100.14, 99.81%, corresponding to $CuPbBi_2S_4$ or $CuS.3PbS.5Bi_2S_3$. One-mm. balls of bismuthosphenite were found on bismuthinite. S. S. DE FINALI

Ramdohrite, a new mineral from Bolivia. Friedrich Ahlfeld. *Centr. Mineral. Geol., Abt. A*, 1930, 305–7. *Mineralog. Abstracts* 4, 341–2.—*Ramdohrite* is found as bluish, grey-black prisms in quartz with accompanying pyrite, stannite, sphalerite, jamesonite and pyrargyrite at the Chocaya la Vieja mine, Potosí. They show "alteration twinning", sp. gr. = 4.15, hardness = 2. Analysis gave: S 21.1, Sb 31.1, Bi 2.5, Pb 30.3, Ag 10.1, Cu 0.3, Fe 0.3, gang ($SiO_2$) 5.5, sum 100.2%, formula $Ag_2S.3PbS.3Sb_2S_3$, near fizelyite. J. F. SCHAIRER

Proustite and xanthoconite from Nagyág. L. Tokody. *Centr Mineral. Geol.* 1930A, 117–23, *Matematik es Természettudomanyi Értesito* 46, 644–51(in German 652–6).—In the locality of Nagyág, Hungary, quartz like material has been mined, consisting primarily of nagyagite (Au 7 61, Pb 54 50, Fe 0 93, Te 17 80, Sb 8 62, S 9 10 and quartz 2 12%), quartz crystals, dolomite rhombohedrons, covered by native As, a little pyrite and chalcopyrite, proustite and xanthoconite The last two have not been previously discovered in Nagyág, and are found but seldom in other parts of Hungary They are fully described here with diagrams of cryst structure J Pinchack

The relations of etch-hills on an etched sphere of fluorite. E Ernst *Fest chr Victor Goldschmidt, Heidelberg* 1928, 89–97, *Mineralog Abstracts* 4, 353 —Minute etch-hills are present on the rounded trisoctahedral faces produced by the solvent action of $HNO_3$ on a sphere of fluorite J F Schairer

Zambonimite, a new mineral species. Francesco Stella Starrabba *Boll soc geol ital* 48, 259–63(1930) *Mineralog Abstracts* 4, 249 —The new mineral, *zambonimite*, occurs as mamillary masses with gypsum in an old fumarole channel in the scoria of 1669 on Monti Rossi, Etna The masses have a grey, stony crust, but the interior is white, friable and radially fibrous with d 2 98–3 00, *n* 1 405–1 411, very weak birefringence with straight extinction and + elongation Analysis gave Mg 24 26, Ca 17 94, Mn not d td , Al 0 41, Fe trace, Na 0 31, K 0 05, F 55 57 $H_2O$ 1 63, sum 100 17%, formula $CaF_2 2MgF_2$ It is probable that the mineral was not formed by direct sublimation, but by the action of F vapors on descending solns contg Mg and Ca J F Schairer

Two mineral notes on Moravia. Jiskra Londýnova *Vestnik Státního Geol Ustavu Československ Rep* 5, 125–30(1929), *Mineralog Abstracts* 4, 379 —Occurrences of *fluorite*, *calcite* and *aragonite* are noted J F Schairer

Some minerals of the Broken Hill Lode. G Smith *Chem Eng Mining Rev* 23, 179–82(1931) —S has been unable to verify the presence of cerargyrite, though other Ag haloids, embolite and iodyrite have been found to be present. Neither was cerussite found Crystals of iodyrite were found deposited on 1895 slabs of limonite In quantity pyromorphite ranked as the 3rd and last of the great Pb-producing minerals of the Lode Calamine was mined but as part of the gang, it was not treated with the object of obtaining Zn Erythrite and smaltite were found in small quantity Cobaltite was the most important Co mineral and was plentiful at various periods from 1890 to 1898 Some of these deposits were of considerable economic value because of their high Ag content H. C. Parish

Mode of formation of spiral groups of dachiardite. G D'Achiardi *Atti accad Lincei* (Cl. Sci fis mat. nat.) [6], 9, 182–7(1929), *Mineralog Abstracts* 4, 318–9 — Crystallographic. J F Schairer

Stamierite (cobaltic hydroxide), a new mineral. A Schoep and V. Cuvelier *Bull soc belg géol pal hydrol* 39, 74–82(1930), *Mineralog. Abstracts* 4, 347–8 — *Stainierite* occurs in some quantity in the upper oxidized portion of a mineral vein at Mindingi, Katanga, Belgian Congo Analysis of material separated as far as possible from intermixed malachite, hematite, kaolin and quartz gave $Co_2O_3$ 68 72, $Fe_2O_3$ 9 45, $Al_2O_3$ 6 87, CuO 2 68, $SiO_2$ 2 67, $H_2O$ 10 15, *sum* 100 54%, *corresponding to* $(Co,Fe,Al)_2O_3 H_2O$ This compn approaches that of transvaalite The mineral is readily sol in HCl with evolution of $Cl_2$ It is black and compact with, in places, a shining mamillary surface It has black streaks, sp gr 4 137, hardness 4½ It is opaque with a granular or banded concentric texture In reflected polarized light it is birefringent and pleochroic The mineral is regarded as the cryst. equivalent of the colloidal heterogenite, and a preliminary x ray examn by W F de Jong suggests that it is isomorphous with goethite J F Schairer

Etch-figures on calcite from Roth. Julius Holzner. *Festschr. Victor Goldschmidt, Heidelberg* 1928, 163–9, *Mineralog Abstracts* 4, 354 —Isolated calcite crystals from a clay seam in a limestone quarry at Roith, Lower Austria, are deeply corroded The etch grooves along cleavage cracks, etch pits, etch-hills and flow-channels are described J F. Schairer

The nature of lublinite and its solubility in distilled water. Stanislaw J. Thugutt. *Arch min soc sci Varsovie* 5, 97–104(in French 105–7)(1929), *Mineralog. Abstracts* 4, 334 —Lublinite from Mt Pulawski on the Vistula gave on analysis CaO 54 56, $Fe_2O_3$ + $Al_2O_3$ 0 18, insol 0 76, $CO_2$ 44.37, loss at 160° 0.21, sum 100 08% This material finely powdered and heated with water in an autoclave for 72 hours at 233° gave a colloidal suspension containing 0 0137 g $CaCO_3$ per 100 cc. This on evapn deposited rhombohedra of calcite J. F. Schairer

Barytocalcite and its structural relations to other materials. B. Gossner and

F. Mussgnug *Centr. Mineral Geol.*, Abt. A, 1930, 321–8, *Mineralog. Abstracts* 4, 304.—Barytocalcite (sp. gr. 3.689) has a unit cell of dimensions $a = 8.15$, $b = 5.22$, $c = 6.58$ A. U. ($a:b:c = 1.561:1:1.2605$, $\beta = 81°52'$) containing 2 mols. of $CaBaC_2O_6$. The space group is $C_3^2$. These cell dimensions are compared with those of $NaNO_3$, $CaCO_3$ (calcite), dolomite and barite. J. F. Schairer

Alstonite and mularite—a contribution to the study of complex crystals. Balthasar Gossner and Franz Mussgnug *Centr. Mineral Geol.*, Abt. A, 1930, 220–38, *Mineralog. Abstracts* 4, 305.—X-ray photographs of *bromlite* (alstonite) (sp. gr. 3.707–3.715) give a unit cell of dimensions $a = 8.77$, $b = 4.90$, $c = 6.11$ A. U. ($a:b:c = 1.787:1:1.224$) containing 2 mols. of $CaBaC_2O_6$. The x-ray data suggest that the mineral is a double salt ($CaCO_3 \cdot BaCO_3$) rather than an isomorphous mixt. of aragonite ($CaCO_3$) and witherite ($BaCO_3$). Mularite gives data conforming with hexagonal symmetry and the space group $D_{6h}^1$. The unit cell of dimensions $a = 10.46$, $c = 13.90$ A. U. ($c/a$ 1.329) contains 2 mols. $(Si_2O_6)_4Al_2Ca_3KH$. The crystals show optical anomalies with a division into orthorhombic sectors. J. F. Schairer

The Fedorov method in the determination of feldspars. Viktor Zsivny. *Földtani Közlony* 58, 93–108(1929).—The method and some detns. by it are given. S. S. de Finály

Determination of the species of plagioclase by the theodolite microscope. S. K. Chatterjee *Proc. 15th Indian Sci. Cong.* 1928, 288. E. J. C.

Notes on minerals from the Canaries. Rafael Candel Vila *Mem. soc. españ. hist. nat.* 15, 265–8(1929), *Mineralog. Abstracts* 4, 314.—Crystallographic notes on olivine and hornblende. J. F. Schairer

The formula of eucolite. Felix Machatschki *Centr. Mineral Geol.*, Abt. A, 1930, 300–4, *Mineralog. Abstracts* 4, 358.—From Cleve's 1890 analysis of eucolite (eudialyte) from Norway the formula is deduced as $X_6Y_2Si_4(O,OH)_{18}$ where X = Ca, Na, Yt, Ce and Y = Zr, Fe, Mn, Mg, Cb. Four such mols. are contained in the unit cell of Gossner and Mussgnug. (Cf. following abstract.) J. F. Schairer

The structural and molecular unit of eudialite. B. Gossner and F. Mussgnug *Centr. Mineral Geol.*, Abt. A, 1930, 81–3.—In an attempt to det. the mol. structure of eudialite, the authors studied the uniformity of the structure and mol. wt. by measuring the lattice structure of the crystals and by estg. the mol. wt., assuming eudialite to have 6 possible chem. compns. The density, $s \times M$, was assumed (suspension method) to be about 2.929. The elementary substance was found to be rhomboidal in character, the crystals showing the form (111), (100), (110), (101), (211), (111). The d. of this substance was estd. at 3.145. The mol. uniformity could not be ascertained on the basis of the accepted structural uniformity; all 6 possibilities presented contradictions to exptl. work, *e. g.*, the formula $2Na_2SiO_3 \cdot CaFeSi_2O_6 \cdot ZrSi_2O_6$ showed the best relationship, but did not agree with the structural uniformity. J. Pinchack

Remarks on the work of B. Gossner and F. Mussgnug. William H. Zachariasen *Centr. Mineral Geol.*, Abt. A, 1930, 315–7, *Mineralog. Abstracts* 4, 307–8.—X-ray rotation and Laue photographs of a crystal of eudialyte from Naujakasik, Greenland, gave a rhombohedral cell of edge $a = 13.01$ A. U. and axial angle 66°44'. The space group is $D_{3d}^5$. Splinters from the crystal had d. ranging from 2.826 to 2.888, and they show differences in optical character, being isotropic or weakly birefringent with blue-violet interference colors, the material is therefore presumably variable in chem. compn. Z from later analyses suggests a formula $R_5Si_6X_{18}$ (where X = O, OH, Cl) or $(Na,Ca,Fe)_6ZrSi_6O_{18}(OH,Cl)$, for which there would be 4.13 mols. in the unit cell. J. F. Schairer

Sulfatic cancrinite from the Ilmen Mts. (South Ural). A. N. Zavaritzkii *Mém. soc. russe mineral.* [2], 58, 201–7(1929), *Mineralog. Abstracts* 4, 379.—Blue cancrinite occurs as nests and veinlets in nephelite crystals in pegmatite veins in the nephelite-syenite of the Ilmen Mts. Two analyses gave $SiO_2$ 34.78, 35.29, $Al_2O_3$ 28.77, 28.79, $Fe_2O_3$ 0.10, 0.19, MgO 0.12, 0.10, CaO 1.27, 1.49, $Na_2O$ 15.59, 15.65, $K_2O$ 4.90, 4.15, $H_2O$ 7.01, 7.62, $CO_2$ 0.89, 1.01, $SO_3$ 6.25, 5.76, sums 99.68, 100.05%. The $SO_3$ content is rather high. J. F. Schairer

Eulytite from Dognácska. Sandor Koch *Matematik. es Természettudomanyi Értesito* 46, 640–2(German abstract 643)(1929).—The forms {100}, {111}, {1$\bar{1}$1} and {211} were observed on 1 mm. crystals. Larger crystals were of a hexaedric, the smaller of a trialstetraedric habit. S. S. de Finály

Mode of occurrence and chemical composition of garnet from Nellore district, Madras. V. S. Swaminathan *Proc. 15th Indian Sci. Cong.* 1928, 288.—Garnet is a common constituent mineral of both the schistose and the pegmatitic rocks and often

occurs as an accessory of the granitic and gneissic outcrops exposed in the country. Crystals as well as massive forms are found, the latter being generally heavy, granular and of a comparatively large size. Dodecahedra, trapezohedra and combinations of these 2 are the most common crystal forms. The dominant colors are red, dark red and varying shades of brown. The sp. gr. varies from 3.52 to 4.15. E. J. C.

**Chemical composition and physical constants of spessartite from Publice near Jihlava.** Radim Nováček. *Časopis Moravského Zemského Musea* 27, 4 pp. (preprint) (1930). *Mineralog. Abstracts* 4, 320.—This garnet has a sp. gr. 4.212, $n_r$ 1.8096, $n_D$ 1.8131, $n_v$ 1.8175 and gave on analysis $SiO_2$ 36.83, $TiO_2$ 0.12, $Al_2O_3$ 20.70, $Fe_2O_3$ 0.78, FeO 12.11, MnO 29.06, MgO 0.14, CaO 0.27, $H_2O$ 0.02, sum 100.31%, corresponding to spessartite 68.21, almandite 30.56, pyrope 0.47 and grossularite 0.76%. J. F. S.

**The general formula of vesuvianite and its relation to garnet.** Felix Machatschki. *Centr. Mineral. Geol., Abt. A* 1930, 284–91. *Mineralog. Abstracts* 4, 377. Published analyses of vesuvianite are calcd. to at. ratios and a general formula deduced as $X_{19}Y_{13}Si_{18}(O,OH,F)_{76}$, i. e., 6 garnet + $CaMg(OH)_2$. The unit cell contains 2 such mols. The unit cell of vesuvianite has dimensions near to those of garnet, indicating a close relation. J. F. Schairer.

**Vesuvianite from the ejecta of Sabatini.** Maria Piazza. *Periodico Mineral.* (Rome) 1, 8–37(1930). *Mineralog. Abstracts* 4, 330. A detailed description. J. F. S.

**The general formula of melilites.** Felix Machatschki. *Centr. Mineral. Geol. Abt. A*, 1930, 278–81. *Mineralog. Abstracts* 4, 357. From the analyses tabulated by Berman (*C. A.* 24, 4181) a general formula for minerals of the melilite group is deduced as $XYZ(O,OH)_7$, where X = Ca or Na, Y = Mg, Fe'', Fe''' or Al and Z = Si with some Al. J. F. Schairer.

**Mineralogical notes. IV.** T. Hodge-Smith. *Rec. Australian Museum* 17, 408–13(1930). *Mineralog. Abstracts* 4, 345–6. *Sturtite*, a new mineral from Broken Hill, New South Wales, is jet black and compact, very brittle, friable, with a yellowish brown streak, hardness 3, sp. gr. 2.051. Thin sections are pale brown and optically isotropic. It fuses with difficulty to a black magnetic glass and is decompd. by acids with sepn. of granular $SiO_2$. Analysis gave $SiO_2$ 42.35, $Al_2O_3$ 0.11, $Fe_2O_3$ 10.22, MnO 25.18, MgO 0.65, CaO 2.10, $H_2O$ (105°) 23.01, $H_2O$ (140°) 1.02, $H_2O$ (+110°) 4.11, insol. ($SiO_2$) 0.79, sum 99.98%, leading to the formula $Fe_2O_3.6(Mn,Ca,Mg)O.8SiO_2.2H_2O$ or $Fe(R_2''H_2SiO_4)_2.H_2O$. J. F. Schairer.

**Zeolites in extrusive rocks—a contribution to the problem of "Sonnenbrand."** K. Hoffer. *Z. prakt. Geol.* 38, 17–20(1930). *Fortschritte Mineral. Kryst. Petr.* 14, 37(1929). *Mineralog. Abstracts* 4, 374–5.—*Many basalts, apparently uniform when* freshly broken, show numerous pale patches after a short exposure to the air (Sonnenbrand). This behavior is due to a hydrous, apparently glassy groundmass, which has been supposed to be zeolitic in nature. The pale patches give a more continuous dehydration curve than does the normal basalt. By centrifuging the finely powdered material of the light patches in Clerici soln. of sp. gr. 2.45 the groundmass was approximately isolated. The material gave a definite base-exchange with NaCl and $CaCl_2$ solns. H. concludes that these basalts contain an alkali glass which is readily decomposed by moisture to form a zeolitic mixt. J. F. Schairer.

**Zeolites from Chibino Mountains and Luyavrurt in Russian Lapland.** A. N. Lamunzov. *Trav. musée acad. sci. U. R. S. S.* 2, 91–100(1927); *Mineralog. Abstracts* 4, 373–4.—Zeolites found in the Khibinsky and Lovozersky tundras, Kola, include natrolite, analcite, chabazite, heulandite and mesolite. Analcite is always associated here with aegirite and may be either primary or secondary after sodalite or aegirite. The *following equations are suggested* $2(3Na_2Al_2Si_2O_8.2NaCl)$ *(sodalite)* $+ nH_2O = 3.(Na_2Al_2Si_4O_{12}.2H_2O)$ *(analcite)* $+ 3(Al_2O_3.nH_2O) + 4NaCl + 6NaOH$. *Earthy white* masses of hydrated alumina are found. From aegirite of the second generation: $n(Na_2(Fe,Al)_2Si_4O_{12})$ *(aegirite)* $+ Na_2Al_2Si_4O_{12}.2H_2O$ *(analcite)* or $Na_2Fe_2Si_4O_{12}$ *(aegirite)* $+ Al_2O_3.nH_2O + 2H_2O = Na_2Al_2Si_4O_{12}.2H_2O$ *(analcite)* $+ Fe_2O_3.nH_2O$. J. L. S.

**Leucophyllite.** Miklós Vendl and A. Romwalter. *Allt. berg u. hüttenmänn. Allt. kgl. ung. Hochschule Berg u. Forstw. Sopron, Ungarn* 1930, 369–73.—Leucophyllite from Sopron Mountain was analyzed $SiO_2$ 75.64, $TiO_2$ 0.15, $B_2O_3$ 0.11, $Al_2O_3$ 14.31, $Fe_2O_3$ 0.62, FeO 0.17, MnO 0.01, MgO 2.07, CaO 0.48, $Na_2O$ 0.22, $K_2O$ 3.50, $H_2O^+$ 2.10, $H_2O^-$ 0.06, sum 100.40%. Osann parameters, Niggli nos. and further optical and petrographic data are given. S. S. de Finaly.

**New localities for zeolites in Moravia.** Bruno Kučera and Božena Novotná. *Časopis Moravského Zemského Musea* 25, 211–27(1927). *Mineralog. Abstracts* 4, 318.—A complete list of old and new zeolite localities in Moravia and Czech Silesia is given. J. L. Schairer.

Analcite and laumontite from Murlo (Tuscany). GIACINTA CURLO *Atti mem. soc. sci. nat. Geron.* 52, 413–6 (1928). *Mineralog. Abstracts* 4, 376.—Clear ico-tetrahedra of analcite gave $SiO_2$ 53.69, $Al_2O_3$ 22.91, $Na_2O$ 14.27 (by difference), $H_2O$ 9.13%. Laumontite $SiO_2$ 50.90, $Al_2O_3$ 21.51, CaO 11.76, $H_2O$ 15.22, sum 99.69%. At 100° the laumontite lost 3.80% $H_2O$ and at 130° 4.15%. J. F. SCHAIRER

Nontronite from two southern Russia graphite deposits. D. P. SERDYTCHENKO. *Centr. Mineral. Geol.*, Abt. A, 1929, 47–55. *Mineralog. Abstracts* 4, 327.—Seams of nontronite occur in pyroxene-graphite-gneiss in the Stary-Krym graphite mine near Mariupol. The mineral is decomposed by cond. HCl with sepn. of $SiO_2$. Analyses on impure material are given. The material has been derived, perhaps, from the direct decompn. of Fe-bearing silicate or may have been formed by the action of solns. of Fe sulfate (from decompn. of pyrite) on secondary kaolin. J. F. SCHAIRER

The geological history of coal. GEORGE A. HICKLING. *Can. Mining J.* 52, 428–9 (1931).—A brief graphic description. W. H. BOYNTON

A new mineral of the nontronite-beidellite group. I. JA. MICKEY. *Centr. Mineral. Geol.* Abt. A, 1930, 293–303. *Mineralog. Abstracts* 4, 342.—A new mineral called *elbrusite* was found in a vein in liparite-pumice-tuff in the ravine of the Chubchur river, near Mt. Elbrus, northern Caucasus. It is chocolate-brown, sp. gr. 2.28, hardness 2, optically uniaxial, $n$ = about 1.56. Analysis gave $SiO_2$ 39.74, $Al_2O_3$ 14.44, $Fe_2O_3$ 7.44, FeO 6.90, MgO 5.11, CaO 0.55, alkalies 2.80, $H_2O$ (110°) 17.69, sum 94.67%, the deficiency being $H_2O$ (above 110°). Over $H_2SO_4$ there is a loss of 14.89% $H_2O$. The formula is given as $1RO \cdot 0.8R_2O_3 \cdot 0.1R_2O \cdot 2.7SiO_2 \cdot 5.5H_2O$. This mineral differs from those of the nontronite-beidellite group in the presence of FeO, MgO and alkalies, in its lower $n$ and absence of pleochroism. J. F. SCHAIRER

Mesolite. A. CAVINATO. *Atti soc. ital. sci. nat.* 65, 104–14 (1926); *Mineralog. Abstracts* 4, 319.—Mesolite from Iceland was studied by optical, goniometric, chem. and x ray methods. Analysis gave $SiO_2$ 44.96, $Al_2O_3$ 26.30, CaO 11.15, $Na_2O$ 4.10, $H_2O$ 13.20, sum 99.71%. Crystallographic measurements and Laue-grams indicate monoclinic symmetry. The optic axial plane is perpendicular to the elongation, the sign is +, $2V$ = 70°, dispersion is strong, $Bx_a$ $c$ = 9½° and birefringence is low. Laue-grams of natrolite and scolecite indicated orthorhombic and monoclinic symmetry, resp. J. F. SCHAIRER

The minerals of the Karviná sphaerosiderites. FRANTIŠEK SLAVÍK. *Sborník Přírodověd. Společnosti v Moravské Ostravě, Moravské Ostrava* 4, 90–3 (1929). *Mineralog. Abstracts* 4, 325.—The succession of minerals in the sphaerosiderite septaria in the coal mines at Karviná, Czech Silesia, is the same as that in those of the Kladno coal basin in central Bohemia, *i. e.*, quartz, ankerite, calcite, sulfide ores, nacrite. An *analysis of nacrite* is given. J. F. SCHAIRER

Phillipsite of the basalts in the region of Lake Balaton. BÉLA MAURITZ. *Matematikai és Természettudományi Értesítő* 46, 657–61 (German abstract 662) (1929).—A crystallographic description is given of phillipsite found in company of aragonite, chabazite and calcite. S. S. DE FINLY

Analysis of monazite from Jun-an, Korea. KENJIRO KIMURA AND SAKAE SHINODA. *J. Chem. Soc. Japan* 52, 47–54 (1931).—Hitherto there being only partial investigations and fragmental statements as to monazite from Jun-an, Korea, a complete analysis was performed, giving the following results: $d_4^{25}$ 5.106, $n$ 1.78, CaO 0.53, PbO 0.09, $Al_2O_3$ 0.28, $Fe_2O_3$ 1.65, $Ce_2O_3$ 28.25, $Nd_2O_3$ etc., 27.87, $Y_2O_3$ etc., 2.47, $ThO_2$ 9.49, $SnO_2$ 0.15, $SiO_2$ 1.85, $UO_3$ 0.15, $P_2O_5$ 26.07, $Sb_2O_3$ 0.06, $H_2O$ 0.79, $CO_2$ 0.23, sum 99.93%. By a spectral analysis by arc light and x ray the existence of La, Ce, Pr, Nd, Sa, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu and Yt is confirmed, and Eu and Sc probably exist. In addn. Ba, Ti, Nb and Ta are detected by arc spectrum. From the Pb, U and Th contents, the age is calcd. as $1.8 \times 10^8$ years (formula of A. Holmes and R. W. Lawson). T. IRIE

New data on lepidolite from Rožná, Moravia. JOSEF SEKANINA AND JOSEF VYSLOUŽIL. *Acta Soc. Sci. Nat. Moravicae* (Brno) 5, Pt. 2, 25–31 (1928). *Mineralog. Abstracts* 4, 379–80.—Analyses of pink lepidolite from Rožná gave: $SiO_2$ 47.63, $Al_2O_3$ 28.69, $Fe_2O_3$ trace, FeO 0.33, MnO 0.75, MgO 0.18, CaO 0.35, $Na_2O$ 1.05, $K_2O$ 11.29, $Li_2O$ 4.57, F 6.81, $H_2O$ (+105°) 1.28, $H_2O$ (−105°) 0.31%, the analysis agreeing with $H_4Li_2(K,Na)_2Al_4Si_8O_{28}F_{16}$. J. F. SCHAIRER

Crystals of magnesium sulfate hexahydrate (hexahydrite). V. V. DOLIVO-DOBROVOLSKII. *Mem. soc. russe mineral.* [2], 58, 3–63 (1929); *Mineralog. Abstracts* 4, 378.—In the Saki salt lakes, Crimea, after the sepn. of NaCl, spear-shaped crystals of $MgSO_4 \cdot 7H_2O$ (detd. by analysis), which differ from epsomite in form, separate. Thick, tabular, monoclinic crystals of $MgSO_4 \cdot 6H_2O$ also occur. Optical and crystallographic data on hexahydrite and on artificial $MgSO_4 \cdot 6H_2O$ are given. J. F. SCHAIRER

Blödite from Kalusz. ANTONI LASZKIEWICZ *Arch min soc sic Varsovie* 5, 79–94(in French 95–6)(1929), *Mineralog Abstracts* 4, 334.—Crystallographic Optical constants, for Na light, are $\alpha = 1.4826$, $\beta = 1.4855$, $\gamma = 1.4869$, $2V = 69° 24'$, $Bx_a$ $(\alpha)$ $c = -42° 11'$ J. F. SCHAIRER

Recent minerals from the mines of Karvinná. VACLAV MAŠTALÍŘ *Sborník Přírodovědecké Společnosti v Moravské Ostrave, Moravská Ostrava* 4, 183–90(1929), *Mineralog Abstracts* 4, 326.—The coal mines have yielded calcite, gypsum, mirabilite, epsomite and mixtures of aluminum and iron sulfates. The descriptions given, with incomplete chem. analyses and no optical data, are insufficient to det. the species exactly. J. F. SCHAIRER

Wulfenite crystals from Almalyk. O. G. PADUROVA *Mem. soc. russe minéral* [2], 58, 109–15(1929), *Mineralog Abstracts* 4, 378.—Microchem. tests showed the presence of Mo, Pb and Ba in crystals of wulfenite from Almalyk in the Tyuya-Muyun district, Fergana. J. F. SCHAIRER

The minerals of the uranium deposit of Katanga. A. SCHOEP *Ann. musée Congo Belge, Sér. I. Minéral., Tervueren* 1, No. 2, 43 pp. (1930), *Mineralog Abstracts* 4, 313.—The Kasolo radium mine is on Kasolo hill, 22 km. S. S. W. of Kambove. Two kilometers to the N. E. is a hill called Shinkolobwe (or Chinkolobwe) in which there is a Cu vein. These 2 mines are on the same mining block. The U ore occurs in veins 20–30 cm. thick in bedded dolomites and slates. Twelve new species have been described from this locality, viz. becquerelite, curite, dewindite, dumontite, fourmarierite, ianthinite, kasolite, parsonsite, renardite, schoepite, sklodowskite and soddyite. Other minerals present are uraninite, torbernite, quartz, talc, magnesite, heterogenite, linnaeite, Au, wulfenite and monazite. J. F. SCHAIRER

Whewellite from the tertiary strata of the Maykop region (northern Caucausus). N. B. VASSOEVICH AND N. K. RAZUMOVSKII *Mem. soc. russe mineral.* [2], 57, 275–300(1928), *Mineralog Abstracts* 4, 377–8.—Yellowish tabular crystals of whewellite ($CaC_2O_4 \cdot H_2O$) were found in crevices in calcareous concretions from bituminous Eocene clay near Khodyzhenskaya in the Maykop district. Sp. gr. 2.22, hardness $3^1/_2$. $\alpha = 1.49$, $\beta = 1.55$, $\gamma = 1.65$, $2V = 82^1/_2°$, optically +. Analysis gave CaO 35.80, $C_2O_3$ 46.92, $H_2O$ 10.60, $CaCO_3$ 6.68%. The mineral is partly replaced by quartz and $CaCO_3$. A summary of the literature on whewellite is given. J. F. SCHAIRER

A meteorite from Oesede near Osnabrück. K. BUSZ *Veroffent. Naturw. Ver. Osnabrück* 21, 4 pp. (reprint)(1929), *Mineralog Abstracts* 4, 258–9.—Thin sections of the meteorite show the ground mass to consist of broken fragments of bronzite and olivine, and chondrules of the same minerals with a granular or eccentric radial structure. The stone is a spherulitic chondrite. Analysis gave: Fe 18.17, Ni 1.90, FeS 5.77, $SiO_2$ 35.57, $Al_2O_3$ 2.71, FeO 7.99, MgO 23.24, CaO 2.96, $Na_2O$ 1.31, $K_2O$ 0.40, P trace, sum 100.03%, corresponding with nickel-iron 20.07, troilite 5.77, feldspar 22 and olivine 52%. J. F. SCHAIRER

Meteorite from Ojuelos Altos. L. FERNÁNDEZ NAVARRO *Bol. soc. españ. hist. nat.* 29, 19–24(1929), *Mineralog Abstracts* 4, 259.—Thin sections of the meteorite show hypersthene, limefeldspar, olivine, much magnetite with a border of hematite and some glass. The stone resembles a basalt tuff and is classed as a hypersthene oligochondrite. Sp. gr. 3.54–3.89. Bulk compn. by analysis: $SiO_2$ 40.02, $TiO$ nil, $Al_2O_3$ 2.77, FeO 11.34, MgO 25.34, CaO 2.49, $Na_2O$ 0.76, $K_2O$ 0.23, $P_2O_5$ 0.34, $H_2O$ (105°) 0.09, FeS 6.76, Fe 8.17, Ni 1.12, Co 0.04%. J. F. SCHAIRER

The meteorite of Olmedilla de Alarcón (Cuenca). L. FERNÁNDEZ NAVARRO *Mem. soc. españ. hist. nat.* 15, 859–65(1929), *Mineralog Abstracts* 4, 259.—The meteorite is classed as an oligo-sidiferous hypersthene-chondrite with a marked brecciated texture and veined, approaching the eucrites, but perhaps representing a new type. There are chondrules of hypersthene, monoclinic pyroxene and basic feldspar, and magnetite bordered with hematite is abundant. Sp. gr. 3.712. Analysis gave the bulk compn.: $SiO_2$ 36.92, $TiO_2$ nil, $Cr_2O_3$ 0.38, $Al_2O_3$ 2.52, FeO 9.39, MnO 0.26, MgO 23.59, CaO 2.16, $Na_2O$ 0.87, $K_2O$ 0.19, $H_2O$ (105°) 0.09, $P_2O_5$ 0.31, FeS 4.66, Fe 17.06, Ni 1.58, Co 0.02%. J. F. SCHAIRER

Our mineral wealth [Paraguay]. GENARO ROMERO. *Rep. Paraguay, Cartilla Informativa* No. 18, Asunción, 70 pp. (1930), *Mineralog Abstracts* 4, 314.—A brief sketch is given of the rocks and minerals of Paraguay with special mention and chem. analyses of ores of Fe and Mn. J. F. SCHAIRER

Notes on the iron ore of Mandi State. S. K. ROY *Proc. 15th Indian Sci. Cong.* 1928, 288.—The unfossiliferous Krol slates of the Mandi state are characterized by the presence of a magnetite-chlorite-schist in which, at certain places, magnetite attains such an enrichment that the rock may then be considered as an Fe ore, *magnetite-haematite-*

*quartz schist* The transition between the ordinary Simla slates and the magnetiferous slate is gradual Characteristic is the presence of a blue slate contg beautiful cubes of pyrite just on both sides of the Fe-ore bed, which is about 400 ft in thickness The ore with the greatest concn of Fe is found in the Chichot Subdivision of the state Inferior types of magnetite-chlorite schist have been traced in the northern parts of the state near Barot, Panjaund, Dhamteth, etc The better type of ore has been followed for about 12 miles between Pansar and Sangalwara, Chichot Near Charan the strike direction has apparently been affected by the intrusion of the Mandi granite gneiss massif, which is therefore younger than the Krol beds Magnetite, sepd by washing from the disintegrated ore, on analysis showed 73.28% of metallic Fe with very little P and S, and a sample of Maroti ore gave about 61% Fe This Fe deposit of Chichot was not reported previously E J C.

Ilmenite and titaniferous iron ore from Nellore District, Madras. V. S Swaminathan *Proc 15th Indian Sci Cong* 1928, 287.—Ilmenite occurs in the form of large segregated masses in a pegmatite vein, situated a mile N E of Gulmcherla village, Rapur Tq The associated minerals are feldspar and biotite Individual masses often weigh 30–50 lbs The mineral breaks up easily into thin plates and tabular pieces, and the freshly broken surface reveals a submetallic luster The sample gives, on analysis, 49.82% of $TiO_2$ The mineral is available in fairly large quantities and could, with profit, be exploited, as it is extensively used in the manuf of ferrotitanium alloys and titanium white Titaniferous Fe ore is met with in limited quantities closely assocd with another pegmatitic vein near the Patragunta mica mine (Gudur Tq) The specimens are tabular and have a dull steel gray luster The results of the analysis of the mineral are $SiO_2$ 0.65, $TiO_2$ 28.71, $Al_2O_3$ 0.48, $Fe_2O_3$ 0.00, FeO 67.71, MnO 1.89, MgO 0.90, CaO 0, $P_2O_5$ 0, sum 100.34%. Only very limited quantities of the mineral are available E J C.

Climax molybdenum deposit of Colorado—with section on history, production, metallurgy and development. B S Butler, John W Vanderwilt and Chas. W. Henderson *Proc Colo Sci Soc* 12, 311–53(1931).—The broken ore reserve (Jan., 1931) is sufficient to furnish 2000 tons daily for 3 years, and plans are under way for increasing production with the demand The Mosquito fault seps the Paleozoic rocks of the western part of the district from the pre Cambrian rocks to the east, the Climax Mo deposit being in the granite of the latter The mineralized area includes a central core, largely quartz, and an envelope consisting of moderately altered rocks cut in all directions by closely spaced veinlets The molybdenite ore occurs in a zone of the envelope consisting of silicified rock surrounding the central core Assocd minerals are pyrite, a little chalcopyrite, brown sphalerite, hubnerite, topaz, quartz and fluorite. W. L. Hill

Mineral resources of Palestine and Transjordan. G S Blake *Jerusalem* (Pub Works Dept.) 1930, 41 pp., *Mineralog Abstracts* 4, 311.—A short outline of the geology is given The most important mineral product is the Dead Sea brine, which is rich in KCl, $MgCl_2$ and $MgBr_2$ Exptl production of salts by solar evapn in large pans yielded first NaCl, then carnallite and last $MgCl_2$ with bromide ($MgBr_2$ 1.46%) Pure KCl can be separated by recrystn from the carnallite Petroleum, bitumen and bituminous limestone are of some importance in the region. In Transjordan occur small deposits of Cu and Fe ores and considerable gypsum and phosphate. J F. Schairer

A deposit of barite in Orchha State, Central India. M K. Roy *Proc 15th Indian Sci Cong* 1928, 289.—In the Orchha State in Central India, in the village Surajpur, formerly called Khura, occurs a deposit of barite in Bundelkhand gneiss The vein is traceable for more than 0.25 mile in length and is over 8 ft. in thickness It is a quartz barite vein, in which barite appears to have been deposited later, filling up the cavities of the quartz vein and, in places, also of the adjoining country rock. A little Cu pyrite and malachite are found in the vein but no Pb ore The deposit is of hydatogenetic origin and apparently belongs to a series of several pyritic ore bodies occurring in the neighborhood and all having the same N E.—S W. direction. E J C.

The origin of coal. Walter Fuchs and Otto Horn *Z angew Chem* 44, 180–4(1931).—The opinions of different investigators on the origin of coal are discussed, with a repetition of some exptl. work. Some new data are given, and numerous tables for comparison are added A Hirsch

Geologic survey of the environments of the radium mine of Tyuya-Muyun. D I Mushketov *Trav radium et minerais radioactifs acad sci U R. S S* II, 3–13(1926).—The only dependable and scientifically recognized deposit of radioactive minerals in the Fergana Co., formerly Skobeleff Co., is the deposit of ores contg V, U, Ca and Cu in the region of Tyuya-Muyun The residue from this ore after treatment contains a con-

siderable amt of Ra salts Several hot springs which are located along Kisil Kungei-Karatash have a temp of about 16° with an emanation content from 1 to 2 21 Maché units Hot springs of the southern slope of Tuya-Muyun have temps from 21° to 25° with an emanation content from 0 1 to 0 3 and finally other hot springs with a temp. of 18 2° and 20 2° contain the max amt of emanation, 6 26 and 4 17 Maché units, resp The temp of all of the hot springs exceeds 16° while the av yearly atm temp could not exceed 10° A C Noé

**The paleozoic deposits in the valley of the Aravan River.** D V Nalivkin *Trav. radium et minerais radioactifs acad sci U R S S* II, 14–20(1926) —The Aravan River crosses the Tuya Muyun ridge which contains deposits of radioactive minerals on the walls of many of its caves The massif of the ridge consists of Silurian, Devonian and Carboniferous rocks The specific radioactive minerals which are found in the walls of the caves are discussed in another paper A C Noé

**Petrographical particularities of Tuya-Muyun radioactive deposits in Fergana.** V I Lucchitzkii *Trav radium et minerais radioactifs, acad sci U R S S* II, 21–50(1926), cf *C A* 17, 3059 —At the beginning of the Kirgis Atan River are strongly developed sediments which are of light gray color They are formed by an aggregate of quartz and feldspar of uniform grain structure Quartz is found in small irregular grains. Microline is represented by large irregular grains which are evenly distributed throughout the strata Plagioclase and oligoclase appear in the form of sharply defined plates with (010) cryst grains and are included in microcline Brown biotite, which often is transformed into chlorite or green hornblende, occurs in large quantities These deposits are of Lower Carboniferous age A C Noé

**The eruptive rocks of the Tuya-Muyun district.** L F Atsberg *Trav radium et minerais radioactifs acad sci U R S S* II, 51–72(1926) —The Tuya-Muyun Ridge is located in southeast Fergana in the region of the northern approach to the Alai Mountains It is a part of an elevated plateau which extends to the South in the deep Naukat Valley The entire district from Tuya-Muyun up to the northern edge of the plateau is composed of Paleozoic slates, which are either bright flints or jasper, or of black carbon-like slates These deposits are characteristic deep sea deposits In some places one could find bituminous limestones, layers of black flint slates and layer like deposits of diabasic porphyrites The following primary and secondary mineral components were found by microscopic examn (1) rock-forming minerals Augite and feldspar, (2) accessory minerals, contained in the compn of the main strata Titanic iron oxide, pyrite, magnetite, apatite; (3) secondary minerals calcite, chlorite and quartz, most commonly found, sericite and epidote, found but seldom A very peculiar characteristic is common to all those types where feldspar is found The feldspar appears in all cases as *albite* A C Noé

**The gypsum in the calamine deposits of Sardinia.** Piero Bonate *Resoconti assoc mineraria sarda* 36, No 1, 39–41(1931), cf Chinaglia, *C A* 25, 899 —Gypsum is rarely present in the deposits of Sardinia, because it was formed in earlier periods and then carried away by the action of the waters This action is also shown by the existence, at the lowest levels, of sedimentary rocks, very similar to the alluvial deposits The gypsum, if protected from the action of the waters, is found in well defined crystals accompanied by blende and calamine Its formation was probably the following the pyrite was oxidized to $FeSO_4$ and $Fe_2(SO_4)_3$, which reacted with ZnS to form $ZnSO_4$ This, by reaction with $CaCO_3$, gave $ZnCO_3$ and $CaSO_4$ G. A. Bravo

**Materials related to the distribution of radioactivity in the western part of Fergana.** A N Snesarev *Trav radium et minerais radioactifs acad sci U. R S S.* II, 121–200(1926) —Every deposit of radioactive ore changes the ionization of air or its elec cond Therefore, a study was made of these 2 valuable sources of information to locate radioactive ores A C Noé

**Investigations in the region of limestone contacts of the Kirghiz-Ata ridge in Fergana.** V I Lucchitzkii *Trav radium et minerais radioactifs acad. sci U. R. S S* II, 201–63(1926) —The purpose was to det the geological and mineralogical character of the limestone contacts These contacts are of interest, because certain traces of Cu ore are found, and the Cu ore in turn is usually found in connection with U compds Particular minerals found are hornblende, porphyrite and hornblende-granites Along the line of contact of syenitic-dioritic magma which formed the ridge of Kirghiz-Ata with Paleozoic limestones pronounced changes took place, as well as within the limestones which were exposed to different changes, as well as in the magma which in the middle part of the ridge gave birth to syenites and at the ends of the ridge gave birth to various diorites, among which the most important roles are played by hornblende and diorites. The first minerals formed during this process were ferric calcite rocks Later, there

appeared plagioclases Considerably younger are the ore minerals as, for instance, magnetite During contact metamorphism no change took place which was due to the influence of pressure The chief role has been played by the high temp of the magma Secondary changes in contact minerals took place chiefly in granite, which gave during its transformation 2 new secondary minerals serpentine and chlorite During these changes, hydrothermic agents were of considerable importance A C Noé

Notes on rocks from Sihor Hills, Bhavnagar, Kathiawar. V. S Swamynathan *Proc 15th Indian Sci Cong* 1928, 291 —Thirty hand specimens collected from the Sulidhar, Lamdhar and Tharsingra hills situated west of Sihor town were examd Barring a few dike rocks, rocks of a more or less acidic compn (differentiation products from a basaltic magma) seem to be prevalent in the area. The more interesting types are rhyolites, pitchstones, etc. E. J C.

Some rocks of the Rajmahal Hills. P C Datta *Proc 15th Indian Sci Cong* 1928, 291 —A study of rocks collected from a group of small conical hills called Gandesuri in the Rajmahal Hills These rocks were first described by Ball as trachyte and subsequently as andesite by McMahon From a phys and chem study of the specimens D has reached the conclusion that the rock is a basalt. E. J C.

The volcanic rocks of the Irrawaddy Delta, Manngmya District, Lower Burma. H L Chibber and M M Wadiwana. *Proc 15th Indian Sci Cong* 1928, 290 — The area which has been geologically mapped is situated on both sides of the Bassein river On the east of the river the volcanic rocks form a plateau with an average height of about 100 feet presenting a steep scarp toward the river The geology of the area has been described as follows (5) Alluvium (4) White and greenish fine tuffs These tuffs enclose purplish or grayish nodules and boulders of trachytic lava (olivine-trachyte) It has been suggested that the eruptions were of a very explosive nature. (3) Coarse-grained grayish tuffs with *Nummulites* (2) Grayish volcanic tuffs and ashes. These rocks were seen exclusively developed in the hills situated east of the village of Zyat Chaung (1) Nummulitic limestones, sandstones and shales. The limestones are remarkable for containing a number of *foraminifera* The area represents the southernmost occurrence of volcanic rocks in Burma situated on the igneous line connected with the Arakan Yomas and their continuation to the north and the south where numerous patches of serpentine occur E J C

The hornblende lamprophyres and associated rocks of Mokpalin quarries, Thaton district, Lower Burma. H L Chibber *Proc. 15th Indian Sci. Cong* 1928, 290 — The petrography of the rocks is as follows (*a*) Contact rocks, *e g*, veins of epidote rock contg a little quartz and feldspar (*b*) Quartz veins, occurring as irregular veins or lenses. (*c*) Acidic pegmatites and aplite veins. (*d*) Lamprophyres. The common rock is a hornblende lamprophyre (camptonite) merging sometimes into a dark quartz-diorite-gneiss (*e*) Hornblende-biotite gneiss, quartz diorite-gneiss and biotite-granite E. J C.

Magma types in the Deccan Trap K K Mathur and V. S Dubey. *Proc 15th Indian Sci Cong* 1928, 291 —The authors have studied a number of occurrences of igneous rocks, usually regarded as part of the Deccan Trap, in Gujrat, Kathiawar and Cutch These can be classified into 3 groups (1) the mafelsic or basalt magma type. (2) the mafic or ultra basic magma type and (3) the felsic or acid magma type. The first group is represented by the common Deccan Trap of the typical plateau basalt facies ranging in the later stages of eruption to an alkali rich basalt. This was followed by intrusions of highly basic rocks The acid type appeared much later and is represented by rhyolites, granophyres, etc., in various parts of Western India. These groups appear not to have any immediate genetic relationship through a process of magmatic differentiation, but probably have their source deep down in distinct zones in the earth's crust They have been traced in South India, the Himalayas, Burma and Western Asia. E. J C.

*Petrochemical data of the environment of Szarvaskö* (Hungary) Zsigmond Szentpétery and Kálmán Emszt *Földtani Kozlony* 58, 109–14(in German 216–22) (1928)(Published 1929) —Data for 12 rock analyses are given with a short explanation of conclusions drawn from them. S S de Finály

Recent lava types of Etna. E. Lengyel. *Földtani Kozlony* 59, 26–34(1929) — Lava of the 1928 eruption of Etna is an extreme in lava types, being the most basic rock of all eruptions It consists of an olivine-labradorite basalt with significant content of nepheline S S de Finály

Granites in the region of Mórágy. F. Papp and R. Reichert. *Földtani Kozlony* 59, 35–41(1929) —A petrographical study combined with 3 analyses of rocks from Mórágy (Hungary) S. S. de Finály

**Oligoclase rocks in the region of Szarvaskö (Hungary).** ZSIGMOND SZENTPÉTERY. *Matematik es Természettudomanyi Értesito* 47, 432–65(in German 466–7)(1930) — Rocks consist of 70–80% oligoclass feldspars Seven analyses are published with strikingly large $Na_2O$ values, 8 05 to 9 12% ($K_2O$ content being 0 30 to 0 75%) Rocks show many similarities to the gabbroidal mass of the environment Analogous rock occurrences are found in Transylvania, at Koswa in North-Ural, in Central Asia, at Mariposa, Coalings, Colorado, etc S S DE FINÁLY

**Petrographic examination of the paleolithic splittings of Cave Budöspest, Borsod (Hungary).** AALDÁR VENDL *Matematik es Természettudomanyi Értesito* 47, 468–83 (German abstract 484)(1930) —Splittings consist mostly of chalcedony, contg generally fibrous chalcedony The occurrence of crystals of calcite is characteristic S S DE FINÁLY

**A study of the eruptive rocks of Lammersdorf (Hautes Fagnes)** PAUL RONCHESNE *Ann soc sci Bruxelles Ser B* 51, 52–7(1931) —The rock of Lammersdorf is apparently similar to the rock of Greece They differ especially by larger cryst texture, less abundance of biotite and the presence of large crystals of plagioclase in recurrent zones In general, the rock of Lammersdorf is the equiv of the rock of Greece Attention is called to the identical situation of the 2 eruptive masses of Greece and of Lammersdorf, on the north side of the anticline. These rocks are evidence of a contemporaneous intrusion and elevation by the same geodynamic process This study is especially directed to chem and microscopical examn of the rock Tables of chem compns are given, and mineral constituents are classified ALICE W EPPERSON

**Andesite bomb with bread-like crust from Tusnádfurdö.** VIKTOR ZSIVNY *Matematik es Termeszettudomanyi Értesitö* 46, 277–90(in German 291–)3(1929) —Microscopical and crystallographical examn of a volcanic bomb of Tusnádfurdo (Transylvania) Chem compn (analyzed by K Emszt) $SiO_2$ 65 15, $TiO_2$ 0 44, CaO 4 41, MgO 2 19, FeO 2 85, $Fe_2O_3$ 1 57, $Al_2O_3$ 16 13, $Na_2O$ 3 02, $K_2O$ 2 14, SrO 0 08, $H_2O$ (—110°) 0 19, and $H_2O$ (+110°) 1.33, total 99 51% S S DE FINÁLY

**Origin of the mica-pegmatites of Kodarma (Hazaribagh).** S L BISWAS. *Proc 15th Indian Sci Cong* 1928, 289 —The country rock of Kodarma constitutes the mesozone of the metamorphic belts and consists of mica-schist with subordinate amts of sillimanite, andalusite, etc The proportion of the last minerals increases with the depth as the katazone is approached B suggests that the residual plutonic magma which form the pegmatites and was rich in volatile magmatic substances and rare earth compds was initially at such a high temp and under such a pressure as to be able to assimilate rocks of the deeper region, whereby it became specially rich in compds producing muscovite, feldspars, etc. Injections through rocks other than mica-schist with sillimanite, andalusite, etc, do not appear to have such enrichment in the Kodarma mica area This accounts for the occurrence of marketable mica in pegmatite veins within mica-schist and not in those cutting through other rocks When the melt was forced up to its present position in the upper region, its thermal activity was so exhausted that no pyrometamorphism was effected The magmatic emanation, however, produced marked pneumatolytic effect by the formation of minerals like tourmaline in the country rock. E J C

**Volcanic-ash showers.** L I GRANGE *New Zealand J Sci Tech* 12, 228–40 (1931) —Showers of volcanic ash, each usually not more than a few feet thick, ejected from craters in the Rotorna-Taupa-Tongariro zone, cover the central part of the north island of New Zealand A general reconnaissance is given of the characteristics of the soil forming showers Tables show mech and chem analyses of air-dried soils from these areas W. H. BOYNTON

**The so-called ophiolitic rock of the mountains of Livornese and Castellina.** G. DE GUIDI *Boll ist super agrario Pisa* 6, 53–68(1930) —A geological, micro- and macroscopical description of this arenaceous rock and of its constituents G A B

**Two new occurrences of crystalline limestone from Madura and Tinnevelly districts.** C. K. KRISHNASWAMY AND V S SWAMINATHAN *Proc 15th Indian Sci Cong* 1928, 298 —The authors think that the rocks were originally sedimentary in origin and have been subsequently subjected to metamorphism E J C.

**The siliceous oölites from the Cuddapah formation.** L RAMA RAO *Proc. 15th Indian Sci Cong* 1928, 292 —A microscopic study of the oölites was undertaken with the special object of finding out whether any definitely recognizable org remains could be detected as forming the nuclei of these oölitic grains Several interesting microstructural peculiarities are shown by these oölites One or two types of structures are very persistent, and the question is raised whether they may not be due to some very primitive organism E. J. C.

A short note on the sedimentary petrography of some sandstones of the Raniganj stage from the Raniganj coal field. A. K. BANERJEE. *Proc. 15th Indian Sci. Cong.* 1928, 291–2.—Four specimens of sandstone were examd. microscopically and macroscopically. The result of the microscopic study shows the presence of quartz, feldspar, garnet, calcite, biotite and limonite. Portions of the hand specimens were crushed and sepd. by $CHBr_3$ and the minerals with a sp. gr. greater than 2.8 were, in the order of their frequency, garnet, zircon, rutile, limonite, tourmaline, monazite, apatite and an undetd. black mineral. The 4 specimens of sandstones examd. were obtained from the upper, middle and lower divisions of the Raniganj stage, and B is of the opinion that the heavy minerals do not furnish any data for distinguishing the beds from one another. Conclusions. The beds of the Raniganj stage were derived from the degradation products of a gneissic area with a granite intrusion, and there was no change in the direction of drainage during the Raniganj stage. E. J. C.

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Petrography and coal classification (SEYLER) 21. Coal properties and its applications (KNOCKER), SUBRAHMANYAM 21. Identifying precious gems by optical analysis of emitted rays (U. S. pat. 1,771,604) 3.

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## 9—METALLURGY AND METALLOGRAPHY

R. J. REYNOLDS, H. W. GILLETT AND RICHARD RIMBACH

Secondary metals in 1929. J. P. DUNLOP. Bur. Mines, *Mineral Resources of the U. S. 1929, Pt. I*, 179–201 (preprint No. 9, published February 24, 1931). E. H.

Lead in 1929. ELMER W. PEHRSON. Bur. Mines, *Mineral Resources of the U. S. 1929, Pt. I*, 231–64 (preprint No. 11, published March 7, 1931). E. H.

Gold, silver, copper and lead in South Dakota and Wyoming in 1929. CHAS. W. HENDERSON. Bur. Mines, *Mineral Resources of the U. S. 1929, Pt. I*, 265–73 (preprint No. 12, published April 20, 1931). E. H.

Iron ore beneficiation. CLYDE E. WILLIAMS. *Mining Met.* 12, 187–8 (1931).—Methods are surveyed and the possibilities of application to Lake Superior ores discussed. In 1930 over 15% of the ore of this district was beneficiated by washing, drying and sintering and over 25% by crushing and screening. Beneficiation is increasing and should be further increased to conserve rich ores. Gaseous reduction to sponge iron is not recommended. The district will be a leader in iron ore production long after the date of predicted exhaustion. A. BUTTS

Mineragraphic aid in the concentration of manganiferous iron ores. W. H. COGHILL, WARREN HOWES AND S. B. COOKE. *Eng. Mining J.* 131, 371–5 (1931).—Two manganiferous ores, representative of large deposits in the Cuyuna district, in Minnesota, were studied by table concn., flotation, roasting and magnetic sepn., and mineragraphic methods. The ores were quite similar in compn. and appearance, but differed widely in results of sepn. by the methods mentioned. A microscopic study led to the conclusion that ore A did not give good flotation concentrates because of the presence of carbonates intimately assocd. with siliceous gang. Ore A responded to table concn. because the greater portion of the Mn and Fe minerals was fairly well liberated from the gang at table size. Ore B could not be tabled satisfactorily because of the intimate locking of the ore minerals with the quartz gang. Magnetic sepn. was impossible, because the Mn and Fe minerals were closely interlocked. Many photomicrographs and camera-lucida drawings are shown. W. H. BOYNTON

Fine chemicals as precious-metal precip. tests. E. T. ELLIS. *Metal Ind.* (London) 38, 377–8 (1931); cf. C. A. 24, 5006.—Chemicals that may be employed to ppt. Au are: $NH_4$ salts such as oxalate and sulfide, $SbCl_3$, $FeSO_4$, MgO, K salts, Na oxalate, $SnCl_2$ and ZnO. Other pptg. agents for Au and some of the other precious metals are formic acid, gallic acid, $HgNO_3$, oxalic acid, AcOK, K citrate, KSCN, K tartrate, $Na_2S$, Na

tartrate, $Na_2S_2O_3$, tannic acid and tartaric acid. In all cases the chemicals should be of high purity W. H. BOYNTON

Milling test of an oxidized gold ore from vicinity of Rockford, South Dakota. FLOYD C LLLINGSON. *Black Hills Eng* 19, 121–9(1931).—Amalgamation tests showed 50% Au recoverable by amalgamation in bottles, with prospects of larger yields by using a muller Cyaniding on 100-mesh ore gave 96% recovery The ore does not produce enough slime to interfere with percolation Cyanide consumption was about 0 6 lbs per ton of ore, lime consumption was 20 lbs. H C DUUS

Group research among gold producers. R M P HAMILTON *Eng Mining J.* 131, 356–8(1931).—A plea is made for coöperation by producers in Northern Ontario Direct operating costs and metallurgical results of 9 mills are tabulated and a flow sheet is shown for a 500 ton combination flotation and cyanide plant Some of the successes of the group research plan in the Transvaal in Western Australia are touched upon. W. H BOYNTON

The preparation and laboratory control of foundry sands J D BURLIE *J. Western Soc Eng* 36, 80–9(1931).—An outline is given of the general characteristics, source, prepn, requirements and methods of control of foundry sands Sands have 2 main classifications those contg little or no natural bonding material and those contg it The first group is used essentially in the production of synthetic molding sands and cores and the latter as a molding sand Sand testing and control equipment are discussed and many data tabulated Conclusions drawn are The introduction of controlled properties of molding sand has contributed to the realization of a more pos. control of casting technic By the use of suitable sands, the scrap losses may be reduced, and improved quality of castings results Accurately controlled sand properties bear a close relation to an increased rate of production. W H BOYNTON

Natural gas for metallurgical furnace. BANCROFT GORE *Black Hills Eng* 19, 103–12(1931).—The assay furnaces in the South Dakota School of Mines were converted from coal firing to natural gas firing The advantages were found to be greater speed of bringing cold furnace to working temperature, more even heating, control to within 10°F over any temperature between 500°F and 2500°F, low cost of operation (500 cu ft per hr as against 60 lbs coal), and possibility of checking up slovenly student work by metering gas used in furnaces H C DUUS

The mathematical basis of the foundry shaft furnace, the determination of its size and mathematical regularity. ALBERT ACHENBACH *Die Giesserei* 18, 217–25, 241–5 (1931).—By making use of recent literature, math relations involving the 4 principal factors in foundry shaft furnace practice (coke and Fe charged, amt. and velocity of blast, time of passage of charge and the height and capacity of shaft) are derived from considerations of theory and practice It is shown that none of these factors can be changed arbitrarily without causing a corresponding change in the fusion process J. BALOZIAN

Desulfurization [of pig iron] in the basic open-hearth furnace. K. KÖHLER *Stahl u Eisen* 50, 1257–64(1930).—The effect of CaO and Mn in the slag on the desulfurization of Fe in the basic open-hearth furnace has been studied The S content of the finished steel is inversely proportional and that of the slag directly proportional to the CaO content of the slag The rate of removal of the S is also a linear function of the CaO content of the slag between 25 and 40% CaO A further increase in CaO increases the viscosity of the slag and, therefore, reduces its reactivity. No definite relation between the Mn content of the slag and its efficiency as a scavenger for S could be established Slags with a low CaO and a high Mn content have no desulfurizing action, and a deficiency of Mn in no way impairs the desulfurizing action of the CaO. Addn of a large excess of Mn does, however, appear to have some accelerating action on the removal of S from the metal bath B C. A

The fundamental study for the production of low-carbon semi-steels from the standpoint of cupola operations. II. MASAYASU HORIKIRI *Tetsu to-Hagané* (*J. Iron Steel Inst Japan*) 16, 935–60, 1063–86(1930), *Metals & Alloys* 2, Abstracts 74; cf. *C. A* 24, 45, 1605.—H reports the result of an investigation on the production of low-C semi-steels on a large scale Pig Fe and mild steel scrap were melted together in a large cupola The temp in the inner part was measured The combustion gas at that place was sampled, and $CO_2$, CO and $O_2$ were detd. The results thus obtained clearly showed that the C in semi steels is absorbed by contact of red-hot coke with the molten Fe It is, therefore, necessary to use the min quantity of charged coke and to reduce the oxides in the charge with Si in order to obtain the low-C semi steels Moreover, the molten Fe contg high Si dissolves only a small amt. of C, so that high-grade low-C semi steels, generally, contain much Si. The oxidation of Fe by gases

gradually decreases from the tuyère level to the upper part, and increases on approaching the furnace wall but decreases at the center part There is no significant relation between the depth of the cupola hearth and the C absorption of molten Fe When many tuyères with small sectional area are used and the blast is passed through at high speed, the conditions are satisfactory, the atm in the melting zone being oxidizing and considerable C being absorbed by the melt On the other hand, with large sectional area and small nos of tuyères the atm. is reducing, and the absorption of C decreases The C content in the product depends on the contact condition of the gases with the melt and red hot coke at the melting zone; that is, the oxidation takes place by the gases, according to the following: $2Fe + O_2 \longrightarrow 2FeO$, or $Fe + CO_2 \longrightarrow FeO + CO$, and the reduction by the red hot coke, thus $FeO + C \longrightarrow Fe + CO$, $2FeO + Si \longrightarrow 2Fe + SiO_2$ and $SiO_2 + C \longrightarrow Si + CO_2$ G G

The fusion process in the cupola furnace according to views and conceptions of technical investigators. Carl Reis *Die Giesserei* 18, 33-7, 58-64, 78-83(1931) —A lecture J. Balozian

Cupola malleable cast iron. H H Shepherd *Foundry Trade J.* 44, 83-4, 102-4, 109, 125-9(1931) —A general discussion of the manuf of white heart and black heart malleable irons, their compn and structure and also of molding sands used and methods of testing them for bond strength, permeability, etc. H C. Parish

What reasons compelled the Prague Ironworks Company to introduce thin-walled blast furnaces? J Sarf *J. Iron and Steel Inst*, Sept, 1930, Advance copy, 33 pp — The theory of blast furnace working is discussed In connection with the irregular working and severe corrosion of the walls it was observed that places where the lining had been melted off to only a few cm thickness would last well for a comparatively long time. Five furnaces of the thin walled type have been erected on practically the original lines and have been eminently successful, as the lining has a long life, troubles in operation have been decreased, and the consumption of coke has been reduced, contrary to general conceptions The original thickness of the lining of the latest furnace was 250 mm., and after 18 months the lining was 180–200 mm thick in the middle of the shaft and 120–40 mm. in the belly. The only disadvantage is the increased consumption of cooling water. Construction costs are not higher than are those of the older type, as the decreased amt. of firebrick covers the extra cost of armoring the furnace. B C. A

Charging installations of blast furnaces and their effect on the behavior of the run. Hubert Hoff *Rev métal* 27, 604-14(1930) H S van Klooster

Metallography. P. Depossez *Camera* (Luzern) 9, 134(1930) —D describes the service of photomicrography in the study of metals and alloys The prepg of the sample and the arrangement of the microscope are briefly indicated M W. S

Applications of x-rays to the study of metals. James B Friauf. *Rev Sci Instruments* 1, 361–96(1930) —A general popular account is given including the subjects of radiography, metal crystals and alloys, orientation, grain size, internal strain, thermal expansion, fiber structure and the effects of mech and heat treatment. A bibliography of 44 references is appended Notice is given of the publication of a complete bibliography on x ray studies of ferrous materials involving more than 300 references George L. Clark

The recrystallization of metals. P Beck. *Technika* 11, 151-3(1930) —In case of homogeneous deformation, true grain no /temp or grain-size/temp diagrams can be obtained if (1) not only the geometric but also the phys characteristics of deformation (*i. e.*, the original structure and temp.), remain unchanged during the expt., (2) the tested bodies are heated quickly to the resp temps and (3) heating is stopped immediately at the end of recrystn S S de Finály

Microscopic investigation of metals. V. N. Krivobok. *Proc Eng Soc. West Penn* 47, 45–62(1931) —A non-technical review is given emphasizing the purposes of metallurgy and the specific uses of metallography related thereto With regard to inspection of metals and alloys, microscopic studies reveal the characteristics, the previous history of the sample and its suitability for a given purpose, but only when the samples are properly prepd by an experienced operator This is illustrated by 7 photomicrographs The second phase of the metallographist's work is the inspection and investigation of material after a failure has occurred. Under the third category of work, K. discusses the development of new materials, and the illustrations show how to recognize definite changes in properties The fourth function dealt with is true research or scientific metallography, under which 5 illustrations of martensite decompn are discussed M. F. Behar

Plasticity of metals. Zay Jeffries *Mech Eng* 53, 252–6(1931) —Plasticity is defined as "the quality by virtue of which a substance may undergo a permanent change

in shape without rupture" Metals are cryst., and plastic flow is the result of the movement of one position of a crystal with reference to another along crystallographic planes Industrial metals are useful because of their high plasticity, without which metal-working processes could be not carried on M F BEHAR

Gases in metals. C J SMITHELLS *Metal Ind* (London) 38, 261–4, 268(1931) — The soly of gases in molten metals usually becomes greater at higher temps, and is generally much less in solid than in liquid metals With $H_2$, Ni, Pb, Fe, Co, Cu and Pd for alloy systems, alk earths and alkali metals form hydrides, and Au, Ag, Be and Mg show practically no absorption Comparatively few metals absorb N as a gas The total vol of gas that can be extd from brass, Cu Al or duralumin is of the same order as the volume of metal Removal of gases from metals involves melting in vacuum, or with Al alloys slow pre-solidification with or without bubbling dry N or Cl gas through the metal, followed by rapid remelting to pouring temps P R KOSTING

Recent metallurgical research in relation to marine engineering S L ARCHBUTT *Trans Inst Marine Eng* 42, 295–346(1930) —The limiting *creep stress* should be considered for design purposes at elevated temp The nature of the atm seems to influence the rate of creep and the mode of deformation *Intercryst fracture* was found in some creep tests A graph showing the relation between temp, tensile strength, limiting creep stress and limit of proportionality for 0.17% C steel is given Higher pressures and degrees of super heat require a material superior to C steel Creep characteristics are given for various alloys *Ni Cr alloys* and their deriv are most suitable for temp ranges of 600–1000° Limiting creep stress at the highest temp increases with increasing Cr content ANN NICHOLSON HIRD

Use of non-ferrous metals in the aeronautical industry D HANSON *J Inst Metals*, Adv copy, No 545, 24 pp (1930) —The alloys of Al and of Mg now used in the aeronautical industry are considered Mg is inferior in comparison with Al in that it has a lower modulus of elasticity and is not as resistant to corrosion J L GREGG

Magnetic method for testing of wire ropes, especially wire cable. FRANZ WEVER AND ARNOLD OTTO *Mitt Kaiser-Wilhelm Inst Eisenforsch, Dusseldorf* 12, 389–90 (1930) —The device developed for boiler tubes was investigated as to its suitability for cables It proved to be sufficiently sensitive to permit the certain detns of single wire fractures even in the interior of the cable R. RIMBACH

Pickling and burning. I. HERBERT KURRFIN *Chem.-Ztg* 55, 133–4(1931) — Pickling serves to remove foreign material from metal surfaces The mechanism of the process consists of 3 stages loosening of the scale, soln of the scale and, to some extent, soln of the metal Scale is loosened by H evolved from the metal. $H_2SO_4$ is preferable to HCl in pickling, because it may be heated without increasing the vol of objectionable fumes Some portions of the scale are more tenacious than others and require longer pickling Unless inhibitors are added, the clean metal will be dissolved, and diffusion of H from the reaction will embrittle the metal Inhibitors should not materially increase pickling time or remain on the metal surface The metal concn. in the pickle should not be allowed to become higher than 50–60 g per l After pickling, the metal should be rinsed to remove reaction products and the excess acid neutralized with dil $Na_2CO_3$ to prevent fresh attack on the metal II. *Ibid* 150–1.— "Burning" is the process of treating metals with strong mixed acids for the purpose of obtaining dull, colored or shiny finishes Various formulas are given for "burning" solns The acids used are $H_2SO_4$ and $HNO_3$ in varying proportions NaCl, $K_2Cr_2O_7$ and $H_2F_2$ and various forms of lampblack are sometimes added to obtain different finishes. Precautions for operating are discussed B E ROETHELI

Metal-ware pickling data. WALLACE G IMHOFF *Am Metal Market* 38, No 54, 5, 10(Mar 20, 1931), No 55, 5(Mar 21, 1931), No 56, 5, 10(Mar 24, 1931) — Data included in 28 tables showing the results in a no of plants of the pickling of hot galvanizing of 12-qt light water pails are discussed Details are given for wts of pails, pickled wts, the strength of pickles used, etc. The wts of Zn deposited differed by 19½ lbs per gross deposited as coating W H BOYNTON

Modern case-hardening practice. FRANCIS W ROWE *J West Scot Iron Steel Inst* 38, 27–42(1930) —The correct choice of steel for case hardening depends on the character of the stresses to which the part will subsequently be subjected in service. These steels are C steel, 3% Ni, 3.5% Ni, 3.5% Ni-Cr, 5% Ni, 4% Ni-1% Cr, Ni-Mo and Cr-Mo steels Plain carbon steels are subjected to abnormality Ni case hardening steels give higher yield point and tensile strength than plain C steels The presence of 3% Ni enables a satisfactory hardness to be developed by a final quench in oil, and the case is rendered tougher. In order to insure proper hardening of the core the steel

must contain 0.13% C and 3–4% Ni, and be quenched from 780°. A class of case hardening steel which is becoming increasingly popular is that with 4% Ni and 1% Cr, with 0.16% C and with 0.20–0.30% Mo. This material in the water-quenched condition has a strength 90–95 tons/sq. in. and 80–85 tons/sq. in. in the oil-quenched condition. This is associated with an impact value of about 30 ft. lbs. Such steel is capable of withstanding the highest surface stresses, even with a comparatively shallow case, and is used for gear-box gears. The disadvantage of this steel is that, even in the fully annealed condition it is relatively hard to machine. It is also much more prone to over-carburizing than the lower alloy-content steels, and for this reason the carburizing temp. should be low. G. T. Motok

The nitriding process of nitrogen case hardening. J. F. Hurst. *Iron & Steel Ind. Brit. Foundryman* 3, 351–4, 379–80(1930).—The steels used in nitriding and the details of this process are discussed. Leopold Pessel.

Properties of meehanite metal—a pearlitic iron. A. G. Lambert and F. M. Robbins. *Can. Foundryman* 21, No. 9, 14–5(1930).—Data are given on compn. and phys. properties. E. I. S.

Influence of the emissive power on the temperature measurement of liquid iron. Rudolf Hase. *Arch. Eisenhüttenw.* 4, 261–4(1930).—The influence of oxidation on the emissive power of liquid Fe, and therefore on optical temp. measurements, was studied by optical, thermoelec. and photographic methods. Optical measurements made on oxidized surfaces agree more nearly with thermoelec. measurements than those made on unoxidized surfaces. The latter may vary as much as 80–140°. Between 1250° and 1600° the radiating power of bare iron is 0.44 ± 0.03, while that of oxidized iron is 0.95 ± 0.05. These values are practically independent of temp. Deoxidation due to the dissolving of the oxide begins at 1400° and increases with temp. until at 1580° an oxide coating is no longer produced by air. H. F. Johnstone

Results of operation and fields of application of various types of malleable iron recently produced. Rud. Stotz. *Die Giesserei* 18, 1–8(1931).—A lecture. J. B.

High-quality malleable iron. E. Piwowarsky. *Die Giesserei* 18, 19–24(1931). cf. *C. A.* 24, 5264.—A lecture. J. Balozian

The influence of nickel and nickel chromium on the properties of malleable iron. Leon Thiéry. *Rev. métal.* 28, 1–18, 61–78(1931). cf. *C. A.* 24, 4744.—White irons prepd. to contain C 3, Si 0.4, Mn 0.10–0.20 and S 0.018–0.09% were alloyed with 0.5, 1.4 and 2.5% Ni. They were tested together with the original base and an alloy produced by alloying it with 1.37% Ni and 0.34% Cr. Specimens were cast in sand but removed from it rapidly enough to produce chill. On plain C stock, the dilation curves show the effect of quenching. The decompn. of cementite in them begins at 1100°. On repeated heating, the cementite begins to decompose at Ac. The pptn. of graphite on the first heating can be seen under the microscope. With 0.5% Ni, the dilation curves have the same appearance, at least on the first heating, but the cementite begins to decompose at Ac. The presence of 1.4% Ni lowers, by 100°, the temp. of graphitization, reduces the temp. of γ to α transformation and lowers, by 50°, the Ar point. Addn. of 2.5% Ni considerably increases the quenching action of the Fe, reduces Ac below 700° and causes graphitization at 870°. The addn. of 1.37% Ni and 0.34% Cr increases the cementite anomaly and raises the temp. of graphitization, reducing the tendency toward quenching by raising the Ar point. Malleabilizing treatments showed that Ni helps to stabilize the system by decompg. the cementite. It prevents changes on cooling and decreases the size of the constituents proportionally to its content. Cr exerts an opposite action. From 1 to 2% Ni increases the tensile strength by about 30% and almost doubles the elongation. Toughness also increases, reaching 0.430 kg./m. for 1.5% Ni. J. D. Gat

Accelerated annealing of malleable cast iron. V. V. Uson and N. N. Pustumikov. *Vestnik Metallopром.* 10, 97–103(1930). *Chimie & industrie* 25, 352(1931).—The American process is too long, requiring 100–120 hrs. The General Electric Co. has succeeded in reducing the time required to 28–30 hrs., but this requires the use of an elec. furnace. U. and P. have endeavored to render the process suitable for application in ordinary case-hardening furnaces. Their work has shown that (1) In order to accelerate graphitization of the free cementite, it is merely necessary to keep the iron above 1000° for 2 hrs., at the end of which time the metal consists exclusively of the solid soln. and of graphite, (2) To reduce the time required for graphitization of the cementite which seps. on cooling, the metal must be cooled rapidly to 710° and maintained 4 hrs. at this temp. to decompose the pearlite formed by cooling into ferrite and graphite. This process required only 8–10 hrs. in the lab. and 16 hrs. in a petroleum-heated muffle furnace. A. Papineau-Couture

**Graphitization in cast iron.** Otomar v Keil *Arch Eisenhüttenw* 4, 245–50 (1930).—The development of graphite in cast Fe depends on the position of the eutectic. Carbidic congelation at the min of the arrest point shows very fine granular graphite sepn, while at the max needle-like formation occurs The cooling velocity before the eutectic is retarded by increasing C content because of the decreasing work of diffusion The transition of the carbidic forms after the stable congelation has a crit velocity dependent upon the C content, a fact which indicates a mol transformation to a stable phase Overheating reduces the crit cooling velocity Overheated cast Fe congeals throughout in the metastable form and remains in this condition after remelting H F Johnstone

**Nickel cast iron and its uses in the electrical industry** W C Hirsch *Elec Mfg* 5, No 2, 55–7(1930).—Marked improvement obtained in the quality of steels by addn of Ni led to an intensive investigation of benefits obtainable from its use in gray iron Ni cast iron offers a solution to many problems in the manuf of elec. machinery and domestic appliances E I S

**The theory of the tempering of cast iron according to American methods.** N Hekker. *Die Giesserei* 18, 14–9, 39–45(1931).—A theoretical paper J B.

**Fatigue tests on iron and steel** Axel Lundgren *Jernkontorets Ann* 115, 1–70 (1931).—Besides a detailed review of the most important results obtained in different countries by studies on the fatigue of metals, a report is given on investigations carried out at the Government Testing Inst, Stockholm The results of these investigations, which were made with the 'Alpha' testing machine, may be summarized as follows: Test bars for one-sided load were made with radius of fillet 0, 1, 2 5 and 10 mm A radius of 10 mm gave 90% higher fatigue limit than a radius of 0 mm and 2% higher than a radius of 5 mm Tests with const moment gave a 2–3% higher fatigue limit than tests with one-sided load A number of steels were investigated with the object of studying the relation between endurance and heat treatment, as well as between endurance and other mech properties Widely differing annealing temps were found to have a very slight influence on the fatigue limit On the other hand the endurance is considerably increased by quenching and varies with the degree of tempering No marked relation was found between the fatigue limit and the limit of proportionality or the yield point The relation between endurance and ultimate stress is more pronounced A scrutiny of the results of this and previous investigations indicated that the ratio $K$ of fatigue limit to ultimate stress varies within certain limits and increases with reduction of area. By plotting $K$ against reduction, diagrams were obtained for steels with different microstructure, from which the following conclusions may be drawn *Pearlitic C steels*—$K$ = 0 37 for a reduction of area less than 36% Above this value $K$ increases with reduction *Pearlitic Ni and Cr steels*—Values of $K$ than in pearlitic C steels *Sorbitic steels*—Values of $K$ are considerably higher than in pearlitic steels Increase of $K$ with reduction of area is not so pronounced as in pearlitic steels *Steels contg a mixt of sorbite, pearlite and ferrite*, with the ferrite in the form of network $K$ is considerably lower than in sorbitic steels, sometimes even lower than in pearlitic. *Martensitic-troostitic steels* with high ultimate stress Values of $K$ are lower than in sorbitic steels A one-page English summary is given. (43 references) H. C Duus

**The influence of various elements on the carburization of iron and steel.** Genské Takahashi *Kinzoku no Kenkyu (J for Study of Metals)* 8, 102–26(1931).—The influence of various elements on the degree of carburization of special iron and steel and also the same influence on the hardness of carburized products have been systematically investigated M Kuroda

**Optical investigations on the passivity of iron and steel.** L Tronstad *Nature* 127, 127–8(1931), cf *C A* 24, 1566.—Using mirrors of Fe and steel, T treated them electrolytically in baths of alk, neutral and acid $Na_2SO_4$ solns, different c. ds were used During the passive state all mirrors showed a change in the reflected light, this corresponded to the formation of a surface film with a mean refractive index of 3 0 and a mean thickness of 30 A U This agrees with a film of $Fe_2O_3$ Reactivation did not completely remove the oxide skin More of the film was destroyed on ferrite than on cementite grains Alternating cathodic and anodic treatments 3 times in 3 hrs left microscopically visible dark brown spots on the cementite, and faint yellow interference colors could be detected only by employing slanting incidence over the ferrite particles Frank Maresh

**Intercrystalline fractures in soft steel.** Enrico Crepaz *Atti III congresso naz chim. pura applicata* 1930, 380–7.—An attempt was made to explain the formation of intercryst cracks in soft steel (0 14% C) after immersion of the steel in liquid metals

or alloys, such as Cu, Zn, brass (30% Zn), bronze (15% Sn) and Al bronze (7% Al). Steel rods of 1 cm diam were immersed for 2–3 min. in the molten bath and were bent after removal from the melt (1) when the adhering melt had not yet solidified and (2) after complete solidification of the molten alloy. In both cases transverse cracks appear which are deepest at the places where the curvature of the rod is greatest. Microscopic observation of transverse sections showed that the cracks were intercryst. and filled with the solidified metal or alloy. The cracks are due to the internal stresses set up as a result of localized heating of the steel in contact with the liquid alloy. This is also brought out by the fact that bending of the rods inside the bath after immersion for several min. does not, as a rule, produce cracking, whereas bending immediately after immersion causes, in most cases, pronounced intercryst. cracks. The dissolving action of the melt is not a contributing factor, since the fractures appear more readily in brass and bronze than in Zn, although the latter has greater dissolving power.

H. S. VAN KLOOSTER

Mechanism of coalescence in steels. R. K. THAKORE. *Proc. 15th Indian Sci. Cong.* 1928, 92.—In considering the phenomenon of coalescence in alloys with special reference to coalescence of carbide in steel from the viewpoint of theoretical physics, K. makes 2 assumptions: (1) slight soly. of carbide in ferrite below the $A_1$ point, and (2) diffusion in solid state subsequent to state of inequil. Both are well supported by the well known researches of Benedicks, Roberts-Austen and others. K.'s observations (not given) show that the acceleration in coalescence in steels due to cold working is not primarily due to breaking up of cementite lamellae. K. made, but does not include here, a quant. record of progress of coalescence of carbide in sorbitic steels, as measured by degradation of mech. properties of steel.

E. J. C.

New process of quenching steel. N. F. BOLKHOVITINOV. *Vestnik Metalloprom.* 10, 88–90(1930). *Chimie & industrie* 25, 352–3(1931).—B. exptd. with Lewis' process, which consists in heating the steel above the crit. temp. and then quenching in a bath of molten salt or of oil heated to 230°. When treated in this way, the steel is at first soft, it consists of austenite, and becomes hard only about 5 min. after having reached ordinary temp. It then expands, becomes magnetic and is transformed into martensite. Owing to this slow change in structure, all the transformations produced by the variations in vol. have time to take place, which completely eliminates the usual defects of the ordinary quenching process, giving great hardness and homogeneity. But from a practical standpoint, the greatest advantage of the method lies in the fact that pieces quenched in this way can undergo all the requisite deformations and flexions in 1–2 min. after quenching.

A. PAPINEAU COUTURE

Interpretation of the complex phenomena observed during the reversion of highly tempered steel. ALBERT PORTEVIN AND PIERRE CHEVENARD. *Compt. rend.* 191, 1008–10(1930).—Two reactions take place simultaneously: (1) Supersatd. $\gamma$-iron decompg. into cementite and $\alpha$-iron, with less C causing contraction and (2) $\gamma$ soln. decompg. into cementite and $\alpha$-soln. with little C causing expansion. Any change in dilatometric manifestation is due to a preponderance of one reaction or the other, according to the temp.

O. M. SMITH

The resistance of steel to cyclic stresses. W. SCHNEIDER. *Stahl u. Eisen* 51, 285–92(1931).—The importance of the resistance of steel to cyclic stresses in construction work is pointed out. The difference between the long- and short-time testing methods and the effect of surface irregularities and of combined stresses on the results of the tests are discussed.

J. A. SZILARD

Annealing of steel in a protective atmosphere of producer gas. A. JOHANSSON AND E. VON WACHENFELDT. *Jernkontorets Ann.* June 1929, 141–79, 180–9.—Results of an investigation of the possibility of bright-annealing steel with charcoal producer gas show that this can be done. The app. used is described.

E. I. S.

Coarse-grained recrystallization of cold-drawn low-carbon seamless tubes. Annealing tests with critically cold-rolled rods of low-carbon steel. ANTON POMP AND ERWIN HOLWEG. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Dusseldorf* 13, 1–28(1930).—It was detd. that the grain size of critically cold rolled rods was considerably smaller after annealing at 750° than after annealing at about 700° or about 800°.

R. R.

Effect of various annealing temperatures on cold-worked low-carbon steel. H. E. PUBLOW, C. M. HEATH AND R. A. GEZELIUS. Mich. Eng. Expt. Sta., *Bull.* No. 35, 17 pp. (1931), cf. *C. A.* 24, 3975.—Without appreciable change in microstructure, low C steel (analysis not given) changes in hardness from 58 to 85 Rockwell B on drawing into brake drums. Olsen ductility tests for such a steel give 0.17 in. deflection at 9000 lb./sq. in. max. load. Annealing at 1150–1250°F. for ½ hr. and cooling at the rate of 70°F. per min. dropped the hardness to 60 and raised the deflection to 0.36 in., max.

load to over 11,000 lb /sq in This gave better ductility than raising above the crit. point and cooling at that rate Various other times and temps were tried Much of the hardness produced by drawing into brake drums is acquired before the microstructure shows apparent distortion of the grains Annealing at 800°F increases the hardness instead of decreasing it, prolonged heating below 1000°F does not relieve internal strains, the best annealing temp is 1250–1300°F, *i e*, just below the lower crit. point. H W GILLETT

**The sensitiveness to overheating of low-carbon ingot steel.** E POHL, E KRIEGER AND F SAUERWALD *Stahl u Eisen* **51**, 324–6(1931) —Annealing tests between 950° and 1400°, in 50° steps, were carried out on 4 low C ingot steel samples and one Mo steel The temp at which oxidation occurs after 1 and 5 hrs of annealing, the depth of the oxidized layer and the change in grain size as a function of the annealing temp were detd After 1 hr annealing the temp of overheating was found to be between 1200° and 1400 for the various samples and the thickness of the oxidized layer 0 1 0 2 mm After 5 hrs annealing the temp of overheating was found to be between 1150° and 1200 and the depth of the oxidized layer 0 4 1 4 mm Ingot steel with a coarse grain structure is less resistant to overheating than steel with a fine grain structure J A SZILARD

**Copper steel for dynamo and transformer sheets.** A KUSSMANN, B SCHARNOW AND V S MESKIN *Stahl u Eisen* **50**, 1194 7(1930) —Addn of up to 0 7% Cu to steel with 1 5 and 4% Si has practically no effect on the magnetic properties, but a larger proportion of Cu has a deleterious effect Less than 0 7% Cu improves the hardness and tensile strength and the resistance to corrosion of these steels and is therefore a desirable addn B C A

**Fatigue strength of carbon- and alloy-steel plates as used for laminated springs.** R G C BATSON AND J BRADLEY *Engineering* **131**, 405–6(1931) Conditions of the surface layer of spring-steel plates cause fatigue resistance of complete laminated springs to be lower than the mech properties of material would indicate Fractures of laminated springs may be due to very low limiting ranges of stress obtained from unmachined plates compared with those from machined specimens Deleterious layers could be removed by machining 1/16 in from the surface Surface effect was found to be produced by hardening and tempering Only very slight improvement was obtained by heat treating spring plates after a thin layer had been machined from the surface of the rolled material Tables are given summarizing the results of tests made LOIS F MCCOMBS

**Cobalt magnet steels.** H E KERSHAW *Edgar Allen News* **9**, 701–5(1930), *Metals & Alloys* **2**, Abstracts 63 —There are 2 classes of Co magnet steels the low- and medium-Co chrome steels and the high-Co steels The Co chrome steels are subdivided, one contg 9% and the other 16% Co, but both contg Cr 9–10, Mo 1.5 and C 1.0–1 15%, these are air hardening, and the best results follow a triple heat treatment. The high-Co steel usually has Co 36, Cr about 6, W 4–6 and C 0 9% these are oil hardening, only a single treatment is necessary, but accurate temp control is essential This alloy has better magnetic properties than any other known at present, *B H* max. values of 900,000–1,000,000 are regularly obtained. The high frequency elec crucible furnace is very efficient for the manuf of Co magnet steels and can also be used for cast magnets With Co-Cr steels better magnetic results are obtained from forged than from cast magnets the higher the Co content, the greater the discrepancy between the magnetic results With the 36% Co alloy, cast magnets can be produced having as good, sometimes better, magnetic properties than forged magnets Some special magnets are described G G

**Properties and application of nickel and nickel-chromium steels.** J GALIBOURG. *Rev metal* **28**, 30–9, 85–100(1931) —A review of the properties of plain C, Ni, Ni Cr and stainless Ni Cr alloys J D GAT

**Suppressed constitutional changes in alloys.** G SACHS *Am Inst Mining Met Eng, Preprint Inst Metals Division* **1931**, N Y meeting, 10 pp —X ray analysis and single-crystal study have been utilized in recent years as a new means of following constitutional changes in alloys If such transformations can be suppressed by rapid cooling, they can be followed at room temp in a particularly convenient manner This paper considers changes in soly and polymorphic transformations with particular reference to phenomena of the age hardening type A thermodynamic viewpoint is developed for examg such transformations C. L MANTELL

**The structure of cast alloys.** MARIE L. V GAYLER. *Metallwirtschaft* **10**, 141–4 (1931) —An Al alloy contg 7% Cu was melted in a high frequency induction furnace and held in a vacuum, in the presence of air, N, H and furnace gases for 25 min. One

set was cast at 740° and another at 840° Each heat was cast into 4 different molds steel, graphite, water cooled Cu and sand Photomacrographs of the structures are shown The furnace atm has little effect on the specimens cast at 740°. The macrostructure in all is fine grained, in those melted in vacuum and under H it is the finest. Those cast in sand are somewhat coarser than those cast in steel The microstructure is the same in all The macrostructure of the set cast at 840° into steel molds is coarser than that cast at 740°, and there is much more difference between different furnace atms Furnace gases produce the coarsest grain, and the difference is still greater when cast in sand The microstructure is finer grained, at the higher casting temp Both series cast in water cooled molds have a similar fine grained macrostructure, with little difference between the various furnace atms C. E. McPARLANE

An investigation of wrought light alloys. BUNTARÔ ÔTANI. *Kinzoku no Kenkyu (J for Study of Metals)* 8, 89–101(1931).—A relative test of forgeability for 40 kinds of special light alloys was carried out, and the effect of heat treatment on the hardness of these alloys was also investigated For the alloys which showed good mech and working properties, the effect of natural and artificial aging on the hardness of quenched alloys was investigated, several mech tests were also carried out on the bars and plates of these alloys M KURODA

Production and application of the light metals and of their alloys in Italy. A W BONARETTI *Metalli leggieri* 1, 7–17(1931).—A monograph ROBERT S POSMONTIER

Aluminum and its alloys. F. LIBERA *Metalli leggieri* 1, 19–28(1931).—A description with photographs ROBERT S POSMONTIER

Influence of antimony in aluminum alloys. A. W. BONARETTI. *Metalli leggieri* 29–52(1931).—A description is given of the phys and chem properties and compns of various Al alloys contg Sb, especially treating of the resistance of such alloys to action by sea water Many photographs are given ROBERT S. POSMONTIER

Changes in properties during the cooling of supersaturated silver-copper alloys. N. V. AGEEV, M HANSEN AND G SACHS *Z Physik* 66, 350–76(1930).—In general the changes proceed in the same manner whether the alloy is rich in Ag or in Cu In addn to the normal changes in resistance due to the altered compn there is an anomalous effect producing an increased resistance At low concn and at high temp, the change in hardness and the anomalous resistance are related to the amt of sepd crystals At high concn and low temp there is a marked increase in hardness in the initial stages of sepn without any corresponding change in resistance S BRADFORD STONE

The structure of copper-zinc alloys. W. BRONIEWSKI AND J STRASBURGER *Rev metal* 28, 19–29, 79–84(1931), cf *C A* 24, 4747.—Literary data do not definitely establish the compn of the definite compds of the Cu-Zn system To obtain the necessary equil specimens cast in chills and contg less than 49% Zn were annealed at 400° for 1000 hrs, and those with higher content of Zn for 3000 hrs The treatment was conducted in an elec furnace well luted with fireclay, so that the changes in the compn were found only in a very thin outside layer of specimens Parallel series of tests were made on cast and so-annealed specimens Elec cond, thermoelectric power, e m f of the soln, dilation and Brinell hardness were detd These tests and microscopic evidence placed the limits of solid soly of the $\alpha$ phrase between 0 and 35 at % of $\beta$ between 46 and 49%, of $\gamma$ between 59 and 67% After 3000 hrs' annealing the $\delta$ phase was never perfectly homogeneous, this interfered with the detns of its limits of solid soly which tentatively can be given as 79 and 87% The range for $\epsilon$-phase is within 98 and 100% Zn The existence of $CuZn_3$, $CuZn_2$ and $CuZn_4$ at room temps. was reasonably well established The shifting of the maxima of corresponding curves from theoretical 50% to about 49.6% can be explained on the assumption of the partial decompn of CuZn into $\gamma$- and $\alpha$ phase. J D GAT

Platinum-iridium alloys. FRANZ KORN *Metal Ind* (London) 38, 309–10 (1931).—Pt-Ir alloys have high strength and a faint blue color and are resistant to tarnishing The tensile strength varies from 30 tons/sq in with 5% Ir to 97 tons/sq in with 30% Ir Alloys contg more than 12% Ir increase in tensile strength when annealed between 600° and 800°. Annealing temps should never be above 950° especially for alloys with more than 15% Ir, some of which is lost by volatilization Corrosion resistance to hot aqua regia and $H_2SO_4$ increases with Ir addns Pd does not harden Pt alloys as effectively as Ir Au increases both hardness and brittleness of Pt, but the brittleness is counteracted by Pd. The Pd content should be 2 or 3 times the Au content to obtain the best results with Pt Pd Au alloys P R KOSTING

Development of zinc-base die-casting alloys. D L COLWELL *Proc Am Soc Testing Materials* 30, Pt II, 473–92(1930).—The history of the improvement of Zn base die casting alloys is illustrated in series of charts, which show the effects of nor-

mal and accelerated aging on size and phys properties of Zn base die-castings The data from the tests and the conclusions are given H W GILLETT

**Equilibrium diagram of the system: lead arsenic.** MOHAMMAD OMAR FARUQ *Proc 15th Indian Sci Cong* 1928, 176—Arsenic alloys with Pb in all proportions The diagram was studied up to 60% As Pb does not dissolve any As at its m p, but at higher temps 2 layers are formed The lower layer is Pb contg a small quantity of As in it, and the upper layer is As with a small quantity of Pb dissolved in it W J C

**Thermal analysis of the system: lithium-copper.** S PASTORELLO *Gazz chim ital* 60, 988-92(1930) Since the publication of a paper on Li Ag alloys (cf *C A* 25, 270) a *method for the thermal analysis* of such systems has been developed, which requires only 0.3-2.0 g of Li and permits verifying a eutectic almost to the limit of its formation A systematic series of thermal analyses of binary alloys of Li and heavy metals of the same group was therefore begun There is no earlier literature on Li Cu alloys and the constitutional diagram of such a binary system is unknown Preliminary to the thermal analysis of Li Cu an x-ray examn was made by photographing an alloy contg approx 50 at % of Li This gave a rontgenograph with only diffraction lines which correspond to the normal lattices of Cu and of Li Consequently no intramol compd and no solid soln of Li with Cu were formed This behavior, which was then confirmed by thermal analysis, is quite different from the behavior of Li with Ag as already shown (cf *C A* 25, 270) and of Li with Au as x-ray examn, to be described later, shows The Li Cu alloys (1.71 to 94.01 at % of Li) were prepd by *fusion in a Ni-Cr steel crucible in an A atm., and the cooling curve was obtained by* temp measurements with a Pt-Pt-Rh thermocouple and a Hartmann and Braun galvanometer If special Ni-Cr steel is not used, the mixt attacks the crucible badly, particularly with alloys rich in Cu Even with Ni-Cr steel, several preliminary fusions must be carried out until the % Fe in the alloys has become low enough (Cu contg 3% Fe is only 10° different from pure Cu—cf Ruer and Goerens, *C A* 12, 577, Sahmen, *C A* 2, 1549—so 0.1% Fe in the Li-Cu alloy is low enough) Alloys contg 1.71, 9.90 and 14.38 at % Li had a color resembling pure Cu, whereas with higher and increasing % Li the color approached the metal gray of Li All alloys were ductile, and those with high % Li were almost as soft as pure Li All were readily attacked by water, leaving cryst Cu of unusual appearance with alloys high in Li A *eutectic* was formed at the m p of pure Li, even for alloys contg less than 2 at % Li In this latter case the m p was approx 50° below that of Cu From 10 to 90 at % Li, the m p depression was almost linear The 2nd arrest in the m p of pure Li was found with all the alloys. Pure Li melts at 180°, which agrees with the data of the majority of investigators Alloys rich in Li did not show any marked liquidation, as would be expected from the great difference in d C. C. DAVIS

**The solid solutions of the copper-silver system.** D STOCKDALE *J Inst Metals*, Advance copy No 559, 14 pp (1931)—The solid solubilities of Ag in Cu and Cu in Ag were detd by microscopic and elec methods. The solv of Ag in Cu is 8.2% at the eutectic temp, 4.7% at 700°, 0.7% at 400° and probably almost zero at room temp The solid solv of Cu in Ag is 8.8% at the eutectic temp, 5.8% at 700°, 1.1% at 400° and about 1% at room temp The Cu rich solidus curves downward sharply near the limit of solid solv The Ag rich solidus is nearly a straight line. J. L. GREGG

**The effect of rate of bending in notched-bar bending tests.** JAMES G DOCHERTY. *Engineering* 131, 347-50(1931)—The expts. were undertaken to establish the relation between the slow bend and the Izod notched bar test, and to discover whether the results obtained in the Izod test measure the resistance of the material to impactive loading or to the stress concn produced by the notch A special testing machine, devised by D., was used The materials tested were C steels, 3% Ni steel, Monel metal, naval brass, phosphor bronze In the more brittle metals, *i e*, those with Izod impact strength less than 30 ft lb, it has been possible to test at ½ the Izod speed in the standard Izod machine by reducing the available energy to 30 ft lb These tests help to bridge the unexplored gap between the fastest slow bend" test (150 in /min) and the standard Izod test (7000/min) For all the ductile metals tested the energy absorbed in bending or in fracture increases with the speed of test Impact brittleness is considered as a velocity effect, and there is no discontinuity between the slow bend and Izod test *Ibid* 414-5—The relation between the notched bar test and the ordinary tensile test is *energy absorbed in ft lb* divided by ultimate tensile strength in tons per sq in G T. MOTOK

**Measurements on the degree of orientation in hard-drawn copper wires.** W. A. WOOD *Phil Mag* 11, 610-7(1931)—The results confirm Schmid's (cf. *C. A.* 23,

1029) The degree of orientation was estd by the measurement of photographic film intensity at convenient points on the diffraction rings where max or min occur The drawn wire may be described as consisting of a randomly oriented cylinder surrounding a highly oriented core This is characteristic of all drawn wire The effect of drawing is to slowly increase the degree of orientation in the interior of the wire Orientation is highest along the axis of the wire The change from oriented to non-oriented is quite sharp ARTHUR FLEISCHER

Cold-working and annealing of α brass. J. NAVARRO ALCÁCER. *Anales soc espaÑ fÍs quím* 28, 1429–34(1930).—The process of recrystn of cold-worked brass was studied, and the optimum annealing temp detd There were detd the x ray diagrams, which fixed the positions of the elementary lattices, the temp of beginning of recrystn., Laue grams and the progressive increase of grain at different temps Mech tests gave data on improvement of coeffs of cold working by repeated annealing and recrystn. processes which agreed well with the above In stamping and the like the best results are obtained between 800° and 900°. E M SYMMES

The recrystallization of technical lead. F LOOPS-RASSOW *Metallwirtschaft* 10, 161–5(1931).—The grain sizes of 17 grades of Pb were detd after casting them into strips, reducing them 50% by rolling and annealing for 15 hrs at 200°. Electrolytic Pb has a grain size considerably above 1 mm., com Parkes Pb about 1 mm., and Pattison Pb and Pb alloys less than 1 mm Elements like Cu and Ni which are not sol. in Pb reduce its grain size, while Bi, which is sol., does not. Samples of one of each of the 3 grades of Pb were reduced 6–87% and annealed at 18–310°. Grain size was detd. and recrystn diagrams constructed. The increase in grain size with rising annealing temp is gradual for the first 2 grades, but Pattison Pb hardly changes up to 280°, then suddenly becomes larger than the other 2 The lower recrystn limit is above room temp for very low deformations, below for higher deformations. There was no difference in the recrystn grain size of samples rolled at room temp and at −70°. Long aging of rolled samples at room temp produces normal recrystn. with higher deformations and grain recovery with low deformation. C. E. MCFARLANE

The influence of impurities in soft lead on its behavior toward acids. ARTHUR BURKHARDT *Metallwirtschaft* 10, 181–7(1931).—Forty-one com. grades and alloys of Pb contg small percentages of Cu, Ni, Bi, Sn, Sb, Te, Zn, Cd, Ag, Tl, Fe, Hg or Li, or combinations of these were tested for corrosion resistance against various strengths of $H_2SO_4$ and HCl at 20°, 90°, 130°, 170° and 220°. Tensile tests are not a suitable measure, as the strength drops in proportion to the reduction in cross sections of the test bar Loss of weight was detd instead Seventy % $H_2SO_4$ at 170° attacks com Pb contg Bi, Zn or Ag most, then those contg little or no Cu, and those contg Ni or Cu the least. Cu can compensate for the bad influence of Bi At 90° Sn, Sb and Ag are no worse than Cu alloys, and at 20° there is very little difference between any of the grades With 98% $H_2SO_4$ similar results were obtained. Fe, Sb, Sn, Te, Cu and Ni retard corrosion of Pb in $H_2SO_4$. Tl and Hg have no effect, Li, Ag, Zn, Cd and Bi increase corrosion Tests were also made in 10 and 20% HCl and in moist $Cl_2$ at 20° and 90°. In HCl brands which contain Cu, Ni and Te are attacked most and the purest grades least. In 20% HCl the attack is greater than in $H_2SO_4$, but in 10% HCl it is slight, in moist $Cl_2$ it is a little greater Attempts to obtain greater resistance to HCl by alloying failed No theory for the effect of impurities on the corrosion of Pb has been worked out, it must be detd empirically. C. E. MCF.

The oxidation and intercrystalline brittleness of nickel. N.-V. AGEEV. *Trans Inst Metals* (Moscow) No 7, 61–79(1930).—Two grades of com Ni showed that Ni is brittle after having been annealed under atm. conditions at 800° and 1000°. Intercryst oxidation is the cause of this brittleness E. I. S.

Sprayed aluminum coatings. LEOPOLD PESSEL. *Metal Ind* (London) 38, 288 (1931).—A blister type of corrosion, occuring on rolled Al sheet, is described and theoretically explained These corrosion exfoliations can be prevented by the application of an Al coating by the metal spraying process LEOPOLD PESSEL.

Standards and exposure tests for plated metals. WILLIAM BLUM. *Brass World* 27, 57–60(1931).—A series of exposure tests of electroplated surfaces has been started. Points considered include the location of the tests, order of tests, solns and conditions to be used in plating, size, shape and arrangement of specimens, prepn for plating, conditions of exposures, methods of inspection, etc. Any general specifications must be prepd with respect to certain types of use or service and adopted or modified by mutual agreement for any specified article. W. H. BOYNTON

Estimating galvanizing pot life. WALLACE G IMHOFF. *Iron Age* 125, 1154–5 (1930); cf. *C. A.* 24, 2373.—The temp. of the bath is the most important single factor

influencing the destruction of the galvanizing pots. They should be designed in such a manner that no part can possibly be heated above 900°F. The regular operating temp of the pots should be as low as possible and should never go above 875–85°F. The use of an elec. pyrometer for indicating and recording the pot temp is recommended. A table is given showing the relationship between the bath temp. and the loss of thickness of the steel walls, from which deductions as to the estd life of galvanizing pots with a wall thickness of 1 in and 1.25 in are drawn. Practical experience was found to check up with these theoretical figures. LEOPOLD PESSEL

Galvanizing-pot destruction. WALLACE G IMHOFF *Iron Age* 125, 633–6(1930); cf. *C. A.* 24, 2973.—The attack of molten Zn upon steel sheets was studied at different temps The attack becomes very strong at 900°F. LEOPOLD PESSEL

Comparison of rust protection of iron by zinc, by cadmium and by zinc-copper alloys and the electrodeposition of such alloys. FRANK C MATHERS AND RUSSEL L HARDY. *Proc. Indiana Acad. Sci* 38, 183–5(1928).—Measurements were made of the relative degree of protection against rusting of an Fe surface given by Zn, by Cd and by Zn-Cu alloys. The metals were sprayed with 5% salt soln to induce rapid rusting The presence of Cu in Zn deposit on Fe lessens the time of protection in the salt spray. Cd gives almost twice as long a protection as does an equal wt. of Zn Cost of rust protection by Cd is 7 times that by Zn A method is given for controlling the compn. of electrodeposited alloys by using anodes of 2 different compns and switching the current alternately from one to the other. H M STARK

Apparatus suitable for control determinations of the total zinc coating on steel. GOEKE. *Chem Fabrik* 1931, 147–8.—The vol of H evolved by acid is measured Cf. Cushman, *C. A.* 15, 1123, 1882 J. H MOORE

Corrosion and its prevention. J VESZELKA *Bányás Kohás Lapok* 63, 9–14, 35–41(1930).—A brief account of corrosion and non-corrosive metals and alloys which may be used in boilers, etc. S S. DE FINÁLY

The corrosion resistance of copper-bearing steels. W MARZAHN AND A PUSCH *Korrosion Metallschutz* 7, No 2, 34–9(1931).—Lab tests of Cu-bearing steels showed the addn of 0.35–0.45% Cu to diminish the wt. loss in 5% $H_2SO_4$, 5% HCl and $H_2O$ Greater addns. did not increase the protection, which was about 90% in $H_2SO_4$, 50% in HCl and 80% in $H_2O$. Addns of 0.36% or more Cu brought about a reduction in tensile-strength loss which was ½ that of Cu-free steel Service tests, in which the plates were located in the roof of a steam railroad tunnel, showed that Cu-bearing steels were about 15–20% more resistant than Cu-free steels. B E. ROETHELI

The role of hydrocyanic acid vapors in the corrosion of iron. J. F G HICKS. *J. Phys Chem* 35, 893–904(1931).—Investigations were made to det. the part played by HCN gas in the corrosion of Fe (particularly in the internal corrosion of gas mains), the app and procedure used being essentially those used previously (*C. A.* 23, 3199) From graphs of the corrosive effects (mg /sq cm.) of various gaseous mixts against the time of test (days), it is concluded that: (1) HCN, although not a cause, is the chief contributory factor in the internal corrosion of gas mains, $H_2CO_3$ and O following in order, and (2) HCN possesses the greatest intensity of effect and is 1st in order of priority of attack. It is shown that in the cases studied HCN does not initiate the corrosion. The mechanism of the "cyanide corrosion" of Fe is similar to other Fe-corrosion processes. Prussian blue is the final product in the corrosion of Fe in the interior of gas mains. The conclusions drawn from the graph are checked electrochemically by the methods in the previous investigation. J. BALOZIAN

Corrosion "danger" with light metals (aluminum alloys). P. SCHWERBER. *Metallwirtschaft* 9, 158–60(1930).—A comparison of the corrodibility of iron (steel) and of light alloys. The latter are found, generally speaking, much less subject to corrosion. LEOPOLD PESSEL

The use of aluminum for oil-lease tanks. I. Field tests. LUDWIG SCHMIDT, JOHN M. DEVINE AND C. J. WILHELM Bur. Mines, *Rept of Investigations* 3066, 17 pp (1931).—Al has promising possibilities as a material for the construction of lease tankage because of its resistance to $H_2S$ corrosion The use of Al steam coils in contact with salt water is not practical The Al tank plate used did not prove highly resistant to the corrosive action of concd brines. When used in conjunction with steel, extreme care must be taken that no electrolyte is present ALDEN H. EMERY

Condenser-tube corrosion. D. HANSON. *Nickel Bull* 3, 81–5(1930); *Metals & Alloys* 2, *Abstracts* 64.—*A theoretical consideration of corrosion is given, particularly of* the mechanism of condenser-tube corrosion, the theory of electrolytic corrosion and the factors influencing corrosion It is concluded that the soln. of the corrosion problem lies in the use of corrosion-resistant alloys. The possibility of the use of Ni-Cu alloys

is treated It contains a schematic illustration of a jet test app used for detg the comparative corrosion resistance of various condenser tubes. G G

A magnetic method for testing boiler tubes. FRANZ WEVER AND ARNOLD OTTO *Mitt Kaiser-Wilhelm Inst Eisenforsch Duesseldorf* 12, 373-87(1930).—The introduction reviews the history and literature of magnetic testing Two methods of testing were investigated (1) the method developed by Sanford and Kouwenhoven, (2) methods developed by the authors The influence of magnetization field strengths and magnetization in weak and strong fields are discussed R. RINBACH

Atomic hydrogen welding. C. J MACGUFFIE *Baltimore Engr* 5, No 5 15-6 (1930).—General notes on development, process and equipment E I S.

Investigations on the influence of covered welding electrodes on the mechanical properties of the welds. K BALMGAERTEL. *Forschungsarbeiten Geb Ingenieurw* No 336, 33 pp (1930), *Metals & Alloys* 2, Abstracts 70.—The absorption of O and N from the surrounding air during welding reduces the mech properties of the weld, to exclude or to reduce this influence the welding rods are provided with a kind of covering or are dipped Tests were made with the following kinds of welding rods (1) bare rods, (2) dipped rods of the American Welding Process Co., (*a*) intermediate, (*b*) normal, (3) asbestos covered rods of the same company, (*c*) special A, (*d*) special B, (*e*) low volt, (*f*) standard The rod itself had the following compn. in all cases: C 0.11, Si 0.01, Mn 0.41, P 0.023, S 0.037%, and the remainder Fe. In the covered rod, asbestos takes the place of a flux The chem compn of the coating is given in detail for every kind of rod used The 2 light coverings *a* and *b* do not materially influence the tensile properties and simply facilitate welding The asbestos-covered rods covered with a flux, however, show a decided favorable influence as illustrated by phys., chem., metallographic and x ray tests The least influence was found in the Brinell test, while tensile strength and elongation showed considerable improvement compared with bare electrodes, the same was true also for bending tests, some of the samples could be bent 180° without fracture X ray tests showed finer-grained structure for covered electrodes. G G

Thyratron control equipment for high-speed resistance welding R C. GRIFFITH *Gen Elec Rev* 33, 511-3(1930).—In interrupted line welding service requirements of the control device are particularly severe, for this reason application has been made of the Thyratron tube as make-and-break device in control equipment. E. I S.

Oxy-acetylene welding of copper. W A HIBBARD *Acetylene J* 31, 250-2(1929) E J C.

Welding corrosion-resistant steels. E J TANGERMAN *Am Mach* 73, 485-7 (1930).—Data are included on the phys properties and compns., of the principal corrosion resistant alloys E I S.

Arc-welding joints in steel structures. R W VAN KIRK. *Am Metal Market* 38, No 48 (Mar 12, 1931) W H BOYNTON

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Unusual corrosion problems (PORTER) 14 High-C carbides of the Fe group (FISCHER, BEHR) 6. The galvanic behavior of a Cr Ni Fe alloy in sulfite liquors (WESLEY, LAQUE) 23. The emissivity of liquid Fe alloys (NAESER) 3. The system Al-Ag (CREPAZ) 2. The crystal structure of the compounds formed in the Sb-Cd system (CHIKASHIGE, YAMAMOTO) 2. Climax Mo deposit of Colorado—with section on metallurgy (BUTLER *et al.*) 8. Quantitative x ray analysis Cu-Ag and Cu Zn alloys (TERREY, BARRETT) 3 Thermal diagrams of the systems Ag-Sr and Ag-Ba (WEIBKE) 2. A thermodynamic study of the equilibria of the systems Sb-Bi and Sb-Pb (YAP) 2. Deflocculating (mineral pulps) (U S. pat 1,799,277) 13. Electromagnetic separator for separating magnetic from non magnetic material (Russ. pat. 14 436) 1. Fe oxide and $SO_2$ (Can 311,150) 18.

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Travail de l'aluminium et de ses alliages, la fonderie. PARIS L'Aluminium français. 163 pp

Travail de l'aluminium et de ses alliages; la soudure, le rivetage. PARIS L'Aluminium français. 46 pp

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Metallurgical coke. ALFRED DUFRAINE Fr 689,738, Feb 11, 1930 The reactivity of metallurgical coke is reduced and economy of the coke is secured by immersing it in a soln of lime or cement or by dusting it with powd lime or cement.

Ores. METALLGES A.-G Fr 697,783, June 23 1930 Ores in the form of slimes or mud are freed from their water by mixing them with substances such as coke which allow the water to run off

**Ores of the rare earths.** Deutsche Gasglühlicht-Auer G m b H Ger 516,852, May 24, 1927 To facilitate the $H_2SO_4$ decompn of oxide ores of Zr, Ti and the rare earths, the ores are powd and heated in a rotary furnace with $SO_2$ and $SO_3$ The ores are then pptd with $H_2SO_4$ and the S recovered as $SO_2$ and $SO_3$ as usual The recovered $SO_2$ and $SO_3$ gases may be used for the pre-treatment of further ore in the rotary furnace

**Ore-flotation reagent.** Ira H Derby and Orin D Cunningham (to P C Reilly). Can. 310,929, Apr 28, 1931 An ore flotation reagent comprises an oily frothing material and a mono or a di ester or an alkali metal salt of a mono ester of di- or tri-thiometasilicic acid Cf *C A* 24, 4752

**Apparatus for flotation separation of ores.** Wm A Butchart U S 1,798,451–2, March 31 Structural features

**Flotation separation of metallic ores** Robert W Loyd and Bertch W Moye Can 310,001, Apr 7, 1931 An ore pulp is treated by flotation for the extn of Pb products by introducing to the pulp proportionate quantities of NaCl, $ZnSO_4$, pine oil and xanthate

**Mechanical ore separator.** Colorado Iron Works Co Fr 697,428, June 14, 1930

**Sluicing apparatus for ore washing.** Antoine France Ger 516,860, June 27, 1926

**Inclined vibrating concentrating table.** Martin J Lidf U S 1,799,694, April 7 Structural features

**Distributing crushed ore on supports for extraction of metals.** Harold W Aldrich and Walter G Scott (to Inspiration Copper Co) U S 1,798,715, March 31 App and mech features of operation are described

**Preparing materials such as ores for sintering** John E Greenawalt U S 1,799,163, April 7 The material is segregated into 3 or more components of graded sizes, and these are placed in a treating holder in layers in a manner to preserve their respective voids, the component of smallest sized particles constituting the top layer and the components of successively increasing size constituting the succeeding layers and the percentage of voids increasing from top to bottom of the charge App is described

**Copper extraction from ore.** Wm E Greenawalt U S 1,798,255, March 31. Cu ore is treated to sep a high-grade and a low-grade Cu concentrate The low-grade concentrate is roasted, the high-grade concentrate is smelted to produce highly concd CuS and the latter is roasted to produce concd. Cu oxide A portion of the latter is leached with acid to ext the Cu and the soln thus obtained is electrolyzed to deposit Cu and regenerate acid, which is returned to the concd Cu oxide The roasted low-grade concentrate is leached to ext a portion of the Cu; the resulting Cu soln is treated with a portion of the concd Cu oxide, and the resulting purified Cu soln is electrolyzed with the Cu soln obtained from leaching the concd Cu oxide

**Chromium ores.** Zahn & Co Bau chemische Fabriken G m b H and Ludwig Wickop. Ger 516,992, July 14, 1926 Cr ores are disintegrated by heating with an insufficient amt of alkali carbonate and lixiviating the sintered mass The residue is mixed with 2–3 parts of burned lime or an equiv amt of limestone, 1 part of $Fe_2O_3$ and alkali carbonate and roasted An example is given

**Treating zinc-bearing concentrates.** Wm C Hooey (to New Jersey Zinc Co) U S 1,799,166, April 7 See Can 308,893 (*C A* 25, 1790)

**Treating zinc sulfide concentrates.** Walter O Borcherdt (to New Jersey Zinc Co) U S 1,799,278, April 7 ZnS concentrates contg water-insol Ca compds are treated, as an aq pulp, with $H_2SO_3$ under such conditions as to convert the Ca compds into minute particles of suspended $CaSO_4$ without materially attacking the ZnS, and the suspended $CaSO_4$ particles are sepd from the ZnS concentrate.

**Zinc.** Alexander Roitzheim and Wilhelm Remy U S 1,798 986, March 31. A charge of zinciferous material such as ore and a reducing agent is subjected to external heating, and a small quantity of O is admitted into the charge to increase its temp, thus forming a small quantity of $CO_2$. By chem reaction of the $CO_2$ with some of the Zn vapor, some ZnO in vapor phase is formed, and the ZnO is sepd from the Zn-metal vapor before the Zn is condensed App is described

**Slags.** Norske Aktieselskab for Elektrokemisk Industri Fr 697,403, June 3, 1930 An app is described for agitating slags to liberate the gases adsorbed or dissolved therein and form bubbles whereby a cellular structure is obtained

**Production of metals and their compounds** Axel S Burman and Ivar Rennerfelt. *Fr. 698,060, June 24, 1930* A soln of one or more metal compds. or salts,

free from $SiO_2$, is mixed with a sol substance contg C, which when heated leaves a residue consisting principally of C. The soln. is evapd. and calcined to form a homogeneous mixt. which is leached with an acid or treated with a gas to sep. one or more of the metals contd. therein. The process may be used to sep Fe from oxides of other metals such as $Al_2O_3$. The calcination step is carried out in an inert or reducing atm. An app is described.

Spongy metals. Henning G. Floody Ger. 522,180, Dec. 25, 1928. Spongy metals are prepd. by briquetting a mixt. of finely ground ore and reducing agent, packing the briquets in a shell or casing, and heating them to a temp. sufficient to reduce the ore without softening the resulting metal. Thus, spongy Fe may be prepd. from a briquetted mixt. of Fe ore, C and a binder at a temp of 1100°, or spongy Cr from a briquetted mixt. of Cr ore, ferrosilicon and a binder at a temp of 1200°. Cf. *C. A.* 24, 330

Wet-dressing plant for metal foundries. Badische Maschinenfabrik & Eisengiesserei vormals G Sebold and Sebold & Neff. Ger. 516,793, Jan. 25, 1930 Details of nozzle tubes are given.

Forming sand molds for metal casting. Otto Harms. Ger. 516,792, June 20, 1929

Feeder for ingot molds. Bloomfield H Howard and Ernest J. Turner. U. S. 1,800,073, April 7. Feeders are composed of self-supporting combustible material such as wood or paper adapted to burn sufficiently slowly on contact with the molten metal to supply heat to the molten metal within the feeder during the solidification of the ingot, so that the molten metal within the feeder is available to compensate for the shrinkage of the ingot.

Vessel for molding metals. Allgemeine Elektrizitäts-Ges. Ger 515,948, April 12, 1929

Die-casting apparatus. Nathan Lester (to P. & R. Tool Co) U S. reissue 18,014, March 31. Reissue of original Pat. No 1,673,833 (*C. A.* 22, 2733).

Casting stereotype plates. Schnellpressenfabrik Frankenthal & Cie A.-G Ger. 516,740, Oct. 15, 1925 Details of supplying hot gases are described.

Drawing metals. Rudolf W. Moll and Hugo von Bruck. Fr. 698,282, July 2, 1930 Metal to be cold-drawn is cleaned with acid, washed in water, treated with a lye of $Na_3PO_4$, then dried and drawn, residual mineral oils being used as lubricants.

Open-hearth furnace. Niklas F. Egler. U. S. 1,798,871, March 31

Open-hearth furnace. Roy L. Leventry. U. S. 1,798 611, March 31.

Open-hearth metallurgical furnace. Stanley H. McKee. U. S. 1,798,618, March 31.

Down-blast oil-burning smelting furnace suitable for treating ores of iron, lead, mercury, copper, zinc, etc. Matthew S Rogers (one-half to F. E. Kennedy). U. S. 1,799 643, April 7. Structural features.

Furnace and conveyor suitable for heating small metal articles. Frank T. Cope (to Elec. Furnace Co.) U S 1,799,956, April 7.

Furnace suitable for the heat treatment of metals. Frank T. Cope and Arthur H. Vaughan (to Elec. Furnace Co) U. S. 1,799,957, April 7

Siemens-Martin furnace. Friedrich Siemens A.-G Ger. 516,887, Mar. 9, 1930 The furnace is made from moldable fireproof material.

Furnace for annealing metals. Akt.-Ges. Brown, Boveri & Cie. Fr. 698,497, April 11, 1930.

Continuous-heating furnace suitable for heating metal sheets. Samuel E. Diescher (to S. Diescher & Sons). U. S. 1,800,170, April 7. Structural features.

Means for preventing burning of blast-furnace tuyères. Ernest H. Holzworth. Ger 522,179, Oct. 8, 1929 Brit. 331,464 (*C. A.* 25, 65).

Discharge device for grate shaft furnaces for roasting lump ore. Hermann Gleichmann Ger. 522,422, Oct. 27, 1929

Heat treatment of metal articles in fused salt baths. Walter Beck (to Deutsche Gold & Silber Scheideanstalt vorm. Roessler). U. S. 1,799,945, April 7. Articles such as tools are heated in a bath of fused salts such as NaCl and KCl in the presence of finely divided charcoal at temps. low enough to prevent any chem. reaction between the metal articles and the constituents of the bath. An alk. compd. such as NaOH may also be added.

Use of gas jets for cutting slots in metal plates. Clarence J. Coberly (to Kobe, Inc.) U. S. 1,799,612-13-14, April 7. Various details of app and procedure are described.

Manganese pig iron. Samuel B Sheldon (First and American National Bank

of Duluth, executor). Can 311,152, May 5, 1931. A mixt. of a siliceous ore and basic-open hearth slag, the latter contg Mn, is charged into a blast furnace, and is so proportioned as to give a pig iron contg approx 8% Mn. This pig iron is charged into another blast furnace with Fe ore to give a pig iron contg approx 2% Mn. This latter iron is suitable for making steel

Reducing oxides of iron. MARIO AMOROSO and SOCIETÀ ANON METALFER Fr 697,626, June 18, 1930 The reduction of oxides or other compds of Fe is accelerated by submitting the mass, during reduction, to the action of a magnetic field for orientation of the atoms of Fe

Magnetic iron. I G FARBENIND A G Fr 698,642, July 8, 1930. Fe with excellent magnetic properties is prepd by heating Fe in pieces (prepd without fusion by pressure or heat or both from finely divided Fe) in a vacuum to a temp below the m p, preferably in an atm of H The finely divided Fe may be obtained from Fe carbonyl

Steel. GEORGE A. CODE Can 310,972, May 5, 1931 In a single-step process of producing steel or its alloys, iron ore is reduced in molten condition while associated with a flux and mucic acid

Steel. KARL ENGEL Austrian 121,797, Sept 15, 1930 Corrosion after welding of austenitic Cr-Ni steel is avoided by applying an acid-resistant coating at and about the welded parts.

Steel. M. STERN A -G Fr 697,811, June 23, 1930 Valuable steels are made by adding waste or scrap metal contg Cu or Cu and Ni to the fusion bath

Coloring steel. SCHOELLER BLECKMANN STAHLWERKE A G (Karl Thomis, inventor). Austrian 121,991, Nov 15, 1930 Steel articles are colored brown by successively steeping in 3 solns. contg (1) oxalic or saccharic acid, *e g*, a 10% soln, (2) an alkali, alk. earth or $NH_4$ sulfide or hydro- or poly-sulfide, *e g*, a 1% soln. of $Na_2S$, and (3) a manganate or permanganate, *e g*, a 5% soln. of $KMnO_4$ The articles may be rinsed after each steeping and should be first polished and degreased The method is particularly applicable to rustless steel articles. Treatment with $H_2S$ may be substituted for the second steeping.

Thermal treatment of alloys. SOC. ANON. DE COMMENTRY, FOURCHAMBAULT ET DECAZEVILLE. Fr. 698,724, Oct. 11, 1929. Alloys contg Ni (or Ni and Co) 6–80, Cr 0–40, Mn 0.3–4, W 0–10, Mo 0–10, V 0–2, Ti 0–0.5, Si 0–3% and Fe the rest in the $\gamma$ state have their elastic limit increased by tempering between 800° and 1200° and then heating for 2 to 200 hrs. between 400° and 900°.

Aluminum-base alloy. ROBERT S ARCHER and LOUIS W. KEMPF (to Aluminum Co. of Am.). U. S. 1,799,837, April 7. An alloy which is suitable for engine pistons, etc., comprises Al together with Si 7–15, Mg 0.2–3 0, Ni 0 5–7 0 and Cu 0.3–4 0%. Cf. *C. A.* 25, 909

Lead alloys. FELTEN & GUILLEAUME CARLSWERKE A -G. Ger. 522,364, Dec. 4, 1926. Pb for sheathing a. c. single-conductor cables is alloyed with more than 5% of Bi and (or) Sb, so as to increase its elec. resistance by at least 25%.

Alloys of magnesium. I G FARBENIND A -G. Fr. 697,747, June 21, 1930 The resistance qualities of alloys of Mg are improved by heating the alloys once or more to a temp of at least 800° before casting Cf *C A* 25, 909

Iron-nickel alloys. ELECTRICAL RESEARCH PRODUCTS, INC. Ger 516,696, Aug 25, 1925 A Fe-Ni alloy for magnetic purposes contains 75–83% Ni. A small addn. of Cr or Mo may be present, *e. g.*, up to 7%.

Nickel-chromium-iron alloy. NORMAN B PILLING (to The International Nickel Co., Inc.) Can. 310,670, Apr. 21, 1931 To an alloy of 1–95% Ni, 1–50% Cr and the rest Fe is added a very small quantity of Ca before pouring to enhance its working properties.

Nickel steel or nickel-iron alloys. THOMAS W HARDY, JR., and CHARLES E. PARSONS. Can 310,951, May 5, 1931 A sulfide ore contg Ni, Fe and Cu is subjected to selective flotation to provide a Ni-Fe sulfide concentrate. The concentrate is roasted to remove S and the mass agglomerated. The mass is heated to a temp. below its sintering point in a reducing atm. to reduce it to the metallic state, and the metallic product is melted to produce steel or alloy.

Steel alloy. THEODOR CZEPL. Fr 697,801, June 23, 1930. A steel resistant to fire and corrosion contains C up to 1, Ni 25–40, Mo 8, Cu 1–8% and Fe the rest The Ni may be replaced more or less completely by Co, and the alloy may contain up to 10% of Ta.

Alloy steel resistant to corrosion and to oxidation at high temperatures. PERCY

Soldering aluminum. RAYMOND ALPHONSE FRÈRE Fr 698,683, Oct 5, 1929. An alloy of Al, Zn, Sn and Cu with a secondary alloy of Al and Zn, or an alloy of Sn, Zn, Pb and P with a secondary alloy of Sn, Zn and Pb (or Cd) or a single alloy of Zn and Cd (or Sn) is used for soldering Al

## 10—ORGANIC CHEMISTRY

CHAS A ROUILLER AND CLARENCE J WEST

The first hundred years of synthetic organic chemistry. F MASTRANGIOLI *Ann soc pharm chim Sao Paulo* 2, 119–33(1931) —A review M H SOULE

Thermal decomposition of organic compounds from the standpoint of free radicals. I. Saturated hydrocarbons. F O RICE *J Am Chem Soc* 53, 1959–72(1931) —When a hydrocarbon decomps we may assume that it dissocs into 2 free radicals which fly apart Comparison of the strength of a C—H bond (93 3 kg cal ) with that of a C—C bond (71 0 kg cal ) shows that the dissocn occurs only through rupture of a C—C bond, any breaking of a C—H bond is wholly negligible compared with that of a C—C bond The probability that the 2 radicals collide again is negligibly small and therefore, free radicals produced in this way can only decomp or react with the surrounding hydrocarbon mols *E g*, a free Me group can take a H atom from the surrounding hydrocarbon and form $CH_4$ and a hydrocarbon radical An Et group produced in this way can undergo 2 reactions the 1st is similar to the Me group and produces $C_2H_6$ and a hydrocarbon radical the 2nd is a dissocn into $C_2H_4$ and H atoms Radicals higher than Et can decomp in a similar manner into an $C_2H_4$ hydrocarbon and either a H atom or a free radical This dissocn of free radicals is possible because, in the process, a single bond becomes a double bond, this process of internal compensation releases 52 800 cal which can contribute to the min activation energy (93,000 cal ) necessary to break a C—H bond or to the min activation energy (71,000 cal ) necessary to break a C—C bond The decompn of paraffin hydrocarbons is represented as a chain type of reaction in which free H atoms or free radicals combine with 1 of the H atoms of the surrounding hydrocarbon mol The hydrocarbon radical then decomps into a compd and either a smaller free radical or a H atom Thus we have a cycle of changes in which certain groups called carriers are regenerated and start a new cycle and this process presumably may go on for a great no of times The composition of the products is detd therefore almost exclusively by the chain cycle and is practically independent of the primary decompn of the hydrocarbon It is possible to calc. the compn of the products when a hydrocarbon is allowed to decomp to a small extent. In these calcns all primary C—H bonds are considered to have the same strength, all sec. C—H bonds 1200 cal less and all tertiary C—H bonds 4000 cal less than a primary C—H bond The only arbitrary assumption made in the calcns is the assignment of the relative strengths to the different classes of C—H bonds The following hydrocarbons are discussed $C_2H_6$, $C_3H_8$, iso-$C_4H_{10}$, $C_4H_{10}$, $C_5H_{12}$, iso-$C_5H_{12}$ and $CMe_4$ C J WEST

Physical properties of the normal paraffin hydrocarbons, pentane to dodecane. A F SHEPARD, A L HENNE AND T MIDGLEY, JR *J Am Chem Soc* 53, 1948–58 (1931) —The samples were prepd from a special gasoline with a normal paraffin hydrocarbon content of about 70%, this was roughly sepd into fractions by distn and then treated with $ClSO_3H$, the progress of the further purification was checked by the total boiling range and the total freezing range, details of the abs temp measurements are given. B ps., m ps., $d_4^{20}$, $d_4^{25}$, $n_\alpha$, $n_\beta$ and $n_D$ at 20°, 25° and 45.3° each, viscosities at 25°, fluidities at 25°, critical soln temps in aniline, and Nekrasov's consts (cf *C A* 23, 3390) are given for $C_5H_{12}$, $C_6H_{14}$, $C_7H_{16}$, $C_8H_{18}$, $C_9H_{20}$, $C_{10}H_{22}$, $C_{11}H_{24}$ and $C_{12}H_{26}$. C J WEST

Alternation in properties of long-carbon-chain compounds. T MALKIN *Nature* 127, 126–7(1931) —The concept of alternation in all long-chain compds is modified so that the zigzag chain is tilted with respect to the terminal planes Nonalternating series possess vertical chains (hydrocarbons, Me ketones, alcs ) alternating series possess tilted chains (mono- and di basic acids, iodides, nitriles) The concept permits a longer spacing for odd numbered compds than for even ones and greater mol vol for odd numbered solid fatty acids FRANK MARESH

The catalytic addition of gaseous hydrochloric acid to unsaturated hydrocarbons. W. J. PIOTROWSKI AND J WINKLER. *J. Inst Petroleum Tech* 17, 225–41(1931) —See *C. A.* 25, 1794 G G

Pyrolysis and condensation of hydrocarbons. I. Ethylene. E. Berl and W Forst *Z angew Chem* 44, 193–7(1931) —$C_2H_4$ is decompd. by recirculating 45 l. of it through a tube furnace Around 800–900°, 43% of the $C_2H_4$ is condensed into liquid products giving $C_6H_6$, $C_{14}H_{10}$, anthracene and their homologs, with traces of cyclopentadiene Metals and oxide catalysts decrease the yield of liquid products and increase the decompn of $C_2H_4$ into its elements The formation of the liquid product proceeds in 2 steps the pyrolysis of the mol into free radicals, and the subsequent hydrogenation or condensation of the latter. George Calingaert

Rate of polymerization. I. Mechanism of polymerization of diethylene hydrocarbons. E N Gapon *J Russ Phys-Chem Soc* 62, 1385–93(1930) —G discusses the mechanism of polymerization of org compds. having 2 double bonds and draws the following conclusions (1) The essence of activation of a hydrocarbon mol. in the process of polymerization consists in the breaking of one double bond and the changing of quadrivalent C atoms at the rupture into tervalent. (2) The theoretical value of the energy of activation is equal to the energy of breaking of one double bond under conditions where chain reactions are absent. (3) Active mols on reacting with normal ones, give products of polymerization, while they cannot react among themselves. II. Rate of polymerization of isoprene. *Ibid* 1395–1406 —By using the method of heating samples of isoprene in sealed tubes in a thermostat, in the absence of light, a study was made of rate of polymerization at 100°, 110°, 130° and 150°. In the activation of the mols of isoprene there appear 3 active forms giving rise to 4 primary products dipentene, 1,3-dimethyl-3-vinyl-6-cyclohexene, and 2 polymers. An equation is developed for a process which goes on simultaneously in various directions independently of each other The consts. of rates of reaction of the primary products and their temp coeffs are detd The values of the heat of activation and the reaction consts. for all 3 reactions are calcd The consts. of the rate of formation of the primary products are in the same order to each other as the heats of formation *E* and the reaction consts. *S.* S. L. Madorsky

Formation of methanol by the direct oxidation of methane. William A Bone. *Nature* 127, 481(1931) —Studies on the slow combustion of $C_2H_6$ by B and Hill (*C. A.* 25, 1360) showed that the initial product was not a peroxide but either EtOH or some less oxygenated substance It has now been found that direct oxidation of $CH_4$ at 360° and 100 atms. gives rise to MeOH as the initial product. In mixts. of $CH_4$ and O in the ratio of 9 1 the action was complete in a few min About 17% of the $CH_4$ burnt was recovered as MeOH, 0.6% as $CH_2O$ and the remainder as CO, $CO_2$ and $H_2O$ No H was liberated and not even a trace of peroxide was formed The MeOH was identified by conversion into $HOC_6H_4CO_2Me$ and $p$-$NO_2C_6H_4CO_2Me$ and was estd. as the nitrite H. W. Leahy

Action of hydrogen peroxide upon simple carbon compounds. I. Methanol, formaldehyde and formic acid. H Shipley Fry and John H Payne *J. Am. Chem. Soc* 53, 1973–80(1931) —$HCO_2H$ (I) is oxidized by $H_2O_2$ to $H_2CO_3$ and $H_2O$, 76% of the acid reacting, no H or CO was found HCHO (II) reacts in 2 ways: $2\,II + H_2O_2 = 2\,I + H_2$ (a), $II + H_2O_2 = I + H_2O$ (b), the I is also oxidized, giving $H_2CO_3 + H_2O$ (c) With 1/16 mol $H_2O_2$, no I is oxidized, with 1/8 mol $H_2O_2$ I is only oxidized to a slight extent, with increasing concn of $H_2O_2$, the extent of the occurrence of reactions (c) and (b) regularly increases while that of (a) regularly decreases, the liberation of H is apparently favored by the lower concn of $H_2O_2$ In the oxidation of MeOH, the first reaction is $MeOH + H_2O_2 = II + 2\,H_2O$ (d); the other reactions (oxidation of I and II) also occur, so that the oxidation of MeOH gives I, II, $H_2CO_3$ and H The reactions represented by equations (a) and (b) decrease in extent while those represented by (c) and the decompn of $H_2O_2$ into $O_2$ and $H_2O$ increase in extent with increasing concns of $H_2O_2$ Reaction (b) always occurs to a greater extent than reaction (a), again showing that the liberation of H is favored by the lower concns of $H_2O_2$ The results are given in a series of tables II. The mechanism of the reactions. *Ibid* 1980–4 —In the oxidation of AcH the yields of the 2 chief reaction products, AcOH and $H_2CO_3$, increase as increased quantities of $H_2O_2$ are used Since separately conducted runs with AcOH and $H_2O_2$ gave $HCO_2H$ and $H_2CO_3$ without the liberation of H or of $CH_4$, it follows that the H arises from the oxidation of AcH to AcOH ($2\,AcOH + H_2O_2 = 2\,AcOH + H_2$) While the max yields of H were obtained with equimol. concns of AcH and $H_2O_2$ another striking parallel to the HCHO reaction is found in the fact that the vols of $CH_4$ liberated according to the proposed equation, $2\,AcH + H_2O_2 = AcOH + HCO_2H + CH_4$, decrease with increasing concns. of $H_2O_2$ The formation of AcOH and $HCO_2H$ with the concurrent liberation of both H and $CH_4$ appears to be in conformity with the equations for the reactions which

were predicted in extending the proposed reaction mechanism to AcII. The term *perhydrolysis* is defined as a double decompn reaction involving $H_2O_2$ in precisely the same manner that hydrolysis is a double decompn reaction involving $H_2O$. The reduction of $H_2CO_3$ by $H_2O_2$ with the liberation of O may likewise involve perhydrolysis, forming percarbonic acid, which, in turn yields $HCO_3H$ through the liberation of O. All reactions of $H_2O_2$ do not involve perhydrolysis. C. J. West

**Isomeric isoprene sulfone. II.** Ernst Eigenberger *J. prakt. Chem.* 129, 312–20(1931), cf. *C. A.* 25, 270. The action of 0.5 *N* aq. or alc. KOH upon isoprene sulfone A (I) in the light of a quartz light for 20 min. gives *isoprene sulfone B* (II), m. 70°, which is less sol. in $Et_2O$ than its isomer. In the absence of KOH light has no action, the 2 isomers form a mixt. m. 30°. Br does not add to II in the light or at 100°. Heating with *N* EtOH KOH for 2 hrs. causes about 50% sapon., giving an amorphous, brown substance. Oxidation with *N* $KMnO_4$ in $K_2CO_3$ gave no definite cryst. product. I and K in dry $Et_2O$ give the *K salt*, very hygroscopic, of 3,6-dimethyl-2,4-octadiene-1,8-disulfinic acid, oily, very unstable and reactive; the most pronounced property of which is its tendency to polymerize; the products being an $Et_2O$ insol., AcOH sol. oil and an amorphous compd., insol. in the ordinary solvents. The acid gives an unstable Br addn. complex; the oily polymer also gives a solid bromide, but this was not investigated because of its insolv. The *Ca salt* and *Zn salt*, m. 70.5°, were also prepd. The K salt and MeI heated 1 hr., give *dimethylisoprene disulfone*, $b_{18-19}$ 130–40°, which polymerizes in part during the distn. Oxidation of the K salt gives $H_2SO_4$ and acetonylacetone. II gives a sulfinic acid which yields the same oxidation products. I and K in moist $Et_2O$ give $Me_2C:CHCH_2SO_2H$. C. J. West

**α-Chloroethane-α-sulfonyl chloride.** Ernst Müller and Hermann Raudenbusch *Ber.* 64B, 99–101(1931).—Chlorination of β-trithioacetaldehyde (I) in aq. suspension had given an oil whose reactivity toward $NH_3$, $PhNH_2$, $N_2H_4$ and $PhNHNH_2$ indicated that it was an ethanesulfonyl chloride, a conclusion confirmed by analysis (*C. A.* 21, 2872). A more thorough study has shown that it $b_{18}$ 70° and is not identical with the known $ClCH_2CH_2SO_2Cl$; it can therefore be only *α-chloroethane α-sulfonyl chloride* (II). It is also obtained in glacial AcOH, but in dry $CCl_4$ there is formed only a dark yellow oil, $C_4H_5Cl_3S$ (III), which is very probably a *heptachlorodiethyl sulfide*. In $H_2O$, along with II are formed $H_2SO_4$ and AcOH and the yield of II is only 50%. II is also formed with HOCl but the formation of $H_2SO_4$ and AcOH is greatly favored in this reaction, the preformed II is also much more readily oxidized by free HOCl than by Cl in $H_2O$. II readily dissolves in the common org. solvents but boiling $H_2O$ converts it into the *acid* (IV). II is sol. in NaOH and in $Ba(OH)_2$, and with $NH_4OH$ gives the *amide* (V). With $H_2O$ in sealed tubes it gives only IV. Boiling EtOH does not attack II while hot anhyd. MeOH gives IV, possibly through the *Me ester* (VI) as an intermediate product which is saponified by traces of $H_2O$ formed by the action of *the liberated HCl on the MeOH. EtOH in sealed tubes at 130° likewise gives IV instead* of the ester. With NaOMe instead of MeOH, VI can be obtained in almost pure form, together with considerable amts. of the Na salt of IV, probably formed according to the equation $MeCHClSO_2Me + MeONa = MeCHClSO_2Na + Me_2O$. With $PCl_5$ at 200° in sealed tubes, II gives $MeCHCl_2$, at room temp. or on heating in an open test tube no reaction occurs. Like other sulfonyl chlorides II is formed from the Na salt of IV with $PCl_5$ and is reduced to the mercaptan by nascent H, but with Zn dust it gives $EtSO_2K$ (VII), instead of a sulfinate when the mixt. is neutralized with $K_2CO_3$ at the end of the reaction. Traces of $H_2O$ are essential for the reaction, which takes place in alc. and $Me_2CO$ but not in abs. anhyd. media like $CHCl_3$ and $C_6H_6$, in abs. $Et_2O$ it sets in immediately when a drop of $H_2O$ is added. III, $b_{15}$ 35–6°. V, m. 66°. *Phenylhydrazide*, IV, thick, gray brown liquid which retains $H_2O$ after long standing over $H_2SO_4$. VI (impure, C 21.93, H 4.23, Cl 23.73%), $b_{18}$ 91–3°. VII, hitherto described as cryst. with 2 mols $H_2O$, was obtained in anhyd. needles.

C. A. R.

**Ethylenic nitriles.** The 2-methyl-3-pentene-5-nitriles. P. Bruylants and H. Minetti. *Bull. soc. chim. roy. Belg.* [5], 16, 1116–28(1930).—Henry (*Chem. Zentr.* 1898, II, 662) described 2-methyl-3-pentene-5-nitrile, $Me_2CHCH:CHCN$ (I), as a liquid, b. 154–5°, but his material was a mixt. of the 2 geometric isomers and 3-methyl-3-pentene-5-nitrile because he started with ordinary fusel oil. Iso-AmOH (II), obtained in 4.4 kg. yield by hydrolysis of 15.0 kg. $(Me_2CHCH_2CH_2OSO_2)_2Ba$ $2H_2O$ (prepd. from fusel oil by the method of Marckwald) with $H_2SO_4$, $b_{18}$ 131.5–2.5° (polarimetric measurements indicated 0.8% active alc.), $d_4^{20}$ 0.80788. $Me_2CHCH_2CHO$ (III), obtained in 1850 g. yield by oxidizing 4.4 kg. II in 130 g. lots with 110 g. $Na_2Cr_2O_7$,

220 g $H_2O$ and 150 g 66° Bé $H_2SO_4$ (yielding about 35% III and 37% II returned for oxidation), $b_{744}$ 91.9–2.1°, $d_4^{22}$ 0.70770, $n$ 1.38710, 1.38930, 1.39121, 1.39351 for $\alpha$, D, $\beta$ and $\gamma$ at 20°. $Me_2CHCH_2CH(OH)CN$ (IV), obtained in 2150 g yield from 1870 g III, $b_5$ 107°, $d_4^{22}$ 0.91852, $n$ 1.42317, 1.42514, 1.43018 for $\alpha$, D and $\beta$ at 20°. I was obtained from IV by dehydration with $P_2O_5$ in $CHCl_3$ but in better yield (64%) and more easily purified without the use of a solvent. Repeated fractionation of about 500 g I yielded chiefly 2 fractions: (1) $b_{744}$ 137.5–8°, $d_4^{22}$ 0.80781, $n$ 1.42186, 1.42433, 1.43246, 1.43891 for $\alpha$, D, $\beta$ and $\gamma$ at 20°, probably the *cis* modification of I, and (2) $b_{747}$ 160–0.5°, $d_4^{22}$ 0.82131, $n$ 1.43296, 1.43620, 1.44199, 1.45010 for $\alpha$, D, $\beta$ and $\gamma$ at 20°, probably impure *trans* I since both correspond on analysis to $C_5H_7N$, and appreciable quantities of a higher boiling material (VI) where the exaltation of the mol. refraction decreases with the b. p., indicating the presence of 2-methyl-2-pentene-5-nitrile (V), formed by isomerization of I. The I absorption method of Kandiah and Linstead (cf. *C. A.* 24, 76) and a better Br absorption method to indicate the relative amts. of type I and V nitriles confirmed the structure assigned to V. The Br absorption method applied to *cis* I indicates 0.7% (within the accuracy of the method) of V in it, 21% in impure *trans* I and 38% in a fraction $b_{747}$ 164.5°. Fractionation of VI under reduced pressure was not successful in sepg. V, and fractional crystn. at −80° to −110° did not appear promising (from the difference in the rate of Br absorption), though the lower melting material is somewhat higher in V. To a soln. of 40 g VI ($b_{747}$ 160–0.5°) in 60 cc. $CHCl_3$ in an ice bath was added 27 g. Br (about 100% excess), the excess Br removed with bisulfite soln. and the $CHCl_3$ soln. dried and distd., the product, $b_{744}$ 48.5–9°, $b_{747}$ 156–7°, $d_4^{22}$ 0.82131, $n$ 1.43075, 1.43419, 1.44190, 1.45150 for $\alpha$, D, $\beta$ and $\gamma$ at 20°, is probably pure *trans* I. It undergoes slight decompn. when distd. at atm. pressure and its b. p. and d. rise. This repeated distn. is not responsible for the formation of V, but the dehydration with $P_2O_5$ produces it as shown by a sep. expt. *cis*- and *trans* I add HCl easily to form $Me_2CHCHClCH_2CN$ (VII), $b_{11}$ 94.4 (probably error for 90.4°—Abstractor) —1.4°, $d_4^{22}$ 1.0186, $n_D^{22}$ 1.44375. Treatment of 60 g. VII with quinoline gave 31 g. crude unsatd. nitrile, most of which b. 159–61°, the Br absorption indicated 17.6–21.6% V and probably the remainder was *trans* I as the b. p. did not indicate any *cis* I. Refluxing for 2 hrs. 30 g. impure *trans* I ($b_{747}$ 160–0.5° and by Br absorption contg. 21% V) with 1 g. phenol and 0.1 g. Na yields a product, b. 164–6°, $d_4^{22}$ 0.83873, $n_D^{22}$ 1.43634 and by Br absorption contg. 43% V. Refluxing 28 g. *cis* I with PhONa under the same conditions gave a fraction b. 164.6°, $d_4^{22}$ 0.84082, $n_D^{22}$ 1.43406 and by Br absorption contg. 51.8% of V, while a fraction b. 166–8° contained 67.7% V. Ultra violet light does not bring about isomerization as does the PhONa. *trans* I was converted by treatment with $H_2SO_4$ for 14 days, into the corresponding amide, m. 87.6–8.2°. *cis* I required 60 days with $H_2SO_4$ to produce the corresponding amide, m. 80°. Equal amts. of the 2 amides m. 55–61°. ODELL E. SHEPPARD

Production of s-trichloroaniline and tetrachloroquinone from aniline in hydrochloric acid solution. J. ERDÉLYI. *Chem. Rundschau Mitteleuropa u. Balkan* 6, No. 14, 83–4 (1929); cf. *C. A.* 23, 4896.—Aniline is dissolved in concd. HCl and chlorinated at 35–40°. s-Trichloroaniline is formed without any colored or resinous secondary products. Tetrachloroquinone is formed if aniline in HCl is treated with a mixt. of Cl and O. S. S. DE FINÁLY

The preparation of trialkylbismuthines. W. C. DAVIES, I. NORVICK AND W. J. JONES. *Bull. soc. chim.* [4], 49, 187–94 (1931).—*Tripropylbismuthine*.—PrMgBr was prepd. by the addn. of 61 cc. of PrBr in 100 cc. $Et_2O$ to 16.2 g. of Mg in 100 cc. $Et_2O$ in a specially arranged Grignard app. permitting the maintenance of a $H_2$ atm., and also the withdrawal of the sepd. layers into a separatory funnel provided with $CO_2$ intake and outlet tubes. To the cooled Grignard reagent, under $H_2$, was added dropwise 30 g. $BiCl_3$ in 350 cc. $Et_2O$. The mixt. was heated for 30 min., then cooled and after decompn. with aq. $NH_4Cl$ the ether layer was transferred to the $CO_2$-filled separatory funnel. After drying over $Na_2SO_4$, and evapn. of the $Et_2O$, both operations being carried out in a $CO_2$ atm., the residue was fractionated *in vacuo*, the main fraction consisting of 16.5 g. of clear liquid, $b_8$ 86–7°, $d_4^{17}$ 1.621. By operating in a closed box provided with flexible sleeves for the arms of the operator, and a glass observation window, the manipulation of this fraction was carried out in a $CO_2$ atm., tubes for C, H and Bi analysis being filled and sealed in this way. By similar procedure, *tributylbismuthine*, $b_7$ [illegible], $d_4^{17}$ 1.456, and *triamylbismuthine*, $b_7$ 157–8°, $d_4^{17}$ 1.281, were prepd. Some hexane, 3 [illegible]-tane, $b_{744}$ 126°, and 10 g. of decane, $b_{744}$ 169°, were formed by

the synthetic action of the Mg Though the bismuthines obtained as main fractions of distn were remarkably pure, bismuthine halides were produced when the Grignard reagent was not in 2-fold excess The trialkylbismuthines are clear liquids which oxidize readily and are thermally unstable Their b ps rise progressively in the series but their ds diminish Tables of b p, b p reduced to 50 mm and ds. are given, together with a résume of the comparative chem. and phys. properties of the trialkyl derivs. of the elements of the 5th group C R. ADDINALL

New compounds of titanium. H A GARDNER AND E BIELOUSS Am Paint & Varnish Mfrs' Assoc., *Circ* No 366, 327–37(1930) —$Ti(OEt)_4$, prepd. by dropwise addn of 132 6 g $TiCl_4$ to a cold soln of NaOEt with subsequent refluxing, contained 31.7% $TiO_2$, calcd 31 5% The product was sol in alc, $C_6H_6$, toluene and mineral spirits. $TiCl(OAm)_3$, *HCl* and $Ti(OAm)_4$ were prepd by dropwise addn of 19 g $TiCl_4$ to 40 g pentasol (mixed amyl alcs contg 26% secondary alcs) The product was dark and viscous Distn (30 mm) below 100° yielded 12 g alc., from 100° to 240° it yielded 5 g $Ti(OAm)_4$, which hydrolyzed rapidly in the air *Ti compds of glycol and glycerol* of varying compns were prepd by dropwise addn of $TiCl_4$ to an excess of the corresponding polyhydric alc at temps from 80° to 145° The products were sol in water and alc but not in toluene Films of $Si(OEt)_4$, hydrolyzed as directed by King (*C A* 24, 2313) and of $Ti(OEt)_4$, hydrolyzed *in situ*, applied to various surfaces were unsatisfactory as they lacked adhesion and continuity $TiCl_4$ converts tung oil to a gelatinous mass A white-pigmented lacquer was formed when Ti glycolate in alc. (1 4) was added to nitrocellulose in AcOBu, the Ti compd hydrolyzing with the formation of $TiO_2$ $Ti(OEt)_4$ gave unsatisfactory results as an *antiknock agent* in gasoline because of pptn of $TiO_2$ on the walls of the passages between the carburetor and the cylinders G G SWARD

State of formaldehyde in aqueous solutions. FREDERIC WALKER *J Phys Chem* 35, 1104–13(1931) —The object of W 's paper was to correlate the scattered data on the subject of the state of $CH_2O$ in $H_2O$ In doing this, W has found that the theories and data of Auerbach (A and Barschall, *Arbb Kais. Ges A* 22, 584–629) enable one to explain quantitatively the vapor pressure of $CH_2O$ in $H_2O$ as recently detd by Ledbury and Blair (*C. A* 19, 1214) In addn W has shown (1) that such solns follow Henry's law, in that the partial pressure of the $CH_2O$ vapor is proportional to the concn of solute in the form of $CH_2(OH)_2$, and (2) that the gas in equil with aq solns is probably the unhydrated monomol $CH_2O$. LOUISE KELLEY

Action of ozone upon aldehydes. F G FISCHER, H DÜLL AND J. L VOLZ *Ann* 486, 80–94(1931), cf *C A* 24, 2106 —The action of $O_3$ on aldehydes gives a mixt of the corresponding acid and peracid; it may be assumed that the aldehyde adds 1 mol $O_2$ and that the RCHO $O_3$ then reacts with 1 mol RCHO to give $RCO_2H$ and $RCO_3H$; with 2RCHO to give $3RCO_2H$ or with $O_2$ to give $RCO_2H$ and $O_2$ The best yields of peracids are obtained by ozonization of small amts of aldehyde in dil soln at —15° to —20° Thus PrCHO (8 g) in 400 cc. $CCl_4$ gives 71 8% $PrCO_3H$, $b_{12}$ 26–30°, iso-$BuCO_3H$, $b_1$ 31–2° (92 7% yield), $BzO_3H$, m 39–40° (2 65 g yield from 8 g BzH) The yield of peracid is affected by the dilu of the aldehyde, by the temp and by the solvent, the yield decreases with increasing concn, a higher yield of peracid is obtained at 10° than at —65° C. J. WEST

Reactions of certain carboxylic acids. LAD EKKERT *Pharm Zentralhalle* 72, 228–9(1931), cf *C A* 25, 2389 —The behavior of $HCO_2H$, AcOH, propionic, butyric, isobutyric, valeric, capric, caprylic, palmitic, stearic, oleic and ricinoleic, acids has been studied with respect to their behavior toward alc. solns (1%) of $CH_2O$, Ph-$CH_2CHO$, BzCHO, furfural, anisaldehyde, salicylaldehyde, vanillin, PhCH.CHCHO, piperonal and sucrose when treated with 1 cc conc'd $H_2SO_4$ A long series of color changes is reported. W. O E

Lignoceric acid from the seeds of Adenanthera pavonina. I. P RAMASWAMI AYYAR *Proc 15th Indian Sci Cong* 1928, 161 —The above seeds yield 14% of a fixed oil equiv to 13% of mixed acids From the latter pure lignoceric acid, $C_{24}H_{48}O_2$, m 80–1°, has been prepd. with a yield of 1 5% on the seeds. The acid on bromination by Volhard's method yields a Br acid, $C_{24}H_{47}BrO_2$, m 70–1° The lignoceric acid thus appears identical with the acid previously obtained from other sources E J C.

Synthesis of straight-chain unsaturated acids. R BHATTACHARYA AND J L SIMONSEN *Proc 15th Indian Sci Cong* 1928, 153 —It has been recently suggested that isoerucic acid is an inseparable mixt of 2 unsatd acids which may be synthesized from (*a*) octine, and 14-iodotetradecanoic acid, and (*b*) hendecin and 10-bromoundecylic acid. As a preliminary to their prepn the synthesis of homologous acids has been tried 12-Iodododecanoic acid was prepd as follows and condensed with the

Na compd of decine to yield behenolic acid castor oil ⟶ undecylenic acid ⟶ 10-bromoundecylic Me ester ⟶ cyanoundecylic Me ester ⟶ decamethylene dicarboxylic Me ester, K salt of the half hydrolyzed ester ⟶ 12 hydroxylauric acid ⟶ 12 iodolauric acid Decine was prepd by the action of $C_5H_{11}Na$ on octyl iodide. No details are given E. J. C.

Constitution of hydroxyoleic acid from oil of ergot. Hermann Matthes and Otto H. Kerschner *Arch. Pharm.* 269, 88–101(1931).—Hydroxyoleic acid, isolated for the 1st time by M. and Schutz (*C. A.* 21, 4017) from oil of ergot, is available in large quantities from this source The ozonide of this acid is split by water on heating into azelaic aldehydoacid and β hydroxypelargonic aldehyde, which are subsequently converted into azelaic acid, *l* β hydroxypelargonic acid, and a 2nd undetd liquid acid. The HO acid of oil of ergot was recognized as 9-octadecen-12-oleic acid, $Me(CH_2)_5CH(OH)CH_2CH{:}CH(CH_2)_7COOH$, identical with ricinoleic acid Both acids possess like chem. and phys. consts., yielding like derivs. on oxidation with $KMnO_4$ according to Hazura and splitting of their ozonides The β hydroxypelargonic acid resulting from the scission of hydroxyoleic acid is unexpectedly *l*-rotatory, while that obtained from ricinoleic acid has been reported as *d* rotatory (cf. following abstr.). W. O. E.

Scission products of ricinoleic acid ozonide. Hermann Matthes and Otto H. Kerschner. *Arch. Pharm.* 269, 101–4(1931).—The ozonides and perozonides of ricinoleic acid and its Me ester are all liquid Furthermore, the azelaic half-aldehyde yields with $NaHSO_3$ no cryst. solid, thus preventing a sepn. of this aldehyde from hydroxypelargonic aldehyde, as carried out by Haller and Brochet (*C. A.* 4, 2091) Scission of ricinoleic acid ozonide yielded in addn. to β hydroxypelargonic acid a liquid acid of insufficient purity for purposes of identification. Contrary to the findings of Haller and Brochet the β hydroxypelargonic acid from the ricinoleic acid ozonide is not *d*-, but *l*-rotatory. W. O. E.

Hydrogenation of linolenic acid. H. van der Veen. *Chem. Umschau Fette, Oele, Wachse u. Harze* 38, 89–90(1931).—V. hydrogenated the Me ester of linolenic acid, prepd. by Rollet's method (*Z. physiol. Chem.* 62, 411(1919)) from the solid hexabromostearic acid of linseed oil He hydrogenated for 20 min. (for 1 mol. H) at 180° in a Normann beaker with 1.0–1.5% Ni, using a Ni kieselguhr catalyst with 20% Ni (reduced at 500°), hardening until 1 and 2 mols. H had been absorbed The resulting products may contain (1) unchanged linolenic acid, (2) octadecadienic acids, (3) octadecenic acids, (4) stearic acid. The amts. of these could be calcd. from the 3 known quantities I nos. (Wijs), percentage of satd. acids (Bertram method), and the Kaufmann thiocyanate nos. The latter were found to be too low and too irregular for a quant. calcn.; only qual. results were obtained by ozonizing the unsatd. acids at the end of the hydrogenation and by analyzing the ozonides formed. The methods of ozonization and the derivation of the final conclusions are clearly outlined. *Conclusions*.—The original linolenic ester showed a double bond at the 9,10-, 12,13- and 15,16-C atoms In the hydrogenation with 1 mol. H the double bond 12,13- is first satd., forming the 9,10,15,16- linolic acid, then by a partial shifting of these double bonds, a quantity of the isomeric 10,11,14,15-linolic acid is formed In the hydrogenation with 2 mols. H the newly formed 10,11,14,15-linolic acid sats. its 14,15-bond, forming a 10,11-elaidic acid, the 9,10,15,16-linolic acid sats. its 15,16-bond and should thereby form the normal 9,10-oleic acid, but instead the 9,10-bond is shifted to 8,9 and possibly some to 10,11, forming isomeric oleic acids. Extended comments are made on the Hilditch-Vidyarthi paper (*C. A.* 23, 2422) and the Bauer-Erdmann paper (*C. A.* 24, 5721) P. Escher

Preparation of aliphatic amides James A. Mitchell and E. Emmet Reid. *J. Am. Chem. Soc.* 53, 1879–83(1931).—Amides may be prepd. by passing $NH_3$ gas through aliphatic acids kept at a suitable temp. in such a way that the $H_2O$ formed is continually removed, the equil. is displaced far to the amide side The reaction velocity is appreciably slower with the higher acids, lauric acid, heated at 185° for 16 hrs., gave only a small fraction of the amide, no amide was obtained with palmitic or stearic acid at 125° or 190° $ZnCl_2$ did not catalyze the reaction with the lower acids AcOH, 8 hrs. at 190°, gives 90% of the amide, EtCO-H, 5 hrs. at 190°, 95%; $PrCO_2H$, 7 hrs. at 185°, 88%, valeric, 15 hrs. at 180°, 82%, caproic, 7 hrs. at 160°, 75% heptoic, 7 hrs. at 160° and 4 hrs. at 190°, 75%, caprylic, 11 hrs. at 180°, 80% Dimethylamides may be obtained in a similar way, using $Me_2NH$, the following yields are reported $HCO_2H$, 3 hrs. at 95°, 73%, b. 130–5°, AcOH, 3 hrs. at 150°, 84%, b. 165–75°; $EtCO_2H$, 3 hrs. at 155°, 78%, b. 165–78°, $PrCO_2H$, 2.5 hrs. at 155°, 84%, b. 180–94°, valeric, 3 hrs. at 165°, 87%, b. 205–15, caproic, 3 hrs. at 155°, 88%, b. 220–30°;

heptoic, 3 6 hrs. at 100°, 81%, bp 165-75°. Cor m ps of the amides are given

C. J. West

**Mechanism of organic reactions. III. The nature of the mechanism of migration of the acyl radical.** Harold Hibbert and Margaret E Grieg *Can J Research* 4, 254-63(1931). cf *C A*. 24, 4266.—The mechanism first proposed by Emil Fischer to explain the migration of acyl radicals in the case of glycerides of fatty acids receives strong confirmatory support in the isolation by H and G of a product analogous to the intermediate dioxolane deriv postulated by him From the theoretical consideration it seemed highly probable that with any glycol monoester contg. a C O group of very pronounced negative polarity, the tendency to undergo cyclization would be so pronounced as to permit of the isolation of the corresponding dioxolane ring It is shown that all attempts to synthesize $HOCH_2CH_2O_2CCCl_3$ gave, instead, the ring isomer, viz., 2 hydroxy-2-trichloromethyl-1,3 dioxolane The latter is quite stable at temps below 90°, but at 100 110° decomps into ethylene carbonate, $CHCl_3$, and a certain amt of higher-boiling, unidentified products In presence of a trace of pyridine the decompn into $CHCl_3$ and ethylene carbonate takes place smoothly and apparently quantitatively Similarly, when ethylene oxide is treated with $Cl_3CH$-$CO_2H$, 2-hydroxy-2-dichloromethyl-1,3 dioxolane is produced On the other hand, AcOH and $CH_2ClCO_2H$ react to give the normal half-esters Epichlorohydrin and glycidol on treatment with $CCl_3CO_2H$ give the corresponding ring compds., viz., 2-hydroxy-2 trichloromethyl-4-chloromethyl-1,3-dioxolane and 2-hydroxy-2-trichloromethyl-4 hydroxymethyl-1,3 dioxolane, resp The last-named compd thus represents the cyclic deriv postulated by Fischer as the intermediate product formed in acyl migration occurring in the case of glycerol derivs. $CH_2(CH_2OH)_2$ treated with $CCl_3$-$COCl$ gives 2-hydroxy-2 trichloromethyl-*m*-dioxane They are all mobile, pleasant-smelling, transparent liquids which decomp when heated at ordinary pressure The reaction of AcOH, $CH_2ClCO_2H$ and $CCl_3CO_2H$ on 1,2-anhydromannopyranose and 1,2 triacetylmannopyranose is under investigation. Preliminary work appears to indicate the formation of the corresponding 1,3-dioxolane deriv of mannose in each case The conclusion is drawn that all org. monoesters of multivalent alcs., carbohydrates, polysaccharides, *o*-aminophenols, etc., contg a free OH group, the H atom of which is spatially in close proximity to the C O group of the acyl radical, tend to pass over into a ring isomer Theoretically, at least, there must exist in all of these cases an equil between the open-chain and its corresponding cyclic isomer Investigations of the structure of the monoacyl derivs of glycerol, of carbohydrates, polysaccharides, aminophenols, etc., should permit of the isolation, in many cases, of the intermediate dioxolane or other ring concerned in the migration of the acyl radical. The existence is postulated of a definite equil between the open chain ester and the corresponding ring isomer in all monoesters of poly-alcs in which spatial proximity of a OH to the C O group exists, and the prediction is made of the probable isolation of many new cyclic isomers under investigation when appropriate consideration is given to their phys. and chem. properties, such as stability, behavior toward acids, alkalies, etc.

J. W. Shipley

**Physicochemical investigation of amino acids. IV.** Gakuji Takahashi, Tokuzo Yaginuma and Kentaro Hayakawa *Proc Imp Acad Tokyo* 7, 57-60(1931). cf. *C. A*. 24, 4266.—*l*- and *d* Leucine have practically the same crystallographic consts: the av value for the 2 are $a:b:c = 1.5139:1:1.0025$, $\alpha$ 1.5331, $\beta$ 1.5361, $\gamma$ 1.5514, V 23° 37′ The values for *d*- and *l* norleucine are $a:b:c = 1.3021:1:1.2866$, $\alpha$ 1.5071, $\beta$ 1.5104, $\gamma$ 1.5400, V 18° 0′. Histamine picrate, monoclinic, $\beta$ 100° 30′, $a:b:c = 1.2216:1:1.2266$, the values for $\alpha$, $\beta$ and $\gamma$ for $\lambda$ 665.9, 591.9 and 433.0 are: 1.6851, 1.6022, 1.7122, 1.7009, 1.7135, 1.7308, 1.7632, 1.7535, 1.7568 Histamine forms a mono HCl salt

C. J. West

**The behavior of polypeptides, containing lysine with substitution in α- and ε-position, toward *N* alkali, erepsin and trypsin.** Emil Abderhalden and Friedrich Schwitzer *Fermentforschung* 12, 350-75(1931).—The ε $NH_2$ group of the lysine component of proteins is generally believed to be unsubstituted, although no convincing proof has yet been offered This paper deals with the enzymic cleavage of lysine peptides in which the α- or the ε $NH_2$, or both, occur in acid amide linkage. The α lysine peptides were obtained by the usual peptide synthesis, starting with ε-benzoyllysine in which the ε-$NH_2$ was already occupied by Bz and thus excluded from the coupling reaction Similarly, the ε peptides were made from α-methyllysine in which only the ε $NH_2$ was free to react The α,ε diaminoacyllysines were obtained directly from unsubstituted lysine. ε Benzoyllysine (I), which served as the starting material, was prepd from benzoylpiperidine by the v. Braun method

(*C A* 3, 1273) I ⟶ ε *N benzoyl α (dl α bromopropionyl)-dl lysine* (II), m 129-30°, ⟶ ε *N benzoyl α-dl-alanyl-dl lysine* (III), m 240°, ⟶ ε *N benzoyl α (N benzoyl-dl alanyl)-dl lysine*, m 145-6° I ⟶ ε *N benzoyl α (dl α bromoisocaproyl)-dl lysine* (IV), m 148-50°, ⟶ ε *N benzoyl α-dl leucyl-dl lysine*, m 232-3°, ⟶ ε *N benzoyl α-(N benzoyl-dl leucyl)-dl lysine*, m 155-6° IV + $PhCH_2NH_2$ ⟶ ε *N benzoyl α-(N benzyl-dl leucyl)-dl lysine*, m 190-1° I ⟶ ε-*N-benzoyl α (dl α-bromocaproyl)-dl-lysine*, m 140°, ⟶ ε *N benzoyl α-dl norleucyl-dl lysine*, m 251-2° III ⟶ ε-*N-benzoyl α (dl α bromoisocaproyl-dl-alanyl)-dl lysine*, m 154-5°, ⟶ ε *N-benzoyl-α-(dl leucyl-dl-alanyl)-dl-lysine* (V) decomps 90° I ⟶ α ε dibenzoyl-*dl* lysine, m 146-7°, ⟶ I, m 252°, ⟶ II, hence this method is unsuitable for the prepn. of α benzoyllysine *dl*-ε-Benzoylamino-α bromocaproic acid (v Braun) + $MeNH_2$ ⟶ ε *N benzoyl α methyl-dl-lysine* m 233-4° ⟶ α *N methyl-dl-lysine HCl salt* (VI), m 244-5° (*III salt* m 230-41° (decompn.)) ⟶ ε-(*dl α bromopropionyl*) α-*N-methyl-dl-lysine* ⟶ ε-*dl-alanyl α N methyl-dl-lysine* (VII) m 115°. VI ⟶ ε-(*dl α-bromoisocaproyl*) α *N methyl-dl-lysine*, m 119-21°, ⟶ ε-*dl leucyl α N methyl-dl lysine* (VIII) decomps 120° *dl Lysine mono HCl salt* (IX), m 235-6°, is more easily handled than the di HCl salt because of its lower soly and greater readiness of crystn IX ⟶ α ε-*di(dl bromopropionyl)-dl-lysine* ⟶ α ε-*di(dl-alanyl)-dl-lysine* (X) IX ⟶ α ε-*di(dl bromoisocaproyl)-dl lysine*, m 93-4°, ⟶ α ε-*di(dl-leucyl)-dl-lysine* (XI), m 130° Trypsin attacked III, V and X, the extent of cleavage indicating that only the α-linkage was broken Trypsin kinase attacked V and XI, the latter only to 25% Here again it appears that only the α peptide linkage is broken The 10.7% cleavage of VIII is considered questionable All of these derivs were hydrolyzed more or less by *N* alkali at 37° The important observation is that the ε peptide linkage of lysine polypeptides is resistant to enzymes A typical illustration is the ereptic cleavage of III and non-cleavage of VII. These observations support the view that the lysine component of proteins is linked only through its α-$NH_2$ A W Dox

**Further studies on the behavior of polypeptides containing proline toward the erepsin trypsin-kinase complex.** Emil Abderhalden and Otto Zumstein *Fermentforschung* 12, 341-9(1931). cf *C A* 25, 77.—The proline peptides were prepd by coupling 1,4-dibromovaleryl chloride with the amino acid or dipeptide and closing the proline ring by amination The above acid chloride was obtained by condensing $CH_2(CO_2Et)_2$ with $(CH_2)_2Br_2$ and brominating, sapong the $Br(CH_2)_2CHBrCH(CO_2Et)_2$ with HBr, extg with $Et_2O$ and distg., and repeating the operation several times with the residue *dl Prolylglycine* (I), m 222-3°, *dl prolyl-d-alanine* (II), m p not stated, *dl prolyl-dl leucine* (III), m 225-6°, *dl prolylglycylglycine* (IV), *dl prolyl-dl-leucylglycine* (V), m 245° (decompn.) III + *dl* $Me_2CHCH_2CHBrCOCl$ ⟶ viscous resin ⟶ *dl leucyl-dl prolyl-dl-leucine* (VI), m 255-6° (decompn.) Enzyme expts indicate that polypeptides which contain no $NH_2$ but rather an NH as in proline require a special enzyme complex for cleavage Trypsin does not attack I or VI; it attacks II and IV only slightly, but III and V more readily Trypsin kinase did not hydrolyze any of the proline peptides III and VI are resistant to *N* alkali while I undergoes 50% cleavage in 2 hrs., then reaches an equil II and IV are slowly hydrolyzed, V more readily The expts show that enzymes do not merely accelerate hydrolyses already in progress but initiate reactions not otherwise occurring The enzyme-substrate complex can behave differently from the substrate alone toward a given H ion concn A W Dox

**The isomerization of E. Fischer's "carbethoxydiglycylglycine ester."** M V Cerchez *Bull soc chim* [4], 49, 324-8(1931). cf *Ber* 36, 2094, 2106(1903).—Fischer prepd carbethoxydiglycylglycine ester, $EtO_2CCH_2NHCOCH_2NHCOCH_2NHCO_2Et$ (I), m 160-1°, from $EtO_2CNHCH_2CONHCH_2COCl$ and $NH_2CH_2CO_2Et$ in $CHCl_3$ and by the action of $ClCOCH_2NHCO_2Et$ on $NH_2CH_2CONHCH_2CO_2Et$ On sapon I formed first the acid ester, $HO_2CCH_2NHCOCH_2NHCOCH_2NHCO_2Et$ (II), m 208-10°, and then the diacid, diglycylglycinecarboxylic acid, $HO_2CCH_2NHCOCH_2NHCOCH_2NHCOCH_2NHCO_2H$ (III), m 206° (decompn.) I found that the esterification of III gave an ester (IV) with the compn of I, but m 146-8°, and considering isomerization to have taken place, designated I and IV as α- and β forms Leuchs and La Forge (*C A* 2, 3078) held the opinion that they could be regarded as the tautomers, $EtO_2CCH_2NHCOCH_2NHCOCH_2NHCO_2Et$ and $EtO_2CCH_2N{:}C(OH)CH_2N{:}C(OH)CH_2NHCO_2Et$ The possibility of carbamidodiacetic acid $OC(NHCH_2CO_2H)_2$, m 205-10°, and its di Et ester, m 147-8°, being identical with III and IV was disposed of when the latter compds were prepd according to the original directions Analysis showed that III was a diacid, $C_7H_{11}O_6N_3$, and mixed m p dets demonstrated the non identity of the pairs of compds in question C R Addinall

**Hydroxy aldehydes. IX. Synthesis and properties of a 6-hydroxy aldehyde.** BURCKHARDT HELFERICH AND GEORG SPARMBERG *Ber* 64B, 104–9(1931), cf *C A*. 19, 2931 —It was shown in earlier papers that 4 and 5-HO aldehydes exist, in large part, at least, as lactols (*i. e.*, in a cyclic form) which on acetalization with acid MeOH give lactolides (cyclohemiacetals) Two derivs or forms of glucose are known in which a 1,6 lactole formation may be assumed, viz levoglucosan and Pringsheim's remarkably stable "γ glucose" It seemed of interest, therefore, to study a 6-HO aldehyde with respect to its ability to form a lactol and lactolides The prepn of such an aldehyde from 1 methylcyclohexene by $O_3$ cleavage and subsequent partial reduction did not prove feasible as the ozonide is very explosive and could be prepd only in small quantity and in dil soln $O_3$ cleavage of dihydrogeraniol (rhodinol), which is present along with its isomer, $HOCH{\cdot}CH_2CHMe(CH_2)_2C(CH_2)Me$, in natural citronellol and hydrogenated geraniol, gave no better result $O_3$ cleavage of acetyl dihydrogeraniol (I) was somewhat more satisfactory, but here too, it was not possible to obtain with certainty the pure (+)-*4 methylhexan 6 ol 1 al acetate* (II), presumably because the *dl* compd was used as the starting material, for pure, sterically quite homogeneous (+)-citronellol (III) yielded the desired II. The free *HO aldehyde* (IV), obtained from II by catalytic sapon with NaOMe, is a very viscous liquid of faint odor which distils *in vacuo* without decompn, reduces hot Fehling soln and is sol to the extent of 1 1% in $H_2O$ at room temp as detd by the Bertrand method Its *n* agrees with the value calcd for the lactol form, but a very dil aq soln gives a color with fuchsin $SO_3$ as rapidly as an equimol soln of AcH in $H_2O$ Its rotation in $CHCl_3$ is much higher than that of the intermediate open form dihydrogeraniol, I and II. The free IV is apparently a desmotropic mixt of the open HO aldehyde and the lactol form which in the concd substance and in $CHCl_3$ lies far toward the lactol, in very dil $H_2O$ soln toward the HO-aldehyde form It gives in very good yield an easily volatile, strongly rotatory *Me lactolide* (V) of peppermint odor which does not reduce Fehling soln and is rapidly and completely hydrolyzed to IV by aq *N* HCl Acetate of III (prepd from a III with $n_D^{20}$ 1 45678, $d^{20}$ 0 8568, $[\alpha]_D^{20}$ 4 1°), $n_D^{20}$ 1 44383, $d^{20}$ 0 8901, $[\alpha]_D^{20}$ 2 5° II (41% yield), $b_{-4}$ 112–3°, $n_D^{19.1}$ 1 43675, $d^{19}$ 0 9892, $[\alpha]_D^{19}$ 1 7°, soly. in $H_2O$ 1 5%, gives no color with 1 1 NaOH even on long standing, but quite rapidly turns yellow in concd $H_2SO_4$ IV (yield, 30%), $b_{14}$ 103–6°, $n_D^{15.8}$ 1 46883, $d^{17}$ 1 0204, mol wt in AcOH 125 5–127, $[\alpha]_D^{13.7}$ 14 8° (no solvent), $[\alpha]_D^{15.5}$ 27 5–7 7° ($CHCl_3$), unchanged by NaOH, rapidly turns yellow and brown in $H_2SO_4$, can be titrated quantitatively with Fehling soln V (yield, about 40%), faintly yellow, $b_{13}$ 35–41°, $n_D^{17.2}$ 1 43549, $d^{17.2}$ 0 9370, $[\alpha]_D^{17}$ 110 6°, mol wt in AcOH 141 C A R

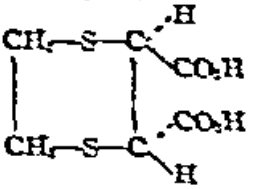
**The constitution of so-called cyanoacetoacetic ester and a disputed synthesis of citric acid.** GEORGES FAVREL AND CHARLES PREVOST *Bull soc. chim* [4], 49, 243–61 (1931), cf *Compt rend* 111, 647(1890) —The prepn of the Et monochloroacetyl acetate of Haller and Held (*Ann chim* 23, 145(1891)), considered by them to be $ClCH_2COCH_2CO_2Et$, was repeated and the fraction b 188 9° and contg 21–38% of Cl was isolated On treatment with $(NH_2)_2CS$, only the thiazole, $MeC\overline{C(CO_2Et)\ N\ C(NH_2)\ S}$, m 174–5°, characteristic of the α Cl deriv could be sepd On diazotization only the hydrazone derived from $AcCHClCO_2Et$ (I) was formed and F and P conclude that the ester of H and H is composed entirely of I. The CN deriv (II) of I, prepd according to the directions of H and H, was identical with the compd made by the action of aq KCN on the true α Cl deriv (*Ber* 23, 2339(1890)) whereas treatment of $NCCH_2COCH_2CO_2Et$ with KCN gave di Et succinylsuccinate, $EtO_2C\overline{CH\ CO\ CH_2\ CH_2\ CO\ CH}CO_2Et$, m 127–8° From the products of the reaction of alc HCl with II, 50% of I was recovered together with a non-volatile portion, free from $CO(CH_2CO_2Et)_2$, which on boiling with HCl for 2 hrs yielded $MeC(CO_2H)(OH)CHClCO_2H$, m 105–6° This diacid was also obtained by the action of KCN and HCl on I, its formation being similar to that of $MeC(CO_2H)(OH)CH_2CO_2H$ from the reaction of KCN and HCl with $AcCH_2CO_2Et$ (*Ber* 24, 2544(1891)) The formula $MeC\overline{(CN)\ CH(CO_2Et)\ O}$ (III) is assigned to II, and its formation is explained by the assumption of an intermediary cyanohydrin and consequent splitting out of HCl By the action of the calcd amount of aq KCN on I, agitation of the soln with air for 1 hr per g mol of material, extn with $Et_2O$ and distn under reduced pressure, yields in excess of 50% of III, $b_{10}$ 108°, were obtained By treatment of 50 g of III

with 100 cc. of 4 *N* KOH for several min., addn. of a slight excess of 4 *N* $H_2SO_4$ and heating to 90°, $MeC(CN)(OH)CH(OH)CO_2H$, m. 185° (decompn.) was formed. Br hydrolyses of III with KOH at 70° until 90% of the theoretical amt. of $NH_3$ was evolved, and neutralization with $H_2SO_4$ a viscous non-crystn. non-distillable residue resulted which was divided. One portion was decomposed by heat into $CO_2$, $H_2O$, $EtCHO$ and $MeCOCO_2H$. The remainder, treated in MeOH with 10 vols. of $Et_2O$, gave an amorphous hygroscopic ppt. m. 110°, identified by its Pb and Ag salts, its reactions with $CuSO_4$, $FeCl_3$, resorcinol and β-$C_{10}H_7OH$, and by comparison with a synthetic product, as $MeC(OH)(CO_2H)CH(OH)CO_2H$. It is concluded that III can lead only to methylglutaric and derivs. and not to derivs. of acetonecarboxylic acid as maintained by H. and H., that though it is conceivable that III might add HCN to give derivs. of $MeC(CO_2H)(CH(OH)CO_2H)$ or $MeC(CO_2H)(OH)CH_2CO_2H$, i. e., derivs. of isomers of citric acid, such isomers have not been isolated in this repetition of the original synthesis. C. R. Addinall

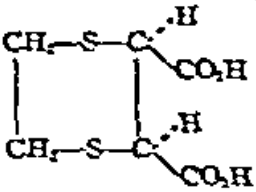
Extension of Michael's reaction. P. C. Guha and M. N. Chatterjee. *Proc. 15th Indian Sci. Cong.* 1928, 150.—Michael's reaction takes place between Na derivs. of $AcCH_2CO_2Et$, malonic ester and $NCCH_2CO_2Et$ and compds. of the general formula RCH:CHX or RC:CX in which R is an org. radical and X is a strongly neg. radical like $CO_2H$ or CN. G. and C. studied the action of the same Na derivs. on mustard oils and isocyanates. The compds., *e. g.*, $RNHC(:S)CH(CO_2Et)_2$, formed from mustard oils are easily decompd. by acids to yield compds. of the general formula RNH-CSMe together with $CO_2$ and ale., isocyanates form compds. of the type $RNHCOMe$. No details are given. E. J. C.

Condensation of ortho esters with acetoacetic ester and malonic ester. Peter P. T. Sah. *J. Am. Chem. Soc.* 53, 1899–9 (1931).—$MeC(OEt)_3$ (1.2 g.) and $AcCH_2CO_2Et$ with 2 mols. $Ac_2O$, boiled 4 hrs., give 3 g. *Et methylethoxymethylenediacetoacetate*, yellowish white glycol-thick liquid, b$_{15}$ 170–73° (decompn.), the low yield is probably due to partial decompn. during distn., on standing the color deepened, addn. of $ZnCl_2$ during the condensation period produced no favorable effect upon the yield. The Cu salt, $C_{18}H_{26}O_6Cu$, greenish blue, is characteristic. $C_5H_5N$ gives a violet color; warm $H_2O$ hydrolyses the salt to CuO. $CH(CO_2Et)_3$ gives 5 g. *di Et methylethoxymethylenemalonate*, glycol-thick liquid, b$_{15}$ 125–8°. Cu salt, greenish blue. $EtC(OEt)_3$ (D., b$_{15}$ 128–30°, b. 240°, $d_4^{15}$ 1.0225, $n_D^{15}$ 1.4168 (12.4 g.) and $AcCH_2CO_2Et$ give 40 g. *Et ethylethoxymethylenediacetoacetate*, b$_{15}$ 185–6°, $d_4^{15}$ 1.0449, $n_D^{15}$ 1.4512, addn. of $ZnCl_2$ increased the yield slightly. Cu salt, light blue. I (7.5 g.) and $CH_2(CO_2Et)_2$ give 25 g. *di Et phenylethoxymethylenedimalonate*, b$_{15}$ 180–90°, $d_4^{15}$ 1.0738, $n_D^{15}$ 1.4925. Cu salt, light blue. $ZnCl_2$ increased the yield considerably. C. J. West

*cis-trans*-Isomerism in closed-ring compounds having two sulfur atoms in the nucleus. Chittaranjan Barat. *Proc. 15th Indian Sci. Cong.* 1928, 156.—Dibromosuccinic acid occurs in two different isomeric forms according as it is obtained by brominating fumaric or maleic acid. The assumption, therefore, that they still retain their steric characteristics, is justifiable. If now they are made to condense (after protecting the $CO_2H$ groups, in the form of a salt or an ester) with $(CH_2SH)_2$, the



formation of and



from dibromofumaric

and dibromomaleic acids, resp., may be expected. The condensations have actually been effected in the presence of NaOEt in ale. suspension (the mercaptan working best as an alkali mercaptide). The products of condensation, though different, have not yet been obtained in a sufficiently pure form. E. J. C.

The interaction of sulfuric acid and bromine on ethyl benzylidenediacetoacetate. B. M. Gupta and S. C. Roy. *Proc. 15th Indian Sci. Cong.* 1928, 158.—With a view to obtaining α-Br derivs. of variously substituted Et glutarates, Et benzylidenediacetoacetate was treated with concd. $H_2SO_4$ and Br. A cryst. compd. m. 159° having the empirical formula $C_{11}H_{11}BrO_5$ was obtained. By studying the products of hydrolysis and oxidation, the constitution of the compd. has been fixed as mono-Et α,α'-diketo-α-bromo-β-phenylglutarate. This formula has been further confirmed by the study of the product of its interaction with aniline, which is a cryst. compd. having the empirical formula $C_{23}H_{20}N_2O_4$ and m. 131°. E. J. C.

*cis trans*-Isomerism in ethyl carbethoxythiocarbamate. Synthesis of four-, five-, six- and seven-membered heterocylic compounds from ethyl carbethoxythiocarbamate. P. C. GUHA AND N. C. DUTT. *Proc 15th Indian Sci. Cong* 1928, 157; cf. *C. A.* 24, 1113.—Et carbethoxythiocarbamate has been isolated in 2 isomeric forms, one m 44° and the other 141°, and the latter has been found to be convertible into the former by boiling with water contg. a drop of HCl. With $(CH_2NH_2)_2$ the lower-melting variety gives NH CO N C(OEt) NH $CH_2$ $CH_2$ (insol in alkali), whereas the higher-melting variety gives NH N C(SH) NH $CH_2$ $CH_2$ CO (sol in alkali). Et carbethoxythiocarbamate has been made to react with aromatic amines, $N_2H_4$, $PhNHNH_2$, urea, phenylurea, thiourea, semicarbazides and $o$-$C_6H_4(NH_2)_2$ and thus a large no of interesting heterocyclic compds have been obtained. E. J. C.

Oxidation of carbohydrates and fats by air in presence of yellow phosphorus. SACHINDRA NATH CHAKRABARTI AND N. R. DHAR. *J. Phys. Chem.* 35, 1114–22(1931); cf. *C. A.* 24, 380.—P can be used as an inductor in the oxidation of carbohydrates and fats. *Finely divided P was found to be most effective, colloidal P next and small pieces of P least.* Colloidal P should have been most effective, but its action was retarded by the alc. in the soln. from which it was prepd. The order of oxidation of the carbohydrates and fats investigated is given by C. and D. The fact that starch is more easily oxidized than glucose shows that in slow photochem. or induced oxidation, starch does not pass through the stage of glucose before its oxidation to $CO_2$.

LOUISE KELLEY

Optical rotation and atomic dimensions. IX. Halogenotetraacetyl derivatives of mannose. Their configurational peculiarities. D. H. BRAUNS. *J. Am. Chem. Soc.* 53, 2004–5(1931); cf. *C. A.* 23, 3114.—Preliminary note, pointing out that mannose derivs. differ from other monosaccharides studied in that ratios of the differences in sp. rotation Cl-I, Br-Cl and I-Br (41 : 25 : 35) are not the same as the ratios of the corresponding differences in at. diameters. It is suggested that for the mannose derivs. the halogens *on the 1 hand and the atoms of the 2nd C atom on the other influence each other.*

C. J. WEST

Unsaturated reduction products of the sugars. XV. Structure of the pseudoglucals. MAX BERGMANN AND WERNER FREUDENBERG. *Ber.* 64B, 158–61(1931); cf. *C. A.* 24, 5027.—The velocity of cleavage of glucosides is influenced by the HO groups of the sugar components. The chemistry of the pseudoglucals affords valuable information on this influence. Diacetyl $\psi$-glucal (I) on hydrogenation of the double bond gives an aldehyde which does not reduce Fehling soln. and it was therefore assigned the structure AcOCH$_2$CH CH(OAc).CH CH CH(OH) O. It is converted by HC(OMe)$_3$ into its *α-Me lactolide* (II) which with $Ba(OH)_2$ at room temp. gives *ψ-glucal α-Me lactolide* (III). III is also obtained with emulsin from the Me lactolide of *ψ*-cellobial (IV). It follows that in *ψ*-glucal and IV the unsatd. sugar residue has *the same structure and IV is 4 glucosido-ψ-glucal. Since in IV the glucosido residue* is on C atom 4, the furoid structure for the unsatd. part of the mol. is excluded. Furthermore, I, as well as III and the pentaacetate of IV, give $(CHO)_2$ (identified as the phenylosazone) with $O_3$, showing that the double bond in these glucals lies between C atoms 2 and 3 and fully confirming the above structures. As the lactolides are converted by catalytic hydrogenation into the lactolides of 2,3 bisdesoxyglucose and 2,3-bisdesoxycellobiose, these latter must also have a pyroid structure. All these lactolides, highly sensitive to very dil. acids, have the same ring structure as *α*- and *β*-Me glucoside, and their sensitivity is in full agreement with the theory that it is due to the absence of HO groups on C atoms 2 and 3. II, $b_{0.5}$ 110°, $n_D^{20}$ 1.4570, $[\alpha]_D^{21}$ 143.0° ($C_6H_6$), rapidly decolorizes Br. III (67% yield), $b_{0.5}$ 118–20°, $n_D^{21}$ 1.4915, $[\alpha]_D^{18}$ 102.3° ($H_2O$), does not reduce Fehling soln. but rapidly decolorizes Br.

C. A. R.

Synthesis of a tetrasaccharide acetate. BURCKHARDT HELFERICH AND RICHARD GOOTZ. *Ber.* 64B, 109–14(1931).—The improvement in the method of coupling acetohalogenosugars with tetraacetylglucose (*C. A.* 24, 3763) has made it possible to prep. a synthetic tetrasaccharide in somewhat greater yield than had hitherto been obtained and to study it somewhat more thoroughly. Gentiobiosidogentiobiose (I) was chosen in order to have a uniform chain of 4 glucose mols. *β* Gentiobiosido-*d*-glucose hendecaacetate (*II*) was converted, by specially cautious treatment with AcOH-HBr, into the *aceto-bromo compd.* (III) which, when coupled with 1,2,3,4-*β* tetraacetyl-*d*-glucose (IV),

gave the *desired β-gentiobiondo-β-gentiobiose tetradecaacetate* (V), in well-crystd form. Cleavage of the Ac groups from both the tri- and the tetrasaccharide has thus far given only amorphous sugars easily sol. in $H_2O$. The purity of the V was established not only by analysis and Ac detns. but also by titration according to Willstätter-Schudel. Its soly. in 100 cc. alc. at 0° is 0.0040 g., but only when it is very pure, while a product which has been recrystd. 8–12 times gives satisfactory results on analysis and mol. wt., Ac and rotation measurements, the above low soly. is obtained only after 20 crystns. This shows the difficulty of sepg. and purifying such sugar acetates and points to the necessity for caution in judging of their homogeneity, especially when dealing with products of the partial hydrolysis of polysaccharides. II, obtained in 59% yield from acetobromogentiobiose and IV in $CHCl_3$ with $CaCl_2$, $Ag_2CO_3$ and I, m. 219–20°, in ice-cold $CHCl_3$ with AcOH satd. at 0° with HBr it gives 61% III, m. 193–4° (cor.), $[\alpha]_D^{17}$ 62.0–3.3° ($CHCl_3$). V, sinters around 135°, resolidifies and m. 207–9° (cor.), $[\alpha]_D^{20}$ −11.1° ($CHCl_3$), mol. wt. (titration according to Willstätter-Schudel) 1200–2%, mol. reducing power (Bertrand) (glucose = 100) 97. C. A. R.

Reactions relating to carbohydrates and polysaccharides. XXXIV. The constitution of levan and its relation to inulin. Harold Hibbert, R. Stuart Tipson and F. Brauns. *Can. J. Research* 4, 221–37 (1931); cf. *C. A.* 25, 723.—A description is given of the properties of levan, a polysaccharide obtained by the action of *Bacillus mesentericus*, and of its enzyme, on sucrose, in particular, its complete hydrolysis to fructose, and behavior when subjected to acetylation and methylation. By hydrolysis of trimethyllevan, a cryst. trimethylfructose was obtained. This yielded a trimethylmethyl fructoside on condensation with MeOH contg. HCl. The properties of these compds. are described for the first time. On methylation and subsequent hydrolysis of the glucoside, a tetramethylfructose was obtained having properties identical with those of the tetramethylfructose obtained by hydrolysis of heptamethylsucrose. Oxidation of the new trimethylfructose yielded a dibasic dimethyllactol acid, and esterification of the latter, followed by methylation and treatment with dry $NH_3$, gave a cryst. diamide. These results show that the new cryst. trimethylfructose is 1,3,4-trimethylfructofuranose. It follows from this that levan is a polymerized anhydrofructofuranose with linkages at positions 2 and 6 of the fructose chain, thus differing from inulin which has been shown to be an anhydrofructofuranose with linkages at positions 1 and 2. The synthesis of levan thus represents a further example of the polymerization of an anhydro sugar taking place through the medium of the γ,4-HO groups. J. W. S.

Carbon rings. XVI. Relationship between density and molecular arrangement in a homologous series of normal aliphatic and cyclic hydrocarbons. M. Stoll and G. Stoll-Comte. *Helv. Chim. Acta* 13, 1185–1200 (1930); cf. *C. A.* 25, 922.—The article is a math. study of the characteristic d. curves of the normal cyclic hydrocarbons and ketones at 20°. Based on this study, S. and S.-C. build up a theory concerning the mol. structure of these compds. A. Wieden.

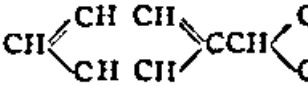
Competitive hydrogenations. II. P. F. Diworky and Homer Adkins. *J. Am. Chem. Soc.* 53, 1868–75 (1931); cf. *C. A.* 24, 94.—The rates of hydrogenation (listed in order of decreasing rate) of quinoline, $C_6H_6$, PhMe, PhOH, $PhCH_2OH$, $C_5H_5N$, $Ph_2NH$, $BzNH_2$ and $PhNH_2$ have been detd. over a Ni catalyst at 125–75° and under pressure of H from 125–200 atms. Thirty two mixts. of these compds., each mixt. contg. 2 components, were subjected to the action of H over a Ni catalyst and the mixt. allowed to take up as much H as would have been sufficient to completely hydrogenate 1 of the components of the mixt. The rate of absorption of the H and its distribution between the components of the mixt. were detd. by analysis of the reaction mixt. It was found that if the compds. were listed in the series quinoline, $C_5H_5N$, $PhNH_2$, $PhCH_2OH$, PhOH, $Ph_2NH$, $C_6H_6$, $BzNH_2$ and $PhNH_2$ in any mixt. contg. 2 of them, the 1 higher in the series would receive the greater proportion of the H. $C_5H_5N$ and quinoline in mixts. with other compds. took all, or practically all, of the H. Apparently there is no relationship between the relative rates of hydrogenation of these compds. singly and in mixts. The relative rates of hydrogenation of the components of a mixt. are at least in part presumably dependent upon selective absorption by the catalyst through 2 possible acceptors of H. The hydrogenation of $Ph_2NH$ was accelerated by PhMe and $C_6H_6$ and the hydrogenation of $PhNH_2$ by the presence of PhOH in the reaction mixt. The ratio of cyclohexylcarbinol to PhMe produced in the hydrogenation of $PhCH_2OH$ was increased by the presence of PhOH or $Ph_2NH$ and especially of $C_6H_6$ or $BzNH_2$ in the reaction mixt. The original should be consulted for the table of data. C. J. West

Syntheses in the cyclobutanol series. L. Blanchard. *Bull. soc. chim.* [4], 49,

279–309(1931). cf *C A* 21, 3888.—The ethers of the dihalohydrins, $XCH_2CH(OR)CH_2X$, on condensation with $NaHC(CO_2Et)_2$ gave $XCH_2CH(OR)CH_2CH(CO_2Et)_2$ which was sapond. to $XCH_2CH(OR)CH_2CH(CO_2H)_2$. Traube and Lehmann (*Ber* 34, 1977(1901)) have shown that the acidification of the condensation product of $ClCH_2\overline{CH\ CH_2\ O}$ with $NaHC(CO_2Et)_2$ gives a lactone, $ClCH_2\overline{CH\ CH_2\ CH(CO_2Et)\ CO\ O}$. Compds of the type $\overline{CH_2\ CH_2\ CH_2\ C(CO_2Et)_2}$ formed by malonic ester condensation with $Cl(CH_2)_3Br$ or $Br(CH_2)_3Br$ are well known. By the use of $XCH_2CH(OR)CH_2X$, it would be possible to evade lactonization and so to prep. $ROCH\ CH_2\ CH_2\ C(CO_2Et)_2$, from which $HOCH\ CH_2\ CH_2\ C(CO_2H)_2$ (I) might be prepd. The removal of the R group of the ether might destroy the cyclobutane ring, though this difficulty would be avoided by synthesis of the corresponding formal, $ROCH_2OCH\ CH_2\ CH_2\ C(CO_2Et)_2$, which could be hydrolyzed by hot $H_2O$ to I. Furthermore, the prepn. of the formals $ROCH_2OCH(CH_2X)_2$ *is more convenient than that of the dihalohydrin ethers. Formals* 1 *Mixed formals*.—The addn. of $XCH_2OR$ to $ROCH\ CH_2\ CH_2\ O$ always yields mixed formals of the type $ROCH_2CH(OCH_2OR)CH_2X$. By the addn. of $MeOCH_2Cl$, $EtOCH_2Cl$ and $AmOCH_2Cl$ to epichlorohydrin the following mixed *formals* were formed. *Me 1,3-dichloroisopropyl*, $MeOCH_2OCH(CH_2Cl)_2$, $b_{11}$ 80–1°, $d_{18}$ 1.237, $n$ 1.45412, M. R. 37.88, calcd. 38.31. *Et 1,3-dichloroisopropyl*, $b_{12}$ 90–1°, $d_{17}$ 1.182, $n$ 1.44912, M. R. 42.44, calcd. 42.93. *Am 1,3-dichloroisopropyl*, $AmOCH_2OCH(CH_2Cl)_2$, $b_{11}$ 133–5°, $d_{18}$ 1.09, $n$ 1.4506, M. R. 56.55, calcd. 56.36. On addn. of $EtOCH_2Br$, $AmOCH_2Br$ and $EtOCH_2I$, to epichlorohydrin, chlorobromo and chloroiodo formals were produced, *Et 1,3-chlorobromoisopropyl*, $b_{16}$ 110–2°, $d_{20}$ 1.409, $n$ 1.46954, M. R. 45.81, calcd. 45.82, *Am 1,3 chlorobromoisopropyl*, $b_{16}$ 142–4°, $d_{15}$ 1.277, $n$ 1.46856, M. R. 59.52, calcd. 59.68. *Et 1,3-chloroiodoisopropyl*, $EtOCH_2OCH(CH_2Cl)CH_2I$, $b_{11}$ 124–5°, $d_{18}$ 1.6528, $n$ 1.50882, M. R. 50.28, calcd. 50.86. $MeOCH_2Cl$ added to $AmOCH_2\overline{CH.CH_2\ O}$ yielded *Me 1,3-chloroamyloxyisopropyl formal*, $MeOCH_2OCH(CH_2Cl)CH_2OAm$, $b_{12}$ 118°, $d_{18}$ 1.01, $n$ 1.43587, M. R. 58.10, calcd. 58.17. 2 *Symmetrical formals*.—A mixt. of dichlorohydrin and its $ClCH_2$ ether reacts slowly at room temp., evolving HCl with formation of a sym. formal. The elimination of HCl is favored by the presence of $Mg(OH)_2$. *Dichlorohydrin formal*, $CH_2[OCH(CH_2Cl)_2]_2$, m. 51°, *chlorobromohydrin formal*, m. 54–5°; *chloroiodohydrin formal* m. 60°, *dibromohydrin formal*, m. 68–9°. The condensation of $ClCH_2CH(OMe)CH_2Br$ with $NaHC(CO_2Et)_2$ formed *di-Et 1-chloro-2-methoxybutane-4,4-dicarboxylate*, $b_{11}$ 157°, $d_{25}$ 1.135, $n$ 1.44682, M. R. 63.11, calcd. 62.75. The sapon. of this ester gave an acid that was very difficult to isolate in a pure state. The condensation of $BrCH_2CH(OAm)CH_2Br$ with $Na_2C(CO_2Et)_2$ was carried out in 2 stages and gave *di-Et amyloxycyclobutanedicarboxylate* (II), $b_{12}$ 175°, $d_{18}$ 1.011, $n$ 1.4436, M. R. 75, calcd. 74.22. By digesting with 30% KOH for 5 hrs., the free *acid* (III) was prepd., which in turn was converted into its Cu salt, *diacid chloride*, $b_{15}$ 143–5°, *diamide*, m. 177.5°, *amyloxycyclobutanebarbituric acid*, m. 222–3°, *dianilide*, m. 175°. By heating to 120°, III gave off $CO_2$ and formed *amyloxycyclobutanecarboxylic acid*, $AmOCH\ CH_2\ CH_2\ CHCO_2H$, $b_{10}$ 164–6°, $d$ 1.003, $n$ 1.45412, M. R. 50.21, calcd. 49.36; *amide*, m. 131–2°. $AmOCH_2OCH\ CH_2\ CH_2\ C(CO_2Et)_2$, prepd. similarly to II, was sapond. to the diacid by the use of gaseous HCl at low temps. to prevent the hydrolysis of the formal group. By boiling the diacid with water for 5 hrs., cleavage into the *diacid alc.*, $HOCH\ CH_2\ CH_2\ C(CO_2H)_2$, m. 125°, and the formal, $CH_2(OAm)_2$, $d_{18}$ 0.843, took place. I and a similar MeO compd. showed an exaltation of the M. R. and the paper is concluded by a discussion of the M. R. of cyclobutane compds. C. R. ADDINALL.

**Cyclohexylmagnesium chloride and bromide.** HENRY GILMAN AND E. A. ZOELLNER. *J. Am. Chem. Soc.* 53, 1945–8(1931).—$C_6H_{11}MgCl$ and $C_6H_{11}MgBr$ have been prepd. in 80–96% yields. In its reaction with Mg $C_6H_{11}Br$ differs significantly from other sec. bromides. General recommendations are given for the use of RCl in preference to RBr and RI compds. for the prepn. of Grignard reagents. C. J. WEST.

**Dehydrogenation catalysis of bicyclic hydrocarbons.** N. D. ZELINSKII AND I. N.

TITE *Ber* 64B, 183–8(1931).—Some time ago Z obtained by dehydrogenation of *cyclohexylcyclopentane* (I) a cryst. compd (II), m 69.4°, which apparently had the compn $C_{11}H_{12}$ and was supposed to have the structure  , it being assumed that in such a system the loss of H atoms from the 6-membered ring stimulated a similar loss from the 5-membered ring although the dehydrogenation of a cyclopentamethylene ring was so unexpected that the synthesis of compds. of the type I was undertaken to check these results (*C. A.* 21, 900). The supposed I had been synthesized from $C_6H_{11}MgBr$ (III) and cyclopentanone (IV) and as the reaction seemed to proceed normally there seemed to be no doubt that the product was I. More thorough study showed, however, that II is really $Ph_2$ and that the action of Mg on $C_6H_{11}Br$ in $Et_2O$ yields chiefly $(C_6H_{11})_2$, the normal III which with IV gives the expected tertiary alc. being formed in only small quantity. Heating the reaction product with aq. $(CO_2H)_2$ yielded, together with the $(C_6H_{11})_2$, only a small quantity of an unsatd. hydrocarbon. Likewise, $C_6H_{11}MgBr$ and cyclohexanone yielded no appreciable amt. of the expected tertiary alc., and III with 3-methylcyclopentanone gave chiefly $(C_6H_{11})_2$. The true I was accordingly prepd. by hydrogenation of phenylcyclopentane (V), b. 217°, $d_4^{22}$ 0.9474, $n_D^{22}$ 1.5280, which was obtained in 54% yield from $C_6H_5Cl$, $C_5H_8$ and $AlCl_3$. Passed at the rate of 4 drops per min. in $H_2$ over Pt-charcoal at 220.5°, V gave I, b. 214°, $d_4^{21}$ 0.8780, $n_D^{21}$ 1.4728, which, when passed 3 times at the rate of 2 drops per min. over Pt-charcoal at 300°, yielded V°, b. 215–7°, $n$ 1.5192, with no higher boiling product and not a trace of crystals of $Ph_2$. This passivity of the pentamethylene nucleus in bicyclic systems toward dehydrogenation catalysis is further confirmed by the following expts. *Phenylcyclopentylmethane* (VI), b. 233–5°, $d_4^{19}$ 0.9345, $n_D^{19}$ 1.5206 (obtained together with $(PhCH_2)_2$ and a little $(C_5H_9)_2$ from $PhCH_2Cl$, $C_5H_9Cl$ and Na), remained unchanged when passed over Pt-charcoal at 300°. At 200° in $H_2$ it yielded *cyclohexylcyclopentylmethane*, b. 225–7°, $d_4^{19}$ 0.8789, $n_D^{19}$ 1.4775, which, when passed over Pt-charcoal at 300°, regenerated the VI. C. A. R.

Influence of substitution on the oxidation of side chains in the benzene nucleus. P. S. VARMA AND P. B. PANICKER. *Proc. 15th Indian Sci. Cong.* 1928, 150–1.—Using a neutral soln. of $KMnO_4$, V. and P. oxidized *o*-, *m*- and *p*-$O_2NC_6H_4Me$, *o*-, *m*- and *p*-$MeC_6H_4CO_2H$, *o*- and *p*-$ClC_6H_4Me$, *o*- and *p*-$BrC_6H_4Me$, *o*- and *p*-$IC_6H_4Me$, *o*-, *m*- and *p*-$AcHNC_6H_4Me$ and *m*- and *p*-$MeC_6H_4OMe$ under identical expti. conditions. Conclusion: In the *p*-series the order (the degree of oxidation decreasing) in which the side chain is oxidized is $-CO_2H$, $-NO_2$, -Br, -Cl, -OMe, -I, -NHAc and in the *o*-series the order is $-NO_2$, $-CO_2H$, -Br, Cl, -NHAc and -I. With regard to position isomers, there does not seem to be any regularity. *p*-$NO_2C_6H_4Me$ is oxidized most, the *m*-compd. the least, whereas in the acetyltoluidines, the *o*-deriv. comes first and the *p*-deriv. last. No details are given. E. J. C.

Obtaining an intermediate form in an acetylenic transposition. M. BOURGUEL. *Compt. rend.* 192, 686–8(1931); cf. *C. A.* 22, 2748.—Treatment of $PhC{\equiv}CMe$ (I) with $NaNH_2$ at 60–70° for 3 hrs. followed by cold very dil. acid yielded true phenylpropine, $PhCH_2C{\equiv}CH$ (II), and a new hydrocarbon, $b_{17}$ 72°, $d_{18}$ 0.9385, $n_D^{20}$ 1.582, believed to be $PhCH{=}C{=}CH_2$ (III). This does not react with CuCl, is not hydrated by $H_2SO_4$ and its Raman effect is different from I or II. Further treatment of III with $NaNH_2$ yields II. II treated with dry KOH at room temp. yields first III, then I. III polymerizes at 60° quickly to a soft resin. It forms a diketone, PhCOCOMe, either by taking up $O_2$ from the air, or by the action of $Hg(OAc)_2$. L. E. GILSON

Physical properties of various nitro derivatives. LOUIS DESVERGNES. *Rev. chim. ind.* 40, 34–7(1931); cf. *C. A.* 21, 3607, 23, 4207, 24, 350.—The solidification point of 2,4,6-$(O_2N)_3C_6H_2Me$ on 3 detns. was 80.83°. Its soly. at 19° in 100 g. of AcOEt is 30.921, abs. EtOH 1.426, MeOH 2.944. The soly. of tetryl at 18° for 100 g. of solvent is AcOEt 13.916, $Me_2CO$ 64.111, abs. EtOH 0.537, MeOH 1.320, $C_6H_6$ 5.070, $C_5H_5N$ at 19.5° 43.997, $C_7H_8$ at 19.5° 3.137. Tetryl is decompd. by $C_5H_5N$. 2,4-$(O_2N)_2$-$C_6H_3NHMe$, recrystd. from $Me_2CO$, m. (3 detns.) 176°, 175.5–6°, 176°, its soly. in $H_2O$ at 18° is 0.002%, at 59° 0.004%, at 100° 0.056%. Its soly. at 17° in 100 g. of solvent is AcOEt 0.718, $Me_2CO$ 1.064, 96% EtOH 0.079, abs. EtOH 0.116, MeOH 0.111, $C_6H_6$ 0.319, $CHCl_3$ at 17.5° 0.699, anhyd. $Et_2O$ at 17.5° 0.108, $C_5H_5N$ at 17.5° 3.454, $CS_2$ at 18.5° 0.051, $CCl_4$ at 18.5° 0.024, $C_7H_8$ at 18.5° 0.276. 2,4,6-$(O_2N)_3$-$C_6H_2NH_2$, m. (3 detns.) 190.5–1°, 190.5–1°, 190.5–1.5°. Its soly. in $H_2O$ at 19.5° is

0 106, at 50° 0 012, at 100° 0 123 Its soly in 100 g of solvent at 19 5° is AcOEt 1 898, $Me_2CO$ 4 709, 96% EtOH 0 120, abs EtOH 0 127, MeOH 0 245, $C_6H_6$ 0 907, $CHCl_3$ at 17° 0 322, anhyd $Et_2O$ at 17° 0 121, $C_5H_5N$ at 17° 13 638, $CS_2$ at 17 5° 0 013, $CCl_4$ at 17 5° 0 003, $C_7H_8$ at 21 5° 1 108 1,3,4,5-$C_6H_2(NO_2)_4$ m (3 detns) 126 1°, 126 2°, 126 2° This product is decompd by $H_2O$ with formation of picric acid Its soly in 100 g of solvent at 23° is $C_6H_6$ 2 294, $CHCl_3$ 0 577, $CS_2$ 0 004, $CCl_4$ at 25° 0 040 This product is decompd by $C_5H_5N$ and $C_7H_8$ Tetranitropentaerythritol m (3 detns) 140°, 139 5°, 139 5° Its soly in $H_2O$ at 19° is 0 010, at 50° 0 010, at 100° 0 035 Its soly in 100 g of solvent is AcOEt at 19° 6 322, at 50° 17 860, $Me_2CO$ at 19° 25 632, at 50° 57 960, 96% EtOH at 19° 0 032, abs EtOH at 21 5° 0 129, MeOH at 21 5° 0 328, $C_6H_6$ at 19° 0 215, $CHCl_3$ at 19° 0 056, anhyd $Et_2O$ at 19° 0 165, $C_5H_5N$ at 19° 5 436, at 50° 8 567, $CS_2$ at 17 5° 0 014, $CCl_4$ at 17.5° insol, $C_7H_8$ at 17 5° 0 623 P THOMASSET

**Nitration of benzene.** P S VARMA AND K A JOSHI *Proc 15th Indian Sci Cong* 1928, 151 —$C_6H_6$ was nitrated by means of $HNO_3$ alone in the presence of Zn, Cu, Sn and Sb as catalysts It was possible to get some increase in the yield of $PhNO_2$ in the presence of metallic Sn but the yield so obtained can in no way be compared with the yield obtained by using a mixt of $HNO_3$ and $H_2SO_4$ as is done in the ordinary nitration No details are given E J C

**Nitration of *m*-dichlorobenzene.** H S JOIS AND B L MANJUNATH *Half-Yearly J. Mysore Univ* 4, 239-40(1930) —*m*-$C_6H_4Cl_2$ (100 g) was nitrated according to the method of Nietzki and Schedler (*Ber* 30, 1666(1897)) using $HNO_3$ of d 1 52. The mixt was kept at 80° for 30 min, then cooled and added to $H_2O$ + ice The ppt, crystd from EtOH, gave pure 4,6 dinitro-1,3 dichlorobenzene (I), rectangular plates, extinction about 40°, m 102 3° The mother liquor was evapd to dryness, and the residue dissolved in $Et_2O$, washed with $H_2O$ and dried, (Cl 30 3%, calcd for $C_6H_2(NO_2)_2Cl_2$, 29 9%) Dissolved in EtOH at 50°, it gave on cooling a crop of crystals of I. On boiling down and then cooling, this last mother liquor sometimes gave crystals of 2,4 dinitro-1,3 dichlorobenzene (II) (acicular crystals, extinction angle 10–12°, m. 70–1°), but it was not possible to det the exact exptl conditions for obtaining II. Recrystn from concd $H_2SO_4$ (cf. Dann, *C. A.* 24, 1356) gave II, m. 68–9°. The total yield was 120 g of I and 30 g of a mixture of I and II. GEORGE CALINGAERT

**New and improved methods in the formation of pharmacologically important amines. II. Synthesis of β-arylethylamines from aromatic aldehydes and carboxylic acids.** KARL KINDLER *Arch Pharm.* 269, 70-8(1931), cf *C A* 21, 260-8-9 —The following scheme indicates the methods followed in the present study in the prepn of β-arylethylamines·

(I) $ArCHO \longrightarrow ArCH(OAc)CN \longrightarrow$

(II) $ArCHO \longrightarrow ArCH_2CH_2CONH_2 \longrightarrow ArCH_2CH_2NH_2$

(III) $ArCOCl \longrightarrow ArCOCN \longrightarrow$

Under I the synthesis of anisaldehyde, methylvanillin, piperonal and myristicinaldehyde was carried out, under II, the amides of *p* methoxy-, 3,4-dimethoxy- and 3,4-methylenedioxyhydrocinnamic acid, under III, anisoyl chloride. The lowest yields obtained under I and II amounted to 70% of the theoretical The amines obtained are convertible into tyramine, hordenine, epinine, laudanosine, papaverine, hydrastinine, berberine and cotarnine WITH W. PESCHKE Reduction expts with II under pressure in a specially constructed app are described in the prepn of homopiperonylamine from 3,4 methylenedioxyacetylmandelic nitrile, homoveratrylamine from 3,4-dimethoxyacetylmandelic nitrile, *tyramine Me ether* from *p-methoxyacetylmandelic nitrile*, $C_{11}H_{11}O_3N$, m 38–9°, $b_6$ 165°, and homomyristicylamine from 3,4 methylenedioxy-5 methoxyacetylmandelic nitrile, tyramine Me ether from *p*-methoxybenzoylcyanide WITH D SCHMIDT Tyramine Me ether from *p*-methoxyhydrocinnamic amide, homoveratrylamine from 3,4-dimethoxyhydrocinnamic amide; homopiperonylamine from 3 4-methylenedioxyhydrocinnamic amide W. O E.

**Preparation of *p*-chloroaniline.** K. HABIB HASAN *Proc 15th Indian Sci Cong* 1928, 158 —Chattaway and Orton (1901) described a method of chlorinating AcNHPh with bleaching powder in glacial AcOH A good yield of *o*- and *p*-compds is obtained On hydrolysis of the anilides, however, the yields claimed for both anilines are not obtained, nor is the method of sepg *p*-chloroaniline suitable E. J. C.

**Diazotization of difficultly diazotizable amines.** S KRISHNA AND RATAN LAL BHATIA *Proc 15th Indian Sci. Cong* 1928, 152 —The usual methods of diazotization do not work with certain substituted amines, nor are such treatments as pressure, high

temp., concn., solvents, etc., applicable in all cases. Hence a method was worked out in which use was made of a basic solvent like pyridine. Make a soln. of the desired amine in the min. quantity of pyridine and add to it a strong soln. of $NaNO_2$ (calcd. quantity) in water. Add this mixt. to a dil. soln. of HCl very slowly in small quantities. Diazotization proceeds satisfactorily. In this way tribromoaniline, 2,6-dichloro-*p*-nitroaniline, dibromo-*p*-aminobenzoic acid and dibromo-*p*-aminobenzaldehyde were successfully diazotized. F. J. C.

**Substituted quaternary azonium iodides. V. The molecular state of phenyldimethylazonium, phenylmethylethylazonium, phenyldiethylazonium, phenylmethylbenzylazonium, phenylpropylbenzylazonium iodides in solution.** Bawa Kartar Singh and Mola Ram Stud. *Proc. 15th Indian Sci. Cong.* 1928, 148; cf. *C. A.* 15, 1506.—The mol. wts. of these 5 compds. are detd. by using the Lumsden-Walker b. p. method, in water and EtOH. The solns. employed are very dil., the concn., in most cases, ranging from 0.6 to 1.5%. Conclusions: (1) The mol. wts. of all but phenylethylazonium iodide (I) are lower in EtOH than in water, in the case of I this relation is reversed. The degree of dissocn. is, therefore, greater in EtOH, a solvent of low dielec. const., than in water, a solvent which has a very high value. It is, therefore, clear that the Nernst-Thomson rule is not followed in these cases. (2) In $H_2O$, the degree of dissocn. of these compds. increases with increasing formula wt. of the base, but this regularity does not appear in EtOH. (3) The degree of dissocn. of the salts increases with dilu. in both solvents. (4) The mol. wts. furnished by the 2 methods, viz., the vol. and the wt. methods, are nearly identical for very dil. solns. No details or values are given. E. J. C.

**Aryl chlorosulfinates and aryl sulfites.** M. Battegay and L. Denivelle. *Compt. rend.* 192, 492–3(1931).—Besides confirming the method for the synthesis of $(PhO)_2SO$, $b_{15}$ 172–6°, by the action of $SOCl_2$ on NaOPh in toluene at 0° (cf. Voss and Blank, *C. A.* 25, 1797), B. and D. obtained a compd. $PhOSOCl$, *Ph chlorosulfinate*, $b_{15}$ 94–6°. This is a new type of compd. It fumes in air, is decompd. by $H_2O$ to PhOH, $SO_2$ and HCl, and by Zn to $SO_2$ and PhCl, and is the intermediate product in the formation of $(PhO)_2SO$. Janet E. Austin.

**Identification of phenols as the esters of 3,5-dinitrobenzoic acid.** Max Phillips and George L. Keenan. *J. Am. Chem. Soc.* 53, 1924–8(1931).—The 3,5-dinitrobenzoyl esters of phenols were prepd. by refluxing 0.01 mol. of the phenol and 0.01 mol. of $3,5\text{-}(O_2N)_2C_6H_3COCl$ in 20 cc. $C_5H_5N$ for 1 hr. and pouring the cooled reaction product into 400 cc. cold 5% $H_2SO_4$, then washing with $H_2O$ and 2% NaOH. The m. ps. are cor. The following data include the m. p. and values for $\alpha$, $\beta$ and $\gamma$; other crystallographic data are given in the original. 3,5-Dinitrobenzoyl deriv. of PhOH, rods, 145.8°, 1.505, 1.690, >1.740; *o*-$MeC_6H_4OH$, plates, 138.4°, 1.490, —, >1.720; *m*-$MeC_6H_4OH$, plates, 165.4°, 1.475, 1.700, 1.740; *p*-$MeC_6H_4OH$, plates, 188.6°, 1.500, —, 1.740; 3,4-$Me_2C_6H_3OH$, rods, needles, 181.6°, 1.508, 1.670, >1.740; 2,6-$Me_2C_6H_3OH$, rods, plates, 158.8°, 1.512, 1.670, >1.740; 2,4-$Me_2C_6H_3OH$, rods, plates, 164.6°, 1.517, 1.645, >1.690; 3,5-$Me_2C_6H_3OH$, rods, 195.4°, 1.485, 1.650, >1.740; 3,6-$Me_2C_6H_3OH$, needles, 137.2°, 1.487, 1.665, 1.740; thymol, needles, 103.2°, 1.480, 1.625, 1.705; *p*-cyclohexylphenol, needles, 168.0°, 1.515, 1.625, 1.702; guaiacol, yellow needles, 141.2°, 1.530, —, >1.740; creosol, rods, needles, 170.6°, 1.550, 1.570, 1.640; 4,2-Pr(MeO)$C_6H_3OH$, needles, 116.2°, 1.520, —, 1.650; eugenol, 130.8°; isoeugenol, 158.4°; $\alpha$-$C_{10}H_7OH$, yellow needles, 217.4°, 1.490, 1.615, >1.740; $\beta$-$C_{10}H_7OH$, needles, 210.2°, 1.475, 1.740, >1.740. Details are given of the prepn. of creosol and 4,2-Pr(MeO)$C_6H_3OH$. C. J. West.

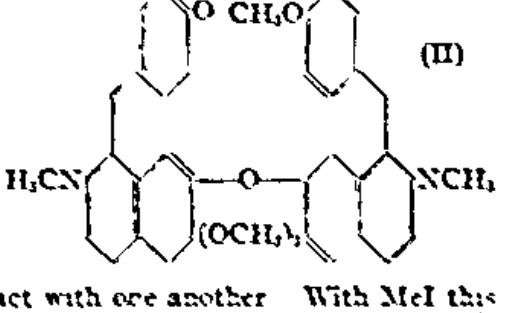
**The pyrolysis of phenols. III. Influence of the time of heating and of gases present.** August Hagemann. *Z. angew. Chem.* 44, 221–4(1931).—PhOH and pyrocatechol are passed through a hot tube in a current of $N_2$, $H_2$, $CO_2$ or steam. The % decompn. decreases as one passes from $N_2$ to steam, the yield of butadiene increasing in the same order from 33 to 56%. George Calingaert.

**Crotyl ethers of phenol.** Charles D. Hurd and Frank L. Cohen. *J. Am. Chem. Soc.* 53, 1917–22(1931).—4-Chloro-2-hexene (10 g.), 7.6 g. PhOH, 40 cc. $Me_2CO$ and 10 g. $K_2CO_3$ refluxed 11 hrs., give 30% of *α-ethylcrotyl Ph ether* (I), $b_{15}$ 116–8°, and 1.8 g. *o-α,δ-dimethylcrotylphenol* (II), $b_{15}$ 140–3°. Similarly, 4-chloro-2-heptene gives 65% of *α-propylcrotyl Ph ether* (III), $b_{12}$ 153–4°, turns a dark red on cooling. 2,4-Dimethyl 2-chloro-3-pentene gives *α α,γ-trimethylcrotyl Ph ether* (IV), very viscous, does not distil at 150° and 15 mm., $n_D^{22}$ 1.2047. Heating I at 200–5° for 30 min. gives 75% of II. III, heated at 228–30° for 30 min., gives 54% of *α-methyl-δ-ethylcrotylphenol*, $b_{15}$ 154–5°. Heating IV at 160–70° for 30 min. gives a mixt. of PhOH and

2,4 dimethyl 1,3 pentadiene (33% yield). It is pointed out that the substituted alkyl aryl ethers with the grouping $ArOCH_2C{:}C$ or $ArOCHRC{:}C$ may be expected to rearrange on heating, whereas with a grouping such as $ArOCR_2C{:}C$ pyrolysis leads to ArOH and a hydrocarbon. C. J. West

**Rearrangement of saturated alkyl phenyl ethers. Synthesis of isopropyl-phenol and -cresols.** Joseph B. Niederl and Samuel Natelson. *J. Am. Chem. Soc.* 53, 1928-34(1931); cf. *C. A.* 25, 931.—For the conclusive proof of the reaction mechanism offered for the condensation of olefins with phenols under the influence of cond. $H_2SO_4$ in the cold presented in the earlier paper, it was necessary to show that satd. alkyl Ph ethers would rearrange under the conditions used by Koenig (*Ber.* 24, 3889(1891)) for this purpose the various iso-Pr Ph and tolyl ethers were studied. The ethers were prepd. by heating 1 mol. wt. of the phenol, excess KOH (58 g.) and excess (125 g.) iso-PrBr (details given); the ethers were rearranged by adding 80 cc. of the ether to 150 cc. cond. $H_2SO_4$ made up to 1 l. with AcOH and refluxing 5 hrs. $PhOCHMe_2$, b. 178°, $d^{20}$ 0.875, $n^{D}_{D}$ 1.4092; rearrangement gives *o*-$MeCHC_6H_4OH$, b. 213-4°, $d^{20}$ 1.012, $n^{D}_{D}$ 1.5315. *iso-Pr o-tolyl ether*, b. 192°, $d^{20}$ 0.933, $n^{D}_{D}$ 1.5040; 2,4 $Me(MeCH)C_6H_3OH$, b. 232-4°, $d^{20}$ 0.980, $n^{D}_{D}$ 1.5178; 2,4,5-tri Br deriv., m. 223°. *iso-Pr m-tolyl ether*, b. 195°, $d^{20}$ 0.931, $n^{D}_{D}$ 1.4939; 3,5 $Me(Me_2CH)C_6H_3OH$, b. 230-5°, $d^{20}$ 0.904, $n^{D}_{D}$ 1.5280. *iso-Pr p-tolyl ether*, b. 184°; b. 195°, $d^{20}$ 0.927, $n^{D}_{D}$ 1.4952; *4 methyl 2 isopropylphenol*, b. 234-7°, $d^{20}$ 0.980, $n^{D}_{D}$ 1.5277. *o*-$MeCHC_6H_4OCH_2CO_2H$, m. 130°; *2 Methyl 4 isopropylphenoxyacetic acid*, from the K salt of the phenol and $BrCH_2CO_2H$, m. 87.5°; *3 methyl 1 isopropyl deriv.*, m. 141°; a 2nd *deriv.*, m. 125-6°, was prepd. from a condensation product, b$_4$ 95-100°; *4 methyl 2 isopropyl deriv.*, m. 126°. Proofs for the probable structure of these products are discussed and a general rule as to the way of migration of the alkyl groups is given. As the possibility of rearranging even short chain, satd. Ph ethers has now been demonstrated, a series of related problems, such as the rearrangement of the more important Ph ethers of mono- and polyfunctional alkanes is being investigated. C. J. West

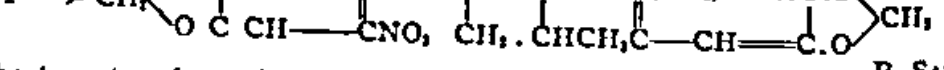
**Constitution of oxyacanthine. II.** F. v. Bruchhausen and P. H. Gericke. *Arch. Pharm.* 269, 115-23(1931); cf. *C. A.* 24, 854.—New exptl. results are reported which appear to substantiate formula II for oxyacanthine and satisfactorily explain the formation of the decarboxyl acid, 4,5 $MeO(p\text{-}HO_2CC_6H_4O)C_6H_2CO_2H$ (I) therefrom. The methine base of oxyacanthine Me ether previously subjected to oxidation by $KMnO_4$ was treated with $O_3$, and smoothly split according to the equation $C_{21}H_{25}O_4N_2 + 2\,O_3 + 2\,H_2O = C_{11}H_{12}O_4 + C_9H_{11}O_4N_2$ (IV) $+ 2\,H_2O_2$ into 2 cryst. components, each in 95% yield. The N free portion is a dialdehyde, m. 72° and yields a disemicarbazone and diphenyl hydrazone, it condenses readily with malonic acid to diphenyl etherdiacrylic acid. Its constitution, 4,5-$MeO(p\text{-}OHCC_6H_4O)C_6H_2CHO$ (III), is easily shown through oxidation to I. The other component (IV) m. 76°, is unusually sol. in $H_2O$, possibly explained by the fact that aldehyde and carboxyl groups do not readily react with one another. With MeI this product yields a cryst. dimethiodide, $C_{23}H_{31}O_4N_2I_2$, characterized by the ease with which it is split by caustic alkali into $Me_3N$ and a cryst. dialdehyde (V), 2,3,4,6-$RO(MeO)_2(CH_2{:}CH)C_6HCHO$ ($R$ = 5,2,4 $OHC(MeO)(CH_2{:}CH)C_6H_3$–), m. 140°. With mineral acids this difficultly sol. product yields characteristic colors in AcOH. It forms a di semicarbazone, and in $CHCl_3$ soln. adds Br without evolution of HBr. Hydrogenation with Pd $BaSO_4$ leads to the formation of the satd. dialdehyde VI, which in turn yields a disemicarbazone and with hippuric acid a monoazlactone, thus showing that 1 aldehyde group is more reactive than the other. In the present study the following compds. were prepd. and characterized: *2′ methoxy-1,1′-diphenyl ether-4,5′-dialdehyde* (III), m. 72° (*disemicarbazone*, $C_{19}H_{19}O_4N_6(H_2O)$, m. 228°, *diphenylhydrazone*, yellowish white, m. 218°, *oxime*). *2′-Methoxy-1,1′-diphenyl ether-4,5′-diacrylic acid*, $C_{19}H_{16}O_6$, m. 258°, is converted into *2′ methoxy-1,1′-diphenyl ether-4,5′-dipropionic acid*, $C_{19}H_{20}O_6$, m. 144°. *Di-o-di (β-dimethylamino)ethyl-trimethoxydiphenyl ether-dialdehyde* (IV) (crystallizes with $H_2O$), m. 76° (*dimethiodide*, m. 239°). *Di-o-ethyl-trimethoxydiphenyl etherdialdehyde* (V), m. 140°, gives with cond. $H_2SO_4$ in AcOH soln. a deep blue color (*semicarbazone*, $C_{25}H_{34}O_6N_6$, m. 230° (decompn.)). *Di-o-ethyl compd.* (VI), (by reduction



of V), m. 88–9° (*disemicarbazone*, m 218°; *azlactone*, $C_{18}H_{17}O_3N$, yellow, m 252°)
W. O. E.

Catalytic reduction of mixtures of *p*-nitro- and nitrosophenols with aldehydes and ketones. Randolph T. Major *J. Am Chem Soc* 53, 1901–8(1931).—Catalytic reduction of 2,4 $(O_2N)_2C_6H_3OH$ in $Me_2CO$, followed by benzoylation of the reduction product, gives *2 benzamido-4 benzoylisopropylaminophenyl benzoate*, m 171°, while in 1,4-dioxane, MeOH, AcOH or iso-PrOH the expected product, $(BzNH)_2C_6H_3OBz$, m 233°, is formed, 2,4-$(O_2N)_2C_6H_3OEt$ in $Me_2CO$ gives *2,4-dibenzamidophenetole*, m 189°. Reduction of a mixt. of *p*-$O_2NC_6H_4OH$ and $Me_2CO$ gives some *p*-$H_2NC_6H_4OH$, m 184° (decompn.), and 4-$Me_2CHNHC_6H_4OH$, m 155–6° (45% yield), this was also obtained by reduction of $Me_2C{:}NC_6H_4OH$, the *NO deriv*, yellow, m 112–3°, the *phenylcarbamyl deriv* m 214–5° (decompn.), *HCl salt*, m 189°. Reduction of *o* $O_2NC_6H_4OH$ in $Me_2CO$ followed by treatment with $HNO_2$ gives a negligible amt. of NO deriv., the product being 2 $H_2NC_6H_4OH$; *p*-$O_2NC_6H_4OH$ and $Et_2CO$ give 60% of the *NO deriv* of *4 sec-amylaminophenol*, m 89–90°; *HCl salt*, decomps without melting, similarly MeEtCO gives the 4 *sec* butylamino deriv., analyzed as the *HCl salt* When *p*-$O_2NC_6H_4OH$ is reduced in BzMe or menthone, only *p*-$H_2NC_6H_4OH$ is formed Catalytic reduction of *p*-$O_2NC_6H_4OH$ in HCHO or AcH gave no definite condensation product, but with BzH in MeOH a considerable yield of 4-dibenzyl amino deriv is obtained, this also results from *p*-$H_2NC_6H_4OH$ and BzH *4 Benzoylisopropylaminophenyl benzoate*, m. 174–5°. *4-Dibenzylaminophenyl benzoate*, m 143–4°.
C. J. West

Derivatives of safrole. I. Kinzo Kafuku and Chiuta Hata *J Chem Soc Japan* 52, 20–5(1931).—A study of some derivs of 6-nitrosafrole. By oxidizing the 6-nitrosafrole (I) with $KMnO_4$, K. and H obtained a cryst. compd m 114° which, from the reaction with the Schiff and Tollens reagents and from analysis, was considered to be 6 nitrohomopiperonal, although it formed no semicarbazone, oxime or phenylhydrazone The other derivs studied were as follows: I ⟶ aminosafrole ⟶ acetylaminosafrole ⟶ acetylaminobromopiperonylic acid ⟶ aminohomopiperonylic acid I ⟶ nitrohomopiperonylic acid (II) ⟶ methylenedioxyoxindole II ⟶ azoxyhomopiperonylic acid, $[HO_2CCH_2(CH_2O_2)C_6H_2]_2N_2O$ I ⟶ 5-Ac deriv. I ⟶ 2,6-dinitrosafrole.



R. Saito

The two stereoisomeric isoeugenols. Fr. Borbecker and H. Volk. *Ber* 64B, 61–6(1931).—Theoretically, aromatic propenyl compds (anethole, isosafrole, isoeugenol (I), isochavibetol) can exist in 2 stereoisomeric forms, but no representative of this type of compds had as yet been isolated in both forms in pure state. If com I, f 0–5°, is dissolved in hot 15% NaOH, there seps on cooling a salt which yields the I m 33° (II) and the mother liquors on further purification through a benzoate give a homogeneous liquid phenol which is not eugenol and is doubtless the *stereoisomer* (III) of II. II and III can be converted into each other through their dibromides. Bromination of either form gives a mixt. of the dibromides of each, although one dibromide, probably the more stable one, predominates Thus the known acetisoeugenol, m 79°, a deriv of II, gives chiefly a dibromide (IV) m 132°, with a smaller amt. of an *isomer* (V) m 79°. The Ac deriv of III gives the same dibromides but the yield of V is somewhat larger. Similarly, both IV and V on debromination give mixts. of the 2 acetates III is best converted into II by brominating its acetate, debrominating the resulting mixt., removing most of the acetate of II, again brominating the residue, etc For the conversion of II into III the V resulting in small amt in the bromination of the acetate of II is debrominated and sapond., the II is sepd as the Na salt and the III isolated as the benzoate. By analogy, II is probably the *trans*- and III the *cis* form II, $b_{13}$ 141–2°, m 30–3°, $d_4^{20}$ 1 0852, $n_D^{20}$ 1 5782 (supercooled liquid) III, faintly yellow, $b_{13}$ 134–5°, $b_{4-5}$ 98°, $d_4^{20}$ 1 0851, $n_D^{20}$ 1 5726, benzoate, m 59–61°, depresses the m. p. of its isomer (m 102–3°) to 57–98° and that of eugenol benzoate (68–9°) to 45–50°. *Me ether* of II, m 16–7°, $b_{11}$ 143–4°, $d_4^{20}$ 1 0528, $n_D^{20}$ 1 5692, of III, $b_{13}$ 138–40°, $d_4^{20}$ 1 0521, $n_D^{20}$ 1 5616 The Me ether of cryst isochavibetol (m 96–7°), m 15 5–6 5°, $b_{13}$ 147°, $d_4^{20}$ 1 0527, $n_D^{20}$ 1 5692, does not depress the m. p. of the Me ether of II, it may therefore be concluded that II and cryst isochavibetol have the same spatial configuration *Acetate* of III, $b_8$ 132°, $b_{13}$ 160–2°, $n_D^{20}$

1.5418 Bromination of 20 6 g. of the acetate of II gives 31 g IV and 1.1 g. V; 22 8 g of the acetate of III yields 20 g. IV and 5 6 g. V. C A. R

**Absorption spectra of *o*-chlorophenol-indophenol and of *o*-cresol-indophenol.** Matilda Moldenhauer Brooks. *J. Am Chem Soc* 53, 1826–30(1931).—The absorption max of *o*-chlorophenol-indophenol (I) at $p_H$ 8 0 9 6 is at 625 mμ At these $p_H$ values the blue ion predominates The absorption max of the dissocd form of *o*-cresol indophenol (II) is at 610 mμ and that of the red acid form is at 500 mμ *The height of the max varies with the $p_H$ and concn of the dye In the case of I* the com sample examd was of equal purity to that of a very pure sample, while with II the com sample was only 51 54% as pure as the sample of known purity Four curves are given C J West

**Some relationships of the ratio of reactants to the extent of conversions of benzaldehyde and furfuraldehyde to their acetals.** Homer Adkins, Joseph Shmh and Lester M. Bolander. *J Am Chem Soc* 53, 1853–8(1931).—The effect of the ratio of reactants upon the extent of the reaction of BzH with EtOH, BuOH and iso-PrOH and of furfural with EtOH has been detd when the ratio of aldehyde to alc is varied from 1.2 to 1.10 The equil const. for the first 2 of these reactions was found to be identical for the 2 alcs but to decrease slightly with increase in ratio of alc to aldehyde The equil const for the reaction of BzH with iso-PrOH and of furfuraldehyde (I) with EtOH appeared to be independent of the concn of reactant The equil const. for the reaction of I and MeOH has been redetd The following values give (1) the mols of alc per mol of aldehyde, (2) % conversion of aldehyde to acetal and (3) $K$: EtOH and BzH, 2 08, 25 1, 0 091, 3 90, 31 1, 0 079, 5 87, 41 9, 0 089, 7 80, 48 6, 0 082; 9 96, 53 0, 0 081 BuOH and BzH, 2 02, 24 8, 0 091, 4 17, 36 0, 0 082, 6 13, 44 0, 0 084; 8 01, 48 9, 0 080, 9 90, 52 7, 0 080 iso-PrOH and BzH, 1 85, 6 7, 0 0045, 5 86, 11 1, 0 0030, 10 41, 18 7, 0 0047 EtOH and I, 2 20, 17 1, 0 036, 6 06, 32 6, 0 036, 6 21, 32 9, 0 035, 9 80, 39 8, 0 034, 11 08, 43 7, 0 039 MeOH and I, 4 40, 39 5, 0 098 I (96 g), 276 g. dry EtOH and 0 0012 g HCl, allowed to stand 1 day, give 21% of furfural acetal, $b_{18}$ 77–9°, $b_{760}$ 184 5°. C J West

**Substitution in resorcinol derivatives. Bromo derivatives from β-resorcylaldehyde and their orientation.** M S Iyengar and H S Jois. *Half-Yearly J. Mysore Univ.* 4, 199–201(1930).—*4 Nitro 6 bromoresorcinol di-Me ether*.—5,2,4-$O_2N(MeO)_2C_6H_2CHO$ (1 g) in a slight excess of cold glacial AcOH was treated with the calcd quantity of Br in AcOH in presence of a small quantity of I as catalyst, and after standing overnight, was dild with plenty of water and filtered On recrystn from EtOH, yellowish white crystals were obtained m 138–9° (Br 29 05%, calcd for $C_9H_9O_4NBr$, 30 5%) No oxime was obtained with the above deriv 5,2,4 $O_2N(MeO)_2C_6H_2CO_2H$ brominated in AcOH as above gave a product m 140–1°, identical with that obtained from the aldehyde (mixed m p) *4 Nitro-6 bromoresorcinol 1-Et 3-Me ether*.—5,2,4 $O_2N(EtO)$-$(MeO)C_6H_2CHO$ brominated as above yielded yellowish white needles m. 119–21° (Br 28 35%, calcd for $C_9H_{10}O_4NBr$ 28 62%), identical with the brominated product of the acid The Br deriv did not give rise to any oxime George Calingaert

**Wandering of groups during brominations.** M G Srinivas Rao, C. Srikantia and M. Sesha Iyengar *Proc 15th Indian Sci Cong* 1928, 158–9.—5-Nitro-4 methoxy-β resorcylaldehyde (I) on monobromination yields a normal bromonitroaldehyde, but this on further bromination apparently rearranges to give a dibromonitro deriv, in which the aldehyde group is absent The 2nd phenolic group in the last was ethylated and the product thus obtained was found to be identical with (1) the nitro deriv of tribromoresorcinol in which both the phenolic groups had alternatively been alkylated with MeI and EtI, resp., and (2) the dibromo (ethylated) deriv of 4 nitroresorcinol 3 Me ether, in which the nitro group is in the same position as in I. From these and a few other expts. the authors conclude that the nitro group has wandered during bromination E J C.

**Replacement of sulfonic groups by nitro groups in aromatic halogen compounds.** P. S. Varma and K. A Joshi *Proc 15th Indian Sci Cong* 1928, 150, cf *C A.* 14, 182. E J. C.

**Dihalocyanoacetyl derivatives of mesitylene.** Reynold C Fuson and Reid G Beveridge. *J. Am Chem. Soc.* 53, 1985–8(1931); cf. F and Walker, *C. A.* 24, 4772.—2,4,6-$Me_3C_6H_2COCH_2Cl$ (10 g) and 4 5 g KCN in 300 cc EtOH, boiled 4 hrs., give 50–60% of *cyanoacetylmesitylene* (I), m 108–9°; NaOBr gives 50–60% of the *di Br deriv.* (II), $Me_3C_6H_2COCBr_2CN$, m 81–2°, *di-Cl deriv*, m 38–9° (45–50% yield). I and fuming $HNO_3$ give 35% of the *di-$NO_2$ deriv*, m 170 3–1 3° (cor.), which yields 45% of a *di-Br deriv*, m 94–5°, also obtained by nitration of II. *Di(cyanoacetyl)-mesitylene*, m 156–7° (cor.) (70–80% yield); *tetra-Cl deriv*, m 52–3° (50–60% yield);

*tetra Br deriv*, m 121.2–2.2° (cor.) (30–5% yield). All of these dihalocyanoacetyl compds. have been found to be stable to cold solns. of alkalies. C. J. West

**New modification of the Reformatsky reaction.** J. A. Nieuwland and S. Florentine Daly. *J. Am. Chem. Soc.* 53, 1842–6(1931).—A β HO synthesis is obtained from α Cl esters and aldehydes or ketones and Zn, through the action of Cu metal or CuO. The catalytic action of Cu is accounted for by the formation of an intermediate between Cu and the aldehyde or ketone present, which then reacts with the Zn Cl ester compd. of the Cl esters and accelerates the synthesis. $C_6H_6$ is the best solvent, since it brings the temp. into the necessary range. It also keeps free metal surface available since the products are sol. in it. Limited reaction time increases the yield. Yields are given for 10 acids in $C_6H_6$, in PhMe and without solvent. *α Phenyl β hydroxy-β-p-methoxyphenylbutyric acid*, m. 75°, Me ester, $b_{4.5}$ 113–5°. C. J. West

*Preparation of 1,2,3-triaryl-2-hydroxybutyric acids.* D. Ivanov and A. Spassov. *Bull. soc. chim.* [4], 49, 371–5(1931). cf. *C. A.* 25, 2134.—$PhMgBr$, *m*- and *p*-$MeC_6H_4MgBr$ and *p*-$BrC_6H_4MgBr$, when added to $PhCH_2CO_2MgCl$ and to *p*-$ClC_6H_4CH_2CO_2MgCl$ condense with the formation of complexes which hydrolyze to give good yields of the corresponding triaryl substituted hydroxybutyric acids. In the course of the reaction of $PhMgBr$ with $PhCH\cdot CO_2MgCl$, the formation of $PhCH_2Bz$ and $PhCH(COMgCl)MgBr$ (I) is assumed and these, in turn, react to give $PhCH_2C(OMgBr)PhCHPhCO\cdot MgCl$ which on hydrolysis would be transformed into $PhCH_2C(OH)PhCHPhCO\cdot H$. The condensation of $PhMgBr$, *m*- and *p*-$MeC_6H_4MgBr$ with $PhCH_2CO_2MgCl$ gave 61% of *1,2,3 triphenyl 2 hydroxybutyric acid*, m. 176–7°, 61% of *1,3-diphenyl 2 m tolyl 2 hydroxybutyric acid*, m. 158–9°, and 62.5% of *1,3 diphenyl 2 p-tolyl 2 hydroxybutyric acid*, m. 169–70°. With *p*-$ClC_6H_4CH_2CO_2MgCl$ the same Grignard reagents gave 50% of *p*-$ClC_6H_4CH_2C(OH)PhCH(C_6H_4Cl)CO_2H$, m. 183°, 64.5% of *p*-$ClC_6H_4CH_2C(OH)(m\text{-}MeC_6H_4)CH(C_6H_4Cl)CO_2H$, m. 157–8°, and 63.5% of *p*-$ClC_6H_4CH_2C(OH)(p\text{-}MeC_6H_4)CH(C_6H_4Cl)CO_2H$, m. 175–6°. Condensation with *p*-$BrC_6H_4MgBr$ yielded *p*-$ClC_6H_4CH_2C(OH)(p\text{-}BrC_6H_4)CH(p\text{-}ClC_6H_4)CO_2H$, m. 181–2°. On the addn. of 14.8 g. of $PhCH_2Bz$ in $Et_2O$ to I prepd. from 9.65 g. of $PhCH_2Cl$ and heating for 3 hrs., 14.2 g. of $PhCH_2C(OH)PhCHPhCO_2H$, m. 176–7°, was formed. C. R. Addinall

**Phenylacetaldehyde and its polymerization.** James R. Pound. *J. Phys. Chem.* 35, 1174–9(1931), cf. *C. A.* 20, 1986.—$PhCH_2CHO$ (I) on standing undergoes polymerization. The d. and *n* increase, in general, linearly with the time, but the viscosity increases much more rapidly. Crystals of the polymer, m. 104°, finally sep. The rate of formation of the polymer is approx. 3 to 4 times faster at 30° than at 15°, but seems to be const. under const. conditions. The solid polymer dissolves in most solvents as $(C_8H_8O)_x$, but in $CHBr_3$ as $(C_8H_8O)_4$. Its crystal unit is, therefore, $(C_8H_8O)_{16}$. I is not oxidized appreciably in air at ordinary temp. Louise Kelley

**Synthesis of 2,4,5-trimethoxyphenylalanine.** T. Széki and E. Lakos. *Acta Sci. Univ. Francisco Iosephinae, Acta Chem., Mineral. Physica* 1, 157–66(1929).—2,4,5-Trimethoxybenzalhydantoin was made from asarylaldehyde, and on treatment with $Ba(OH)_2$ and $H_2O$ gave *dl* 2,4,5-trimethoxyphenylalanine, m. 217°. Its Et ester HCl, m. 181°, was also produced. S. S. de Finály

**Condensation of monochloromethyl ether with phenylmalonic ester.** M. Gopala Rao and J. L. Simonsen. *Proc. 15th Indian Sci. Cong.* 1928, 149, cf. *C. A.* 14, 2483.—A simple method of synthesizing atropic acid is by treating $PhC(CO_2Et)_2CH_2OMe$ (I) (from $PhCH(CO_2Et)_2$ and $ClCH_2OMe$) with 50% KOH. I with 10% alc. KOH gives methyltropic acid, $PhCH(CO_2H)CH_2OMe$, $b_4$ 164.8° (?). No further information is given. E. J. C.

**Anacardic acid.** A. J. Haagen Smit. *Proc. Acad. Sci. Amsterdam* 34, 165–8 (1931).—Et$_2$O extn. of the *fruits of Anacardium occidentale* gave *anacardic acid* (I) which was purified through its Pb salt. The purified free acid crystd. when seeded with *pelandjauic acid* (II) but the mixed m. p. of I and II showed some depression so it appeared that, though the two were similar, they were not identical. Hydrogenation of I in EtOAc with Pt black gave *tetrahydroanacardic acid* (III), m. 92°. Tetrahydro-II m. 98° and gave a m.-p. depression of 7° with III. III with $FeCl_3$ in EtOH gave a violet color, indicating a OH ortho to $CO_2H$. I lost $CO_2$ at 220°, the same as II, and the product (IV) $b_{4.5}$ 205°. The Me ether (V) of IV $b_{4.5}$ 202°, $d_4^{15}$ 0.9240, $n_D^{15}$ 1.5076, $M_D$ 101.3 (calcd. for $C_{22}H_{34}O$, $M_D$ 100.9) and HI did not split off the Me group. V gave a tetrahydro deriv., m. 30°. The Me ether Me ester of I $b_{4.5}$ 220–2° and yielded the corresponding tetrahydro deriv. (VI), m. 38°. Oxidation of VI with $CrO_3$ gave an acid m. 59° which showed no m. p. depression with palmitic acid but did give de

pressions with stearic and myristic acids so a normal 16 C chain acid was indicated Hydrogenation of IV gave a decahydro deriv (VII), m 31°. VII was dehydrated with $ZnCl_2$ to give a deriv $b_{0.4}$ 180–5° The existence of a double bond was shown by a yellow color with $C(NO_2)_4$ This double bond was reduced catalytically and the resulting hydrocarbon, $b_{0.7}$ 178°, m 25°, $n_D^{20}$ 1 4612, $d_4^{19.5}$ 0 8323, $M_D$ 97 (calcd for $C_{21}H_{42}$ $M_D$ 97), was identical with pentadecylcyclohexane The corresponding hydrocarbon from II $b_{0.4}$ 194°, $n_D^{24}$ 1 4506, $n_D^{37.5}$ 1 4542, $d_4^{18}$ 0 8332, $d_4^{37.5}$ 0 8821, $M_D$ 106 1 (calcd for $C_{23}H_{46}$ $M_D$ 106 2) I is a homolog of II contg 2 less $CH_2$ groups and the following formula is suggested for it $C_4H_3(OH)(CO_2H)(C_{15}H_{27})$ C H Peet

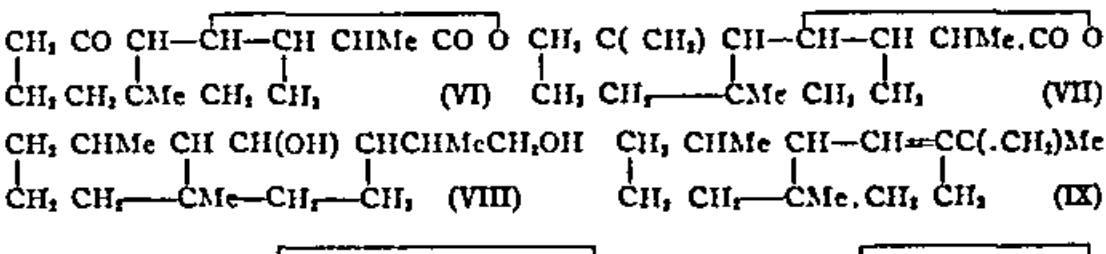
**2,4,5-Trimethoxybenzoic acid, a derivative of dehydrodeguelin.** E P Clark *J Am Chem Soc* 53, 2007–8(1931)—$KMnO_4$ oxidation of dehydrodeguelin in $Me_2CO$ gives a $HO(MeO)_3C_6H_2CO_2H$, m 210° (decompn), gives a blue color with $FeCl_3$ and gives asaronic acid (2 4,5-$(MeO)_3C_6H_2CO_2H$) on methylation Synthesis of the acid is under way C J West

**Condensation of ethyl phenylacetate and ethyl *p*-chlorophenylacetate by means of isopropylmagnesium halides.** D Ivanov and A Spassov *Bull soc chim* [4], 49, 375–7(1931) cf *C A* 23, 2420—Into a flask fitted with a reflux condenser and contg 0 15 mol of iso-PrMgX, 0 1 mol of $PhCH_2CO_2Et$ in $Et_2O$ was added dropwise and the mixt was heated for 2–3 hrs After hydrolysis and extn with $Et_2O$, 25 g of *Et 1,3 diphenylacetylacetate*, $PhCH_2COCHPhCO_2Et$ m 78 0–8 5°, was formed From *p*-$ClC_6H_4CH_2CO_2Et$ was similarly produced *p*-$ClC_6H_4CH_2COCH(p\text{-}ClC_6H_4)CO_2Et$, m 119 20°, in 93% yield The prepn of this compd by the condensation of *p*-$ClC_6H_4CH_2CO_2Et$ with the aid of NaOEt is not possible (*J Prakt Chem* 62, 554(1900)) C R Addinall

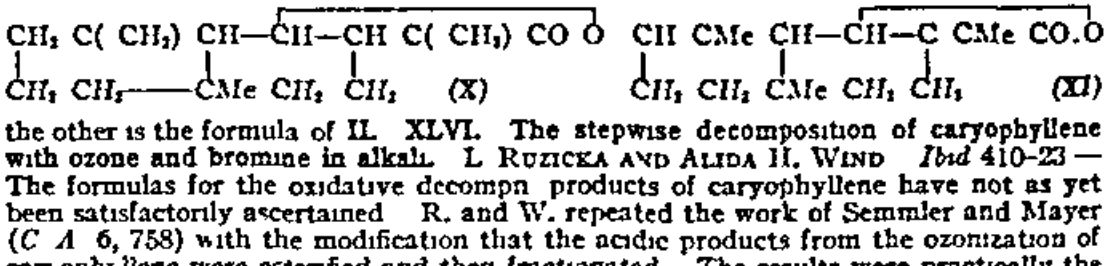
**Preparation of 1-phenyl-2,2-(dialkyl, diaryl or alkylaryl)-2-hydroxypropionic acids.** D Ivanov and A Spassov *Bull soc chim* [4], 49, 377–9(1931)—Ketones react with the complex $PhCH(CO_2MgCl)MgX$ (I) to give, in good yields, substituted hydroxypropionic acids I, prepd from 0 1 mol of $PhCH_2Cl$, was treated with 0 1 mol of the following ketones $Pr_2CO$, MeBz, $(PhCH_2)_2CO$, PhBz and $CH_2(CH_2)_4CO$, giving an 88% yield of $Pr_2C(OH)CHPhCO_2H$, m 171°, $PhMeC(OH)CHPhCO_2H$, m 182–3°, $(PhCH_2)_2C(OH)CHPhCO_2H$, m 183–4° $Ph_2C(OH)CHPhCO_2H$ (II), m 186–7°, and $CH_2(CH_2)_3CH_2C(OH)CHPhCO_2H$, m 135° II was also prepd from PhBz and $PhCH(CO_2Na)MgBr$, this latter being readily obtained from $PhCH_2CO_2Na$ and iso-PrMgBr (Cl) or EtMgBr C R Addinall

**Higher terpene compounds. XLV. Alantolactone and isoalantolactone.** L Ruzicka and J A van Melsen *Helv Chim Acta* 14, 397–410(1930), cf *C A*. 25, 2136—The study of alantolactone (helenin) (I) and isoalantolactone (isohelenin) (II) was undertaken because of the possible derivation of these compds from sesquiterpenes and especially to prove their relationship with santonin I was sepd from elecampane oil together with a *monocyclic sesquiterpene*, $b_{13}$ 135–8°, $d_4^{15}$ 0 8864, $n_D^{15}$ 1 5000, $M_D$ 67 76 (calcd 67 79), which yields eudalin (III) upon dehydrogenation with Se A *liquid* with a formula $C_{15}H_{20}O_2$ identical with that of I and II was also isolated Upon refluxing I or II (which may not be single compds) with Se, 1,7 $C_{10}H_6MeEt$ (IV) (*styphnate* m 125–6°) was obtained IV was oxidized to *1,7 naphthalenedicarboxylic acid* (0 6 g from 3 g of IV), m 294–6° (*di-Me ester* m 86–7°) by means of $K_3Fe(CN)_6$ and *KOH* Treatment of *I* or *II* with $H_2$ in the presence of *PtO* leads to the formation of *tetrahydroalantolactone* (V), m 143–4°, $\alpha_D$ 15 2°, which is either identical or stereoisomeric with deoxytetrahydrosantonin (Clemo and Haworth, *C A* 25, 708) The *dihydro deriv* of I, m 134°, $\alpha_D$ —24 6°, obtained by catalytic hydrogenation, and that of II, m 159–60, $\alpha_D$ 26 2°, could not be isolated in the pure state but are definitely not identical From the products of successive oxidation of impure I by $O_2$ and $KMnO_4$, the keto acid, $CH_2CH_2CH_2COCH_2CMe(CH_2)_2CO_2H$, $b_{0.4}$ 140–1°, m 92–3° (*semicarbazone*, m 183–5°) was isolated as the *Me ester*, the *semicarbazone* of which m 207–8°, in addn, VI, m 203–5°, was also obtained, presumably originating in a *dihydrolactone* (VII), different from either of the dihydro derivs already described Upon reduction of V with Na and alc the *glycol* VIII, $b_{0.4}$ 167–70°, was obtained (16 3 g from 31 g of V) This was transformed into the *dibromide* which upon treatment with quinoline at 250°, yielded the sesquiterpene IX (still contg 1% of O), $b_{12}$ 130–3°, $d_4^{19}$ 0 918, $n_D^{19}$ 1 5104 Dehydrogenation of IX with Se gave *1 methyl 7 isopropenylnaphthalene*,

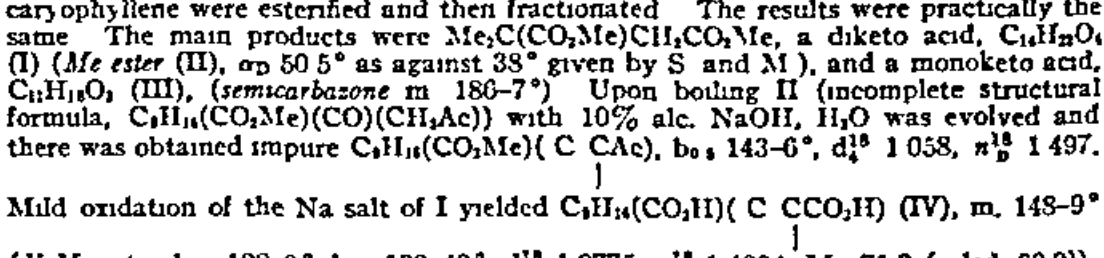
isolated as the *picrate* m 87–8° I and II upon reduction yielded the *unsatd glycol* $C_{15}H_{26}O_2$, $b_{0.4}$ 168–70°, from which no pure dibromide could be obtained As a result of this work R and van M believe that one of the formulas X or XI, is that of I, while



(VI) (VII)



(VIII) (IX)



(X) (XI)

the other is the formula of II. XLVI. The stepwise decomposition of caryophyllene with ozone and bromine in alkali. L Ruzicka and Alida H. Wind *Ibid* 410–23 — The formulas for the oxidative decompn products of caryophyllene have not as yet been satisfactorily ascertained R. and W. repeated the work of Semmler and Mayer (*C A* 6, 758) with the modification that the acidic products from the ozonization of caryophyllene were esterified and then fractionated The results were practically the same The main products were $Me_2C(CO_2Me)CH_2CO_2Me$, a diketo acid, $C_{14}H_{22}O_6$ (I) (*Me ester* (II), $\alpha_D$ 50 5° as against 38° given by S and M ), and a monoketo acid, $C_{11}H_{18}O_3$ (III), (*semicarbazone* m 186–7°) Upon boiling II (incomplete structural formula, $C_8H_{14}(CO_2Me)(CO)(CH_2Ac)$) with 10% alc. NaOH, $H_2O$ was evolved and there was obtained impure $C_8H_{14}(CO_2Me)(C\ CAc)$, $b_{0.5}$ 143–6°, $d_4^{18}$ 1 058, $n_D^{18}$ 1 497.

Mild oxidation of the Na salt of I yielded $C_8H_{14}(CO_2H)(C\ CCO_2H)$ (IV), m. 148–9° (*di-Me ester*, $b_{0.5}$ 128–9°, $b_{0.6}$ 139–40°, $d_4^{18}$ 1 0775, $n_D^{18}$ 1 4894, $M_D$ 71.3 (calcd 69 9)) Oxidation of I obtained directly from the ozonization products also yielded IV besides a *substance*, $b_{0.5}$ 155–60°, $d_4^{20}$ 1 1390, $n_D^{20}$ 1 4873, which may be $C_8H_{14}(CO_2Me)(CO)(CH_2CO_2Me)$ IV does not absorb $Br_2$ (the ester does slowly) but by catalytic hydrogenation, $C_{12}H_{20}O_6$, m 149°, was obtained By ozonizing 1 7 g of IV, and esterifying the acid products (1 6 g ) $C_8H_{14}(CO)(CO_2Me)_2$ (tentative formula), $b_{0.5}$ 135–6°, $d_4^{18}$ 1 0856, $n_D^{18}$ 1 4625, $M_D$ 68 4 (calcd 68 0), was obtained The corresponding acid, m 70°, resists crystn , it loses 1 mol of $H_2O$ at 200°. From the products of the oxidation of III with $Br_2$ in NaOH, followed by esterification, the di Me ester, $C_{12}H_{20}O_6$, $b_{12}$ 140–2°, $d_4^{21}$ 1 048, $n_D^{21}$ 1 4516, $M_D$ 58 7 (calcd 58 7), was isolated The production of this compd by oxidation indicated the presence of the Ac group in III as well as in I. XLVII. Caryophyllenic acid. L Ruzicka, J C Bardhan and Alida H Wind *Ibid* 423–35 — S and M obtained caryophyllenic acid (V), $C_7H_{12}(CO_2H)_2$ by oxidizing some of the products from the ozonization of caryophyllene (VI) R , B and W consider that it was not a single substance They therefore repeated the work of S and M , with the modification that the oxidation products from the treatment of VI with $O_2$ and then with $HNO_3$ were esterified and then fractionated The analyses of 4 fractions b 110–25° agreed with the formula $C_7H_{12}(CO_2Me)_2$ (VII) From VII, b 110–20°, a cryst. product, m 145–50°, was isolated which consisted of a mixt. of V and a homolog $C_8H_{12}O_4$, the fraction b 124–5° yielded a product $b_{0.5}$ 165–70°, m. 66–75°, the analysis of which approached that of V very closely By treatment of VII with PhMgBr and MeMgI, the glycols $C_7H_{12}(CPh_2OH)_2$ (VIII), m 198–9° (15 g from 10 g of VII), and $C_7H_{12}(CMe_2OH)_2$ (IX), m 99–100° (4 5 g from 11 5 g of VII), were obtained *Oxidation of VIII and IX with $CrO_3$* seemed to proceed in different directions, from VIII, 1 7 (and 1 8) mols. of PhAc, 0 5 (and 0 6) mol of $Me_2C(CO_2H)CH_2CO_2H$ and a small quantity of BzOH were obtained IX underwent rearrangement during the oxidation, for it yielded $CH_2(CMe_2CO_2H)_2$ By boiling VIII with HOAc and with a mixt of HOAc and $HCO_2H$, the compd $C_{28}H_{20}$, $b_{0.2}$ 235°, and the unsatd alc , $C_{28}H_{22}O$, $b_{0.5}$ 240°, resp , were obtained Upon ozonization of the last compd PhAc resulted VII was carefully sapond with 1 mol of KOH, yielding *mono Me caryophyllenate* (X), $b_{0.4}$ 130–4°, this was converted with $SOCl_2$ into $C_7H_{12}(CO_2Me)(COCl)$ (XI), $b_{13}$ 115–8°, and this further into the amide, $C_7H_{12}(CO_2Me)(CONH_2)$, $b_{0.5}$

135°, which crystallizes very slowly. A compd., $b_{0.3}$ 240°, between 1 mol of $NH_2NH_2$ and 2 mols of XI was also obtained by mixing the constituents with the hope of obtaining the hydrazide of X. This series of compds is to be subjected to oxidative decompn. I. M. LEVINE

**Sesquiterpene alcohol of Cryptomeria japonica, D. Don.** Y. SUGII AND T. SENGOKU *J. Pharm. Soc. Japan* 51, 196–9(1931), German abstr. 21.—S. and S. isolated from *Cryptomeria japonica*, D. Don, a compd., $C_{15}H_{26}O$ (I), m. 84°, $[\alpha]_D^{19}$ 19.78° (in alc.). I corresponds to the *cryptomeradol* of Wienhaus and Schölz (*C. A.* 24, 1932) and did not depress the m. p. of the *machilol* of Takagi. Oxidation of I gave a compd. which did not depress the m. p. of *dihydroxymachilol* (m. 110°), the *monobenzoate* (m. 144–5°) did not depress the m. p. of *dihydroxymachilol monobenzoate* (*loc. cit.*). F. I. N.

**Bitter principles from alant root (preliminary communication).** KARL FR. W. HANSEN. *Ber.* 64B, 67–71(1931).—Alant root contains, in addn. to the known alantolactone, $C_{15}H_{20}O_2$ (I), m. 76°, and isoalantolactone (II), m. 115°, a 3rd bitter principle, $C_{15}H_{22}O_2$ (III), m. 174°, which is also a lactone. The starting material was Merck "Helenin (alant camphor)," but as the prepn. of the 3 compds. in pure form by crystn. was very tedious and time consuming a process was devised which, although it involved considerable losses, gave pure, readily crystd. products, identical with those obtained by crystn. The amides of the corresponding alantolic acids, obtained with alc. $NH_3$, are especially well adapted to the characterization of I and II but III gives no amide. The stability of the lactone ring in III is also shown in the behavior toward alkali. I and II yield the HO acid with boiling aq. alkalies while III requires alc. KOH. Contrary to the analyses reported by Bredt and Posth and by Sprinz for the amides obtained from I and II, which agree with the values calcd. for $C_{15}H_{20}O_2 + NH_3$, the compds. obtained in this work, although having the same m. ps. as those given by the earlier workers, have a quite different compn. Presumably these amides have a considerably more complicated structure than was assumed by Bredt and by Sprinz, the numerous analyses made would indicate that they contain 2 mols. lactone per mol. of $NH_3$. III is apparently a dihydro deriv. of II, which gives I with Na Hg. On dehydrogenation with Se, I, II and III give 1,7 $C_{10}H_6MeEt$ (IV), whose picrate (m. 101°) and styphnate (m. 126°) did not depress the m. ps. of prepns. furnished by Ruzicka who obtained the hydrocarbon by dehydrogenation of hexahydrosantenin (R. and Eichenberger, *C. A.* 25, 961) and of helenin and isohelenin (van Melsen, *Diss. Utrecht*, 1929). Of the two C atoms split off in the dehydrogenation, one presumably belongs to the C:O of the lactone ring and the other, as in eudesmol, is probably attached to a quaternary ring C atom, complete hydrogenation of the lactones and subsequent dehydrogenation with Se again gave IV and in somewhat better yield than did the non hydrogenated lactones. The 3 bitter principles are apparently sesquiterpene lactones of the eudesmol type. They were obtained by distg. the com. "Helenin (alant camphor)" in a high vacuum, treating the crystd. distillate in cold alc. with $NH_3$, filtering off the alantol- and isoalantolamides and recrystg. the residue from the mother liquors from AcOH. The III has a mol. wt. of 240 in camphor. The 2 amides are sepd. by crystn. from AcOEt and $Me_2CO$ and converted back into the lactones by dry distn. *in vacuo*. Amide from I, m. 205–6° (Bredt and Posth, 197°), Ac deriv., m. 180°. Amide from II, m. 247° (Sprinz, 237–9°), C 74.87, H 9.00, N 3.00%, Ac deriv., m. 216–7° (S., 212°), N 2.85%. IV with $K_3Fe(CN)_6$ gave 1,7-$C_{10}H_6(CO_2H)_2$, m. 265–6° (van Melsen gives 295–6° for the pure acid). C. A. R.

**Amyrins and attempts to clarify their constitution.** H. DIETERLE, A. SALOMON AND E. HERZBERG. *Arch. Pharm.* 269, 78–87(1931).—The amyrins required in the present study were prepd. *in accordance with a procedure duplicating in part the* methods of both Horrmann and Vesterberg. By oxidation with $CrO_3$ Vesterberg obtained α amyrone, $C_{30}H_{48}O$, a result corroborated by the present authors. Entirely different results were obtained, however, when oxidation was carried out in the presence of $H_2O$ vapor, a method previously employed by Windaus with cholesterol, and by D. with lupeol. In addn. to the volatile products AcMe and $CO_2$, as also minute quantities of a pleasant smelling substance, a non volatile *compd.*, $C_{21}H_{34}O$ (*hydrazone*, $C_{21}H_{36}N_2$, m. 224°), m. 89–90°, $[\alpha]_D^{20}$ 123.2°, and amyrone (*hydrazone*, $C_{30}H_{50}N_2$, m. 252°), were isolated. While amyrin is apparently unaffected by $KMnO_4$ in either alk. or acid soln., it is converted by $HNO_3$ into the 2 *products*, $C_{23}H_{30}N_2O_{10}$ and $C_{23}H_{32}N_2O_{10}$, the former m. 171°, the latter, yellow, m. 185–6°, both representing tribasic acids of the probable compn. $C_{20}H_{27}(NO_2)_2(CO_2H)_3$ and $C_{20}H_{29}(NO_2)_2(CO_2H)_3$. $O_3$ converts amyrin into a *dibasic* and a *tribasic acid*, $C_{23}H_{32}O_4$ and $C_{23}H_{36}O_6$. Since these acids are unaffected by Br, they contain no double bonds. On dehydration *via* Diels, amyrin

yields 3 different *hydrocarbons*, $C_{21}H_{36}$, $C_{21}H_{38}$ and $C_{21}H_{34}$, the constitutions of which are at present unknown. Attempts to convert α amyrin into the β form, and *vice versa*, were unsuccessful. On conversion of β amyrin into the formate, with subsequent sapon., an isomeric *substance*, γ amyrin, m. 168.9°, $[\alpha]_D^{20}$ 42°, resulted, which yields the hydrocarbon *γ-amyrilene*, $C_{30}H_{48}$, m. 175°, $[\alpha]_D^{22}$ 54.1°, reducible by HI to the *hydrocarbon*, $C_{30}H_{50}$ (amyrene), thick yellow oil, $b_{14}$ 120°, $[\alpha]_D^{22}$ 44.9°. W. O. F.

**The Plöchl reaction. Aminocamphor and formaldehyde.** H. Rupe, Fr. Buxtorf and W. Lutz. *Helv. Chim. Acta* 13, 1026-30(1930).—Attempts to prep. dimethylaminocamphor (I) through Plöchl's reaction (heating the amine HCl with HCHO) gave camphorquinone (II) and $(Me_2NCH_2)_2$ (III) instead of I. Aminocamphor HCl (IV) heated with $H_2O$ gave no II and I HCl treated similarly gave only a small amt. of II. I HCl treated with HCHO gave a fair amt. of II but no III. Since the conversion of I or IV into II involves an oxidation the following mechanism, which accounts also for the formation of III, is suggested. $Me_2NH$ is split off from I and 2 mols. of this react with 2 mols. of $CH_2(OH)_2$ to give III, O and $H_2O$. C. H. Peet.

**α-Carboxycamphocean-β-acrylic and -β-propionic acids. Synthesis of β-homocamphor.** F. Salmon Legagneur. *Compt. rend.* 192, 748-50(1931), cf. Bredt, *et al.*, *C. A.* 12, 1774.—Camphoric acid semialdehyde, $HO_2CC_8H_{14}CHO$, treated with $SOCl_2$ then MeOH, gave the Me ester, $b_{12}$ 136°. This was condensed with Zn and $BrCH_2CO_2Et$, forming the mixed ester of α-carboxycamphocean β acrylic acid, $MeO_2CC_8H_{13}CH{:}CHCOOEt$, m. 53°, $[\alpha]_D^{21}$ −92.2° in MeOH. The free acid (I) obtained by sapon. m. 174-6°, $[\alpha]_D^{23}$ 58.8° in MeOH. I does not decolorize cold Br but can be oxidized by alk. $KMnO_4$ to camphoric acid. Reduced in presence of PtO by Adam's method it yielded α-carboxycamphocean β propionic acid, $HO_2CC_8H_{14}(CH_2)_2CO_2H$, shiny plates, m. 151°, $[\alpha]_D^{19}$ 38.1° in MeOH, the Pb salt of which, heated in a current of $CO_2$, gave 45% of β homocamphor, $C_8H_{14}\underline{CH_2 CH_2 CO}$, m. 202-4°, $[\alpha]_D^{12}$ 111.2° in MeOH.

β Homocamphor is very sol. in org. solvents and is readily sublimed or steam-distd. Oxime, m. 105°, semicarbazone, m. 245°. L. E. Gilson.

**Oxidation of 5-hydroxycamphor from camphorol.** Yasuhiko Asahina and Morizo Ishidate. *Ber.* 64B, 188-92(1931).—The camphorol of Schmiedeberg and Meyer was recently shown to be a mixt. of 3- and 5-hydroxycamphor yielding on oxidation camphorquinone (or camphoric acid) and *p*-diketocamphane (I) (*C. A.* 22, 2161) and I later isolated the 5-HO compd. (II) from the camphorol (*C. A.* 22, 3406). By purification through the Ac deriv. or by boiling with KOH the m. p. of II has been raised to 222° and it was found that it gives I on oxidation only at high temps. and with an excess of acid, at lower temps. and in as dil. acid as possible there is formed a lower melting mixt. (around 200°) of I and a stereoisomer which decolorizes $KMnO_4$ in $H_2O$ or $Me_2CO$ and Br in $CHCl_3$, but on repeated crystn. is stabilized to I. The new product is autoxidizable in solid form as well as in soln. An aq. or alc. soln. which has stood a long time or a prepn. which has been exposed to the air reacts decidedly acid in $H_2O$ or alc. The unsatd. nature of the product is undoubtedly due to enolization and it is the enol which takes up O and changes into an acid. From a prepn. a month old was isolated an *acid*, $C_{10}H_{16}O_4$ (III), m. 250-1°, also obtained, with considerable unchanged I, with $KMnO_4$. As III gives a *disemicarbazone* (m. 251°), is stable toward cold $KMnO_4$, and does not reduce $NH_3$-$AgNO_3$, it is probably *1,5,5-trimethylcyclopentane 2,4-dione 1-acetic acid*. *5 Acetoxycamphor semicarbazone*, m. 180-5°. The enol content of various prepns. of the oxidation product II, as detd. by the Meyer Br titration method, ranged from 0.50% for a product m. 210° to 5.70% for a product m. 200° which had stood 1 month. C. A. R.

**Catalytic reduction of benzidine.** F. Balas and P. Ševčenko. *Collection Czechoslov. Chem. Comm.* 3, 171-6(1931).—$(p\text{-}NH_2C_6H_4)_2$ (I) (10 g.) in 150 cc. of glacial AcOH, shaken with 120 cc. of colloidal Pt (Skita), contg. 2 g. of Pt, at 0.1 atm. and 50°, absorbed the theoretical amt. of $H_2$ for complete reduction in 18 hrs. The solvents were distd. off *in vacuo*, the residue was dissolved in abs. EtOH, the Pt was filtered off, most of the EtOH was removed *in vacuo*, the bases were pptd. with dil. NaOH, mixed with much $H_2O$, extd. with $Et_2O$ and distd. at 0.8 mm. Most of the distillate was $(p\text{-}NH_2C_6H_{10})_2$ (II), $b_{0.8}$ 120°, m. 59°, colorless, turning yellow brown in the air, smelling like $C_6H_{11}N$, strongly basic, easily sol. in MeOH, EtOH and in dil. org. and inorg. acids, less sol. in $Et_2O$, $CHCl_3$ and PhH and very slightly sol. in $H_2O$. II does not give the characteristic reactions of I. No cryst. salts of II could be obtained but a *di HCl salt*, darkening at 260° and decompg. at 290°, was obtained by passing dry HCl gas

into II in anhyd $Et_2O$, and a *dipicrate*, dark red needles darkening at 235° and decompg *explosively* at 247°, was obtained in abs EtOH $NH_3$ corresponding to over 60% of the I was obtained from the acid reduction medium and unidentified amorphous by products of high mol wt which decompd on attempted distn were left after extn of the II. *Bicyclohexane* was not found C H Peet

**Addition of free radicals to unsaturated compounds (preliminary paper).** J B Conant and H W Schiefp *J Am Chem Soc* 53, 1941–4(1931) —$Ph_3C$ and $CH_2$ - $CMeCH$ $CH_2$ in N or $Ph_3CCl$, $CH_2$ $CMeCH$ $CH_2$ and Hg in $C_6H_6$ give *1,4 bis(triphenylmethyl) 2 methyl 2 butene*, m 163–4°, the structure was established by the action of $O_2$, giving $Ph_3CCH_2CO_2H$ and *1,1,1 triphenylbutan 3 one*, m 140.5–1°, also obtained from $Ph_3CCH_2COCl$ and MeZnCl $CH_2$ $CMeCMe$ $CH_2$ and $Ph_3C$ give the *compd* $C_{41}H_{40}$, m 240° (decompn.), $O_2$ gives $Ph_3CCH_2Ac$ C J West

**Action of cyanoacetic acid on triphenylcarbinol. Synthesis of triphenylmethylcyanoacetic and *N*-triphenylmethylmalonamic acids.** R Fosse *Bull soc chim* [4], 49, 159–73(1931) cf *C A* 1, 2797 —$Ph_3COH$ reacts with $NCCH_2CO_2H$ to give $Ph_3CCH(CN)CO_2H$ (I) by elimination of $H_2O$ and also by addn., forming a new type of acid, *N* triphenylmethylmalonamic acid, $Ph_3CNHCOCH_2CO_2H$ (II), the *N* $Ph_3C$ deriv of the yet unknown malonamic acid The sirup like liquid formed by heating 10 g of $Ph_3COH$ in 25 g of $NCCH_2CO_2H$ for 4 min on the steam bath was freed from excess $NCCH_2CO_2H$ by treatment with $H_2O$, and was agitated with 100 cc anhyd $Et_2O$ in a stoppered flask On addn of petroleum ether to the ether soln dried over $Na_2SO_4$, and on standing for 24 hrs crystals were formed which gave off $H_2O$ at 60° *in vacuo* to form I, m 155° Heated to 160–70°, $CO_2$ was evolved with formation of $Ph_3CCH_2CN$ (III), m 140° after recrystn from EtOH (*C A* 23, 4025) III was also prepd by the action of $Ph_3COH$ on $NCCH_2CO_2H$ at 110–5°, and by evapn to dryness of a soln of $Ph_3CCH(CN)CO_2Na$ To establish the constitution of I and III, the latter was hydrolyzed by heating with alc KOH to 280° for 20 min to $Ph_3CCH_2CO_2H$, which in turn was prepd by the fusion of $Ph_3COH$ with $CH_2(CO_2H)_2$. $Ph_3C$-$CH_2CONH_2$ was formed by refluxing 10 g of $Ph_3CCH_2CO_2H$ with 3.5 g of $PCl_3$ in 60 cc *dry PhH for 20 hrs., and passing dry $NH_3$ into the cooled soln* (*C A* 21, 2670) The amide was then transformed into III by refluxing with $PCl_3$ in PhH for 4 hrs The ether insol residue (II) from the prepn of I, when recrystd from $CHCl_3$, m 175°, giving off $CO_2$ and forming $Ph_3CNHAc$ (IV), m 211°, identical with the product of the action of $Ac_2O$ on $Ph_3CNH_2$ (*Ber* 17, 744(1884)) or by the fusion of $Ph_3COH$ with $AcNH_2$ at 210–40° for 45 min in the presence of a trace of $H_2SO_4$. It was hydrolyzed by 90% $H_2SO_4$ to $Ph_3COH$, $NH_3$ and AcOH II is therefore $Ph_3CNHCOCH_2CO_2H$, m 175° C R Addinall

**Combinations among certain dyestuff radicals.** M Rebek. *Collection Czechoslov Chem Comm* 3, 155–70(1931) —$(p\text{-}Me_2NC_6H_4)_3COH$ (I) condensed with $[2,4\text{-}(O_2N)_2C_6H_3]_3CH$ in boiling $Me_2CO$, in $PhNO_2$ at 120–5° or by melting the components together, to give a compd (II) which was pptd by addn of $Et_2O$ On recrystn from $Me_2CO$, II yielded large green crystals with a golden glance which analyzed as $C_{41}H_{35}O_{12}N_9 \cdot 3Me_2CO$ Mol.-wt detns (f p) in $PhNO_2$ indicated 2 mols of $Me_2CO$ of crystn Similarly, I condensed with *[2,4,6-(O₂N)₃C₆H₂]₂NH (III)* to give long green crystals which analyzed as $C_{37}H_{31}O_{12}N_{10}Me_2CO$ (IV) and this formula was confirmed by a mol.-wt. detn IV reacted with $I_2$ in $CHCl_3$ to give a triiodide 3,4 $Me(H_2N)C_6H_3C(OH)(C_6H_4NH_2(p))_2$ condensed with III to give $C_{71}H_{52}O_{12}N_{10}$ (V) The rate of reaction for each of these condensations was followed *via* the cond changes of their $Me_2CO$ or $PhNO_2$ solns and these data are tabulated The reactions which give IV and V were instantaneous but, probably because both the pseudo base and pseudo acid involved must change to the true base and true acid form preliminary to the formation of the dye salt, II was formed slowly Color changes occurred at definite dilns II and IV exhibited identical absorption in the yellow and green regions and spectral examn indicated that the optical effect is additive An approximation to Lambert and Beer's law was observed C H Peet

**Triphenylmethane dyes derived from quinoline, tetrahydroquinoline, diphenylamine and carbazole.** Rajendra Nath Sen and Bhola Nath Sen *J Indian Chem Soc* 7, 965–72(1930) —Two mols of quinoline (I) condense with 1 mol of an aromatic aldehyde in the presence of concd HCl to form a leuco base oxidizable by $PbO_2$ to a carbinol, the linkage taking place at the 6-position of I since the 6-nitro deriv. of I did not condense The reaction is greatly retarded by the presence of a *m*-acidic substituent in the aldehyde. Aliphatic aldehydes did not condense Tetrahydroquinoline (II) and its *N*-Me deriv condensed more easily than I, the greater activity of the 6-H and stronger basicity of the products being due to the ring N atom which is doubly linked

in I, but singly in II to form a secondary (alkylated) amine. Phenylation of the amino group as in $Ph_2NH$ greatly retards the reactivity of the *p*-H, but methylation of the imino H in this compd markedly increases the reactivity of the *p*-H. Carbazole condensed less readily and methylation had less effect, showing that the influence of the NH group is affected when the N forms part of a ring. The II complex exerts a stronger auxochromic influence than the I complex. The following diquinolylmethanes were prepd. *phenyl*, by heating 14 cc. I, 6 cc. BzH, and 15 cc. concd. HCl 20 hrs. on the *water bath, extg. with 100 cc. $H_2O$, making alk. with NaOH, removing excess* BzH by steam distn., repptg. the product from AcOH with $NH_4OH$, and crystg. from equal parts of EtOH and AcOH (yield 30%), dyes wool and silk light green (*chloroplatinate*, m. 230°, *picrate*, m. 199°). *p-methoxyphenyl*, from I and anisaldehyde, orange-yellow; *o-hydroxyphenyl*, m. 157–60°, light yellow, *p-hydroxyphenyl*, m. above 263°, brownish red, *p-nitrophenyl*, m. 108°, light green (the *o*- and *m*-compds. were not obtained pure), *dimethyl-p-aminophenyl*, m. 168–70°, brown, *2,4-dihydroxyphenyl*, m. above 240°, orange (*Ac deriv.*, decomps. without melting; *di Ac deriv.*, m. above 267°, *di-Ag salt*, red flakes). *Ditetrahydroquinolylmethanes: m-hydroxyphenyl*, by heating 6 g. II and 2.8 g. *m* $HOC_6H_4CHO$, with 25 cc. 20% HCl 5 hrs. on the water bath, and working up as before, m. above 256°, light brown, *m-nitrophenyl*, m. 212° (decompn.), bright green, *furfuryl*, *p-methoxyphenyl*, light bluish green, *o-hydroxyphenyl*, m. 163–4°, bluish green *p-hydroxyphenyl*, m. 225°, bluish ash; *dimethyl-p-aminophenyl*, softens about 10°, yellowish brown, *2,4-dihydroxyphenyl*, m. above 235°, reddish brown. *p',p"-Diphenyldiaminotriphenylmethane*, by refluxing for 13 hrs. 10 g. $Ph_2NH$, 3 cc. BzH, and 30 cc. EtOH, and recrystg. the insol. product from EtOH and AcOH (1:2), green powder (*disulfonic acid*, by heating 5 g. with 15 cc. concd. $H_2SO_4$ 10 hrs. on the water bath, green plates from EtOH), *o HO deriv.*, from $Ph_2NH$ and salicylaldehyde, green powder, *3,4-methylenedioxy deriv.*, from $Ph_2NH$ and piperonal, green powder. *Diphenyldiaminodiphenylmethane*, from $Ph_2NH$ and HCHO, bluish green powder. *Dimethyldiphenyldiaminotriphenylmethane*, by heating $Ph_2NMe$ and BzH 0.5 hr. on the water bath without a condensing agent, m. 144–6°, greenish. *Dimethyldiphenyldiaminodiphenylmethane*, from $Ph_2NMe$ and HCHO, dark green powder. *Phenyldicarbazolemethane*, from carbazole and BzH, m. above 260°, faint green, *di N-Me deriv.*, from *N* methylcarbazole and BzH, m. 149°, bluish green. R. C. Elderfield

**Mixed benzoins. IV. Determination of the structure of mixed benzoins by the Beckmann reaction.** Johannes S. Buck and Walter S. Ide. *J. Am. Chem. Soc.* 53, 1912–7(1931); cf. *C. A.* 25, 2713.—The structures of 7 mixed benzoins, obtained by the usual KCN condensation have been detd. by means of a 2nd type Beckmann reaction. The results, interpreted according to Werner's views of the Beckmann rearrangement, give structures in agreement with those detd. by independent methods. The compds. studied were $ClC_6H_4CH(OH)COC_6H_3(OMe)_2$, $ClC_6H_4CH(OH)COC_6H_4OMe$, $ClC_6H_4CH(OH)COC_6H_4NMe_2$, $ClC_6H_4CH(OH)COC_6H_3O_2CH_2$, $PhCH(OH)COC_6H_4OMe$, $PhCH(OH)COC_6H_3O_2CH_2$, $PhCH(OH)COC_6H_4NMe_2$. The *oximes* of these m. as follows: 149°, 144°, 156–8°, 149°, 140°, 158°, 140°. The yields of aldehyde and nitrile obtained in the Beckmann reactions are listed. C. J. West

**Cyclohexanone-benzil.** Charles F. H. Allen. *Can. J. Research* 4, 264–74 (1931).—Cyclohexanone and benzil in the presence of a small amt. of NaOMe formed an addn. product which is a "semicyclic" 1,4-diketone. No derivs. of a bicyclic cycloheptane were found. Its most conspicuous chem. property is its sensitivity to mineral acids. Among the reaction products was found a diphenyltetrahydrocoumarone. Although the addn. product exhibits the phenomenon of halochromism the existence of a perchlorate is doubtful and it did not form a free radical. Analysis of cyclohexanone-benzil gave C 77.5, H 6.5%, mol. wt. 300–6 (calcd. for $C_{21}H_{20}O_3$: C 77.9, H 6.5%, mol. wt. 308). Reactions of cyclohexanone-benzil with the OH and C:O groups and with acidic and dehydrating reagents were studied. J. W. Shipley

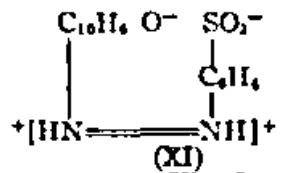
**Naphthalene series. III. Action of bisulfite on *p*-nitrobenzeneazo-β-naphthol.** N. N. Vorozhtzov and P. A. Bielov. *Ber.* 64B, 77–83(1931); cf. *C. A.* 23, 2434, Turski, Pulawski, Hildebrand and Bortnowoska, *C. A.* 23, 2037.—Acid sulfites with azo dyes generally give bisulfite compds. from which the original dye can be regenerated by hydrolysis or by adding alk. reagents to their aq. soln. Of these dyes *p*-nitrobenzeneazo-β-naphthol (parared) (I) was of special interest because of its practical importance and also of the presence of a $NO_2$ group, which is not indifferent toward $SO_2$ and sulfites. V. had found 15 yrs. ago that I, probably because of its slight soly., reacts with $NaHSO_3$ considerably more slowly than the other azonaphthol dyes studied, yielding in every case as an end product the yellow crystals of a bisulfite compd. (or a mixt. of several), if the reaction is carried out under sufficiently rigorous conditions

the bisulfite compd on decompn yields a dye quite different from the original I; it contains S (apparently as $SO_3H$), dissolves in aq alkalies (even carbonates) and contains a primary diazotizable $NH_2$ group. The new dye gives with excess of $NaHSO_3$ the bisulfite compd. to be expected of naphthol dyes. These expts are described in a sealed report filed in 1916 with the *Gesellschaft zur Mitwirkung an der Verbesserung und Entwickelung der Textilindustrie in Moskau*, and the work has been taken up again because of the appearance of the paper by Turski, *et al.*, who found $H_2NC_6H_4N{:}NC_{10}H_6OH$ and $HO_3S(H_2N)C_6H_3N{:}NC_{10}H_6OH$ among the products. As far as can be judged from the *Chem. Zentr.* abstr. of their paper, they give no complete explanation of the course of the reaction, and V. and B. have endeavored especially to det. whether the reaction begins with the reduction of the $NO_2$ group or whether the formation of the bisulfite compd. is the 1st step. They found that under mild conditions I and $NaHSO_3$ give a compd. (*II*) of the compn. $I.NaHSO_3$ which readily regenerates the original I and has all the properties (as regards hydrolytic cleavage by dil., by acids or by alkalies) characteristic of the azonaphthol dye derivs. of this type. In agreement with the views previously developed, II must have the structure $C_6H_4{:}CH{:}CH{:}C(OH)(OSO_2Na){:}C{:}NNHC_6H_4NO_2$. The II is obtained in 2.5 g. yield

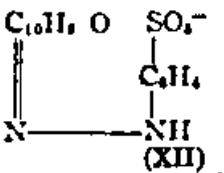
by refluxing 14.65 g. I with 75 cc. $CHCl_3$, 150 cc. alc., 125 cc. $NaHSO_3$ soln. (33.8% $NaHSO_3$) and 70 cc. $H_2O$ 20–5 hrs., filtering hot from the unchanged I and cooling to 25°. It is sol. in about 150 parts $H_2O$, forming orange-red concd. and yellow dil. solns., in concd. aq. soln. it begins to decomp. at 60–5°. With concd. solns. of $CaCl_2$, $BaCl_2$, $NiCl_2$, $CuSO_4$, $Pb(NO_3)_2$, $AgNO_3$ it at once forms ppts. which are yellow in the presence of $H_2O$ but assume a deeper color when dried in the air or in desiccators, the *Ba compd.* has the compn. $C_{22}H_{12}O_{12}N_4S_2Ba \cdot H_2O$, and the *Cu salt* contains $8H_2O$. The dissocn. of II in aq. solns. of various concns. at 25° was followed by iodometric titration, the amt. of titratable $SO_2$ in % of total $SO_2$ after 24 hrs. increased from 6.68 in $^1/_{100}$ to 11.08 in $^1/_{1000}$ *N* soln. In 50 cc. 0.01 *N* soln. of II, 25 cc. $H_2O$ and varying amts. of $NaHCO_3$, the titratable $SO_2$ increased from 5.58% with 0 equiv. $NaHCO_3$ to 73% with 10 equivs. $NaHCO_3$. In 25 cc. 0.01 *N* II and 25 cc. $H_2O$ with varying amts. of HCl, the titratable $SO_2$ decreased from 9.2% with 0 equiv. HCl to 3.84% with 0.05 equiv. HCl and 1.56% with 10 equivs. HCl. C. A. R.

Constitution of the azo indicators. I. α-Naphthol orange. K. H. Slotta and W. Franke. *Ber.* 64B, 86–94(1931).—α-Naphthol orange (I), compared with other compds. of similar mol. wt. contg. a $SO_3H$ group, is strikingly little sol. in $H_2O$, indicating that there is some point in its mol. which can extremely readily bind the H nucleus of the $SO_3H$ acid to form an inner salt. This was confirmed in attempts to det. the acid const. of I by cond. methods, the cond. of I in $H_2O$ is so small (of the order of magnitude of the cond. water used) that it could not be detd. The question now again arose whether the dissocn. of one H atom suffices for the indicator color change or whether the H of the phenolic OH must also dissoc. Conductometric titration of I showed that the color change to red occurred simultaneously with the 1st break in the titration curve on addn. of exactly 1 equiv. of alkali, the dissocn. of the 2nd H on further addn. of alkali, manifested by a 2nd break in the curve when the 2nd equiv. of alkali has been added, is without optical effect. This 2nd H atom can smoothly be replaced by alkyls in alk. soln. and the alkylated products do not lose their indicator properties. Alk. $Me_2SO_4$ gives only the mono-Me deriv. (III), almost identical with I itself as regards the color change interval and the half-value stage (*i. e.*, the $p_H$ at which 50% of the red and yellow forms are present). The same is true of the other monoalkyl derivs. obtained with $Et_2SO_4$, *p*-$MeC_6H_4SO_2Pr$, *p*-$MeC_6H_4SO_2Bu$ and heryl bromide, the introduction of the alkyls merely deepening the limiting colors. The covering power is also materially increased. Below are given the properties of I and its *Me* (II), *Et* (III), *Pr* (IV), *Bu* (V) and *heryl deriv.* (VI), resp.: Color change interval, 7.4–8.9, 7.4–9.0, 7.3–8.9, 7.4–8.9, 7.3–9.0, 7.4–8.9; half-value stage, 8.27, 8.25, 8.23, 8.26, 8.33, 8.27; alk. color, gray pink, blue-pink, rose-crimson, crimson, crimson, crimson; acid color, pale yellow green, yellow green, yellow, golden yellow, golden yellow, golden yellow, amt. of indicator for equal covering power, 100, 90, 75, 70, 75, 60. In view of this similarity in properties, all these indicators must have the same structure. The Me group in II is not split off by const.-boiling HI, indicating that it is not on the phenolic HO or the $SO_3H$ group. Only with $NH_4I$ above 200° is MeI split off, and even then only 0.5 of the calcd. amt. is given off. *p*-$H_2NNMeC_6H_4SO_3H$ (VII) behaves in exactly the same way, showing that in II the Me is on one of the azo N atoms. With alk. $Na_2S_2O_4$ II gives as one of the cleavage products 1,4-$C_6H_3(OH)$-$NH_2$ (VIII) which was detected by covering the reaction mixt. with $Et_2O$; the VIII

dissolved in the Et$_2$O with blue violet color as fast as formed and, after evapn of the ether, was isolated as the yellow *N p-nitrobenzoyl deriv*, decomps 276°, by treatment in C$_5$H$_5$N with O$_2$NC$_6$H$_4$COCl This shows that the Me in II is on the N attached to the C$_6$H$_4$ ring and hence that it is not the H on this N which is responsible for the indicator properties of these compds The other N atom could not be alkylated with any of the above agents but solid II in Et$_2$O suspension gave on long standing with CH$_2$N$_2$ a red orange *di Me deriv* (IX) which is insol in H$_2$O and in aq Me$_2$CO and shows no color change with alkalies, with Na$_2$S$_2$O$_4$ in hot MeOH it yields 1,4 C$_{10}$H$_4$(OH)NHMe (X) which splits off no MeI with HI-P and is distinctly sol in alkalies, showing that the Me is on the N and not on the HO group These facts indicate that the yellow acid ' form of I has the double zwitterion structure XI; as the $p_H$ of the soln is raised a H nucleus is withdrawn from the azo N atom whose attached ring is best adapted to a neutralization of the unions set free by becoming quinoid (the C$_{10}$H$_6$ nucleus), giving the deeply colored *p*-naphthoquinonephenylhydrazonesulfonic anion (XII), whose hydrazone H can be substituted by the usual alkylating agents If these views are correct, it should be possible to obtain the di Me deriv directly from the "acid ' form of I, and as a matter of fact the solid I allowed to stand some hrs with CH$_2$N$_2$ in Et$_2$O changes into the red di Me deriv I (90% from diazobenzenesulfonic acid and α naphthol in HCl I tOH), decomps 200° II (yield, almost quant ), needles with green luster, decomps 260° *p Methoxyazobenzene p-sulfonic acid*, which is the product obtained under the same conditions from HOC$_6$H$_4$N NC$_6$H$_4$SO$_3$H, is light brown and gives no color change with alkali III (3 6 g from 3 3 g I), green brown, decomps 263-5° IV (75% yield), green black, decomps 268°. V (64%), decomps 269-70°. VI (22%), green, decomps 267° IX, m 178° *N p-nitrobenzoyl deriv* of X, yellow, m 216°.



(XI)



(XII)

C A R.

**Asymmetric synthesis. IX. Preparation of optically active substituted glycolic acids from *l*-menthyl and *l*-bornyl α-naphthoylformates.** Alex. McKenzie and Patrick D Ritchie *Biochem Z* 231, 412-22(1931) —*l Menthyl α naphthoylformate*, α C$_{10}$H$_7$COCO$_2$C$_{10}$H$_{19}$ (I), m 88 5-9°, was prepd from naphthoyl formamide (II) and *l* menthol It showed slight mutarotation in PrOH, iso-BuOH, and EtOH, the *l* rotation increasing PhMgBr and I on hydrolysis give phenyl α naphthylglycolic acid, both as racemic and optically active acid, $[\alpha]^{25}_{5461}$ —16 4° Similarly, methyl and ethyl α naphthylglycolic acids were obtained as *dl* and *l* acids, $[\alpha]^{25}_{5461}$ —30 7° (methyl), $[\alpha]^{25}_{5790}$ —6 8° (ethyl) *l Bornyl α naphthoylformate* (III), m 69 5-70 5°, was prepd from II and *l* borneol and showed mutarotation in EtOH, $[\alpha]^{25}_{5461}$ —26° to —27° Methyl α naphthylglycolic acid prepd from III and MeMgI occurred as the *dl* and *l* acids, $[\alpha]^{25}_{5461}$ —34 1°

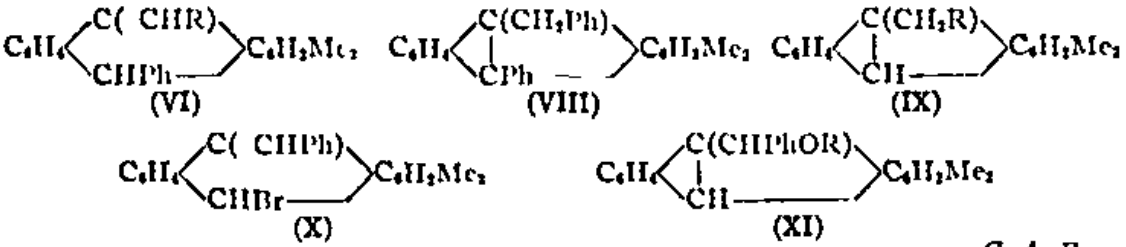
D S Searle

**Anthracene series. Halogenation and nitration.** P S Varma and A Subramanyam *Proc 15th Indian Sci Cong* 1928, 151 —Monoiodo- and *diiodo-anthraquinone* were obtained by the action of NaNO$_3$ and fuming H$_2$SO$_4$ on anthracene and I A number of Br compds were obtained by the action of Br and fuming H$_2$SO$_4$. Some of these halogenated compds were also nitrated In some cases nitro derivs were obtained, while in others the halogen compds were decompd and the halogens liberated No details are given

E J C

**Anthracene derivatives III.** Edward de Barry Barnett and John A Low *Ber* 64B, 49-56(1931), cf *C A* 24, 1638 —The work of the last 10 yrs has agreed with the hypothesis that the influence of α Cl atoms in the reactions of certain anthracene derivs is due to a coördination with a H atom in the *peri meso* position but it was desirable to show that the properties produced by a coördinated group would not be produced by a non-coördinated group in the same position An investigation of the α methylanthracenes was accordingly undertaken and, contrary to expectations, it was found with 1,4 dimethylanthracene (I) that an α Me group has very much the same influence as an α Cl atom *1,4 Dimethyl 10 bromoanthrone* (II) readily yields the corresponding *10 MeO deriv* (III) and reacts with bases, NHRR', to form the 10 NRR' derivs (IV) II also readily undergoes the Friedel Crafts reaction with C$_6$H$_6$, the resulting *10-Ph deriv* (V) giving with Grignard reagents carbinols (not isolated) which, under the catalytic influence of H ions, undergo no transanellar de-

hydration but change into alkylidene compds (VI), whose structure was proved by their complete lack of color and the absence of fluorescence, and also by the oxidation of the methylene deriv (R = H) back to V. That the intermediate carbinols, however, can readily undergo transanellar dehydration when alkylidene formation is impossible is shown by the very smooth formation of *1,4 dimethyl 9 10 diphenylanthracene* (VII) from V with PhMgBr and by the formation of I (see below). Furthermore, the benzylidene deriv VI (R = Ph) boiled with AcOH contg HCl gives a yellow, strongly fluorescent substance, probably VIII. 1 4 Dimethylanthrone with Grignard reagents and subsequent treatment with HCl gives the faintly yellow, strongly fluorescent compds IX; the benzyl compd (R = Ph) gives a Br deriv (X) which forms non *fluorescent NR'R" and R'O derivs with bases NHR'R" and alcs., R'OH, resp.* The latter on boiling with alcs. contg a little HCl change into easily sol., yellow, fluorescent substances, probably of the structure XI. Although v. Braun and Bayer were unable to acetylate 1 4 dimethylanthrone with hot $Ac_2O$ NaOAc the *1,4 dimethylanthranyl acetate* (XII) was easily obtained with $C_5H_5N$ $Ac_2O$. V, however, is recovered unchanged after heating 2 hrs. with $C_5H_5N$ $Ac_2O$ on the water bath. With Zn dust and $NH_4OH$ on the water bath, 1,4 dimethylanthrone gives the *9 10 dihydroanthranol* which on catalytic dehydrogenation in the presence of H ions readily yields I. I at once adds Br but the resulting dibromide slowly loses HBr at room temp. and both HBr and Br in boiling $C_6H_6$. It is clear therefore, that in spite of the impossibility of a *peri* co ordination the derivs of I are much more similar to the corresponding derivs of 1,4-, 1,5- and 4,5-dichloro and 1,5 diphenoxyanthracene than to those of anthracene itself, and it must be concluded that the hypothesis of *peri* coordination is untenable. It remains to be seen how many of the explanations on an electronic basis which have in recent yrs. been advanced by some investigators will stand the test of a more thorough and critical examn. than they have yet received. An extensive study of the influence of *bz*-substituents on the *meso* position of the anthracene complex has been begun and in the meantime no further theoretical discussion will be indulged in. *o*-(2,5 $Me_2C_6H_3CO)C_6H_4CO_2H$, from $AlCl_3$ slowly added to $C_6H_4(CO)$ O in *p* xylene, m. 149°, reduced by Zn dust (activated with $CuSO_4$), $NH_4OH$ and NaOH to *2,5-dimethyldiphenylmethane 2' carboxylic acid*, m. 136°, which with 80% $H_2SO_4$ on the water bath gives almost quantitatively 1,4 dimethylanthrone, m. 116°. XII, m. 162°, forms yellow, fluorescent solns. *1,4,9 Trimethylanthracene* (IX, R = H) m. 81°. *9 benzyl compd* (R = Ph), m. 135°. *1,4-Dimethyl 10 bromo 9 benzylidene 9,10 dihydroanthracene* (X), very light yellow, m. 180°, *10 piperidino compd.*, m. 150°, *10 MeO compd.*, m. 118-9°, *10 EtO compd.*, m. 130°. II, from the anthrone with Br in $CS_2$, yellow, decomps. about 160°, *10 piperidino compd* (IV), m. 133°, *10-PhNH deriv.*, bright yellow, m. 192°, *10 PhNMe deriv.*, yellow, m. 179°, *10 p-dimethylaminophenyl compd.*, m. 184°. III, m. 76°. V, m. 141°. *1,4-Dimethyl 9 methylene 10 phenyl 9,10 dihydroanthracene* (VI, R = H), *from V and MeMgI*, m. 129°. *9 benzylidene compd* (VI, R = Ph), from V and $PhCH_2MgCl$, m. 170°. VII, light yellow, m. 189°, shows vivid blue fluorescence in soln. in the light of an arc lamp.




C. A. R.

***ms*-Dichloroanthracene and its β-sulfonic acid as starting materials for production of alizarin.** V. I. Minaev and B. P. Fedorov. *Rev. gén. mat. color.* **34**, 330-2, 376-82 (1930).—See *C. A.* **25**, 1252. E. J. C.

**3-Nitrophthalic acid series.** H. W. Underwood, Jr., and R. L. Wakeman. *J. Am. Chem. Soc.* **53**, 1839-42(1931).—Condensation of 15 g. 3 nitrophthalic anhydride (I) and 16.1 g. PhOH with 3 g. concd. $H_2SO_4$ by heating 2.5 hrs. at 170° and 3 hrs. at 215-20° gives 2.1% of *phenol-3-nitrophthalein*, yellow, m. 204-5°, the NaOH soln. has a violet color, a very dil. soln. of the Na salt becomes practically colorless on addn. of a large excess of concd. NaOH. I (5 g.) and 6.3 g. *m* $C_6H_4(OH)_2$, heated 1.25 hrs. at 195-200°, give 17.4% of *resorcinol 3 nitrophthalein*, red, m. 260°, the NaOH soln. is brownish yellow; a dil. alk. soln. exhibits a green fluorescence but not nearly to the same extent as a soln. of fluorescein. The 1-mono-Me 3 nitrophthalate is un-

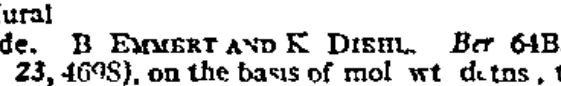
changed on heating with Ac$_2$O, while the 2 mono Me ester gives the anhydride, the di Me ester is unchanged. The isomeric 3 nitrophthalamic acids and 3 nitrophthalamide are converted into 3 nitrophthalimide by treatment with Ac$_2$O. C. J. W.

**A reaction of aromatic 1,4-diketone monoximes occurring instead of the Hofmann rearrangement.** I. Roland Scholl, Hans Semp and Edmund Stix. *Ber* 64B, 71–7 (1931).—The monoxime of α (2,4 Me$_2$C$_6$H$_3$CO)C$_6$H$_4$(CO)$_2$C$_6$H$_4$ with alc. HCl at 150° gives the xylidide Me$_2$C$_6$H$_3$NHCOC$_6$H$_4$(CO)$_2$C$_6$H$_4$ (I) and was therefore assigned the structure Me$_2$C$_6$H$_3$C(NOH)C$_6$H$_3$(CO)$_2$C$_6$H$_4$ (II) (*C. A.* 21, 2084). The yield of I was very small, however, and attempts were made to increase it by using other rearranging agents than alc. HCl. AcOH-H$_2$SO$_4$ gave in good yield a yellow, weakly basic compd. C$_{21}$H$_{11}$O$_2$N (III), contg. 1 H$_2$O less than I. Of the 2 theoretically possible Beckmann rearrangement products of II, viz., I and α (2,4 Me$_2$C$_6$H$_3$CONH)C$_6$H$_3$(CO)$_2$C$_6$H$_4$ (IV), neither gives III with AcOH-H$_2$SO$_4$; I splits off C$_6$H$_4$(CO$_2$)C$_6$H$_3$CO$_2$H and IV gives C$_6$H$_4$(CO)$_2$C$_6$H$_3$NH$_2$. The formation of III, therefore, is not dependent on a Beckmann rearrangement. The most plausible assumption, then, was that anhydridization occurred between the oxime OH and a H of the 2 Me group in the Me$_2$C$_6$H$_3$ residue, with formation of the isoindole, $\underline{CH_2}$ C$_6$H$_3$Me CR N (R = C$_6$H$_3$(CO)$_2$C$_6$H$_4$), especially as the oxime of *p xylyl α-anthraquinonyl ketone* (V) gave with AcOH H$_2$SO$_4$ an "anhydride" (VI) with the same ease as does II. But the oxime of the *p* tolyl (VII) and Ph homologs (VIII) also give "anhydrides" with great ease, while 2,4 Me$_2$C$_6$H$_3$C(NOH)Ph forms no anhydride with either AcOH-H$_2$SO$_4$ or any other dehydrating agent but merely undergoes the Beckmann rearrangement. The H$_2$O split off in the formation of III can therefore be formed only from the oxime OH and aromatic H. To det. at what point the anhydride ring was closed the oximes of 2,1-C$_6$H$_4$(CO)$_2$C$_6$H$_2$MeCOR (R = Ph and 2,4- and 2,5-Me$_2$C$_6$H$_3$) and of α (2,4,6 Me$_3$C$_6$H$_2$CO)C$_6$H$_3$(CO)$_2$C$_6$H$_4$ were treated with AcOH-H$_2$SO$_4$. None formed an anhydride, the first 3 were unchanged by short treatment and under more drastic conditions gave black, indefinite products together with a little 2,1 C$_6$H$_4$(CO)$_2$C$_6$H$_2$MeCO$_2$H, while the last reacted in some other way which remains to be elucidated. These results led to testing whether the anhydrides are phthalylacridines, C$_6$H$_4$(CO)$_2$C$_6$H$_2$  C$_6$H$_4$ formed directly from the oximes or from their tautomeric nitroso forms C$_6$H$_4$(CO)$_2$C$_6$H$_3$CH(NO)Ph. Phthalylacridines of this type are not known, but the corresponding acridones are. Both Ullmann's anthraquinone 1,2 acridone and the "anhydride" obtained from VIII were distd. over Zn dust, the former yielded *β-anilinoanthracene* (IX), also obtained by distn. of β C$_6$H$_4$(CO)$_2$C$_6$H$_3$NHPh over Zn dust, whereas the latter yielded a different product. The acridine structure can therefore not be considered for these anhydro oximes. Ph$_2$C:NOH also did not give acridine with dehydrating agents. *Anhydrophenyl α-anthraquinonyl ketone oxime* (1.15 g. from 2.5 g. VIII oxime heated in AcOH H$_2$SO$_4$ from 160° to 240° in the course of 10 min.), yellow, m. 291°, shows no fluorescence in org. solvents even under a quartz lamp, easily sol. in concd. H$_2$SO$_4$ with vivid yellow color, likewise in hot concd. HCl by which it is not changed at 180°, forms a dark orange complex salt when rubbed with anhyd. AlCl$_3$, gives a blue vat (sensitive to air) with alk. Na$_2$S$_2$O$_4$, yields on distn. in H over Zn dust an orange-red sublimate sol. in org. solvents with blue, in H$_2$SO$_4$ with green fluorescence and forming an orange red to brown picrate. The sublimate is therefore not IX, yellow leaves with green fluorescence, m. 197–8°, which forms an almost black picrate. *Anhydro-p-tolyl α-anthraquinonyl ketone oxime*, from the oxime of VII boiled 3 min. in AcOH H$_2$SO$_4$, m. 236–7°. *m-Xylyl homolog* (III) (yield, 50–60%), yellow, m. 240°, insol. in NaOH but readily forms a blue-green vat with NaOH-Na$_2$S$_2$O$_4$ at 70°. V (with Wilhelm Messe), from 1 C$_6$H$_4$(CO)$_2$C$_6$H$_3$COCl, *p*-xylene and AlCl$_3$ in PhNO$_2$ or CS$_2$, light yellow, m. 205°, sol. in concd. H$_2$SO$_4$ with yellow color, changed to green by Al powder, H$_2$O ppts. a blue substance, *oxime*, m. 223°, *anhydro oxime* (VI) (50% yield), yellow, darkens 255°, m. 265–6°. *Anthraquinone 1-carboxanilide*, light yellow, m. 288–9°, gives anthracene on distn. with Zn dust. *m-Xyloyl-α-aminoanthraquinone* (IV), from C$_6$H$_4$(CO)$_2$C$_6$H$_3$NH$_2$ and Me$_2$C$_6$H$_3$COCl in PhNO$_2$, m. 261–2°. *2 Methyl anthraquinone 1 carboxanilide*, light yellow, m. 287–8°, forms no anhydro oxime with AcOH H$_2$SO$_4$. C. A. R.

**Some experiments with fluoranthene.** O. Kruber. *Ber* 64B, 84–5(1931); cf. v. Braun and Manz, *C. A.* 25, 1244.—Treatment of 2.4 kg. of a neutral tar-oil fraction (b. about 370–90°) in an equal amt. of purified "solvent benzene" (b. about 140–80°) at 160° with 300 g. Na gave after 3 hrs. stirring a crumbly brown mass which, after thorough

washing with toluene, stirring with ice water, extn with $C_6H_6$ and distn *in vacuo*, yielded *180 g residue and 800 g distillate, most of which solidified on cooling and on* crystn from alc yielded 120 g tetrahydrofluoranthene (I), m 75°, shown by direct comparison to be identical with v Braun's synthetic product. The part of the original material which had not been attacked by the Na yielded *on fractionation 150 g* pure pyrene The I with $Na_2Cr_2O_7$ in AcOH gave an acid, $C_{16}H_{12}O_3$ (probably *fluorenone-8-propionic acid*), red-yellow, m 137–8° (2 6 g from 5 g I) The I with Na at 140–60° readily yields substances which with dry $CO_2$ give a mixt of $CO_2H$ acids from which was isolated a *mono-$CO_2H$ acid*, $C_{17}H_{14}O_2$, m 188°, on long heating above its m p or distn with lime the acid regenerates I. The I $b_{745}$ 363 5° and it is hardly likely that it was already present in the original tar-oil fraction C A R

**Nitrofurfuryl alcohol.** Henry Gilman and Geo F Wright *J Am Chem Soc* 53, 1923–4(1931), cf *C A* 24, 5751 —Furfuryl acetate and fuming $HNO_3$ in $Ac_2O$ at —20° give 59 5% of *5(?)-$NO_2$ deriv*, m 47°, hydrolysis gives 49–55% of *5(?)-nitrofurfuryl alc*, $b_4$ 157°, m 32°, oxidation of the latter with $MnO_2$ and 50% $H_2SO_4$ gives nitrofurfural C J West

**α-Pyrrolealdehyde.** B Emmert and K Diehl. *Ber* 64B, 130–2(1931) —It was shown recently (*C A* 23, 4698), on the basis of mol wt detns, that α-pyrrolealdehyde (I) exists in soln in an equil (depending on the solvent) with a form of higher mol wt. for which was suggested the Jacobson formula  (II)

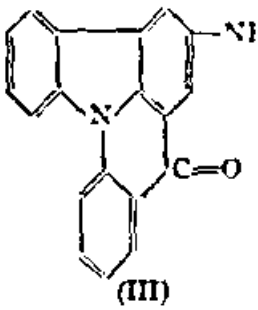
It has now been possible, by benzoylation in petr ether, to stabilize the 2 forms and sep. them by means of MeOH as their Bz derivs. *N-Bz deriv* of I, sol in MeOH at room temp., m 90°, mol wt. in $Et_2O$ 171–8, in camphor 198, also obtained exclusively from the Na deriv of I and BzCl in ligroin, *phenylhydrazone*, green yellow, m 154° *Dibenzoate* of II, only slightly sol in cold MeOH, m 178°, mol wt in camphor 418–25 *N-p-Methylbenzoyl deriv* of I, m 79–80°, mol wt. in camphor 220, *phenylhydrazone*, yellow, m 146°. *Bis(p-methylbenzoate)* of II, m 167–8°, mol wt in camphor 432 C. A R.

**General method of synthesis for α-substituted pyrrolines and pyrrolidines.** Lyman C. Craig, Helen Bulbrook and R M Hixon *J. Am Chem Soc* 53, 1831–5(1931), cf. *C. A* 24, 1374 —A study has been made of the synthesis reported by Cloke (*C A.* 23, 2438) for the prepn of α substituted pyrrolines from $ClCH_2CH_2CH_2CN$ (I) The yields have been increased and the procedure shortened by elimination of MgClBr from the addn product of the Grignard reagent with I, closing the ring without passing through the intermediate ketimine α-Ethylpyrroline, b. 140°, results in 46% yield, *picrate*, m 87°, *chloroaurate*, m 122° The work of Gabriel and Coleman (*C. A.* 2, 1425) on the reduction of α-phenylpyrroline (55% yield by the new method) with Sn and HCl has been confirmed, catalytic reduction of this compd yields an indefinite mixt. γ-Chloropropyl phenyl ketimine acetate is reduced catalytically to 1-phenyl-1-amino-4-chlorobutane, although the latter compd was not isolated due to the ease with which it splits off HCl to form α phenylpyrrolidine. *α-Benzylpyrroline*, $b_{15}$ 126–8°, results in 13% yields, *picrate*, m 89°, *chloroaurate*, m 125° (decompn.). The yields of these 3 compds is in the reverse order to the order of reactivity of the Grignard compds. *from which they are derived* C. J West

**Behavior of pyrrolidine on dehydrogenation catalysis.** N D Zelinskii and I. K. Yur'ev. *Ber.* 64B, 101–3(1931) —It was shown recently (*C A.* 24, 1110) how easily *N*-methylpyrrole is hydrogenated with Pd under the usual conditions and the resulting *N*-methylpyrrolidine can be dehydrogenated back It was of interest to det. how pyrrolidine (I) would behave A com synthetic pyrrole, b 129–30°, when purified through the K compd which was washed several times in H with petroleum ether, dried in H and decompd with ice, $b_{760}$ 128 5°, $n_D^{21}$ 1 5093, with H and Pd asbestos at 160° it gave 30% I, b 85–6° (in H), $n_D^{19}$ 1 4390, $d_4^{20}$ 0 8618, with Rh as catalyst (which *permits of effecting the reduction at 100°*), *the resulting* I b 86–8°, $n_D^{24}$ 1 3498, I obtained from pyrrolidine (II) with Pd asbestos at 135° and carefully fractionated from BaO $b_{741}$ 85 5–6 5°, $n_D^{22.5}$ 1.4423, $d_4^{22.5}$ 0 8533 The II, obtained in 35% yield from pyrrole in alc with Zn-Pd and concd. HCl, $b_{740}$ 90–0 5°, $n_D^{22.5}$ 1 4650, $d_4^{22.5}$ 0 9017. The I, led at the rate of 4 drops per min through Pd-asbestos at 300°, yielded pyrrole, b 129–31°, $n_D^{19}$ 1.4955 C. A R.

**Tervalent nitrogen. II. Carbazoleacridone and its several monosubstitution prod-**

ucts. TARO HAYASHI *Bull Inst Phys-Chem Research* (Tokyo) 9, 970–90 (Abstracts 92–3 (in English) published with Sci *Papers Inst Phys-Chem Research* (Tokyo) 15, Nos 278–81 (1930)), cf *C A* 25, 1824.—The following compds were prepd to ascertain the existence of optical isomers of org compds contg a tervalent asym N atom entirely in the ring structure, and having neither an asym C atom nor any other cause for the optical activity *Carbazoleacridone* (I), obtained by treating $(C_6H_4)_2NH$ with $ClC_6H_4CO_2H$, yellow, m 178.9° (181.9°, cor.), whose CO group does not react with $PhNHNH_2$, showing no ketonic character *2 Nitrocarbazoleacridone* (II), obtained in 35 g (83%) yield by the addn of 160 cc conc $HNO_3$ (d 1.38) to 36 g of I in satd. glacial AcOH soln., yellow crystals from $PhNO_2$, m 304.5° *2 Aminocarbazoleacridone* (III), obtained by making alk. with NaOH the hot $H_2O$ ext of the double salt resulting from II, $SnCl_2$ and conc HCl, then treating its helicin compd with alk. KOH (the direct recrystn gives poor results), reddish orange crystals from $C_6H_6$, m 279.8° *HCl salt*, orange yellow, m 270.8°, *picrate*, yellow, m 163.4.5°, *2-acetylamino compd.*, yellow, m 225–6°, *2 benzoylamino compd.*, yellow, m 286.8°, *benzenesulfonamide* of I, yellow, m 224.5.6°, *methylamine* of I, a secondary amine, reddish orange, m 193.5.5°, *d α bromocamphorsulfonate*, yellow, m 252.4° *l tartrate*, yellow, m 171.2° (decomp.), *reaction product of* III *and salicylaldehyde*, yellow, m 251–2° (decompn.) *Helicin compd.*, obtained from III and helicin in hot EtOH, an orange ppt decomping at 218.22.5°, gives, on recrystn from EtOH, 2 geometrical isomers, one comparatively insol in EtOH, yellowish orange crystals from EtOH, decomping 223.5–5°, $\alpha_D^{22}$ 0.03° (in 0.098% EtOH sol., $l$ = 1 dm.), another easily sol in EtOH, yellow crystals from EtOH, m 238.9°, $\alpha_D^{22}$ 0.02° (in 0.100% EtOH sol., $l$ = 1 dm.) *d Hydroxymethylenecamphor deriv* of III, obtained in 14.5 g yield by treating 10 g of III in 100 cc glacial AcOH and 200 cc $H_2O$ with 6.5 g *d* hydroxymethylenecamphor in MeOH, yellowish orange crystals from the mixt of MeOH and $H_2O$, m 176.5–8°. Heating 3 hrs with alc potash and addn of alkali or HCl bring about no change, but cold conc $H_2SO_4$ dissolves it, with pink color, and treatment with $H_2O$ and dil NaOH gives III There is no indication of the existence of any optical isomer in III. *Carbazoleacridonediazonium chloride* (V), yellow powder, decomps about 230°. V in 10% cold NaOH, treated with SnCl in 50% NaOH and 5% NaOH, gives I. *Carbazoleacridone 2 nitrile* obtained in 8.0 g yield by treating 10.0 g of V with a hot soln of CuCN, yellow crystals from $C_6H_6$, m 248–9°, on sapong it with $H_2SO_4$ or NaOH, there results *carbazoleacridone 2 carboxylic acid*, yellow crystals from MeOH, m. 288–90°. *Strychnine salt*, yellow, decomps 180–4°, *brucine salt*, yellow, m 269–70°, *cinchonine salt*, yellow, m 220–2°. The latter 2 salts were optically inactive III. Configuration of the tervalent nitrogen compound *Ibid* 10, 1–4 (1931); *Ibid* 15, Nos 283–5, Abstracts (English) 1 (1931).—The structural formula ordinarily given for *indazolecarboxylic acid* (cf *C A* 25, 1824) selected as an org N compd contg a tervalent asym N atom which is entirely in the ring structure, and an amino or carboxyl radical capable of being combined with active substances, was doubtful and therefore *monosubstitution products of carbazoleacridone* (cf preceding abstr.) were prepd The exptl evidence that the tervalent N atom in *2-aminocarbazoleacridone α methylenecamphor* and the *brucine* and *quinine salt of carbazoleacridone 2-carboxylic acid* does not give rise to the existence of optical isomers and that *carbazoleacridone*, its *2 nitro* and *2-amino derivs.*, and its *2-carboxylic acid* form very weak combinations with MeI and HCl seems to permit of concluding that all 3 bonds of such a tervalent N atom exist in one plane K. KONDA



(III)

Color of complex diazoles III. Double quinonoid structure—the real chromophore GOPAL C CHAKRAVARTI *Proc 15th Indian Sci Cong* 1928, 158, cf *C A* 19, 2493.—All attempts to correlate color with the constitution of compds contg fused pyrrole imidazole or pyridine imidazole ring systems have so far been unsuccessful. Hewitt's rule and its modification by Watson and his co-workers are not sufficiently elastic to explain the color of these nitrogenous bodies. But when the theory of quinonoid structure is extended to heterocyclic compds like pyrrole and pyridine, a ready explanation of the cause of color in these condensed systems is at once available It is found that all the known colored condensed pyrrole imidazole and pyridine imidazole derivs may be represented as having a double quinonoid pyrrole or pyridine nucleus, whereas the colorless compds either do not possess this structure, or if they do possess it their chromophoric effect is neutralized by the presence of other hypsochromic groups Hence it is suggested that the presence of a double quinonoid pyrrole or pyridine ring

is necessary so that systems contg fused pyrrole- or pyridine-imidazole skeletons may develop visible color E J C

Action of hydroxylamine upon mustard oils: formation of dianilino-1,2,5-oxdiazole. P. C Guha and M N Chakladar *Proc 15th Indian Sci Cong* 1928, 157 —$NH_2OH$ reacts with mustard oils to yield unstable intermediate hydroxythioureas, RNHCS-NHOH, 2 mols. of which are easily decompd even at ordinary temp to yield 1,2,5-oxdiazoles with the sepn of S and water $2\ RNHC(NOH)SH \longrightarrow (RNHC(NOH)-S-)_2 \longrightarrow RHNC\ N\ O\ N\ CNHR + H_2O + 2S$ No details are given E J C

Possible existence of 2-thioimidazole group in insulin. C Ruiz, L Silva and L Libenson *Compt rend soc biol* 104, 1101 2(1930), *Physiol Abstracts* 15, 530 — The 4- or 5-methyl 2 thioimidazole produces hypoglucemia in the rabbit There is no proof that imidazole is the active group in insulin, though histidine has been isolated from it 2-Thioimidazole, the nucleus of ergothioneine, exists in red blood cells It has a hypoglucemic action on the rabbit *per os* 2 Thioimidazoline has a similar action Other derivs have no such effect. The pos effect is slight and does not suggest that the insulin mol contains the 2 thioimidazole group G G

Dyes derived from oxalyldibenzyl ketone. S A Saletore and Gopal Chandra Chakravarti *Proc 15th Indian Sci Cong* 1928, 152 —Hydroxyimidazoles obtained by condensing phenanthraquinone and acenaphthaquinone with salicylaldehyde in the presence of $NH_3$ are all colorless cryst compds (Japp and Streatfield, *J Chem Soc.* 41, 146(1882) and others), while those derived from substituted salicylaldehydes are colored (Sircar and Sircar, *C A* 17, 2880) It was therefore anticipated that the imidazole from oxalyldibenzyl ketone and salicylaldehyde would likewise be colorless, whereas this compd was obtained as a deep brown cryst. product with marked chromophoric properties. This is evidence in support of the observation made recently (C., *C. A.* 20, 207) that oxalyldibenzyl ketone is a much better chromophore than phenanthraquinone or acenaphthaquinone, although the latter bodies contain condensed benzene nuclei Several other imidazoles derived from oxalyldibenzyl ketone *on the one hand* and vanillin, nitrosalicylaldehyde, *p-* and *m* $HOC_6H_4CHO$, resorcyl aldehyde, bromosalicylaldehyde, etc., on the other, are also found to be deeply colored No details are given E J C

Some heterocyclic derivatives of biphenyl. J M F Leaper *J Am Chem Soc* 53, 1891–6(1931) —4-ClH $H_2NC_6H_3Ph$ (100 g.), slowly added to 700 g of $S_2Cl_2$ at 20° and stirred overnight, then treated with 400 cc $C_6H_6$ and heated 4 5 hrs at 75–80°, gives 140 g *phenylphenylenethiazthionium chloride*, brownish red powder, chars about 130°, stirring with $H_2O$ overnight gives the *hydrate* (I), m 135° (decompn.) I and NaOH give the Na salt of *4-amino-3 mercaptobiphenyl*, analyzed as the *Zn salt* The Na salt and $CS_2$ in NaOH, refluxed 5 min., give 87% (on the basis of the $PhC_6H_4NH_2$) *of 2 mercapto-6-phenylbenzothiazole* (II), m 220 *Zn salt*, *Pb salt*, yellow. I in NaOH gives *bis-6-phenyl 2-benzothiazole disulfide*, m 163° II was also obtained from $PhC_6H_4NH_2$, NaSCN and Br in AcOH, which gives *2-amino-6 phenylbenzothiazole*, m 227–8°, heating with concd KOH splits the heterocyclic ring, giving the aminothiophenol which reacts with $CS_2$ to give II. The above Na salt and ClCH·CO·H give 94% of *2-amino-5-phenylthioglycolic acid*, m 212–2.5° The diazo compd gives a *dye* with β $C_{10}H_7OH$, $C_{24}H_{15}O_2N_2S$, reddish needles with metallic luster, *o*-$PhC_6H_4OH$ gives a dye which gives an orange AcOH soln., while that from β $C_{10}H_7OH$ gives a bluish red soln. C. J West

The two isomers of hydroxymethyl phenylcyanopyridine. N Troccoli *Ann chim applicata 21, 41–45(1931)* —J *Guareschi has shown (Atti accad Torino 34)* that β-diketones condense with $NCCH_2CO_2Et$ in the presence of $NH_4OH$ to form cyanopyridones. If an asym. diketone is used 2 isomers are obtained. Thus with $AcCH_2Bz$, the α- as well as α'-phenyl-γ-methyl β-cyano-α-ketodihydropyridine, m 263–4° and 310° resp., are obtained, and are sepd. by their difference in soly in EtOH, the latter being much less sol. Alkali salts form readily by treating the EtOH suspension with 10% alkali. The salts of the heavy metals can then be prepd. from the alkali salts by adding sol. metal salts, by metathesis. In this way the K, Na, Ba, Cu, Ni and Co salts of each isomer was prepd. A. W Contieri

The condensation of pyridine- and quinolinecarboxylic acids with amino acids. Hans Meyer and Roderich Graf *Biochem. Z.* 229, 154–63(1930) —$CH_2(NH_2)-CO_2Et$ and 2 $C_5H_4NCOCl$ give *Et 2-pyridoylaminoacetate* (I), m. 71°. Sapon. gives the *free acid*, m. 165–6° (cf Sendju, *C A* 22, 602), its *amide*, m. 184–5°, is obtained from I and $NH_4OH$ The following compds. were prepd. similarly. *3 pyridoylaminoacetic acid*, m 237–8° (decompn.) (*amide*, m 193–5°, *Et* and *Me esters*, m 54–5° and 67–8°,

resp.). *4-pyridoylaminoacetic acid*, m. 221–2° (decompn.) (*Et ester*, m. 89–90°; *amide*, m. 227–8° (decompn.)). *2-quinoloylaminoacetic acid*, m. 183–4° (decompn.) (*Me ester*, m. 100°, *amide*, m. 231–2° (decompn.)). *4-quinoloylaminoacetic* acid, m. 244–6° (decompn.) (*monohydrate*, decomps. 110°, *amide*, m. 226–7°; *Et ester monohydrate*, sinters 110°, m. clear 120°). *2-phenyl-4-quinoloylaminoacetic acid*, m. 216° (*Et ester*, m. 140–1°, *amide*, m. 213°). *3-pyridoylglycylglycine*, m. 232° (decompn.) (*Et ester*, m. 144.5°). *N (3-pyridoyl)anthranilic acid*, m. 258.9° (*Me ester*, m. 127°). *N (2-pyridoyl)anthranilic acid*, m. 171–2° (*Me ester*, m. 84–5°). *N-(3-pyridoyl)-anthranoylanthranilic acid*, m. 222° (*Me ester*, m. 181° (decompn.)). A. P. Shepard

Anhydrides of pyridine- and quinoline-carboxylic acids. Roderich Graf. *Biochem. Z.* 229, 164–8(1930); cf. *C. A.* 23, 837.—Nicotinyl chloride and Na nicotinate refluxed 1 hr. in $C_6H_6$ give *nicotinic anhydride* (I), m. 122–4°. *Isonicotinic anhydride* (II), prepd. similarly, m. 103–4° and carbonizes 180°. I and II are only slowly hydrolyzed. Na cinchoninate and cinchoninyl chloride heated 0.5 hr. at 170° give *cinchoninic anhydride*, b. about 240–50°, m. 215° (decompn.). Anhydrides could not be obtained from quinaldinic acid or 2-pyridinecarboxylic acid. A. P. Shepard

α-Piperidinobenzalacetophenone. I. P. Kohler and W. F. Bruce. *J. Am. Chem. Soc.* 53, 1994–8(1931).—K. and Addinall (*C. A.* 24, 1030) expressed the opinion that a peculiar red piperidine deriv. (Watson, *J. Chem. Soc.* 85, 1322(1904)) is an unsatd. ethylene oxide, $PhCH\overset{O}{\frown}C(NC_5H_{10})Ph$ (I); however, it is an unsatd. ketone, $PhCH{:}CBzNC_5H_{10}$ (II), as by Dufraisse Moureu (*C. A.* 21, 3051). Hydrogenation gives *α-piperidinobenzylacetophenone* (III), pale yellow, m. 81°, also obtained from $PhCH_2CHBrBz$ and piperidine; the *oxime* m. 141–2°; it was not possible to regenerate the ketone from the oxime. III and PhMgBr give *α α,γ-triphenyl-β piperidinopropanol*, m. 148–9°; pyrolysis of the carbinol gives $PhCH_2CH_2NC_5H_{10}$ and $Ph_2CO$. I and PhMgBr give *α piperidino β,β-diphenylpropiophenone*, yellow, m. 163°; further action of PhMgBr gives *α α-diphenyl β piperidino γ,γ-diphenylpropanol*, m. 136–7°; the *chloride* m. 162–4°. C. J. West

The bromination of methylarsepidine. The existence of a radical with quadrivalent arsenic. Enrique V. Zappi and Helvecio Degiorgi. *Bull. soc. chim.* [4], 49, 366–71 (1931); cf. *C. A.* 10, 2874.—The bromination of methylarsepidine, $CH_2.(CH_2)_3.CH_2.AsMe$ (I) is exothermic and forms the *dibromide*, $\overbrace{CH_2\ (CH_2)_3\ CH_2}\ AsBr_2Me$ (II). On adding about 50 cc. of 2 *N* Br in $CCl_4$ (contg. 0.1 atom Br) to a cold soln. of 16.1 g. of I (0.1 mol.), the reaction ceases with the production of *dibromomethylbiarsepidine*, $[\overbrace{CH_2\ (CH_2)_3\ CH_2}\ AsBrMe]_2$ (III). By allowing this soln. to attain room temp. and on adding 50 cc. of 2 *N* Br, II was pptd. The white cryst. material (III), m. 60° (decompn.), is very hygroscopic, sol. in warm $CCl_4$ to a yellow soln. which is decolorized on exposure to the air, pptg. the *peroxide*, $[\overbrace{CH_2\ (CH_2)_3\ CH_2}\ As(MeBr)O]_2$. It would seem that III is capable of dissocg. into the free radical *bromomethylarsepidyl* $\overbrace{CH_2\ (CH_2)_3\ CH_2}\ As(MeBr)$, contg. As in the quadrivalent state. Though there are no previous reports on quadrivalent As, Blicke and Smith (*C. A.* 23, 3908), have reported bivalent As in the tetraaryldiarsyls. When II is heated to 80–90° at 6–8 mm., or when a soln. of II in $CCl_4$ is distd. to a small vol., MeBr is evolved, with formation of *bromoarsepidine*, $\overbrace{CH_2\ (CH_2)_3\ CH_2}\ AsBr$, a red oil which is converted on bromination into *arsepidine tribromide*, $\overbrace{CH_2\ (CH_2)_3\ CH_2}\ AsBr_3$ (IV), m. 102°. IV is decompd. by $H_2O$ into HBr and $\overbrace{CH_2\ (CH_2)_3\ CH_2}\ As(OH)O$, and on heating gave gaseous hydrocarbons and $AsBr_3$ but not $\overbrace{CH_2\ CH_2\ CH\ CH\ CH_2}\ As$ as was hoped. Attempts to form the pentabromide, $\overbrace{CH_2\ (CH_2)_3\ CH_2}\ AsBr_4$, were unsuccessful. C. R. A.

Pyrimidines. CXXII. Improved methods for the synthesis of orotic acid. Treat B. Johnson and Elmer F. Schroeder. *J. Am. Chem. Soc.* 53, 1989–94(1931); cf. *C. A.* 25, 1830.—Uracil-4-carboxylic acid (orotic acid) (I), known to occur in milk, is most easily prepd. in quantity by oxidation of 2-thiouracil-4-aldehyde (II) or uracil-4-aldehyde (III) with $CrO_3$. Details are given for the prepn. of $(EtO)_2CHCO_2Et$, $(EtO)_2$

$CHCOCH_2CO_2I$ t, the di I't acetal (IV) of II, II, and the di-I't acetal (V) of 2 ethylmercaptouracil-4 aldehyde (VI) Oxidation of II gives 76% of I, identical with the natural product; VI gives 55% of I; IV gives 68% of I, V gives 53% of I. IV, oxidized with 3% $H_2O_2$ in 20% NaOH, gives a nearly quant yield of the di I t acetal of III; oxidation of the latter gives a good yield of I. A quant yield of III is obtained by the careful hydrolysis of corresponding di I't acetal; III contains 1 mol $H_2O$, lost on heating 1 hr at 120°, it is easily oxidized to I. C J West

**Cyclic ammono ketones and acid chlorides of the quinoxaline series.** R A. Ogg, Jr., and T W. Bergstrom *J Am Chem Soc* 53, 1840–53(1931), cf *C A* 25, 957.—*2,3-Dichloroquinoxaline (I) is a deriv of an ammono oxalyl chloride, the method of prepn*, from $PCl_5$ and 2 3 dihydroxyquinoxaline (previously shown to be an ester of a mixed aquoammono oxalic acid), is in accord with this view I also reacts with $(CH_2NH_2)_2$ *to give o-phenylenethylenoxamidine, leaves, m above 250° alc solns show a* faint fluorescence I also reacts with 2 1 equivs of MeMgI to give 60% of 2,3 dimethylquinoxaline (II) and with PrMgI to give 30% *of 2,3 dipropylquinoxaline* (III) *m. 42.9°* (cor.) *I did not react with PhMgBr even after prolonged heating II is a* deriv. of an ammono diacetyl this is seen in its synthesis from I and MeMgI and from *o* $C_6H_4(NH_2)_2$ and di Ac and in its behavior on reduction further, BzH gives a *dibenzal deriv II does not react with Grignard reagents or with HCN* With 2 equivs of $KNH_2$ II gives a di K salt, greenish yellow, which yields with I t-I III (70% yield) 2,3-Diphenylquinoxaline (IV) is a deriv of an ammono benzil as shown by its synthesis and behavior on reduction and oxidation IV does not react with Grignard reagents or with HCN, with $KNH_2$ it appears to undergo a benzilic acid rearrangement giving 30% of what is assumed to be *1,2 dihydro 2 2 diphenyl 3 aminoquinoxaline*, m 287° (cor.), it does not react with $HNO_2$ or with I tOH HCl at 150° These reactions constitute 2 new methods for the synthesis of 2,3 dialkylquinoxalines C J W

**Synthesis of substituted thiazines.** S Krishna and Mitter S Jain *Proc 15th Indian Sci Cong.* 1928, 153–4.—The methods of prepn of substituted thiazines hitherto described give only the symmetrically disubstituted derivs and are applicable only in a very limited no of cases An attempt has therefore been made to synthesize mono-, di- or polysubstituted thiazines by a method that should be applicable to $C_6H_4$ derivs contg acid or basic substituents Thiazine was synthesized by a method utilizing the reactivity of the *halogen atom in negatively substituted chlorobenzene* 6,3 $Cl(O_2N)C_6H_3SO_2H$ condenses with aniline to form 4,2 $O_2N(HO_2S)C_6H_3NHPh$. This is readily sol. in $H_2SO_4$ If the blue soln obtained is immediately dild with water, *3-nitrophenothiazine S oxide is pptd., but if the soln is kept for half an hr before dilu.*, 3-nitrophenothiazine (I) is obtained and $SO_2$ evolved. I is readily reduced to 3-amino phenothiazine from which, through the diazo compd., phenothiazine is obtained. A *blue color is produced when a soln of I in AcOH is treated with HCl gas* The production of this blue color has been regarded as evidence of the existence of quinonoid dithionium salts. Attempts have been made to isolate such salts but these have not *been successful, probably on account of the influence of a nitro group* E J C

**The hydrogenation of methylene blue in the absence of enzymes.** Fritz Lieben and Erich Molnar *Biochem Z* 232, 209–17(1931).—Glycocoll as well as alanine inhibit *the effect of dil NaOH in deepening the color of methylene blue and lead thus to the* formation of stable light blue solns Since this effect can also be produced by means of inorg buffers, it is concluded that the amino acids probably produce this effect through their buffer action The hydrogenation of methylene blue by urea or guanidine derivs manifests certain regularities The addn of CO groups to the —NHCONH or —NHC(:NH)NH— promotes the reduction, whereas $CH_2$ groups inhibit it Urea and guanidine themselves are inactive, nor do the groups —CONH— or —CONHCO— occasion reduction Opening the ring diminishes or even abolishes the reducing action The reducing effect diminishes along the series: alloxan > parabanic acid > allantoin > hydantoin also hydantoin > hydantoic acid, creatinine > creatine This shows the stimulating effect of CO groups or of the cyclic structure S. M

**Isomerism. Ring closure of *o*-thiocarbamidobenzoic acids.** Trjendra Nath Ghosh *J Indian Chem Soc* 7, 981–4(1930).—When anthranilic acid and PhNCS are allowed to react in the cold, *o-phenylthiocarbamidobenzoic acid*, *o*-$RNHCSNHC_6H_4CO_2H$ (I), (R = Ph), and *4 keto-2 thio-3-phenyl-1,2,3,4 tetrahydroquinazoline*, $C_6H_4$ NH CS NR.CO (II), are obtained Anthranilic acid has now been condensed with various mustard oils in hot alc and in each case only the corresponding quinazoline has been obtained, showing that the arylthiocarbamidobenzoic acid very easily passes into the quinazoline with loss of water When II is heated with concd $H_2SO_4$

for 3–4 hrs at 125–30° it is isomerized to a compd of the type $C_6H_4$ N·C(NHR) S CO,

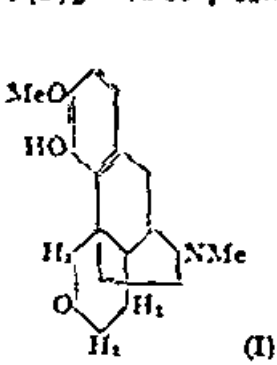
*2-anilino 3 keto-4,5 benzo 1,3 thiazine* (III), insol in alkali but sol in acids. III is also obtained from I by the same treatment. The allyl analog gave, however, a S-free compd with $H_2SO_4$, but a compd similar to III when HCl was used. II m above 300°, *disulfide* (by addn of $I_2$ in KI to II in AcOH and gentle warming followed by diln.), m 250–2°, *p-tolyl analog* m 310°, *o tolyl analog*, m 258–70°, *disulfide*, m 215°, *1,3,4 xylyl analog*, m 259–60°, *allyl analog*, m 206–7°. III, m 184–5°, *p-tolyl analog*, m 235°, *allyl analog*, m 115°. R C. Elderfield

Thiodiazines. VII. Condensation of ethyl chloroacetate with thiosemicarbazides. Prafulla Kumar Bose and Birendra Kumar Nandi *J. Indian Chem Soc* 7, 961–4(1930), cf *C A* 25, 1532.—Thiosemicarbazide and its 4 substituted derivs condense with $ClCH_2CO_2Et$ to give in good yields thiodiazines, RNH C N N C(OH) $CH_2$ S (I), sol in warm aq alkalies and acids. The indifference of

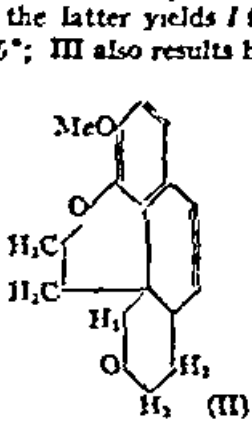
these compds to aldehydes and ketones indicates a thiodiazine rather than a thiazole formula. Mol proportions of the thiosemicarbazide and $ClCH_2CO_2Et$ were refluxed in EtOH for 1 hr. The cryst condensation product sepd during the reaction. *2-Amino 5 hydroxy 1,3,4 thiodiazine* (R = H in I), m 254° (decompn.) (*Ac deriv.*, m 205°, *Bz deriv.*, m 200°, *addn compd with phenylthiocarbamide*, m 195°), *2 Me homolog* m 282° (decompn.) (*Ac deriv.*, m 198°), *2 Et homolog*, m 225° (*Ac deriv.*, m 189°), *2 iso Bu homolog*, m 210° (*Ac deriv.*, m 190°, *mono-Me deriv.*, by refluxing with slightly more than 1 mol MeI and 1% KOH in MeOH, m 135°), *2 phenylamino analog* m 184° (*Ac deriv.*, m 172°, *mono-Me deriv.*, m 205°), *2-o-tolylamino analog*, m 183° (*Ac deriv.*, m 210°), *2 p-tolylamino analog*, m 195° (*Ac deriv.*, m 218°). R C Elderfield

Calycanthine. II. The degradation of calycanthine to *N*-methyltryptamine. Richard H F. Manske *Can J Research* 4, 275–82(1931).—Degradation of calycanthine by benzoylation with subsequent treatment with alkali gave a well-defined cryst. substance, benzoyl *N* methyltryptamine. The identity of this substance was established by both analysis (C 77.14, 76.87, H 6.58, 6.40, N 9.90, 9.95, mol wt 293, 305) and synthesis. *m* Chlorobenzoyl and *p*-nitrobenzoyl *N* methyltryptamine were prepd., the former consists of short stout prisms, m 153°, the latter of golden yellow rectangular plates, m 134°. Benzoyl 1-methyltryptamine formed synthetically from BzCl and 1 methyltryptamine was recovered as colorless acicular needles, m 117°. J W. Shipley

Sinomenine. XXIV. Degradation of sinomenine to *l*-thebenone. Kakuji Goto with Reikichi Inaba and Hideo Shishido *Ann* 485, 247–57(1931), cf *C A* 25, 2132 and following abstr.—Demethoxyd hydrosinomenine MeI, heated with 25% KOH 10 min., gives 80% of *des N methyldesmethoxydihydrosinomenine*, $C_{15}H_{19}O_3N$ (I), m. 182°, $[\alpha]_D^{22}$ −54.94° ($CHCl_3$), coned $H_2SO_4$ gives a deep red soln., while this has the same m. p. as the *N* Me I ase from dihydrothebainone, the rotation is different. I MeI gives with KOH 44% of *dehydrothebenone*, $C_{17}H_{19}O_3$ (II), m. 104°, $[\alpha]_D^{18}$ −206.87° ($CHCl_3$). Catalytic reduction of I gives nearly quant. the *dihydro deriv.*, m 156.5°, $[\alpha]_D^{19}$ 67.82°, *methiodide*, m 226–9°, with KOH the latter yields *l* thebenone (III), $C_{17}H_{21}O_4$ m 134°, $[\alpha]_D^{18}$ −78.60°, *oxime*, m 204.5°; III also results by the reduction of II.



(I)

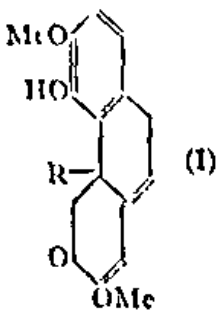


(II)

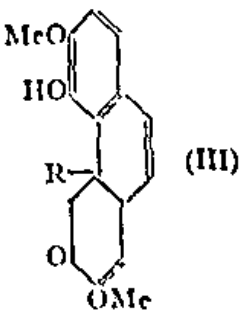
C. J West

Sinomenine and disinomenine. XXV. Three different sinomenmemethines. Kakuji Goto and Hideo Shishido *Bull Chem Soc Japan* 6, 79–87(1931), cf

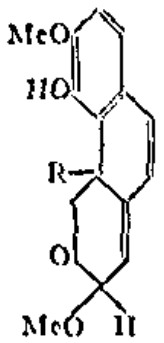
preceding abstr.—Sinomenine MeI and 2 mols. 2% NaOH, boiled 1 min., give *sinomenine achro-methine* (I, R = $Me_2NCH_2CH_2$-) (previously termed *N*-methylanhydrosinomenine, *C. A.* **21**, 1050; the name arises from the very faintly yellow halochromy in concd. $H_2SO_4$ and to avoid confusion with the methylmorphimethines), best purified through the Na salt, *m.* 170°, $[\alpha]_D^{18}$ 72.58° ($CHCl_3$), *easily sol. in Et₂O*, *HI salt*, *m.* 115–8°; the HCl and HBr salts are very hygroscopic; *methiodide* (II), m. 212°, $[\alpha]_D^{17}$ −33.00° ($H_2O$); *oxime*, decomps. 204.5°, decompn. of I with 60% KOH or $Bz_2O$ gives the same sinomenol or Bz deriv. as with sinomenine itself. I on standing for years gives 10% of *sinomenine roseo methine* (III) (previously termed *β* sinomenine methine), also obtained by decompn. *of sinomenine-MeI with 5 mols. 5% NaOH*, yellow, m. 183°, gives an intense red halochromy in concd. $H_2SO_4$ and a yellow red in concd. HCl; $[\alpha]_D^{18}$ 135.70° ($CHCl_3$), difficultly sol. in $Et_2O$; *methiodide*, m. 277° (decompn.), $[\alpha]_D^{17}$ −18.26° ($H_2O$). I with 10% NaOH gives 20% of *sinomenine isoleo methine* (IV) (previously termed the *α* deriv.), m. 172.3°, almost insol. in $Et_2O$, $[\alpha]_D^{17}$ 434.78°; the *methiodide*, m. 200°, $[\alpha]_D^{17}$ 373.30° ($H_2O$), results in almost quant. yield by the action of cold 10% NaOH upon II; both compds. give an intense blue halochromy *in concd. $H_2SO_4$ or fuming HCl*, *boiling the MeI deriv. with 3.3% NaOH* for 1 hr. gives sinomenol. The proposed structures for these 3 compds. are discussed.



(I)



(III)



(IV)

C. J. West

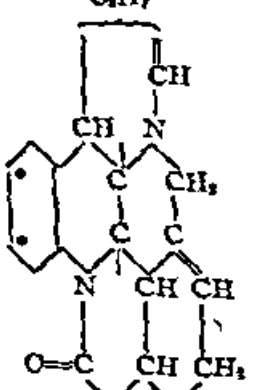
**The structure of yohimbine.** F. Mendlik. *Pharm. Weekblad* **68**, 257–71(1931).—The alkaloid yohimbine $C_{21}H_{26}O_3N_2$, which is the Me ester of yohimbic acid and contains a OH, was *mixed with Se and heated in a bath at 300°. Dehydrogenation occurred* with evolution of $H_2Se$. Extn. of the reaction mass with $C_6H_6$ yielded a cryst. base *yobyrine* (I), $C_{18}H_{12}N_2$, m. 217°, the salts of which have a violet blue fluorescence. From the $C_6H_6$ mother liquor a more sol. base *dihydroyobyrine* (II), $C_{18}H_{10}N_2$, m. 170°, was obtained. The residue insol. in $C_6H_6$ was extd. with EtOH and yielded *ketoyobyrine* (III), $C_{20}H_{10}ON_2$, m. 328°. Fusion of III with KOH at 350° gave a *cryst. base* $C_{11}H_{10}O_2N_2$, m. 258°, and an acid, m. 144°, which was identified as *hemimellitic acid*. Yohimbine probably contains a cyclohexane ring. The first thermal reaction product of the acid is apoyohimbic acid in which the *OH* and an adjacent *H* have split out as $H_2O$. Dehydrogenation by Se then splits off $CO_2$ from the $CO_2H$ and removes 4 H, leaving I and the intermediate II. The products are the same whether yohimbic acid or its Me ester (yohimbine) is used. In the formation of III the dehydrogenation of apoyohimbine is attended by loss of $H_2O$ instead of loss of $CO_2$. The base $C_{18}H_{12}N_2$ *obtained by dry distn. of yohimbine differs from I by 0 C and 6 H. It is possible that a hydrogenated o-xylene ring is present which is broken up in the distn. leaving* 2 H at the places of attachment, while the same ring is rendered stable by the Se dehydrogenation. Dimethylindole, another decompn. product of yohimbine, may possibly represent the structural portion from which the hemimellitic acid was obtained *by oxidation*. A. W. Dox

**Diastereoisomerism. VI. Configuration of the morphine alkaloids.** Hermann Fuhr. *Helv. Chim. Acta* **13**, 1035–58(1930); cf. *C. A.* **24**, 2115.—It is deduced from observations recorded in the literature and from the detn. of the rotation of derivs. that the rotation of the 5 asym. C atoms in morphine is $C_9(-)$, $C_{13}(-)$, $C_{14}(-)$, $C_{15}(+)$, $C_{16}(+)$, numbered according to Gulland and Robinson (*C. A.* **17**, 2584). Based on these conclusions regarding morphine, it was correctly predicted that thebaine would be *l*- and dihydrothebaine *d* rotatory. The isomers of morphine and of codeine prove to be exceptions to this, *e. g.*, *a*-isomorphine rotates *more strongly levo than* morphine although it would be expected to rotate less strongly levo if these compds. were true epimerides. The explanation that all 5 rings may not be in the same plane

may answer here. If a model for morphine is constructed using planar rings, the quaternary asym C atom ($C_{13}$) prevents all 5 rings from being in the same plane, ring III or V is inclined against the plane of the other 4 rings. In apomorphine or morphothebaine, when $C_{13}$ is not asym., all 5 rings may be arranged in the same plane. $[M]_D$ (in water unless stated otherwise) are recorded as follows: morphine·HCl ($3H_2O$) —370°, codeine·HCl ($2H_2O$) —402°, thebaine·HCl ($H_2O$) —574°, apomorphine·HCl —149°, morphothebaine·HCl —146°, codeine MeI —302°, α-6-acetylmorphine·HCl —593°, diacetylmorphine·HCl —619°, dipropionylmorphine, m. 107°, —655° in alc., dipropionylmorphine —671° in dil. HCl (HCl salt, m. 210° (not sharp)), —613°), dihydrocodeine —459° (H tartrate —588°), dihydrothebaine —623° in dil. HCl.

A. Wieben

Cinchona alkaloids. VII. Sulfonation of quinine and hydroquinine. G. Grassa and M. Oesterlin *Ber.* 64B, 57–61(1931); cf. *C. A.* 19, 1425, Kitasato and Goto *C. A.* 25, 1532.—The striking ease with which the hydroquinine-sulfonic acids are formed and saponified led to the suspicion that sulfonation does not occur in the nucleus and that the supposed $SO_3H$ acids result from esterification of the alc. group and are really acid sulfates. Sulfonation occurs only when the alc. group is present, if it is acylated, either the acyl group is saponified off and the sulfonic acid is formed or, under the proper conditions, neither sapon. nor sulfonation occurs. Accordingly, hydroquinine chloride and desoxyhydroquinine form no sulfonic acid, while acetyl and benzoylhydroquinine undergo a quant. exchange of acyl radicals (*Umesterung*). On the other hand, it is not possible to obtain from hydroquininesulfonic acids the corresponding acylsulfonic acids, even with such reactive agents as AcCl or ClCO·Et. It had been shown that treatment of freshly diazotized 5'-aminohydroquinine with freshly prepd. Cu paste reduces the alc. group simultaneously with the elimination of N, giving methylhydrocuprein. Diazotized 5'-aminohydroquininesulfonic acid behaves in the same way, splitting off the sulfonic group (at room temp.) and likewise giving the cuprein. Because of the possibility of rearrangement into the iso base, quinine with concd. $H_2SO_4$ gives no homogeneous product. The rearrangement can be completely prevented, however, by using $Ac_2O$, the resulting *quininesulfonic acid* (I) is difficultly sol. in $H_2O$, can be converted back into quinine, adds 1 mol $Br_2$ to form *quininesulfonic acid dibromide* (II) (which can be saponified to quinine dibromide) and is oxidized by $KMnO_4$ to *quiteninesulfonic acid* (III), which forms quitenine with HCl. The quant. formation of I in $Ac_2O$ from quinine bisulfate would suggest an intermediate formation of acetylquinine, which then reacts with the $H_2SO_4$, in expts. with acetylquinine under analogous conditions, however, almost 90% was recovered unchanged. With concd. $H_2SO_4$ quinine in the cold gives chiefly *hydroxyhydroquininesulfonic acid* (IV) (mixt. of the α- and β isomers), along with isoquinine- and niquininesulfonic acids. I, from quinine bisulfate in $Ac_2O$ at room temp. or, more simply, from neutral quinine sulfate in $Ac_2O$ with the amt. of $H_2SO_4$ necessary for the formation of the bisulfate, darkens around 230°, decomps. 237°, gives a positive thalleioquine reaction, rapidly decolorizes $KMnO_4$, $[\alpha]_D^{20}$ 88.86° (NaOH), *mono-HCl salt*, needles with 5 $H_2O$, m. 205°, is quantitatively converted back into quinine by boiling 25% HCl. II, m. 232°. III, very hygroscopic, m. 221–5°. IV has not as yet been crystd.; the $H_2SO_4$ soln. shows blue fluorescence and only slowly decolorizes $KMnO_4$; the thalleioquine reaction is positive; it forms no NO deriv. but yields with Ac·O a di-Ac deriv. C. A. R.



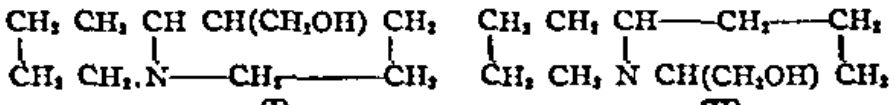
The molecular structure of strychnine and brucine. Robert Robinson. *Proc. Roy. Soc.* (London) A130, 431–52(1931).—Bakerian Lecture, May 1930. A summary of the chemistry of *strychnine* and *brucine* (dimethoxystrychnine). Evidence is given to prove the occurrence of 5 groups of atoms in strychnine. These 5 groups are combined, giving a structure contg. 5 fused rings. The disposition of the atoms of the group $C_3H_7$ cannot be predicted but they must be added so as to introduce 2 new rings. The structure of strychnine is represented by the accompanying formula, brucine contains MeO groups instead of H at the 2 positions marked with an asterisk. Janet E. Austin

Synthesis and pharmacodynamic action of a homoisopapaverine (and laudanosine). I. Synthesis of β-2,3-dimethoxyquinaldine. Frigyes (Fritz) Kohek. *Matematik és Természettud. Értesítő* 47, 779–86(in German 787)(1930).—Veratrole in glacial AcOH is nitrated with 1.5 $HNO_3$, the resulting nitroveratrole is reduced with Sn to aminoveratrole, then

treated with fuming HCl and paraldehyde, 0.25 vol alc and 0.25 vol ether is added and the mixt cooled to —10–15°. The HCl salt of the base which ppts is water-sol. and has an anesthetic action when put on the tongue. S S DE FINÁLY

**Problems of the technical manufacture of papaverine (and laudanosine).** FRIGYES (FRITZ) KONEK. *Matematik és Természettud Értesitö* 47, 788-93(in German 794) (1930).—For the time being neither the method of Pictet, that of Rosenmund nor that of Pictet-Spāth seems to be economical for papaverine manuf S S DE FINÁLY

**Constitution of lupinine. I.** K WINTERFELD AND F W. HOLSCHNEIDER. *Ber.* 64B, 137–50(1931).—In the course of their investigations on the lupine alkaloids (*C. A.* 24, 4787), W. and H have confirmed one of Karrer's suggested formulas for lupinine (I) but have also found that I is not homogeneous, being accompanied by a structural isomer (II), for which the name *allo-lupinine* is suggested. These conclusions are based on the following series of reactions: $C_{10}H_{19}ON$ (I) ($-H_2O$) ⟶ anhydrolupinine (III) ($+ H_2$, Pd) ⟶ lupinane, $C_{10}H_{19}N$ (IV) ($+$ BrCN) ⟶ bromo-*lupinanecyanoamide* (*V*) ($H_2$, Pd) ⟶ *lupinanecyanoamide* (*VI*) ($+ HCl$) ⟶ $C_{10}H_{21}N$ (VII) ($-6 H_2$) ⟶ $C_{10}H_{15}N$ (VIII). In spite of the most careful purification, these intermediate products did not seem to be homogeneous, as indicated by the not quite sharp m. or decompn. ps. of individual salts and of *N*-derivs. of VII. VII has a secondary cyclic N atom and all the properties of a piperidine deriv., VIII a tertiary cyclic N atom and the properties of a $C_5H_5N$ homolog. Oxidation of the VIII in $H_2O$ with varying amts. of $KMnO_4$ gave $\alpha,\alpha'$- (IX) and $\beta,\alpha$-$C_5H_3NMeCO_2H$ (X), $\alpha,\beta$ $C_5H_3N$-$(CO_2H)_2$ (XI) and a mono-$CO_2H$ acid $C_{11}H_{13}O_2N$ (XII) giving the Fe salt reaction characteristic of α-pyridinecarboxylic acids. The extraordinarily slow oxidation of the side chain $C_4H_9$ in XII and the failure of I and IV to give a pyrrole reaction indicate that this $C_4H_9$ group contains a straight C chain and that XII is *α-butylpyridine-α'-carboxylic acid*. It follows that VIII is a mixt. of *α-butyl-β-* and *-β'-methylpyridines*, and VII a mixt. of the corresponding *piperidines*, that I and II have the structures shown in the accompanying formulas and IV is a mixt. of the corresponding compds. with Me instead of $CH_2OH$. Yields of the oxidation products of VIII indicate that in the product isolated by W. and H. from the seeds of the yellow lupine I predominates. Since no trace of α-picolinic acid could be detected in the oxidation products, cleavage by the action of BrCN on IV must take place almost exclusively in the non-substituted ring. In the light of the structure thus established for I, there can hardly be any doubt that the quant. rearrangement of the *l* rotatory I by Na in boiling $C_6H_6$ into the *d*-rotatory isolupinine (Krieg, *Diss. Marburg*, 1928) is a case of *cis-trans* isomerism, I being the energy richer *cis* form. V (yield, 90%), yellow to light red oil, is very slightly sol. *in 15% HCl*. *In the prepn. of VI is formed as by product a base* $C_{11}H_{24}N_2$ *(XIII)*, isolated as the *chloroplatinate*, orange, m. 217–8° (decompn.). The VI (yield, 85%) is a light yellow mobile oil of garlic-like odor. VII, $b_{11}$ 101–2° (decompn.), b. 169–71° (decompn.), gives the characteristic piperidine reaction (blue-violet color) with the Levin reagent, *HCl salt*, m. 151–3°, easily sol. in $H_2O$ with weak acid reaction, is optically inactive (0.0505 g. in 10 cc. 96% alc. in a 10-cm. tube), *HI salt*, readily becomes discolored in the light, *HBr salt*, m. 168–70°, *N-Bz* and *N p-nitrobenzoyl derivs.*, yellow oils practically insol. in dil. acids and $H_2O$ (the Bz deriv. requires 4–5 hrs. heating with concd. HCl at 150° for quant. hydrolysis), *Ac deriv.*, liquid, *β naphthalenesulfonyl derivative*, leaflets from aq. MeOH, m. 86–7°, granular and of higher



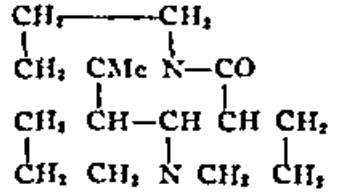
(I) (II)

m. p. from petroleum ether, of lower m. p. (57–9°) from $Me_2CO$. The HCl salt heated with concd. aq. KOCN and then treated with BzCl gives a *Bz deriv.*, $C_{18}H_{18}NCONBz_2$, m. 169–70°, of the *half-sapond.* VI, also obtained by moderate sapon. of VI with alc. HCl at 85°. XIII is also obtained from VI with $H_2$ in 96% alc. with Pd $CaCO_3$. VIII, $b_{11-10}$ 110–2°, b. 153–4° (decompn.), *chloroplatinate*, orange- to yellow red, m. 190–1°, decomps. 192–4°; *chloroaurate*, m. 46–7°. XII was isolated as the dark violet *Cu salt; chloroplatinate*, yellow, m. 154–5°. *Cu salt* of IX, light blue crystals with 1 $H_2O$, m. 253–5° (decompn.); *HCl salt*, m. 202.5–3.5° (decompn.); free *acid*, m. 95–6°, identical with a product synthesized from 2,6-$C_5H_3NMe_2$. X was isolated as the chloroplatinate, orange-red crystals with 2 $H_2O$, m. 189–90° (decompn.). *Cu salt* of XI, dark blue prisms with 2 $H_2O$ or prismatic needles with 1 $H_2O$, darkens and evolves gas 190–5°, m. 229° (decompn.), identical with synthetic quinolinic acid; synthetic $\alpha,\alpha'$-

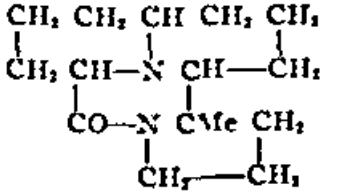
*pyridinedicarboxylic acid*, from 2 6 $C_5H_3NMe_2$, m 235–6° (decompn ) and depresses the m p of XI 10–2°

C A R

**Lupanine.** K Winterfeld and A Kneuer *Ber* 64B, 1979–87(1931) —Lupanine (I), the main alkaloid of the blue lupine, differs from sparteine (II), an alkaloid of the yellow lupine, only by having an O instead of 2 H atoms As this O atom is present neither as HO nor as an ether, it was concluded that it is present as a C O group, and since I, although it is bitertiary, is a mono-acid base, the C O group must form a lactam ring with a N atom, a view confirmed by Clemo and Leitch who with fuming HI and red P were able to replace the O in I with H and obtain in good yield a desoxylupanine isomeric with II. W and K by the same reaction under somewhat different conditions (heating 50 instead of 36 hrs and raising the temp to 240°) have been able to break down the I mol and obtain 2 cleavage products $C_{14}H_{15}N$ (III), yellow oil of a hay like odor, $b_{15}$ 85 6°, identified through its *chloroaurate*, m 143–4°, and picrate, m 164 5°, with β lupinane, and a product (IV) $b_{12-3}$ 145–7°, which yielded no cryst salts but distinctly gave the pine splinter pyrrole reaction Ten of the C atoms in I must therefore have the same structure as in β lupinane and the other five are probably in the form of a pyrrolidine nucleus Oxidative degradation of II gives α methyl pyrrolidine, assuming a similar ring system in I, the (still purely hypothetical) structure V may be assigned to I. Direct comparison of III with a sample of the decompn product of matrine (Kondo, *C A* 22, 1212) proved that the 2 compds are identical Kneuer (*Diss Freiburg i Br* 1929) obtained from the mother liquors of lupinine a new alkaloid, *lupanidine*, isomeric with I, which, in view of the facts presented in the preceding abstr , is probably the structural isomer VI. Contrary to Thoms and Bergerhoff, W and K were able to effect a quant cleavage of I with BrCN by using boiling $C_6H_6$ and excluding moisture The well-crystd *bromocyanoamide* (VII) after removal of the Br and sapon of the CN group gave an oily *base* (VIII) whose secondary cyclic N atom was readily benzoylated but the ring in the Bz deriv could not be broken open with $PBr_5$ or $PCl_5$, at the high temp required, considerable halogen substitution took place, exhaustive methylation also resulted in only 15% cleavage, boiling the quaternary $NH_4$ base chiefly split off MeOH *Chloroplatinate* of III, red, decomps 217° IV, $b_{0.01}$ 72–3°, mol wt in $C_6H_6$ 220–5, chloroplatinate, sinters 55–70°. IV is apparently a mixt VII, reacts neutral to litmus in $H_2O$, gives in acid soln with $AgNO_3$ a slight opalescence only after some time, forms no salts, quantitatively reduced by Zn dust in boiling AcOH to the *lupaninecyanoamide*, faintly yellow oil of distinct alk reaction *Chloroaurate* of VIII, m 153°, *picrate*, m 93–4°, *chloroplatinate*, red, decomps 225°. *Bz deriv*, m 195°, only slightly sol in $H_2O$, with neutral reaction *chloroaurate*, m 206° *Quaternary methiodide*, m 277–8°, gave on extn from alk soln with $Et_2O$ *N methyllupanine*, viscous, strongly alk oil (*chloroaurate*, m 140° (decompn )), which on methylation with MeI in abs alc and distn of the quaternary $NH_4$ base gave a thick oil $b_{0.05}$ 120–40° and immediately decolorizing $KMnO_4$ in $H_2SO_4$. Similar treatment of the des *N* methyllupanine gave 15% of the calcd amt of $NMe_3$ (as the chloroaurate), methylation of the product and extn of the neutral soln with $Et_2O$ gave a strongly unsatd yellowish sirup of neutral reaction in $H_2O$



(V)

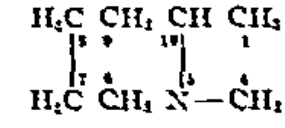


(VI)

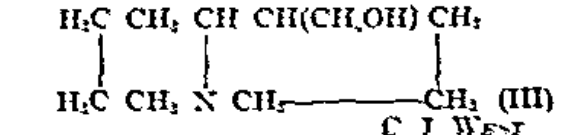
C A R.

**Lupine alkaloids. III.** George R Clemo, Richard Raper and Charles R S Tennyswood *J Chem Soc* 1931, 429–37, *cf C A* 24, 123 —Clemo and Leitch (*C A* 22, 3665) showed that *dl* lupanine (I) is reduced to an inactive base, probably *dl*-sparteine, the work is now repeated with the active bases Attempts to resolve I through the thiocyanates (Davies, *Arch Pharm* 235, 211(1897)) failed, however, the active forms are readily obtained by the use of the camphorsulfonates (II) *d* I-*d* II, in 24 2 g yield from 50 g I and 46 g II after 3 crystns from $Me_2CO$ m 108–10°, $[\alpha]_D$ 45 5°, a satd soln of KI gives the *HI salt*, m 189°, $[\alpha]_D$ 45 5° ($H_2O$), of *d* I, m 40°, the thiocyanate m 184°, $[\alpha]_D$ 55 6° (1 062% $H_2O$ soln ) The mother liquor from the *d* I-*d* II was concd , treated with KI and then with *l*-II, giving 16 1 g of *l* I-*l*-II, m 110–3°, $[\alpha]_D$ —45 3°, the *HI salt* m 190°, $[\alpha]_D$ —43 6°, of *l* I, $b_{11}$ 186–8°, $[\alpha]_D$ —61 0° (3 146% $Me_2CO$ soln ), the thiocyanate m 183–5°, $[\alpha]_D$ —55 3° (1 25%

aq soln.) Equal wts. of the 2 bases, crystd from $Me_2CO$, give I, m 98°. *d* I, HI and red P, heated 36 hrs at 220–30°, give *l* sparteine, $b_{11}$ 130·5°, $[\alpha]_D$ −11·3° (2·732% abs EtOH soln.), while this is about 6° less than the recorded value for sparteine, the picrate, m 205–6°, and the HI salt, m 231°, do not depress the m. p. of authentic products. Similarly, *l* I gives *d-sparteine*, $b_{11}$ 133·5°, $[\alpha]_D$ 15·9°; *picrate*, m 205–6°, *HI salt*, m 229°. Lupinine and $PBr_3$ in $C_6H_6$ give ω-bromolupinane (III), whose *methiodide* m 228·8° (decompn.). III and 20% MeOH KOH, refluxed on the $H_2O$ bath for 16 hrs., give a mixt. of ψ-anhydrolupinine (IV) and lupinine Me ether, whose *methiodide* m 177·8° and *picrate*, bright yellow, m 81·2°. The action of heat on ω-lupinyltrimethylammonium chloride gives a mixt. of IV and *ω-dimethylaminolupinane*, $b_{23}$ 95°, $[\alpha]_D$ −37·7°, whose *dimethiodide* m 308°. Karrer and Vogt (*C.* 1·25, 900) state that they obtained in this way 30% of the *l* anhydro base. Chlorolupinane and K phthalimide heated with a trace of Cu 72 hrs. at 210–20° give *N(II)-lupinylphthalimide*, m 105°, unchanged in concd. $H_2SO_4$ after 24 hrs.; electrolytic reduction in 20% $H_2SO_4$ gives *N-lupinylhydroxamide* m 88°; hydrolysis gives *II-aminolupinane* (V) $b_{11}$ 98°, rapidly absorbs $CO_2$ from the air and yields a *Bz deriv.* m 131·2°. V and $(CH_2CO_2Me)_2$, heated to 100° for 5 min. and then slowly to 190° during 1 hr., give a mixt. of *dilupinylsuccinamide*, m 225·6°, and *lupinylsuccinimide*, m 137° (*methiodide*, m 290°). Electrolytic reduction of the imide gives *N(II)-lupinylpyrrolidine*, $b_{11}$ 155°, whose *methiodide* m 302° (decompn.). The amide is not reduced under these conditions. $CH_2(CH{\cdot}CO_2Me)_2$ and V give *Me N(II)-lupinylglutaramate*, m 75–6°, and *dilupinylglutaramide*, m 193–5°. It has not been possible to convert the Me ester into the glutarimide and obtain compds. isomeric or identical with lupanine or α-Methyloxysparteine and Br in $C_6H_6$ give a *Br deriv.*, m 142°. HBr salt, m 214°, the Br is very firmly held as the compd. is not attacked by EtOH KOH, HBr, KOH at 180° or boiling $C_5H_5N$. IV. Synthesis of octahydropyridocoline. G. R. Clemo and George Rowntree Ramage. *Ibid* 437–42.—Because of the work of Winterfeld and Holschneider (preceding abstrs.), the following report is now offered. Distn. of lupininic acid with soda lime gives a base mixt. from which, after catalytic reduction, an inactive *base* (I), $C_9H_{17}N$, can be readily isolated; this $b_{23}$ 43·5°, and has a strong non terpene-like basic odor; the *picrate*, bright yellow, m 195·4°; *methiodide*, m 333–5° (decompn.); *chloroaurate*, light yellow, m 106–7°. I + piperidine-2-carboxylate and $Br(CH_2)_3CN$ with $K_2CO_3$ give 90% of *γ-2 carbethoxypiperidinobutyronitrile*, $b_{13}$ 170° (an excess of nitrile gives a *quaternary salt*, m 184°); hydrolysis with EtOH-HCl gives 75% of *Et γ-2-carbethoxypiperidinobutyrate*, $b_{14}$ 180°. Na in PhMe gives 50% of *Et 1 keto-octahydropyridocoline-2-carboxylate*, orange oil, $b_3$ 155°; heating with 20% $H_2SO_4$ on the $H_2O$ bath for 3 hrs. gives 70% of *1 keto-octahydropyridocoline*, yellow oil, $b_{14}$ 107° (*semicarbazone*, m 215°; *methiodide* m 210°). Zn and concd. HCl reduce this to *octahydropyridocoline* (II), $b_{23}$ 43°, $b_{14}$ 75°; *picrate*, yellow, m 213° (decompn.), *methiodide*, m 283°, *chloroaurate*, old gold m 170°. Reduction of the keto deriv. with Na Hg and abs. EtOH gives the *1 HO deriv.* of II, $b_3$ 120°, m 65–8°. Since I is not II or 3-ethylquinuclidine, it follows that either lupinine is not represented by *III* or structural changes have occurred in the production of *I*. Such possible changes were mentioned in part II and by W. and H.



(II)



(III)

C. J. West.

Thevetin, a crystalline glucoside from the seeds of Thevetia neriifolia. I. P. Ramaswami Ayyar. *Proc. 15th Indian Sci. Cong.* 1928, 161.—The defatted seed kernels of the yellow oleander yield on extn. with alc. about 1·5% of a glucoside which has been obtained in the form of glistening white plates, m. 215° after softening at 190°. Analysis gave C 56·2, H 7·2, O 36·6, OH 2·4, MeO 3·0. $[\alpha]_D^{31°}$ −39·2°. Hydrolysis with 1% $H_2SO_4$ gave 57% sugar ($[\alpha]_D^{31°}$ 22·7°; osazone, m. 205°, pentaacetate, m. 180°) and 48% nonsugar. From the nonsugar, an acid was obtained, m. 150°.

E. J. C.

Recent investigations on the constitution of pectins. Marc Bridel. *J. pharm. chim.* [8], 13, 99–131(1931).—A detailed review with structural formulas, a summary and 39 references are given of the investigations of Ehrlich and Schubert, *et al.*, on the pectins of the sugar beet, fruits and of flaxseed (cf. *C. A.* 20, 2519, 3310; 22, 996, 23, 1623, 5465; 24, 65).

S. Waldsott.

Ring synthesis of 3-methyl-4-acetylpyrrole-5-carboxylic acid. Hans Fischer,

Heinrich Beyer and Ewald Zaucker *Ann* 486, 55-70(1931); *cf C. A.* 22, 2569 — In the previous synthesis of opsopyrrole from $H_2NCH_2COMe$ and $MeCOCH_2COCO_2H$ there was obtained a by product, m 251°, removal of $CO_2$ gave a pyrrole, m. 80°, which is shown by synthesis to be *2 methyl 5-acetylpyrrole* (I) 2-Methyl-5-acetylpyrrole-4-carboxylic acid (II), m 305° (decompn.), gives an *Et ester* (III), m. 125°. II gives a *hydrazone*, needles, which do not m. 300°; *phenylhydrazone*, golden yellow, m 238°, in AcOH $PhNHNH_2$ gives a *pyridazine deriv*, decomps 324°, *oxime*, decomps. 244° boiling in NaOH gives the *oxime anhydride*, m. 233° (decompn.), heating the latter with $N_2H_4$ and EtONa in a bomb tube gives the ketazine of II. The oxime gives a *Br deriv* in AcOH at 40° III is reduced by Al Hg in $Et_2O$, giving the *carbinol*, $C_{10}H_{15}NO_3$, m 142° III gives a *p-dimethylaminobenzal deriv*, cinnabar red, m. 231°; the acid soln has a strong blue green fluorescence. Decarboxylation of II or the action of EtMgBr upon 2 methylpyrrole gives I, m 89°, *phenylhydrazone*, *oxime*, m 150° (*Ac deriv*, m 147°), *ketazine*, $C_{14}H_{18}N_4$, yellow, m. 183°, *semicarbazone*, m 200°, *benzylidine deriv*, yellow, m 197°. I with 2 mols. Br yields a *tri Br deriv*, decompn. not sharp. 3 mols Br give a *di Br deriv*, m 161°. 2 Methyl-5-ethylpyrrole and $MeC_6H_4N_2Cl$ give an *azo dye*, $C_{15}H_{16}N_3Cl$, orange red, decomps 178°. $PhN_2Cl$ gives a yellow *dye*, $C_{13}H_{14}N_3Cl$, decomps. 174°, the *dye* with $HO_3SC_6H_4N_2Cl$ m. 240–50°. III and 2 mols Br give a *di Br deriv*, m 185°, the *tri-Br deriv* m. 165°. The isoopsopyrrole obtained by reduction of I, heated with 2 mols. $NH_2OH$ HCl and 1 mol $Na_2CO_3$ 7 hrs., gives *2,5-heptanedione dioxime*, m 150°. The reaction product of 2 methyl-3-carbethoxypyrrole (IV) and EtMgBr, treated with AcBr, gives *2-methyl-3-carbethoxy-5-acetylpyrrole* (V), m 152°, *phenylhydrazone*, m. 144°, *oxime*, m 191°, *hydrazone*, m 116°, *di Br deriv*, m. 214°. 2 Ethylpyrrole (VI) and EtMgBr, heated 4 hrs. and then treated with $HCO_2Et$, give *triethyltripyrrylmethane*, m 162° (cor.), heating with EtOH for 2 hrs. gives *2-ethyl-5 formylpyrrole*, m 52°. *2 Methyl 5 formylpyrrole*, m 70°, *oxime*, m 153°. VI, MeMgI and $ClC(OEt)_3$ give *2-ethyl-5-carbethoxypyrrole*, $b_{15}$ 134°, m 48°, heating with satd. $NH_4OH$ 12 hrs at 150–65° gives *α-ethylpyrrole-α'-carboxylic amide*, m 112°. IV and AcCl with $AlCl_3$ and $CS_2$ give V and a deep red *compd*, decomps 194°. α-Acetylpyrrole and *p*-$Me_2NC_6H_4CHO$ give the *chalcone deriv*, $C_{15}H_{16}ON_2$, orange, m. 200° (cor.)

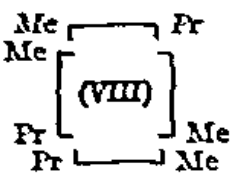
C. J. West

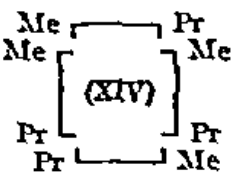
Synthesis of some pyrroles and dipyrrylethanones. H. Fischer and Pierre Viaud *Ber* 64B, 193–200(1931) —The position of one or more $CO_2H$ groups in the chlorophyll and uroporphyrin mols is still in question. These $CO_2H$ groups are readily split off and therefore cannot be present as $EtCO_2H$ residues. One possibility is that they are attached to the methine groups joining the pyrrole nuclei and it was therefore undertaken to synthesize pyrromethenes carboxylated on the methine group by condensing pyrroles having an α-$CCl_3CO$ side chain with trisubstituted pyrroles and then sapong the $CCl_3$ group 2,4 Dimethylpyrrole (I) with $CCl_3CN$ yielded the *5-trichloroacetyl deriv* (II), readily obtained by hydrolysis of the imine and reduced by Zn dust AcOH to the 5-Ac deriv., thus establishing its structure. Similarly, I with $NCCO_2Et$ gave *Et 2,4-dimethylpyrrole-5 glyoxylate* (III), the free *acid* (IV) is stable toward Br. Cryptopyrrole likewise yields the *5-trichloroacetyl deriv* (V), reduced to the *5-Ac deriv* (VI) which is readily obtained from cryptopyrrole with glacial AcOH With alc. KOH, the imine-HCl of V splits off $CHCl_3$ to give α-cyanocryptopyrrole 2,3 4-Trimethyl and 2,4-dimethyl-3 acetylpyrroles also yielded 5-$CCl_3CO$ derivs. Unfortunately, the condensation of these $CCl_3CO$ derivs. with di- and trisubstituted pyrroles has as yet given no well-defined products, there result dyes with no characteristic absorption and having no tendency to crystallize In phylloporphyrin it is not yet definitely established whether the 2 pyrrole nuclei are united through a group —CH CH— or —CMe= To throw light on this point *bis(2,4-dimethyl-3-acetyl)pyrrothylmethane* (VII) and the *Pr homolog* (VIII) were prepd by condensation of 2,4-dimethyl-3 acetylpyrrole with the appropriate aldehydes, but dehydrogenation to the methenes has thus far yielded no cryst. products As the pyrrole nuclei in chlorophyll may possibly be united through a $—CH_2CO—$ group, a $ClCH_2CO$ group was introduced into I, 2,3 4 trimethylpyrrole and cryptopyrrolecarboxylic acid and the products were treated with the Grignard compds of di- and trisubstituted pyrroles. The resulting dipyrrylethanones with α α'-brominated pyrromethenes give dyes which have not yet been obtained in cryst. form II (22 g from 10 cc. I), m. 108–9°, is stable toward boiling alc. *2,4 Dimethyl-5-carbethoxy-3-trichloroacetylpyrrole* (60–70% yield) m. 173–4° *3 Br deriv* of II (11 5 g from 10 g II with Br in AcOH), m 145–6°. V (4 g from 2 cc. cryptopyrrole), m 101–2°. VI (70% from V), m. 111–2°. *2,3,4-Trimethyl-5-trichloroacetylpyrrole* (90%), m. 114–5°. *2,4-Dimethyl-3-acetyl-5-trichloro-*

*acetylpyrrole*, m. 145–6°. *2,4-Dimethyl-3-bromo-5-chloroacetylpyrrole*, m 184–6°. III, m. 60–1°. IV, m. 164–5° (decompn). VII (87%), m 208–9°. VIII, m 213–4°. MeCH CHCHO gives a product m 236–8° whose compn, however, does not agree entirely with that calcd for the propenyl analog. of VIII. *(3,4,5-Trimethylpyrryl)-(3,'5'-dimethylpyrryl)-2,2'-ethanone*, m 168°. *3,5-Dimethyl-3,'5'-dimethyl-4'-ethyl analog*, m 162–3° (in 1 prepn there was obtained as by-product an isomeric (probably dimeric) *product*, m 229° (cor.)) *3,5-Dimethyl-4-ethyl-3',5'-dimethyl compd*, m. 156°. *3,4,5-Trimethyl-3',5'-dimethyl-4'-ethyl compd*, m 157° *Bis(3,5-dimethyl) compd*, m. 179° (cor.) 2,4-Dimethyl-3-ethyl-5-chloroacetylpyrrole with 1 mol $SO_2Cl_2$ in $Et_2O$ gives a *mono-Cl deriv*, m 123–5°, whereas with 2 mols $SO_2Cl_2$ is obtained a product which, after washing with ice $H_2O$, is *3-ethyl-4-methyl-5-chloroacetylpyrrole-2-aldehyde*, m 113–4° *(Chloroacetyl)cryptopyrrolecarboxylic acid*, obtained with $ClCH_2CN$, m 212–3° *2,3,4 Trimethyl-5-anilinoacetylpyrrole*, from the 5-$ClCH_2CO$ *deriv* and $PhNH_2$, m 194–6° *2,4 Dimethyl compd*, m 207° *2,4-Dimethyl-3-bromo compd*, m 205–10° (decompn) *2,4-Dimethyl-3-ethyl compd*, m 181–3° C. A. R.

Porphyrin syntheses. XXXVII. Synthesis of tetramethyltetrapropylporphins I–IV and of octapropylporphin. H Fischer, Martin Goldschmidt and Wilhelm Nüssler. *Ann.* 486, 1–54(1931), cf *C A* 25, 1256.—Although the 4 possible isomers of etioporphyrin (tetramethyltetraethylporphin) have been synthesized, their high m ps. make a detn of their differences difficult, for this reason the corresponding tetramethyl tetrapropylporphins have been prepd 2,4-*Dimethyl-5-carbethoxypyrrole* and EtCOCl with $AlCl_3$ give 83% of the *3-propionyl deriv* (I), m 140°, in AcOH Br and I give the *2-bromomethyl deriv*, m 145° (cor.) Heating 100 g I, 55.5 g Na, 667 cc. abs. EtOH and 50 cc. 77% $N_2H_4.H_2O$ 12 hrs. at 160–5° (25–35 atm.) gives 25–6 g *2,4-dimethyl-3-propylpyrrole* (II), $b_{15}$ 98–100°, m 13.5°, $d^{19}$ 0.8988, $n_D$ 1.49243, *picrate*, yellow, m 132° (cor.). $HO_3SC_6H_4N_2Cl$ gives an *azo dye*, $C_{15}H_{15}N_3O_3S$, brown red, m. 248°. II, (18 g) HCN and HCl in $CHCl_3$-$Et_2O$ give 14 g *2,4-dimethyl-3-propyl-5-formylpyrrole*, m 105°, $NCCO_2Et$ gives the *5-Et glyoxylate deriv*, m 192°. II in 30% $H_2SO_4$ with $CrO_3$ gives *methylpropylmaleinimide* (III), m 57°. II gives an *oxime*, m 198° The residue from II is the *pyrazoline* of I, $b_{15-16}$ 141–5° (yield, 45 g), *di-HCl salt*, m. 145° (cor.); *dipicrate*, deep yellow, m. 137° (cor.) 2,4-Dimethyl-3 propionylpyrrole and 77% $N_2H_4.H_2O$ in abs. EtOH, boiled 5 hrs., give the *ketazine*, canary-yellow, m. 159° (cor.). II and Br in AcOH-$CCl_4$ give the *HBr salt*, blue-violet leaflets, m. 130° (*HCl salt*, brown red, m 178°, *picrate*, yellow-brown, m. 182°), of *5-bromo-5'-bromomethyl-4,3'-dimethyl-3,4'-dipropylpyrromethene*, brown red, decomps. 207°. The methene with HBr-AcOH, heated 4 hrs. at 170° or better with $(CH_2CO_2H)_2$ 10 min. at 180° gives 10–15% of the *tetramethyltetrapropylporphin* (IV), m. 290°; *Cu complex*, needles, m 295°; *Mg complex*, red leaflets, m 249°; *Fe complex*, dark leaflets, m. 338° (cor.), the *bromohemin* m 333°, the *iodohemin* m. 310°; the *nitroporphyrin*, brown red, m. 272°. Shaking IV in $CHCl_3$-AcOH with $PbO_2$ until the porphyrin spectrum has disappeared, gives *xanthoporphyrinogen*, yellow, crystals with 2 mols $H_2O$, m. 262°; reduction with Na-Hg again gives IV; photooxidation gives III. The reaction product of II and EtMgBr, treated with $ClCO_2Et$, gives 70% of *2,4-dimethyl-3-propyl-5-carbethoxypyrrole*, m. 98° (cor.); the *2-bromomethyl deriv*. m. 148°; the crude Br deriv., heated with *(HCHO)*$_x$ in MeOH 3–4 hrs., gives *4,4'-dimethyl-3,3'-dipropyl-5,5'-dicarbethoxypyrromethane* (V), m 166°; the free acid is not stable and could not be recrystd; the crude product decomps. about 140°, boiling in AcOH for 4 hrs. gives some 2-methyl-4-propylpyrrole and a small amt. of crystals, m. 121–2°. The dry acid







and Br in $HCO_2H$-AcOH give *5,5'-dibromo-4,4'-dimethyl-3,3'-dipropylpyrromethene* (VI), orange-brown, m. 146°, as the *HBr salt*, dark violet, does not decomp. at 270°;

*picrate*, orange, m 181° (decompn.). 2,3-Dimethyl-4-*propylpyrrole* and 48% HBr in $HCO_2H$, boiled 5 min., give *5,5',4,4'-tetramethyl-3,3'-dipropylpyrromethene HBr*, red, m 184°, *picrate*, bluish green decomps 179-80°, the *HBr* salt and Br in AcOH give the *5,5'-dibromomethyl deriv* (VII), red, m.p. not sharp. V (6.5 g.) in 20 cc. $HCO_2H$, oxidized with a stream of air at 30-40° for 5-10 days, gives 600 mg. *tetramethyltetrapropylporphin* (VIII), dark violet, m. 330° (decompn.), this also results in 41% yield from VI and VII with succinic and tartaric acids at 190°. the *Fe complex* decomps. 336-9° (cor.). *Cu complex*, Cu red does not m. 310°. *Zn complex*, wine red, does not m. 340°. *3,5,3',5'-Tetramethyl-4,4'-dipropylpyrromethene*, yellow, m. 95°. *HBr salt*, red, m. 218°. *5,5'-bromomethyl HBr salt* (IX), red, decomps. above 200°. VII and IX with succinic and tartaric acids, heated at 190°, give 47% while HBr-AcOH at 170-5° for 4 hrs. give 17.5% of *tetramethyltetrapropylporphin* (X), m. 218°. *Fe complex*, dark violet, m. 276°; *Cu complex*, red, m. 255°. *Ag complex*, red brown, m. 267° (cor.). $PrCOCH_2CO_2Et$, for which details of prepn. are given, $b_{16}$ 84-8°, $b_{12}$ 94-6°, $b_{10}$ 101°, $b_{9}$ 104°, $d^{15.4}_{4}$ 0.9862, $n^{15}_{D}$ 1.4700. titration with Br indicates 12.95% enol form; the values are also given for various solvents at 17.9°. $PrCOCH_2CO_2Et$ (180 g.) in 850 cc. AcOH, treated with 80.4 g. $NaNO_2$ in $H_2O$ at 5-10°, allowed to stand overnight, then treated with 147.6 g. $AcCH_2CO_2H$ and finally with 150 g. Zn at 70-80°, gives 160-80 g. *2-methyl-4-propyl-3,5-dicarbethoxypyrrole*, m. 102°, with conc'd $H_2SO_4$ at 40° there is partial sapon., giving the *3-carboxylic acid*, m. 217° (cor.), $CO_2$ being split off giving *2-methyl-4-propyl-5-carbethoxypyrrole*, m. 80°, with HCN and HCl this yields the *3-formyl deriv.* (XI), m. 117°, reduction with EtONa and $N_2H_4 \cdot H_2O$ by heating 12 hrs. at 160-70° gives about 70% of *2,3-dimethyl-4-propylpyrrole* (XII), $b_{14}$ 96-8°, *picrate*, yellow, m. 127°. XI and XII with HBr give *5,5',4,3'-tetramethyl-3,4'-dipropylpyrromethene HBr* (XIII), yellow brown, decomps. 182°, *picrate*, orange-yellow, decomps. 162°, *perbromide*, dark wine red, m. 100° and easily loses HBr. The HBr salt and Br in AcOH give the *5,5'-dibromomethyl HBr salt*, red brown, has no m.p. XII (30 g.) with EtMgBr and $ClCO_2Et$ give 33 g. of *2,3-dimethyl-4-propyl-5-carbethoxypyrrole*, m. 102°, *2-bromomethyl deriv.*, m. 156°, heating with $(HCHO)_x$ in MeOH-HBr gives *5,5'-dicarbethoxy-4,4'-dipropyl-2,3'-dimethylpyrromethane*, m. 132°, the *free acid* m. 168°, with Br in AcOH the acid gives *5,5'-dibromo-4,4'-dipropyl-3,3'-dimethylpyrromethene* yellow brown, m. 141°, as the *HBr salt*, red, does not melt. VII and XIII with HBr-AcOH at 130-5° for 8 hrs. give 29.6%, with HBr-AcOH at 170-5° for 4 hrs., 14.5% of tetramethyltetrapropylporphin (XIV), lilac-brown, m. 206°, *Fe complex*, black violet, m. 287°, *Cu complex*, red, m. 235°, *Zn complex*, red, m. 250°, *picrate*, violet brown, decomps. 190-204°. The HCl nos. of the 4 isomers are IV, 6.6, VIII, 6.4, X, 6.2, XIV, 6.3. Spectroscopic data are also given. *2-Methyl-4-propyl-3-propionyl-5-carbethoxypyrrole*, m. 119°, reduction gives *2-methyl-3,4-dipropylpyrrole*, $b_{16}$ 116-24°, *picrate*, yellow, m. 98°, HBr in AcOH gives *5,5'-dimethyl-4,4',3,3'-tetrapropylpyrromethene HBr*, m. 152°, the *perbromide*, violet, m. 113°. With succinic and tartaric acids the perbromide gives 27% of *octapropylporphin*, violet red, m. 276°, HCl no. 21, *Fe complex*, black, begins to sinter at 225°, *Cu complex*, red, m. 327°. *2-Methyl-4-propyl-3,5-dicarboxypyrrole*, from the 5-$CO_2Et$ deriv. with EtOH-NaOH or the 3,5-$(CO_2Et)_2$ deriv. (XV) with 10% NaOH, m. 251° (cor.), decarboxylation gives *2-methyl-4-propylpyrrole* (XVI), $b_{14}$ 86-8°. *2,2'-dimethyl-4,4'-dipropylpyrromethene HBr*, yellow brown, m. 190° (quant. yield), *picrate*, has no m.p., *Cu complex*, green, sinters at 160°. XV (20 g.) and $SO_2Cl_2$ in abs. $Et_2O$ give 10-15 g. *2-formyl-4-propyl-3,5-dicarbethoxypyrrole*, m. 88°, *hydrazone*, m. 118°, *semicarbazone*, m. 199°, *phenylhydrazone*, m. 85° (decompn.), the free *acid* carbonizes above 210°. XVI and the acid with HBr give quant. *4,3'-dipropyl-5'-methyl-3-carboxypyrromethene HBr*, decomps. about 100°. *2,4-Dimethyl-3-propionyl-5-carboxypyrrole* (XVII) m. 214° (decompn.), on distn. gives *2,4-dimethyl-3-propionylpyrrole* (XVIII), m. 122°. XVII and Br in AcOH give *3,5-dibromo-4-5'-dimethyl-4'-propionylpyrromethene HBr*, red, which does not melt, the free base, orange red, decomps. 175°. XVIII, HCN and HCl give *2,4-dimethyl-3-propionyl-5-formylpyrrole* pale yellow, m. 169°, with XVIII and HBr in EtOH there results *3,5,3',5'-tetramethyl-4,4'-dipropionylpyrromethene*, yellow red, m. 197°. *HBr salt*, red yellow, m. 222°, heating with Br in AcOH gives *4,4'-dibromo-3,5,3',5'-tetramethylpyrromethene HBr*, m. 217°. Short heating of XVIII in HCHO gives *3,5,3',5'-tetramethyl-4,4'-dipropionylmethane*, m. 225°, the Br deriv. decomps. 175°. *2-Ethyl-4-propyl-3,5-dicarbethoxypyrrole*, m. 91°, *2,4-di-Pr deriv.*, m. 87°, *2-methyl-3-acetyl-4-propyl-5-carbethoxypyrrole*, m. 112°, *2,3-dimethyl-4-propyl-5-formylpyrrole*, m. 75°, *2,5-dimethyl-3,6-diacetylpyrazine*, m. 101° (cor.).

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**Coloring matter of awobana.** CHIKA KURODA *Proc Imp Acad Tokyo* 7, 61–3 (1931).—The flower of "Tsuyukusa" (*Commelina communis*), which is azure blue, is used in the prepn of awobana paper, which was used in these expts The dye is insol in MeOH but is sol in $H_2O$, from which the dye is pptd by MeOH as an ultramarine-colored powder The ash contains (14.5–15%) principally K and Mg, with traces of Fe, Al, Ca, $PO_4$ and $SO_4$ are the important acid radicals Heating with MgO gives about 1% $NH_3$ The coloring matter, acidified, turns purple to red without losing its solv in $H_2O$ Hydrolysis gives about 31% of sugar, which appears to be 1 mol of a monosaccharose (glucose) the red aglycon is sol in EtOH but insol in other org solvents Decompn with alkali gives *p*-coumaric acid and *p*-$HOC_6H_4Ac$, the acid is obtained even with cold 1% aq alkali while the ketone is formed only after heating C J WEST

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The formation of films of drying oils (KAPPELMEIER) 26. Electric moment and molecular structure III Double and triple bonds and polarity in aromatic hydrocarbons (SMYTH, DORNTE) 2 The birefringence of safrole (PAUTHENIER, BART) 2. X ray examination of the crystal structure of resorcinol (SARKAR) 2. Crystals of 3,4,-3',4',6'-pentamethoxydiphenylmethane 2-carboxylic acid (LENGYEL) 2. Ultra violet absorption spectra of the nitriles and amides of 2 methyl-3 pentene (CASTILLE, RUPPOL) 3 Melting point curves of the monobasic fatty acids (KING, GARNER) 2. The decomposition of hydrocarbons in the positive ray tube (STEWART, OLSON) 3. The chemical action of ultra violet light on the alkyl iodides (FUSCHWILLER) 3 Significance of the structure of the hydrocarbon residue on the velocity and equilibrium position in organic reactions (HEROLD, WOLF) 3. The absorption of aqueous solutions of tartaric acid (BRUHAT) 3. Electrical properties of molecules (ATEN) 2. Interaction of epichlorohydrin and cyclohexene oxide with alkali and $NH_4$ halides (SEN, *et al*.) 2. Recovery of solvents such as those used in the manufacture of the alkali metal phenyl glycines (U S pat 1,798,713) 13.

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**Beilsteins Handbuch der organischen Chemie.** 4th ed Erstes Erg.-Werk, d Literatur von 1910–19 umfassend. Bd. VI. Als Erg d 6 Bds. d Hauptwerkes (System-Nr 499 bis 608) Issued by Deutschen Chemischen Gesellschaft Edited by FRIEDRICH RICHTER Berlin J Springer. 642 pp. Linen, M 128.

MACBETH, A KILLEN. **Organic Chemistry for Medical Intermediate Science and Pharmaceutical Students.** London Longmans Green and Co 296 pp 6s. 6d

VLASSOPOULOS, VLASSIOS. **Über die sterische Hinderung bei Reaktionen von Aminosäuren und Polypeptiden, zugleich ein Beitrag zum Wesen der sterischen Hinderung.** Leipzig Gustav Fock G m b H 30 pp.

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**Organic oxygen compounds.** HENRY DREYFUS. Fr 697,726, June 20, 1930 O compds of C are hydrogenated in the presence of catalysts composed of or contg Fe or Co in the form of compds having the metals in the acid radical, *e. g.*, ferrites, ferrates, cobaltites or cobaltates of alkali or alk. earth metals Examples are given of the prepn of EtOH and higher alcs along with aliphatic acids and aldehydes from CO and H and from a mixt of MeOH, CO, $CO_2$ and H Fr 697,727 describes the prepn of similar compds. in which catalysts composed of or contg compds of metals of groups 1 and 2 are used with oxy acids of elements of groups 2, 3, 4 and 5, *e. g.*, borates, aluminates, zincates, silicates or phosphates of alkali, or alk. earth metals or Cu Cf. *C. A.* 25, 963 and following abstrs

**Organic oxygen compounds.** HENRY DREYFUS Fr 697,896, June 25, 1930 EtOH and higher aliphatic alcs are obtained from mixts of H and O compds of C in the presence of a catalyst composed of or contg Fe, Ni or Co in the form of oxy acids of groups 2, 3, 4 or 5, or as free metals (or their compds.) in intimate assocn with other compds of oxy acids. The metals may be used in the form of borates, aluminates, zincates, silicates, phosphates or other salts of oxy acids of P

**Organic oxygen compounds.** HENRY DREYFUS. Fr 698,094, June 26, 1930 Org. O compds are prepd by the reaction of steam with aliphatic hydrocarbons such as $CH_4$, $C_2H_6$, $C_3H_4$ or $C_2H_2$. Alk. earth metals or metals of groups 4, 5, 6, 7 and 8, Al, Mg or Zn or their compds may be used as catalysts The reaction is carried out under pressure and preferably at 250–500°. Examples are given of the prepn of MeOH and higher alcs along with aldehydes, acids and ketones

**Oxidizing paraffins, etc.** I. G FARBENIND. A.-G. (Manfred Dunkel, inventor). Ger 522,361, Mar. 19, 1927 Paraffin hydrocarbons, waxes, etc., are oxidized with

gases contg O in the presence of both a metalliferous catalyst and a small quantity of an org base. Thus, paraffin may be oxidized at 170° with air in the presence of Mn soap 0.5 and $(CH_3)_2NH$ 0.3%

Higher olefins and diolefins from lower olefins. PAUL FEILER (to I G Farbenind. A.-G.) U. S. 1,799,787, April 7. In the production of compds such as diolefins from lower olefins such as $C_2H_4$, the initial gases are exposed, at a higher rate of flow than that required for the production of $C_2H_2$, to the action of high temp. elec. discharges and the process is carried out in a closed cycle with continuous removal of the higher olefins and diolefins by cooling. Cf. *C. A.* 25, 2435.

Diolefins. I. G. FARBENIND. A.-G. Fr. 698,426, July 5, 1930. 1,3 Butylene glycol or other compds. hydroxylated in the 1 and 3 positions are dehydrated in the presence of catalysts and under pressure. Suitable catalysts are $H_3PO_4$, red P, $NaH_2PO_4$, or alum. Examples are given.

Cyclic aldehydes. I. G. FARBENIND. A.-G. (Georg Kalischer and Karl Keller, inventors). Ger. 519,806, Mar. 22, 1928. Addn. to 514,415 (*C. A.* 25, 1536). The aldehyde group is introduced into oxygenated cyclic compds. by treating these with formamide in the presence of $AlCl_3$ or a chloride or oxychloride of P or S. A large excess of formamide should be used. Thus, a mixt. of β naphthol and formamide may be heated to 95°, mixed with $AlCl_3$, the mixt. heated to 130–40°, and the cooled product stirred with water, then heated with AcOH and filtered. 2 naphthol 1 aldehyde is obtained from the filtrate. Other examples are given also.

Ketones. SCHERING-KAHLBAUM A.-G. Fr. 698,230, June 30, 1930. Vapors of aromatic dicarboxylic acids or their anhydrides and vapors of aliphatic carboxylic acids are passed together over suitable catalysts. Thus, a mixt. of acetone and acetophenone is obtained by passing a mixt. of phthalic anhydride and AcOH over $MnO_2$ at 350–400°.

Catalytic synthesis of amines from alcohols and ammonia. HERRICK R. ARNOLD (to E. I. du Pont de Nemours & Co.) U. S. 1,799,722, April 7. In processes such as effecting reactions between MeOH and $NH_3$ in the presence of a catalyst such as alumina gel, the mol. ratio of alc. to $NH_3$ is the most important factor influencing yield and proportion of primary, secondary and tertiary amines in the product. As this ratio is increased the total conversion increases. At low ratios, *e. g.*, 1 to 4, primary amine is the major product, while at a ratio of about 3 to 1 primary amine disappears, the product consisting of secondary and tertiary amines, tertiary being formed in the larger amts. Examples with details of procedure are given.

Aromatic amines. I. G. FARBENIND. A.-G. (Julius Laux, inventor). Ger. 516,999, Feb. 16, 1927. Addn. to 515,758 (*C. A.* 25, 2437). The method of 515,758, for producing aromatic amines by the reduction of nitro compds. by Fe in the presence of aq. Al salt soln. is modified by replacing the Al salts by salts of other ter- or quadrivalent metals. Thus, $PhNO_2$ is reduced by Fe filings in the presence of $CeCl_4$ to produce $PhNH_2$.

Monocyclic lactones. LEOPOLD RUZICKA (to Soc. anon. M. Naef & Co.). U. S. 1,799,536, April 7. See Fr. 657,971 (*C. A.* 23, 4483). For prepg. monocyclic lactones having 14 to 18 ring members, monocyclic ketones having 13 to 17 ring members are heated with persulfuric acid. Examples with details of procedure are given.

Keto acid esters. PAUL HALBIG, FELIX KAUFLER and H. PETER SCHMITZ (to A. Wacker Ges. für Elektrochemische Industrie G. m. b. H.) U. S. 1,798,937, March 31. See Fr. 654,413 (*C. A.* 23, 3714).

Diazo solutions. KARL SCHNITZPAHN (to General Aniline Works). U. S. 1,799,068, March 31. A solid aryl diazonium fluoborate of the benzene series such as *p*-nitrophenyldiazonium fluoborate is dissolved in an aq. soln. of salts of metals such as KCl or $AlCl_3$, the metal of which has a greater affinity for the hydrofluoboric acid than for the acid residue of the salt, so that difficultly sol. fluoboric metal salts may be sepd. and concd. diazo solns. obtained.

Stable diazo compounds. SOC. ANON. POUR L'IND. CHIM. A BÂLE. Fr. 697,425, June 14, 1930. Solns. of diazo compds. are treated with aromatic sulfonic acids contg. more than one $SO_3H$ group in the presence of salts of metals of the 2nd group of the periodic system, the hydroxides of which are strong bases, *e. g.*, $CaCl_2$, $MgCl_2$ or $MgSO_4$. Cf. *C. A.* 24, 1391.

Hydroxycarbazoles. I. G. FARBENIND. A.-G. Fr. 698,148, June 27, 1930. The prepn. of 2- or 3-hydroxycarbazole is described by treating 2- or 3-alkoxytetrahydrocarbazole with PbO at a temp. of 400–600°.

Phenols. F. RASCHIG G. M. B. H. Fr. 698,341, July 3, 1930. PhOH and its homologs are prepd. by treating PhCl and its homologs with steam at a high temp. in the presence of $Al_2O_3$ or $Al(OH)_3$ free from Fe. The catalyst may be prepd. by

neutralizing a soln of $Al(OH)_3$ in an alk lye with an acid soln of a Cu salt. Instead of Al other metals of the 1st to the 4th group may be used

Stabilizing phenols. I G Farbenind A -G Ger. 522,391, Feb 24, 1929 The darkening and ultimate resinification of phenols or their solns under the influence of light and air is hindered by addn of 0 5–3% of oxalic acid or its acid or neutral salts or esters

Alkyl substituted phenols. Soc. Reichhold, Flugger & Boecking Fr 697,711, June 20, 1930 Unsatd hydrocarbons are caused to react on phenols in the presence of metallic chlorides such as $AlCl_3$, $ZnCl_2$ and $FeCl_3$ The reaction is started by small quantities of alkyl halides or halogen acids Thus, gaseous isobutylene is bubbled *through a soln of PhOH in $CCl_4$ contg $AlCl_3$, a small quantity of tert-BuCl being* added at the start. Other examples are given

Isoalkylene phenols. Walter Schoeller, Hans Jordan and Reinhard Clerc (to Schering-Kahlbaum A -G ) U S 1,798,813, March 31 3 Methyl-6-isopropylenephenol is prepd by heating 4,4′-dimethyl 2,2′ dihydroxydiphenyldimethylmethane above the m p and sepg the decompn products by fractional distn.

*Polymerization products. I G Farbenind A -G. Fr 697,437, June 14, 1930* Acid polymers or their derivs are prepd by polymerizing, in known manner, the halides or nitriles of monomeric acids capable of being polymerized and afterward substituting the halogen or CN by other radicals by appropriate treatment By treatment with water, steam, aq solns of alkalies or moist air the acids themselves are obtained, and with less than the equiv amt of water the anhydrides are obtained Examples are given of the treatment of polymerized acrylic acid chloride

Condensation products. Oscar Adler and Rudolf Adler. Fr 697,881, June 25, 1930 Salts of phenylquinolinecarboxylic acid and pyrazolones or alkylated aminopyrazolones are heated in the presence of water to a temp necessary to obtain a clear fusion. Thus, Ca 2-phenyl-4-quinolinecarboxylate is ground with 1 phenyl 2,3-dimethyl-4-dimethylamino-5-pyrazolone and a little water and heated The mass obtained is cooled and ground

Alkylene derivatives. I G Farbenind A -G Fr. 697,786, June 23, 1930 Alkylene oxides with org compds contg OH or COOH groups or water are passed through heated pressure towers and afterward distd Thus, ethylene glycol is prepd. from a mixt. of ethylene oxide and water, and glycol monoacetate from ethylene oxide and AcOH Other examples are given

Derivatives of anthraquinone. I. G. Farbenind A -G. (Wilhelm Müller, inventor) Ger 516,997, June 30, 1928 Derivs of anthrapyrimidine character are obtained by the action of $NH_3$ on anthraquinone 2,1-oxazole Thus, *C*-phenylanthraquinone-2,1-oxazole is heated to 150° with aq $NH_3$ for 12 hrs in an autoclave to give 2-amino-*C*-phenyl 1,9 anthrapyrimidine, m. 343–5° Further examples are given

*Benzimidazole derivatives. I G Farbenind A -G (Wilhelm Eckert and Otto* Braunsdorf, inventors) Ger 522,173, June 19, 1928 4 Dialkylacetylnaphthoylenebenzimidazole-5-carboxylic acids are prepd by heating naphthoylenebenzimidazole-*peri*-dialkylindandiones with KOH The initial materials are prepd by oxidizing acenaphthenedialkyl-*peri* indandiones (cf *C A* 4, 2144), and condensing the resulting naphthalene-4,5-dialkylindandione-1,8-dicarboxylic acids or their anhydrides with *o*-diamines Examples are given

Benzothiazole derivatives. I. G Farbenind A -G. (Heinrich Jensch, inventor) Ger. 522,059, Sept 18, 1928 See Fr 680,384 (*C A* 24, 3801).

Guanidine derivatives. R. Freiherr von Godin Ger. 522,057, July 10, 1929. Salts of alkylenediguanidines are prepd by fusing higher alkylenediamines with guanidine salts The reaction proceeds with evolution of $NH_3$ Examples are given Cf *C A* 23, 1649

Hydroxydiphenylamine derivatives. I G Farbenind A -G Fr 697,764, June 21, 1930 Derivs of 3-hydroxydiphenylamine are prepd by heating 1-methyl 2-amino-4-hydroxybenzene with aromatic amines contg no sulfonic, carboxylic or nitric groups in the presence of HCl or agents liberating HCl Examples are given of the prepn of the 6-methyl-4,6-dimethyl and 4-chloro derivs

Piperazine derivatives. Soc. des usines chim Rhône-Poulenc. Fr. 698,687, Oct 7, 1929 Mono- and di substituted derivs of piperazine are prepd by the reaction of ethylene oxides on piperazine hydrate, in excess to obtain the monosubstituted, and not in excess to obtain the disubstituted derivs Examples are given of the prepn. of piperazinedimethylethylcarbinol, m 77–78°, piperazinebis(dimethylethylcarbinol), m 230° (with decompn ), *N*-benzoylpiperazinedimethylethylcarbinol, m. 33°, piperazinebutyloxymethylmethylcarbinol (picrate, m. 204°), piperazinemethylbenzylcarbinol,

m 63–64°, piperazinebis(methylbenzylcarbinol), m 135°, piperazinemethylphenoxymethylcarbinol, m 58–59°, piperazinebis(methylphenoxymethylcarbinol), piperazine-α quinoline (picrate, m 244°), and quinolinepiperazinedimethylethylcarbinol

**Pyridine derivatives.** Schering-Kahlbaum A.-G. (Curt Räth, inventor) Ger. 522,060, April 15, 1927. Derivs. of 2-chloropyridine substituted in the 5-position or the 3,5-positions with $NO_2$, COOH, or halogen, are prepd. by halogenating the correspondingly substituted *N* alkyl- or *N* aryl 2 ketopyridines. Thus, *N* methyl 2 keto-5-nitropyridine, treated at 150–160° with $PCl_5$ contg. a little $POCl_3$, yields 2 chloro-5-nitropyridine. Other examples are given.

**Xylenol derivatives.** I. G. Farbenind A. G. Fr. 697,821, June 23, 1930. Aryl ides of asym-o-xylenolcarboxylic acid are prepd. by heating the carboxylic acid (obtained by heating alkali salts of *o* xylenol of the constitution $CH_3$, $CH_3$, OH = 1,2,4) in the presence of condensing agents with arylamines contg. no COOH or $SO_3H$ groups. Examples are given of the prepn. of the anilide (m. 178°), the *p* chloroanilide (m. 209–210°), the *o* toluide (m. 296–297°) and a list of constituents with the m. ps. of the compds. is given.

**Stable leuco indigo preparations.** Imperial Chemical Industries, Ltd. Fr. 698,491, April 2, 1930. Dispersed indigo, the particles of which are much smaller than those of ordinary finely divided indigo (i. e., below 10μ) is reduced, by means of alkali and reducing sugar, one mol. proportion or less of reducing sugar and 7 mol. proportions or less of alkali being used for one mol. proportion of indigo. Cf. *C. A.* 25, 1539.

**Trialkyl phosphates.** Wm. J. Bannister (to Commercial Solvents Corp.). U. S. 1,799,349, April 7. Tributyl phosphates are obtained by the reaction of Al butoxide with P oxychloride in $C_6H_6$ at a temp. below 15°, adding water to hydrolyze $AlCl_3$ and fractionally distg.

**Calcium tartrate.** Société industrielle du Languedoc (S. A.). Ger. 516,673, April 24, 1929. Crystd. Ca tartrate is freed from its water of crystn. by heating with water to above 120° in an autoclave. Thus, the salt contg. 72.3% Ca tartrate and 27.7% water, is mixed with water and heated to about 160° and steam under pressure led in. The resulting salt has a water content of 0.4%.

**Aryl isothiocyanates.** I. D. Riedel-E. de Haën A.-G. (Karl H. Slotta and Helmut Dressler, inventors). Ger. 522,058, Oct. 18, 1928. Aryl isothiocyanates are prepd. by the reaction $RNHCSSNH_4 + COCl_2 = RN{:}C{:}S + HCl + NH_4Cl + COS$. The reaction is effected in an anhyd. solvent, e. g., $C_6H_6$, while cooling. The aryldithiocarbamate required as initial material is preferably prepd. with exclusion of water, e. g., by treating an aromatic amine in $C_6H_6$ soln. with dry $NH_3$ and then with $CS_2$ while still passing in $NH_3$. Examples are given.

**Halogen derivatives of α-chloronaphthalene.** I. G. Farbenind A.-G. (Georg Rosch and Wilhelm Bauer, inventors). Ger. 516,671, Oct. 25, 1928. 1 Chloronaphthalene-8-sulfonic acid is halogenated. If the $SO_3H$ group is retained in the mol. after halogenation, it can be removed or replaced by halogen if desired. Several examples are given. In one, Na 1,4-dichloronaphthalene 8-sulfonate is prepd. by chlorinating Na 1-chloronaphthalene 8-sulfonate. In another, 1,4,8-trichloronaphthalene, m. 130°, is obtained by further chlorinating the same sulfonate as in the preceding example.

**Tetramethylthiuram polysulfides.** Adrien Cambron (to Roessler & Hasslacher Chem. Co.). U. S. 1,798,588, March 31. After reaction of an aq. soln. of $NH_4Cl$ with formaldehyde, the soln. is treated to remove the major portion of unreacted $NH_4Cl$ and by products formed, and the resulting soln. is treated with $CS_2$ followed by an aq. soln. of an alkali metal hydroxide while cool to produce an alkali metal salt of dimethyl dithiocarbamic acid, and the soln. is treated with $S_2Cl_2$ to form tetramethylthiuram tetrasulfide.

**Acrylic acid chloride.** I. G. Farbenind A. G. Fr. 697,311, June 30, 1930. See Brit. 333,079 (*C. A.* 25, 524).

**Salts of sulfuric acid esters of nitroanthrahydroquinone.** I. G. Farbenind A.-G. (Arthur Luttringhaus, Heinrich Neresheimer and Wilhelm Schneider, inventors). Ger. 516,845, Nov. 6, 1927. Nitroanthraquinone is treated with metals in the presence of tertiary bases and halides or anhydride of $H_2SO_4$. Thus, 1 nitroanthraquinone and Cu powder is added to pyridine and Me sulfuric acid chloride. Further examples are given.

**Sulfuric esters.** Richard M. Deanesly (to Shell Development Co.). Can. 310,439, April 14, 1931. Alkyl sulfuric esters are prepd. by contacting liquid olefins with $H_2SO_4$ at a const. temp. obtained by permitting the vaporization of some part of

the hydrocarbons and condensing the vapors in a condensing device apart from the reaction vessel, and returning the condensed hydrocarbons to the reaction vessel

**Silicic acid ester.** Tuhitaro Sakami and Kansai Paint Kabushiki Kaisha Japan 90,227, Feb 10, 1931 Silicic acid ester is prepd from $SiCl_4$ and MeOH, PrOH, BuOH, AmOH or benzyl alcohol The product is heated above 100° to expel HCl Then a small amt of remaining HCl is removed by mixing with slight excess of oxides or hydroxides of Pb Hg or Ag at about 60 The product contains no trace of HCl The metallic chlorides formed are insol in $H_2O$ or alc and sepd by decantation

**Acylated esters of hydroxy acids.** Howard J Powers (to Commercial Solvents Corp) Can 310,874 Apr 28, 1931 A mixt of a hydroxy aliphatic acid and an ester is refluxed in the presence of a catalyst Suitable catalysts are aq concd HCl, dry HCl, anhyd $NaHSO_4$, concd $H_3PO_4$, benzene, sulfonic acids, etc

**Compounds of dialkylbarbituric acids and 1-phenyl-2,3-dimethyl-4-dimethylamino-5-pyrazolone.** Ernst Preiswerk (to Hoffmann La Roche Inc) U S 1,798,576 March 31 Mol proportions of 1 phenyl 2 3 dimethyl 4 dimethylamino 5 pyrazolone and a compd such as isopropylallylbarbituric acid are dissolved in a common solvent such as acetone or $C_6H_6$ and a compd of the 2 substances sepa as crystals which are removed from the solvent before any excess of the starting materials crystallizes out The products form yellow crystals sol in org solvents

**Products from 1-phenyl-2,3-dimethyl-4-dimethylamino-5-pyrazolone and 5,5-substituted barbituric acids** Georg Preiswerk (to Schering Kahlbaum A G) U S 1,798,771, March 31 A substantially colorless solid product is obtained by solidification of a molten mixt of 1 phenyl 2,3 dimethyl 4 methylamino 5 pyrazolone and a 5,5 substituted barbituric acid such as 5,5 diethylbarbituric acid

**Recovery of dilute acids in esterification processes.** Ignaci J Krchma (to Commercial Solvents Corp) Can 309,802, Mar 31 1931 In the production of esters, *e g*, butyl acetate, by the reaction of acid and alc, the unchanged acid is recovered from the aq distillate fraction by extn with the alc and then the water is removed from the alc soln by distn

**Fatty acids.** I G Farbenind A G Fr 697,505, June 18, 1930 Hydrocarbons are oxidized to fatty acids by means of oxides of N or $HNO_3$ and the product of the oxidation is submitted to a temp below 300° or to a reduction, preferably in the presence of catalysts or under high pressure or both, before the final distn

**Sulfonic acids.** N V de Bataafsche Petroleum Maatschappij Fr 698,536, June 13, 1930 Sulfonic acids, the Ca salts of which are sol in water, are prepd from sulfonic acids the Ca salts of which are insol by treating the latter with concd or fuming $H_2SO_4$ or an agent acting in the same way Examples are given

***o*-Xylenolcarboxylic acid.** I G Farbenind A G (Leopold Laska and Oskar Haller, inventors) Ger 522,064, May 20, 1929 An acid believed to be 1,2 dimethyl 4 hydroxybenzene 5 carboxylic acid is prepd by heating an alkali salt of 1,2 dimethyl 4 hydroxybenzene with $CO_2$ under pressure An example is given

**Acetic acid.** Hermann Suida Austrian 121,909, Nov 15, 1930 Concd AcOH is recovered from dil AcOH by extg the superheated vapor of the dil acid with a high-boiling solvent for AcOH to which 5 10% of pure or crude MeOH has been added Cf. *C A* 25, 2440

**Acetic acid.** Verein für chemische und metallurgische Produktion Fr 698,098, June 26, 1930 AcOH and AcOMe are made by catalytic synthesis from $Me_2O$ and CO or gases contg them at temps of 250 450° and pressure of 300 500 atm Neutral or acid phosphates of Cr and of a metal of the 3rd group, *e g*, Al are used as catalysts

**Polyvinyl alcohol.** Consortium für Elektrochemische Industrie G m b H (Wolfram Haehnel and Willy O Herrmann inventors) Ger 510,096, Sept 24, 1928 Addn to 450,286 Polyvinyl halides are saponified by alk reagents in the presence of catalyzers In the example, polyvinyl chloride is saponified with NaOH in the presence of light and uranyl nitrate A 90% yield is obtained

**Methylamine.** I G Farbenind A G Fr 698,640, July 8, 1930 The imides of dicarboxylic or sulfonic acids or their *N* methylol derivs are treated with $CH_2O$ under heat and pressure Examples are given of the treatment of phthalimide, *o* sulfobenzoic acid, *N* methylolphthalimide and succinimide

**Naphthalene purification.** Georg Schroeter (to Newport Mfg Co) U S 1,800,160, April 7 Naphthalene contg impurities capable of producing a red coloration on treatment with concd $H_2SO_4$ is treated, at a temp above its m p, with a porous material such as absorbent earth contg small quantities of metal oxides such as lime

*(d)* $CH_2O_2$ *and Fe, and from defibrinated blood by (e) putrefaction or satn. with illuminating gas,* was converted into the Na or K salt and purified by crystn. from pyridine or MeOH-KOH-AcOH. Various cryst. forms were obtained depending on the procedure, and these forms were mutually convertible. A. W. Dox

Absorption spectra of the fractions of serum albumins. E. Faltin. *Magyar Chem. Folyóirat* 37, 74–87(1934).—The ultra-violet absorption spectra of serum albumin of horse and oxen blood were exaind. No distinction can be made in the different bloods because of the very varying action of different animals of the same species. The difference is probably caused by the fact that albumin and globulin are not homogeneous albumins but mixts. of several proteins with different absorption spectra. The ratio of the mixt. varies probably in each individual. Gradual satn. of sera with $(NH_4)_2SO_4$ sepd. 6 protein fractions, the absorption power of which was less the more $(NH_4)_2SO_4$ was needed for their sepn. Of the various fractions the contents of tyrosine and tryptophan diminished in proportion to their absorption power. S. S. de Finály

The nature of the chromaffin reaction. P. Gerard, R. Cordier and L. Lison. *Bull. hist. appl. physiol. et path.* 7, 133–9(1930). *Physiol. Abstracts* 15, 331.—The red color obtained by the action of oxidizers on adrenaline is due, not to a simple oxidation product, but *to an addn. compd. formed between the quinone deriv. produced in* the oxidation and the unchanged adrenaline. The chromaffin reaction, then, is to be interpreted as a dehydrogenation and transformation of adrenaline into a quinone deriv., which then combines with as yet unchanged adrenaline to give a strongly colored substance. G. G.

Histochemical study of the chromo-argentaffine substance in Kultschitzky's cells. R. Cordier and L. Lison. *Bull. hist. appl. physiol. et path.* 7, 140–8(1930). *Physiol. Abstracts* 15, 331.—*These are special cells in the intestinal epithelium.* Guinea-pig duodenum was fixed in 10% neutral formol and imbedded in paraffin, and the diazo reaction for the phenol group applied to the sections. The presence of 2 OH groups was then proved by the usual oxidation tests. Thus the phenolic constitution of the argentaffine granules, previously postulated, was definitely confirmed. G. G.

The red fluorescence which certain bilirubin derivatives show in ultra-violet light. Ch. Dhéré. *Compt. rend. soc. biol.* 103, 371–4(1930). *Physiol. Abstracts* 15, 303.—Very dil. solns. of bilirubin with $NH_3$, $(AcO)_2Zn$ and a drop of I show a striking red fluorescence with ultra-violet light. The fluorescence is intense, like that of the porphyrins. Bilirubin in $CHCl_3$ soln. plus Br gives a blue pigment which shows a red fluorescence. The blue color of cholecyanin comes out with soda and $NaNO_2$. All these fluorescent solns. show several absorption bands. A distinctive band in the red is present even with extreme dilns. It is impossible to say if all the fluorescent pigments consist of bilicyanin, or whether several complex combinations exist with I, Br and Zn. Also in *Arch. intern. pharmacodynamie* 38, 134–9(1930). G. G.

Models for the capillary electrical theory of irritability. J. Klinke. *Arch. ges. Physiol.* (*Pflügers*) 227, 110–31(1931).—Mech. models (gelatin membranes in solns. of electrolytes) were prepd. to illustrate the transmission of elec. impulses in the body. Arthur Grollman

Effect of heat upon the activating efficiency of enterokinase. James Pace. *Biochem. J.* 25, 1–7(1931).—The course of the heat inactivation may be described by the unimol. expression. The optimum $p_H$ for enterokinase lies between 6 and 7. Benjamin Harrow

Optimum hydrogen-ion concentration and temperature of the style enzyme of Pecten maximus. Alastair Graham. *Proc. Roy. Soc.* (London) B108, 84–95(1931).—The diastase of the cryst. style of the mollusc, *Pecten maximus*, exhibited no variation in its optimum $p_H$ with variation in the time of the expt. A decrease in the optimum temp. accompanied a decrease in the $p_H$ of the medium. When time and temp. were made equal to those in natural conditions, then the optimum $p_H$ was found to be the actual value in the living animal. Joseph S. Hepburn

Proteolytic enzymes. VII. Peptidases of green malt. Masakazu Sato. *Compt. rend. trav. lab. Carlsberg* 19, No. 1, 1–26(1931). *cf. C. A.* 23, 5477.—The velocity of hydrolysis of the peptides alanylglycine (AG) and leucylglycine (LG) by the peptidases of malt indicate the presence of 2 different enzymes, and not one, as might be inferred from the data of Grassman and Klenk (*C. A.* 24, 868). LG, for which an enzyme prepn. has slight affinity, inhibits markedly the splitting of AG, for which the prepn. has great affinity. Calcn. according to the data of G. and K. would indicate that the LG affinity is about 32 times greater than the AG affinity, a conclusion which cannot be correct. W. D. Langley

Asymmetric ester hydrolysis by enzymes. VI. The influence of cleavage products

upon the optical selectivity of an esterase. EUGEN BAMANN AND PAUL LAEVERENZ. *Ber* 64B, 897-909(1931), cf *C A*. 25, 527-8.—Recent objections (Rona, *et al*., *C. A*. 25, 976) to the theory of esterase hydrolysis, based on the mass action law, have led to a review of the work. With liver esterase in *dl* mandelic acid ester mixts., the *d*-component was the more rapidly hydrolyzed, while in mixts., with the optically active components used separately as substrates, the *l*-component was favored. This action was explained as a result of the ratio of the velocities of the destruction of the intermediate products and the ratio of the enzyme affinities. B. and L. also investigated the effect of alc. upon the optical selectivity of the esterase. They found, as expected, that the action of the *d*-ester was favored. 0.0575 g. 1 tOH in 200 cc. reaction liquid decreased by 19° the negative rotation, of the mandelic acid produced. MARY E. LEAR

Possible relationship between hemoglobin and chlorophyll as shown by the use of liver ext. ORAN RABER. *Science* 73, 457-8(1931).—Liver ext. was added to solns. of corn plants which were then kept in the dark 10 days. These were greener than the control plants. Some factor seemed to check the destruction of the chlorophyll. Whether this is the same effect as that observed in the use of liver ext. in cases of hemoglobin deficiency is the question. MARY E. LEAR

The ultra-violet rays of artificial light. H. BUTZ AND TH. BOTTGER. *Z. Tierzucht. Zuchtungsbiol. Tierernahr.* 21, 48-72(1931).—The question of the usefulness of the rays in the prevention and cure of rickets is reviewed with special reference to animal husbandry practice. Data are presented showing that light treatment is without effect upon the hemoglobin content of the blood of rabbits. L. A. MAYNARD

Enzymic synthesis of higher dextrins. S. NISHIMURA. *Biochem. Z.* 225, 264-6 (1930).—It is shown that yeast autolyzate contains an enzyme which synthesizes amylum. If 20 cc. of such a purified enzyme soln. is added to 100 cc. of 1% achroodextrin soln. and the $p_H$ adjusted to 6.2 with 0.1 *N* HCl the mixt. gives a red to reddish violet color with $I_2$ after several days. At that time more enzyme prepn. is added and a few days later the soln. gives a violet to violet blue color with $I_2$. Dextrin was also prepd. from the mixt., thus proving its synthesis from the lower mols. S. MORGULIS

Influence of citrates on enzyme hydrolysis of starch. E. OHLSSON. *Arch. intern. pharmacodynamie* 37, 98-107(1930). *Physiol. Abstracts* 15, 276-7.—Citrates have no influence on diastases in optimum H ion concn., but they retard their action in high or low concn. of H ions. In the presence of chlorides citrates do not affect the action of pancreatic diastase, but in the absence of chlorides they increase this action when the H ion concn. is optimum. Citric acid does not hinder pancreatic digestion in the normal intestine. J. D. S.

Action of the alkaloids of cinchona on amylolytic enzymes. E. OHLSSON. *Arch. intern. pharmacodynamie* 37, 108-14(1930); *Physiol. Abstracts* 15, 276.—Quinidine has no effect on pancreatic amylase. Quinine, cinchonine, cinchonidine and optochine retard the hydrolysis of starch by enzymes, quinine being the most strongly inhibitory. For taka-diastase the order is quinine, cinchonine, cinchonidine, optochine, while for pancreatic enzyme it is quinine, cinchonidine, optochine and cinchonine. J. D. S.

Oxidation mechanisms in animal tissues. M. DIXON. *Biol. Rev.* 4, 352(1929). *Physiol. Abstracts* 15, 501.—This review is divided into the following sections: (*a*) the dehydrases, (*b*) peroxide formation, peroxidases and coupled oxidations, (*c*) Warburg's theory and the "respiratory enzyme", (*d*) cytochrome; (*e*) glutathione. A full discussion of the present position of our knowledge of these systems is given, together with extensive bibliography. J. D. S.

Viscosity of protoplasm as determining the rate of biological reactions. W. STILES. *Biol. Rev.* 5, 171(1930). *Physiol. Abstracts* 15, 495-6.—This contribution to the problem of temp. coeffs. brings support to the views of Crozier and attacks those of Belehradek. The general applicability of the Sutherland Einstein-Smoluchovski formula is contested by Stiles, who adduces several investigations on rate of diffusion in colloidal solns. of varying viscosity which show that increasing viscosity reduces the coeff. of diffusion relatively little. It is concluded that the viscosity of protoplasm, far from detg. the rate of biol. reactions, generally plays a very small, perhaps a negligible, part. J. D. S.

The distribution of urea in trichloroacetic acid filtrates as a function of the urea concentration of the medium. E. DELCOURT BERNARD. *Compt. rend. soc. biol.* 104, 784-5 (1930). *Physiol. Abstracts* 15, 590. cf. *C. A*. 25, 321.—The distribution of urea in different portions of a $CCl_3CO_2H$ filtrate from an albuminous fluid, blood, soln. of egg white, etc., is irregular. The differences are greater for blood than for albuminous fluids. The 1st parts of the filtrate from sheep blood contain the mean amt., then the curve rises, again falls and finally reaches the mean again. That is for a small concn. of urea

When the concn is greater, the 1st portions have a low titer and the 2nd high.
J D S

Molecular weight of casein. III. D C CARPENTER *J Am Chem Soc* 53, 1812–26(1931), cf *C A*. 24, 1400.—The protein contained in crude casein, which has been shown to have a mol wt between 75,000 and 100,000 by the ultracentrifuge, has been subjected to analysis. The S, P, cystine, tryptophan, tyrosine and histidine contents have been found to be 0.785, 0.856, 0.488, 1.237, 5.55 and 1.776%, resp. The most probable value for the mol wt of this protein, consistent with the above analyses and the results obtained with the ultracentrifuge, is 98,000. Details are given of the analytical methods used in detg the above components. C. J. WEST

Polarimetric reducing-sugar relationships of starch hydrolytic products resulting from diastatic action. D. T. ENGLIS, G. T. PFEIFER AND J. L. GABBY *J Am Chem Soc* 53, 1883–9(1931).—Theoretical consideration of the properties of the final products of hydrolysis of starch resulting from diastatic conversion seemed to indicate that the assumed const. relationship between the polarimetric and reducing sugar values would not hold if glucose as well as maltose resulted from the action of the amylase system. It was further believed that the ratios found might furnish information on the mechanism of the hydrolysis of starch. Detns. of the ratio have been carried out with taka-diastase as a glucose-forming amylase system. The ratios found were different from those anticipated and indicate that the changes in the early stages of hydrolysis are probably unlike those of malt diastase. While the ratios found were not const., detns. of diastatic activity based upon the assumption of a const. value will probably not involve an error more serious than those from other sources in such procedures. Improvements in the procedure will be necessary to give definite information as to the course of hydrolysis of starch. C. J. WEST

Certain observations on the Donnan equilibrium (RONCATO) 2. The physical state of water bound by organic colloids and by the tissues (MARINESCO) 2. Properties of protein-cellulose membranes (VELLUZ, LOISELEUR) 2. Recent investigations on the constitution of pectins (BRIDEL) 10. Hydrolysis of gelatin (DESAI, BOLAM) 2. Röntgen diagram of collagen (HERZOG, JANCKE) 2. Physicochemical investigation of amino acids (TAKAHASHI, *et al*.) 10. Further studies on the behavior of polypeptides containing proline toward the erepsin and trypsin kinase complex (ABDERHALDEN, ZUMSTEIN) 10. The behavior of polypeptides containing lysine with substitution in α- and ε-position, toward *N* alkali, erepsin and trypsin (ABDERHALDEN, SCHWEITZER) 10.

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## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

A new method for staining mycelium. A. FERRARI *Boll. soc. intern. microbiol. Sez. ital.* 3, 26–7(1931)(in French).—The microscopic sections contg. mycelium are kept for 20 min. in the ruthenium red reagent (0.01 g. of $RuNH_4$ oxychloride in 15 cc. $H_2O$). The mycelium color is red and the cell color is pale red, but if the sections are then transferred to a 10–20% KOH, the cell color disappears, while the mycelium color becomes red-yellow. G. A. BRAVO

A simple procedure for the determination of the hydrogen-ion concentration of normal human skin surface. B. LUSTIG AND A. PERUTZ *Arch. Dermatol. u. Syphilis* 162, 129–34(1930).—A thin sheet of absorbent paper, moistened with distd. water, is pressed for 5 min. against the skin surface to be measured. The liquid is then expressed and its $p_H$ is measured. To avoid error due to constituents of sweat, the $p_H$ of the skin surface is detd. after washing with water, then after washing with soap and finally after washing with $C_6H_6$. The detns. of the $p_H$ of the soln. expressed from the absorbent paper were made with Wulff's indicator papers. (These consist of a colloidal membrane, on which the indicator is adsorbed, $^1/_5$–$^1/_4$ of the paper is dipped in the soln. to be measured, then wiped dry with filter paper, and compared with a scale.) The chief cause for a marked acid reaction of the skin is sweat. After treatment with water, soap

and $C_4H_6$, the $p_H$ values found for various regions of the skin ranged from 5.1 to 5.8.
B. C. BRUNSTETTER

Modifications in technic for the determination of cholesterol, phosphorus and calcium on the same sample of blood serum. G. H. BARIL AND J. LABARRE *Trans. Roy. Soc. Can.* 24, Sect. V, 185–7(1930).—Add to 1 cc. serum 1 cc. water and 1 cc. 2% $K_2C_2O_4$ mix, and after 20 min. centrifuge. Wash the ppt. with 2 cc. water, again centrifuge, dissolve the ppt. in dil. $H_2SO_4$ and titrate against 0.005 *N* $KMnO_4$ for Ca. Pour the first filtrate into a tall, somewhat conical 30-cc. beaker and add 5 cc. of 0.05% KOH in 60% alc., and 10 cc. $Et_2O$, shake vigorously and then allow to rest some minutes. Transfer the aq. layer to a test tube calibrated at 25 cc. Pour the wash water from the oxalate slowly into the ethereal layer, and after sepn. the ethereal layer is added to the calibrated tube. Est. cholesterol in the ethereal soln. by Grigaut's method (*C. A.* 4, 2513, 2514), and the P in the aq. soln. by that of Benedict and Theis (*C. A.* 18, 3398). Comparison with the usual procedures showed accurate results. A. T. CAMERON

Determination of glycogen in liver tissue. ALBERT CARRUTHERS. *Chinese J. Physiol.* 5, 85–92(1931).—A method is described for the estn. of glycogen in liver tissue which does not require the use of strong KOH, as does Pflüger's method. About 5 g. of chopped liver tissue is boiled for 1 min. in 10 cc. $H_2O$ and then ground in a mortar. The mixt. is again boiled for 1 min. and made up to 50 cc. After centrifugation 20 cc. of supernatant fluid is pptd. with 5 cc. of 10% $CCl_3CO_2H$ and filtered. To an aliquot portion of filtrate EtOH is added to make a concn. of 70%. On the next day the ppt. is washed by centrifuging with 70, 95% and absolute EtOH and finally with ether. The ppt. is dissolved in boiling $H_2O$, HCl is added to make 2% and the mixt. hydrolyzed for 3 hrs. on the boiling water bath. After neutralization with NaOH sugar is detd. by a suitable micromethod. The values obtained by this method are somewhat higher than those by Pflüger's method, because of the presence of a carbohydrate which is insol. in 70% EtOH, but which is destroyed in 30% KOH. C. F. CORI

Determination of total sugar in liver tissue. ALBERT CARRUTHERS. *Chinese J. Physiol.* 5, 93–102(1931).—The $CCl_3CO_2H$ filtrates described in the preceding abstract were used for the detn. of total sugar. An aliquot part was hydrolyzed for 3 hrs. in 2% HCl. Non-sugar reducing substances were removed from the neutralized soln. by pptn. with $HgSO_4$ according to West, Scharles and Peterson. No evidence was found for the presence of hydrolyzable carbohydrates other than glycogen. C. F. CORI

Folin's method for determining amino acids in the blood. P. M. RE AND D. POTICK. *Compt. rend. soc. biol.* 103, 1283–5(1930).—See *C. A.* 25, 1856. E. J. C.

A simple method for the determination of assimilable pentosans. R. D. REGE. *Proc. 15th Indian Sci. Cong.* 1928, 51.—Treat a definite quantity of finely powd. material in the cold with 5% pure NaOH for 24 hrs. with occasional shaking. After neutralization distil the ext. with HCl by the usual Krober and Tollens' method. This method gives quite satisfactory results agreeing within 5% with those from the lengthy method (*C. A.* 21, 4062) previously described. E. J. C.

A micromethod for the analysis of proteins. N. NARAYANA AND M. SREENIVASAYYA. *Proc. 15th Indian Sci. Cong.* 1928, 163.—Van Slyke's well known method of protein analysis has been extended and modified for dealing with 100–200 mg. of substance, 0.05 of the quantity usually employed for a microanalysis. The pptn. of the hexone bases by phosphotungstic acid, which is affected by the presence of salts, is controlled by the effective removal of the HCl from the protein hydrolyzate *in vacuo* over freshly burnt lime. Arginine is estd. by flavianic acid, and histidine by bromination. Total monoamino and diamino is estd. by the Van Slyke micro app. Cystine is estd. by a microestn. of S according to Pregl. Tyrosine is detd. colorimetrically. E. J. C.

A simple method of protein determination in spinal fluid (and other body fluids). IVÁN BERGER. *Klin. Wochschr.* 9, 888–90(1930).—The turbidity produced by sulfosalicylic acid added to the fluid is compared with that produced in known standards (casein solns.) in a specially designed comparator. The av. protein content of spinal fluid is 0.200%; the minimal value, 0.05–0.08%. H. EAGLE

Studies on blood volume. I. A micromethod for the indirect determination of absolute blood volume. ISTVÁN WENT. *Magyar Orvosi Arch.* 31, 39–53(1930); cf. *C. A.* 23, 3942.—A colorimetric micromethod is described. A procedure is given for the elimination of errors caused by unequal distribution of dye. S. S. DE FINÁLY

Solution for the simultaneous staining of fat and nuclei. LAJOS KAROLINY. *Magyar Orvosi Arch.* 31, 440–1(1930).—One-hundred cc. of hematoxylin of Ehrlich is added to 20 cc. of acetone alc., then 2.3 g. of Sudan III is dissolved. The mixt. is shaken, let stand for 24 hrs., decanted and kept hermetically closed. Staining with this soln. is effected in 5 min. S. S. DE FINÁLY

Determination of calcium in blood serum. A. Grigaut and I Ornstein *Compt rend. soc. biol.* 104, 747–9(1930); *Physiol. Abstracts* 15, 573.—The serum is first evapd. to dryness in a Pt crucible and then incinerated to a white ash This is washed with HCl and centrifuged, treated with NaOAc and $(NH_4)_2C_2O_4$, and again washed and centrifuged. After addn. of $H_2SO_4$, titration with $KMnO_4$ is carried out to the point of persistence of a pink color The no of cc. of 0 1 *N* $KMnO_4$ used multiplied by 100 gives Ca in mg per l The amt. in normal serum is 95 to 110 mg by this method. G G.

Microestimation of calcium L Velluz and R. Deschiaseaux *Compt rend. soc biol* 104, 976–7(1930); *Physiol Abstracts* 15, 562.—*In estg Ca, it is* recommended to use org solvents (alc., ether) to wash the Ca oxalate, which is sol in distd water. These solvents permit the removal of $NH_4$ oxalate and prevent mech removal of part of the ppt It is well also to oxidize the Ca oxalate in the cold by means of 150 *N* permanganate, of which the excess is estd iodometrically G G.

Glass electrodes. Hyakuichi Yagata and Noboru Furutani *Japan J. Gastroenterology* 3, 71–5(1931) —The glass electrode can be employed in the detn. of the $p_H$ of biological fluids C. M. McCay

The chemistry of uroselectan. Arthur Binz *Brit J Urol* 2, 348–51(1930), *J. Urol.* 25, 297–309(1931), *cf C A* 25, 2192.—*Uroselectan, the Na salt of 5-iodo-2-*pyridoneacetic acid, appears to be a satisfactory substance for use in visualization of the urinary tract E R. Main

Methodical contributions. XI. A method for the determination of silver, ionized or bound to protein and of silver in organic substance. Ludwig Pincussen and Wadim Roman. *Biochem Z* 225, 447–51(1930), *cf C. A.* 24, 3524, 4801.—The method consists in sepg the Ag salts, Ag protein compd and the metallic Ag and detg the Ag in each fraction Tissues are frozen with $CO_2$ and weighed. The frozen tissue is rubbed up fine at first dry, then with 5 cc. 0 1 *N* $Na_2S_2O_3$ The material is washed into a large centrifuge tube with 5 times 5 cc. 0 1 *N* $Na_2S_2O_3$ With blood, 5 cc. is treated directly with 30 cc. 0 1 *N* $Na_2S_2O_3$ in the centrifuge tube. This is now kept overnight in a cool, dark place, and sharply centrifuged The turbid soln. is decanted into a second centrifuge tube, placed in a water bath at 70° to coagulate the proteins and again centrifuged. The clear soln. is now transferred to an Erlenmeyer flask, and the residue once more treated with 5 cc. 0 1 *N* $Na_2S_2O_3$. The combined $Na_2S_2O_3$ exts. contg. the inorg. Ag compds. constitute fraction A. The residue is mixed with 5 cc. 5% $NH_4OH$ and after standing overnight is also centrifuged for about 20 min and treated 4 times more with 5 cc of the $NH_4OH$ soln. The combined centrifuged $NH_4OH$ exts. constitute the B fraction contg. the Ag bound to the protein. The last residue, fraction C, contains the metallic Ag. It is evapd to dryness on the water bath, it is then charred on the sand bath. This is also done with the fractions A and B. When cool the charred material is taken up with halogen-free $HNO_3$ and perhydrol and evapd. to dryness; this process is repeated until a colorless soln. is obtained. All org. material is thereby oxidized and Ag converted to $AgNO_3$, while the halogens are driven off. The white residue is now dissolved in $H_2O$ and evapd., this treatment continued until the $HNO_3$ is completely removed The residue is then acidified with a few drops $HNO_3$ (1:3), and titrated with 0 001 *N* $NH_4SCN$ in the presence of a crystal of iron alum, each cc. corresponding to 107.9 g Ag S. Morgulis

Manometric determination of catalase. Akiji Fujita and Takeshi Kodama *Biochem Z.* 232, 20–34(1931) —The Warburg manometric app. is used to det. the catalase activity of bacteria. The catalase coeff. = $Q_{cat.}$ = (cc. $O_2$ produced in 30 min. at 38°) ÷ (mg dry wt). If the rise in level of manometer is $h$ mm. and the vessel const. $k_{ox}$ sq mm., the $O_2$ formed $x_{ox}$ is calcd. from the formula $x_{ox} = h\,k_{ox}$. The $Q_{cat}$ for *Staphylococcus pyogenes albus* was found to be 5120–5200; for gonococci 8700–8720; for *Saccharomyces saké* 44 5–45.2, for rabbit retina 65–53; for Jensen's rat sarcoma 119–113, for rat lung emulsion 475–459; and for a purified catalase prepn. 900,000–895,000 The optimum activity was found to be between $p_H$ 6.4 and 8 0. NaCl did not produce an inhibitory action nor was any depressing effect observed with a phosphate concn below 0 005 mol. No difference in the catalase activity has been found in enterococci cultured aerobically or anaerobically. On the contrary in the case of bacteria no catalase was found in the anaerobes, although some aerobes like the Shiga dysenteria bacillus are also free from catalase, and facultative anaerobes contain a moderate amt. of catalase Two long lists are reported of the $Q_{cat.}$ values for various bacteria and tissues from several organisms S Morgulis

Application of the Folin method for determining amino nitrogen in 0 2 cc. of blood. S A. Povorinskaya. *Biochem. Z* 232, 69–71(1931).—The reagents and procedure are the same as in the original Folin method except that the blood (0.2 cc.) is obtained from

the finger by means of a micropipet, and only 0.2 of the amts of the reagents are employed throughout the detn S MORGULIS

A simple colorimetric $p_H$ determination. E HERZFELD *Biochem Z* 232, 72-7 (1931).—Buffer mixts of $Na_2HPO_4 2H_2O$ and citric acid with a range from $p_H$ 2.2 to 8.0, and mixts of $H_3BO_3$, KCl and NaOH with a range from $p_H$ 7.8 to 10 are employed together with 7 sep indicator solns The detns are carried out in the 1931 model of the Leitz Universal colorimeter in the following way After adding the specified quantity of indicator to 100 cc of buffer mixt this is divided into 3 parts One is placed in the lower left cup The second portion is acidified with a few drops of concd HCl and is used in the right upper compensating cup The third portion made alk with a few drops of NaOH is placed in the lower right cup, while the left compensating cup is filled with distd $H_2O$ The depth of the buffer mixt is set at 10 mm and the depths of the cups with the acidified and alkalinized mixts are so adjusted that a perfect color match is obtained The relative depths of the last two cups corresponding to each $p_H$ between 2.2 and 10.0 are tabulated The $p_H$ values of urine, serum, etc., are detd in a similar way by adding the proportional quantity of indicator and proceeding as before With the microcolorimeter the detns can be made with only 10 cc of the original sample, and from the depths of the acidified and alkalinized portions which together match the color of the untreated sample the $p_H$ is read off from the table The color of the material studied does not interfere in the detns by this method S MORGULIS

Titrimetric determination of fat and lipoid substances by the Bang chromic acid oxidation method. H STRAUB *Biochem Z* 232, 128-45(1931).—The reduction quotient of Bang i. e., the cc. 0.1 *N* $K_2Cr_2O_7$ necessary for the oxidation of 1 mg fat or lipoid material has been redetd on a series of substances, and has been found to be generally lower than that given by Bang This quotient was found to be larger the greater the excess of $K_2Cr_2O_7$ employed On the other hand if the quantity of fat exceeds about 0.4 g the value of the quotient tends to decrease The quotient is also affected by the temp of the reaction mixt. after the addn of $H_2SO_4$, by the length of time during which the $K_2Cr_2O_7$-$H_2SO_4$ mixt has been kept, etc For triolein, tripalmitin, tristearin, the quotient is 1.82, for oleic and palmitic acids 1.87, for stearic acid, 2.03, for cholesterol, 2.37, for cholesterol palmitate, 2.16, for cholesterol stearate, 2.27; and for lecithin, 1.44 The method has been applied to quantities ranging from 0.5 to 10 mg The lipide in a 100 cc Erlenmeyer flask is treated with 3.0 cc. *N* $K_2Cr_2O_7$, then with 15 cc concd $H_2SO_4$, and the mixt is left standing until it cools to room temp This is now transferred with 300 cc $H_2O$ to a 500 cc flask and after the addn of 10 cc 10% KI is titrated with 0.1 *N* $Na_2S_2O_3$ The results of such analyses with the different pure substances are tabulated The results are also plotted and the amt of substance corresponding to the cc 0.1 *N* $Na_2S_2O_3$ used up can be read off directly from the curves with an av error of 2.92% S MORGULIS

Dialysis procedure for the determination of serum proteins. A A SCHMIDT AND KLARA TULICHIVSKA *Biochem Z* 232, 323-34(1931).—One cc. of serum is dild with 2 cc. $H_2O$ and 3 cc satd $(NH_4)_2SO_4$, thoroughly mixed and left standing $^1/_2$-1 hr The pptd globulins are collected on a small filter paper and washed 3 times with 2 cc. of $^1/_2$ satd $(NH_4)_2SO_4$ soln, the wash water being added to the original filtrate The globulins are transferred to a small dialyzing shell by dissolving them in small quantities of $H_2O$ and allowing the soln to drip through the funnel, and the filter paper is washed with 5 cc of 250 *N* NaOH, 1 cc. is used at a time The NaOH is then neutralized by adding from a buret an equiv quantity of 0.1 *N* HCl, the shell is then closed with a stopper and the dialysis carried out The filtrate contg the albumins is also put into a dialyzing shell The dialysis is carried out for about 8 hrs at a temp of 45-60°, against water circulating at the rate of 10 l per hr until the reaction with Nessler's reagent is neg when distd water is passed at the rate of $^1/_2$ l per hr In the shell with the globulin soln at the end of dialysis the euglobulin is present as a firm ppt while the pseudoglobulin is in soln and the 2 fractions are quantitatively sepd by centrifuging The euglobulin is washed with 3-5 cc $H_2O$ which is placed together with the original pseudoglobulin soln in a 25 cc flask The ppt is dissolved in 5 cc. *N*/250 NaOH and also transferred to a 25 cc flask The dialyzed albumin soln is entirely clear and is put into a 50 cc flask, to which is added also the *N*/250 NaOH used for rinsing the shell The N is detd on these 3 portions and expressed in terms of mg per cc serum S M

A method for determining lactose in the urine. E FREUND AND B LUSTIG *Biochem Z* 232, 449-51(1931).—To 100 cc urine add 25 cc $HNO_3$ and evap to 20 cc Dil and cool the mixt and wash the pptd mucic acid with alc. and ether, dry and weigh Considerable amts of mucic acid are found after feeding 40-100 g lactose or galactose, but none is obtained when 1-2 g lactose is added directly to the urine, which suggests

that the mucic acid is derived from the galactose However, a 1% aq soln of lactose also yields much mucic acid The reason for the neg results with urine is found in the fact that urea and $NH_4$ salts prevent the formation of mucic acid under the same exptl conditions A modified method was, therefore, developed for the lactose detn in urine Add 1-g lactose to 100 cc urine, acidified with 0 1% AcOH, and treat with 10 cc of 10% Pb acetate soln Wash the ppt with 0 1% AcOH, and remove the excess Pb in the filtrate by adding, drop by drop, dil $H_2SO_4$ Neutralize the filtered soln with NaOH, make slightly acid with AcOH and carefully evap to a small vol Boil the residue 2–3 times with 100 cc alc, cool and filter This procedure removes urea, $NH_4$ salts and sugar except the lactose *which is practically insol in cold alc* *Dissolve the alc -extd* residue in $H_2O$ and filter Lactose detns made by this procedure, the lactose being detd polarimetrically or by reduction methods, give recoveries with 10% of the added amt S MORGULIS

**Determination of iron in organs and in body fluids.** HANS HORSTERS *Biochem Z* 232, 460 78(1931) —Organs are oxidized by the Neumann wet method, urea being added to destroy nitroso compds The ash soln is dild with Fe-free water to 50 cc in case 2–5 g of tissue was oxidized To this is added for every 2 mg Fe 10 cc of Neumann's Zn reagent, which is made by dissolving separately 25 g $ZnSO_4$ and 100 g $Na_2PO_4$, mixing the two in a 1 l flask, redissolving the ppt with purest dil $H_2SO_4$ and diluting the soln to 1 l The pptd double salt of Fe and Zn phosphate is carefully dissolved *in pure NH₄OH (d 0 90) added drop by drop, and the clear soln is heated 30–60 min* The ppt is filtered off hot and washed several times with hot water The ppt is now dissolved on the filter paper in exactly 5 cc purest HCl (d 1 124), and the paper is washed several times with hot water, but the total vol should not exceed 20 cc The soln of the double salt, which under certain conditions may be purified by a second pptn with the Zn reagent, is transferred to a 50-cc volumetric flask and filled to the mark with 30 cc of 40% $NH_4SCN$ The colorimetric detn is then carried out after 3 min, as standard, a suitable soln of $FeCl_3$ (0 10 to 0 01 mg % Fe) acidified with HCl is used The standard soln should not be used longer than 20 min, when it should be replaced by a freshly prepd soln S MORGULIS

**Determination of methylglyoxal, pyruvic acid and acetaldehyde separately or in *mixture as well as a determination of lactic acid in the presence of these substances* and in a single sample of material.** ERNST SIMON AND CARL NEUBERG *Biochem Z* 232, 479–84(1931).—Biol fluids contg methylglyoxal, AcH and pyruvic acid are deproteinized in an acid medium, *i e*, $CCl_3CO_2H$ These are pptd with 2,4 dinitrophenylhydrazine, the hydrazones being either filtered off or centrifuged off For lactic acid detns the excess 2,4-dinitrophenylhydrazine can be removed first by making the soln alk and filtering off the ppt The traces of reagent still remaining in soln can be extd with EtOAc However, where carbohydrates must be removed by the Cu-Ca pptn method the extn is unnecessary because the traces of the 2,4-dinitrophenylhydrazine are carried down in the ppt In this filtrate lactate is detd by the usual procedures The pptn of methylglyoxal, pyruvic acid and AcH is practically quant *for solns contg 0 1 to 1 0%, and this is also true when all 3 substances are present* together, but in the presence of AcH the pptn must be made in the cold The suspended ppt is then left for 10 hrs at 37° in a glass-stoppered Erlenmeyer flask After cooling this is filtered through a Gerate glass filter No 1G4ab, washed 3 times with cold 2 *N* HCl and then with cold water For the sepn of the dinitrophenylhydrazones advantage is taken of the fact that only the pyruvic acid hydrazone is sol in $Na_2CO_3$ and can be dissolved out from the ppt in the glass filter Since this soln is colored brown it is possible to tell when the extn is completed because the soln begins to come through colorless. The hydrazone is again pptd in the filtrate by carefully acidifying with HCl, filtered off, washed, dried at 110° and weighed The sepn of the other 2 hydrazones is effected by means of hot 0 1% alc in which the AcH deriv alone is sol The extn. is, *therefore, again carried out in the original glass filter by passing hot alc until the soln* which is at first yellow becomes colorless The alc soln of the AcH hydrazone is evapd in a weighed beaker, the residue is dried in a vacuum desiccator to const wt and weighed The methylglyoxal hydrazone is washed on the filter with ether, dried at 140° and weighed The method is also applicable to the detn of trioses since these yield methylglyoxal on distn with 20% $H_2SO_4$ By treating the methylglyoxal deriv with alc. or $Na_2CO_3$ even levulinic acid and furfurol coming from hexoses and pentoses, resp, do not interfere S MORGULIS

Calcium and constitution. New method for the estimation of calcium in the blood. LUIGI F. LUNARDONI AND GIUSEPPE MIRAGLIA *Rass clin terap sci affini* 30, 1–7 (1931) —Two cc. of serum is mixed in a centrifuge tube with 2 cc of water and 1 cc. of

satd $(NH_4)_2C_2O_4$ soln The mixt is allowed to stand for 4 hrs., centrifugalized for 1 min, decanted and the ppt is washed with 4 cc of 1% $(NH_4)_2C_2O_4$ soln The mixt. is centrifugalized, decanted and the ppt is dissolved in the smallest possible quantity of 4% HCl One drop of alc. phenolphthalein soln is then added, enough of 2% $NH_4$ to produce a red color, and 1 cc. of satd $(NH_4)_2C_2O_4$ soln After 2 hrs. the ppt. is conveyed to an ashless filter, 2-3 washings of 3 cc. of 1% $(NH_4)_2C_2O_4$ soln. are employed to bring the last traces of the ppt on the filter The filter is placed in an oven at 100°, until the ppt. is almost dry Then the filter with the ppt. is conveyed to a Pt crucible and incinerated The residue of CaO is dissolved in 5 cc. of 0.01 *N* HCl, the soln. with washings is conveyed to a beaker and the excess of HCl is titrated with 0.01 *N* NaOH with methyl red as an indicator A blank test should be run to det. the alky. of the ashes of the filter paper used Calcn.: $Q = 50(5-n-y) \times 0.0002$, where $Q$ = Ca in mg., $y$ = no. of cc. of 0.01 *N* HCl used for the neutralization of the ashes originated from the ignition of the filter and $n$ = no. of cc. of 0.01 *N* NaOH used for the neutralization of HCl. G. Scriwoch

Determinaton of uric acid in blood. F. Montequi *Anales soc. espaĥ. fis. quim.* 29, 204–6(1931).—The method depends on the reduction of $K_3Fe(CN)_6$ by uric acid in the presence of $Na_2CO_3$, the $K_4Fe(CN)_6$ formed giving a blue color with $FeCl_3$. Blood is dealbuminized by the Folin method, by adding Na tungstate and 0.66 *N* $H_2SO_4$. Uric acid is isolated as Ag urate, uric acid is set free and oxidized in an alk. $K_3Fe(CN)_6$ soln., the soln. is acidified with HCl and $FeCl_3$ is added to give a blue color. Detn. is by color comparison. E. M. Symmes

Lamiaud, H Le lipiodol en urologie. Paris N Maloine 71 pp. F. 15

Fixing solution for histological purposes. Walter Schiller. Ger. 522,317, June 19, 1930 See Austrian 119,237 (*C. A.* 25, 721).

## C—BACTERIOLOGY

CHARLES B MORREY

Necessity of the control and standardization of methods of investigation of vitamin products. Edmund Lelesz and A Przedziecka Jedrzejowska. *Med. Doswiadczalna i Spoleczna* 12, 357–87(1930).—The popularization of the science of vitamins is discussed Control tests as performed by the Biochem. Department of the State Hygienic Institute of Poland are described J. Kučera

The kinetics of the bacterium-bacteriophage reaction. Albert P. Krueger and John H Northrop *J Gen Physiol* 14, 223–54(1930).—Expts. were made on 16-hr cultures of *Staphylococcus aureus* and antistaphylococcus bacteriophage in nutrient broth of $p_H$ 7.6 at 36°, the cultures being mechanically shaken The following symbols are used in explaining the results $B$ = bacterium, $P$ = bacteriophage, $[B]$ = bacteria/ml., $[P]$ = phage/ml., $Bo$ = initial value of $[B]$, $Be$ = $[B]$ at max. stationary phase of $B$ growth, $Po$ = initial value of $[P]$ $B$ growth in $P$-$B$ mixts. resembles growth in controls without $P$ except where the initial $P/B$ ratio is very high. The destruction of $B$ does not begin soon after mixing $P$ and $B$. $B$ growth is not stimulated by $P$ but it is an essential conditioning factor for $P$ formation $B$ growth and $P$ production exhibit short lags during which time $P$ diffuses so rapidly into $B$ that by the end of the lag period 70–90% of the total $P$ is assocd with $B$, the rest being extracellular During the logarithmic $B$ growth phase, the formation of $P$ is also logarithmic but at a higher rate. Therefore it is not true that each time a $B$ divides a certain amt. of $P$ is formed When $B$ growth shows pos. acceleration equil between extracellular and intracellular $P$ fractions becomes established and is maintained until the onset of lysis Extracellular $[P]$ constitutes a small const. % of total $[P]$ The distribution of $P$ suggests that of a simple chem. compd. rather than that of a complex organized parasite Lysis begins when log $P/B$ = 2.1. If this value is reached or exceeded when $P$ and $B$ are mixed $B$ does not grow and lysis soon occurs. Lysis is probably brought about by a particular $[P]$ per $B$ and not by a certain $[P]$ per ml., but the major conditioning factor is in doubt. The max. $[P]$'s of lysates made by mixing a const. initial $[B]$ with widely varying $Po$'s fall within a narrow range The lytic destruction of $B$ is logarithmic with time, being similar in this respect to most death processes Cells need not be growing to undergo lysis. During $B$ lysis a considerable percentage of total max. $P$ formed is destroyed, the loss is chiefly in intracellular $P$. From 70 to 90% of the final $P$ present at the completion of bacteriophagy is set free during bacterial soln. Although $B$ growth is essential for $P$ formation, the different temps. of $B$ and $P$ formation suggest that the 2 processes are basically different. A

similar interpretation is given for $B$ soln and $P$ inactivation The $[B]$ at which lysis occurs for given values of $Bo$ and $Po$ may be calcd from the equation $\log B = \frac{2\ 1 + n \log Bo - \log Po}{n - 1}$ If this value of $\log B$ is substituted in the equation $t = \frac{1}{g\ Be}\left[\log \frac{B(Be - Bo)}{Bo(Be - B)}\right]$ gives satisfactory agreement with exptl values for lysis time Kinetic analysis of the $P - B$ reaction predicts a straight line relation when $\log Po$ is plotted against $t$ lysis for a const $Bo$ The plot has been used in a method for the estn of $P$ (cf *C A* 24, 3810) on the basis of exptl observation Its use is made more rational by the facts given in this paper

C H RICHARDSON

**Natural and chemically defined media.** A BERTHELOT *Bull soc chim biol* 12, 1025–8(1930) —Various media suitable for the growth of *M tuberculosis* are discussed A high content of arginine is favorable, and use may be made of products derived by *proteolysis from naturally occurring substances* B C A

**Occurrence of cellulose-decomposing bacteria of the group Cytophaga in the rumen of the ox.** CH ARMANDI *Boll soc intern microbiol Sez ital* 3, 35–40(1931) (in French) —In the ox rumen, 2nd and 3rd stomach and in the cecum (examd by the Winogradsky method (*C A* 24, 3309)) several species of cellulose-decomposing bacteria were found, and *Cytophaga hutchinsonis* was isolated The oxidation products of cellulose give the reaction of oxycellulose, but do not reduce Fehling's soln G A BRAVO

**The relation between the acidity of milk serum and its bacterial content.** M. BONDIOLI *Boll soc intern microbiol Sez. ital* 3, 77–8(1931)(in French) —The coccus groups of microorganisms, which are weak acid producers and very slightly resistant to acid, are predominant at first in milk serum, but afterward they are gradually replaced by organisms of the bacillus group, which produce more acid and are more acid resistant.

G. A BRAVO

**Favoring influence of local disturbances caused by adrenaline on the development of bacterial infections.** M RENAUD AND A MIGET *Compt rend soc biol* 103, 1052–4 (1930), *Physiol Abstracts* 15, 412 —Adrenaline favors the growth of microbes in living tissues Subcutaneously injected before inoculation, it induces rapid development of pathogenic organisms, and saprophytic bacteria which are ordinarily quickly destroyed continue to live in the prepd. regions Added to the culture medium, adrenaline also renders bacteria more active than those cultivated without it G. G

**Egg-yolk agar medium for the growth of tubercle bacilli.** RUSSELL D HERROLD *J Infectious Diseases* 48, 236–41(1931) —Approx 15% raw and sterile egg yolk added to melted ordinary beef ext agar at $p_H$ 7.5 forms an excellent medium for the isolation of tubercle bacilli from body fluids and tissues. JULIAN H. LEWIS

**Further studies on bacterial lipoids.** M GUNDEL AND W WAGNER *Z Immunitäts* 69, 63–76(1930) —The acetone-sol fraction of the alc. ext. of *Pseudomonas aeruginosa* was bactericidal for all of a series of bacteria except the typhoid colon group The same fraction from other bacteria was bactericidal for anthrax bacilli alone. The bacteria are killed by bacteriolysis The bactericidal properties of bacterial lipoids are thermostable in an aq medium, but are inactivated by heat when in a protein medium Bactericidal action is dependent on the concn and age of the lipoids After standing and after exposure to light, the lipoids are decreased in their bactericidal properties but not in their antigenic action *Immunization with lipoids from Ps aeruginosa* produces lipoid antibodies, while lipoids from staphylococci and typhoid and colon bacilli are not antigenic The bactericidal and antigenic properties of bacterial lipoids are not identical *Fatty acids and their esters and lipoids from plant but non-bacterial origins* are bactericidal JULIAN H. LEWIS

**The chemical differentiation of hemolytic and nonhemolytic streptococci.** LOUIS AVILES *Z. Immunitäts* 69, 433–7(1931) —By means of the Berlin blue reaction the changes in the hemoglobin of blood agar plate cultures of streptococci were studied. In the clear zone around hemolytic streptococci hemoglobin is absent and the bacterial colonies give the reaction for Fe. In nonhemolytic cultures the zone around the colonies gives a reaction for Fe while the colonies themselves do not JULIAN H LEWIS

**Are there gas-forming variants of typhoid bacilli?** CURT SONNENSCHEIN *Z. Immunitäts* 69, 449–63(1931) —A critical study of the claims of various workers to have observed variants of typhoid bacilli that form gas leads to the conclusion that these claims are unwarranted These organisms never acquire this property by any process of regression, transformation or dissocn Gas formation by an organism excludes its possibility of being *Eberthella typhi*. JULIAN H LEWIS

A quantitative study of the respiration of Staphylococcus aureus cultures lyzed by bacteriophage. Monroe D Eaton, Jr *J Bact* 21, 143–53(1931).—When a large amt of bacteriophage actively lyzes a culture of staphylococcus in the stage of max rate of growth the observed rate of O consumption is greater than can be accounted for by the number of intact cells present A lyzed culture contg negligible numbers of living bacteria continues to give off $CO_2$ and take up O for several hours Either the bacteriophage itself or some product of the action of bacteriophage on or in combination with bacteria respires Lysis by bacteriophage is not a simple autolysis J T M

Isolation and study of an apparently wide-spread cellulose-fermenting anaerobe, Cl. cellulosolvens (N. Sp?). Philip B Cowles and Leo I Rettger *J. Bact* 21, 167–82(1931).—This organism was isolated from horse feces and is morphologically similar to the organisms described by Omelianshy The rods are thin, often slightly curved, and form spherical terminal spores Colony formation can best be obtained on a peptone beef infusion agar contg dextrin and cysteine although it is not selective The best liquid medium is beef infusion peptone phosphate agar contg a strip of filter paper Cellulose, dextrin, arabinose and xylose alone of the materials tested are attacked Glucose is not utilized, a fact in contradiction to the so-called theory of carbohydrate gradients Dextrin or glucose has little effect on cellulose decompn The products of cellulose decompn by this organism are $CO_2$, H and org acids John T. Myers

Influence of osmotic pressure upon spore germination. Harold R. Curran *J Bact* 21, 197–209(1931).—There is a definite limiting concn of food below which no germination occurs, irrespective of the osmotic pressure There is no evidence of a purely osmotic limitation in low pressure solns, limitation being probably due to food deficiency Germination is more rapid and complete at relatively low pressures. When the min nutritional requirements are exceeded, the increased concn of food may retard germination because of an unfavorable increase in osmotic pressure A pressure of 36 to 40 atm becomes inhibitory John T. Myers

Peptone water with rhamnose as a differential culture medium for Pasteurella pestis and Corynebacterium rodentium Pfeiffer. A Bessonova *Zentr. Bakt Parasitenk*, I Abt., 119, 33–5(1930).—*C pseudotuberculosis* produces acid, *P pestis* does not John T Myers

Investigations on the power of the Brucella melitensis group of bacteria to produce hydrogen sulfide The production of hydrogen sulfide as a criterion for the differentiation of the members of the Brucella group. Giovanni Favilli *Zentr Bakt Parasitenk*, I Abt., 120, 24–34(1931).—See *C A* 24, 5329 John T Myers

The influence of bile on the agglutinability of a typical paratyphoid bacilli. N G Kluyeva *Zentr Bakt Parasitenk*, I Abt., 120, 34–40(1931).—Some magglutinable strains become agglutinable when grown in a bile-contg medium Spontaneously agglutinable strains are not changed by bile John T. Myers

The frequent occurrence of streptococci in human croup which produce excessive polysaccharides when grown on the surface of a substrate containing sucrose or raffinose. J Oerskov and K A Poulsen *Zentr Bakt Parasitenk*, I Abt., 120, 125–7(1931).—This is a const property of many strains John T. Myers

A substance which increases bacteriophage action. Friedrich Hoper *Zentr Bakt Parasitenk*, I Abt., 120, 162–5(1931).—There is a substance in human and animal blood which increases bacteriophage action It appears also to be present in certain bacteria Its nature is not understood It may be enzyme like or vitamin-like in character John T Myers

Bacteriological study of chronic infectious arthritis. John W Gray and Cecil H Gowen *J Med Soc New Jersey* 28, 38–41(1931).—G and G describe a modification of the medium used in Cecil's method (*Arch Internal Med* 43, 571) for the isolation of a streptococcus from the circulating blood of patients with chronic infectious arthritis The beef heart infusion is prepd as described by C At the end of the boiling and filtering, 0.5% NaCl, 1% gelatin, 1% glucose and 1.5% Witte peptone are added The mixt is kept in the Arnold app for 20 min., titrated to $p_H$ 8, placed again in the Arnold app for 60 min., and retitrated The $p_H$ should not be below 7.8 The soln is filtered through paper and sterilized in the Arnold app for 30 min. on 3 successive days in bottles contg a teaspoonful of powd $CaCO_3$ If the $p_H$ is 7.6–7.8 the medium is satisfactory With this improved medium it is possible to produce growth in the form of diffuse clouding of the medium in 1–4 days without opening the bottles G Schwoch

Investigations on the agglutination of various species of Leishmania. Alessandro Laurinsich *Pediatria Rivista* 39, 345–50(1931).—The expts were carried out on 4 strains of *L infantum*, 2 strains of *L donovani*, 1 strain of *L tropica* and 1 strain of *L*

*brasiliensis* Immune sera were prepd by injecting rabbits with cultures of these strains The immune sera from the rabbits injected with *L donovani* agglutinated the homologous strains and also the *L infantum* strains The immune sera from *L infantum* agglutinated the homologous strains and also the strains of *L donovani* The immune sera prepd with *L tropica* and *L brasiliensis* agglutinated only the resp homologous strains L assumes on the basis of his results that *L donovani* and *L infantum* are identical or at least very closely related G SCHWOCH

Specific and nonspecific polysaccharides of type IV pneumococcus. MICHAEL HEIDELBERGER AND FORREST E KENDALL *J Exptl Med* 53, 625-39(1931), cf *C A* 24, 653.—Three N contg polysaccharides have been isolated from autolyzed cultures of Type IV pneumococcus a type sp carbohydrate (I), differing markedly from those of Types I, II and III pneumococcus and representing a type of substance hitherto not observed among sp polysaccharides a chemically similar carbohydrate (II) without sp function, and the C" substance (III), or species-sp polysaccharide of Tillett, Goebel and Avery (*C A* 25, 541) Detailed directions are given for the sepn of these 3 compds That I was not obtained pure is evidenced in the variation of $[\alpha]_D$ from 17 0° to 35 0°, in the acid equiv from 1250 to 3330, in the total N from 4 7 to 5 9, in the reducing sugars on hydrolysis (as glucose) from 67 to 76 4, 2 samples contained in % 0 1 and 0 4 amino N, 5 6–5 9 acetamido N, less than 0 1 P and 1 sample showed 45 9 C and 6 7 H, the hydrolysis products are AcOH and an amino sugar deriv II showed $[\alpha]_D$ 10°, acid equiv 4540, total N 5 9 acetamido N 5 6, reducing sugars on hydrolysis (as glucose) 55 (av values), the hydrolysis products are glucosamine, amino sugar deriv and AcOH III gave as av values, $[\alpha]_D$ 42°, acid equiv 1050, total N 6 1, amino N, 0 9, acetamido N 3 7, reducing sugars 36, hydrolysis products, amino sugar deriv, $H_3PO_4$ and AcOH III contained 4% P, at 100° $H_3PO_4$ is only slowly split off by *N* HCl or NaOH The relationship of these compds to chitin is pointed out and its bearing indicated on the unsettled controversy as to whether or not chitin occurs in bacteria C J WEST

Metabolism of S and R forms of pneumococcus PHILIP FINKLE *J Exptl Med* 53, 661–76(1931).—Results are given of studies on the respiration and glucolytic metabolism of pneumococcus Types I (I), II (II) and III (III) and of the R forms derived from these The metabolism of the S and R forms is compared and the relationship between changes in virulence, changes in chem constitution and changes in metabolism is discussed. There is no respiration in Ringer soln unless sugar is added The $p_H$ (7 8) that is optimal for growth of pneumococcus is also the $p_H$ at which the max respiration occurs The intensity of respiration varies with the type in the strains used The respiratory capacity of I is 56% of that of III, which in turn is 71% of that of II. The anaerobic glucolysis is approx the same for all 3 groups I is capable of aerobic glucolysis, while II and III do not effect glucolysis aerobically The energy set free in respiration is considerably greater than that set free in glucolysis The oxidation quotient for lactic acid is of the same order as that found by Meyerhof in muscle and by Warburg for mammalian tissues The respiratory capacities of I and III are changed on conversion of the smooth to the rough form For I the respiration is increased 110%; for II it is diminished 45%, for III there is only a slight diminution in respiratory activity (16%) The anaerobic glucolysis is increased 25% on the av for all R forms irrespective of type derivation I on being converted to the R form loses its capacity for aerobic glucolysis, while III gains it The *O* consumption by pneumococcus compared with that of the human tubercle bacillus and of mammalian tissue, for the same time intervals, wt for wt, is I consumes 13 times as much O as does the tubercle bacillus (*H 37*), *II consumes 34 times as much O, and III consumes over 20 times as much O as* does isolated rat kidney tissue and almost 100 times as much O as does isolated dog muscle. C. J. WEST

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## D—BOTANY

THOMAS G PHILLIPS

The possible presence of norleucine in the proteins of castor-oil seeds. R NUCCORINI (WITH G BAGNIS) *Boll ist super agrario Pisa* 6, 227–37(1930).—Among the hydrolysis products (with concd boiling HCl) of the proteins of germinating castor-oil seeds, together with ricinine, a crystd compd was found, which had the compn.

$C_6H_{11}O_2N$, m 270–80° (with partial decompn.), $[\alpha]$ —10.52 in aq. soln. and +14.00 in 20% HCl soln. This compd was racemized and the Bz deriv (prepd by the Fischer method, cf. *Ber* 33, 2370(1900)) had m. p. 134–5° (with previous softening). The yield was too low to continue the identification expts., but very likely the compd is norleucine, which till now has not been found among the hydrolysis products of the vegetable proteins. G. A. Bravo

Fluorescent substances contained in plants. II. R. Nuccorini (with M. Monsaccini). *Boll. ist. super. agrario Pisa* 6, 252-62(1930).—The plants examd. (olive tree, black cabbage, rape, spinach, lettuce, celandine, rue, sweet clover) contain water-sol. substances fluorescing bluish to Wood's light (3950–4750 A. U.), which are probably pigments formed as secondary products of the biochem. activity of the plants. In several plants characteristic fluorescing compds. are present, *e. g.*, *oleuriols* (fluorescing green blue, 4500 A. U.) in the olive tree and *berberine* (fluorescing gold yellow, 5500 A. U.) in the celandine. The fluorescent substances are not injured by the action of the molds. G. A. Bravo

Studies in sap analysis. I. Carbohydrates in saps. M. Srinivasaya and H. N. Sastry. *Proc. 15th Indian Sci. Cong.* 1928, 163–4.—The estn. of sugars in saps is complicated by the presence of interfering impurities such as tannins, gallic acid, dextrins, proteins and similar substances. Pptg. agents like basic Pb acetate, dialyzed Fe, fibrous alumina, $HgCl_2$, etc., have proved unsatisfactory in one way or another. A very suitable method consists in the preliminary removal of dextrins and the greater part of the proteins by an addn. of 10 vols. of 95% alc. contg. a little $NH_3$. The alc. filtrate is concd. on a water bath; tannins, etc., are eliminated by dialyzed Fe; and the clear filtrate is used for the sugar estns. by Bertrand's method. The direct reducing sugars are estd. as dextrose. The citric acid hydrolysis gives sucrose and the HCl hydrolysis gives maltose. Invertase and maltase are also being tried for the estn. of sucrose and maltose. The saps can also be absorbed on fat free filter paper, extd. by 95% alc. contg. a little $NH_3$ and the alc. ext. treated as above. This modification gives excellent results. E. J. C.

Effects of hydrogen-ion concentrations on rice cultures. S. K. Mitra and Lokenath Phukan. *Proc. 15th Indian Sci. Cong.* 1928, 166–7.—Effects of H ion concns. on rice cultures were studied with Knop's soln. as the standard nutrient soln. and with HCl (0.001–0.01%) and NaOH (0.001–0.05%) as the adjusting media. The $p_H$ values of the solns. ranged from 3.0 to about 8.4. The expt. was continued with one-month old seedlings for a fortnight and the total length of roots in mm. was taken as the criterion of growth. *Results.*—(1) The seedlings showed strong acid toxicity at a concn. of 0.002% HCl, whereas higher concns. were distinctly inhibitory to root growth. With the addn. of alkali, the roots developed far better and the highest root development was shown at a concn. of 0.3% NaOH. (2) A definite relationship was found between the H ion concns. of the culture solns. and their corresponding root lengths, which showed a steady increase with the higher $p_H$ values. $p_H$ 3.9 was distinctly toxic whereas $p_H$ 3.3 was extremely toxic to root growth. At acidities less than $p_H$ 6.0, the development of roots was below normal but beyond this it was quite satisfactory. The highest root growth was attained at $p_H$ 7.9, but further on a drop was shown at $p_H$ 8.4, which was, however, not quite confirmatory and requires further experimentation. E. J. C.

Effects of Shive's three salt nutrients on rice seedlings. S. K. Mitra and Lokenath Phukan. *Proc. 15th Indian Sci. Cong.* 1928, 167.—Following Shive's procedure an expt. on the effects of the 3 salt nutrients of $KH_2PO_4$, $Ca(NO_3)_2$, and $MgSO_4$ was tried on the development of roots in rice seedlings. The nutrient solns. were arranged to give all possible combinations in variations of 0.1–0.8 of the total osmotic concn. of 1.75 atm., for each of the 3 salts used. The results of the expt. were as follows. (1) The culture showing the highest root development had 0.5 of its total osmotic concn. due to $KH_2PO_4$, 0.2 to $MgSO_4$ and 0.3 to $Ca(NO_3)_2$. Similarly, other high root developments were characterized by high concns. of $KH_2PO_4$ and low concns. of the other 2 salts. (2) The culture showing the lowest root development had 0.3 of its total concn. due to $KH_2PO_4$, 0.5 to $Ca(NO_3)_2$ and 0.2 to $MgSO_4$. The region of low root development was characterized by low concns. of $KH_2PO_4$ and high concns. of $Ca(NO_3)_2$ or $MgSO_4$ or both. (3) The best and the worst cultures contained the metallic ions of Mg, Ca and K in the proportions of 0.56 0.43 1.00 and 0.93 1.20 1.00, resp. E. J. C.

Injection experiments with special reference to the production of alkaloids, etc., and general metabolism in plants. S. Krishna and H. Chaudhuri. *Proc. 15th Indian Sci. Cong.* 1928, 224.—For expti. purposes 2 or more species (of the same genus) which differed in the production of alkaloids, etc., were taken at a time. The plants were all grown from seeds under observation. Successful and interesting results were

obtained when even min quantities of chemicals in colloidal solns. were injected Thus when colloidal Fe was injected in opium poppy, which normally contains berberine, it produced less of that alkaloid, whereas when colloidal Fe was injected in red poppy, which contains practically no morphine or berberine, berberine was actually found Injection of colloidal S caused vigorous growth and produced healthier flowers and seeds, though the flower production was a bit delayed. Injection of colloidal Fe in a no of plants inhibited the development of flower buds. E J C

Importance of iron for the growth of fungi (Fusarium vasinfectum Atkinson). B B Mundkur *Proc 15th Indian Sci Cong* 1928, 230—*Fusarium vasinfectum* Atkinson was grown in media with and without Fe in order to det. whether Fe exercised any influence on the growth of the fungus It was observed that in solns. with Fe there was more growth than in solns. without Fe. It is concluded that for some fungi, at any rate, Fe acts as a stimulant, even though they do not have chlorophyll and therefore do not need it. E J C.

Studies in photosynthesis in tropical sunlight. I. G Gopala Rao and N R Dhar *J Phys Chem* 35, 1418–23(1931)—HCHO has been obtained from $CO_2$ and $H_2O$ *in the presence of the following photosensitizers and sunlight chlorophyll, methyl* ene blue, malachite green, methyl orange, ferric hydroxide sol, uranyl nitrate, Cr sulfate and $CuSO_4$. Small quantities of CO were obtained from the photochemical reduction of $CO_2$ by chlorophyll II. Photosynthesis of formaldehyde and carbohydrates from alkali bicarbonates in the presence of colored insoluble substances. *Ibid* 1424–32.—Exposure of $NaHCO_3$ solns. contg inorg catalysts such as Ni carbonate, Co carbonate or colloidal $Fe(OH)_3$ to sunlight for a period of 45 to 60 hrs. effected the synthesis of definite quantities of HCHO and carbohydrates. HCHO solns. contg ZnO methyl orange, or $FeCl_3$ when exposed to sunlight formed small quantities of reducing sugar the soln alone, or contg $Fe(OH)_3$ sol, or MgO produced no sugar A suggested mechanism for the photosynthesis of HCHO consists of 2 steps, (1) the combination of chlorophyll and $H_2CO_3$ in the presence of light energy to form chlorophyll peroxide and CO and (2) the instantaneous interaction of this nascent CO with $H_2O$ to form HCHO and $O_2$ The proposed mechanism is shown to account for most of the facts of photosynthesis. P H Emmett

Sorbitol content of Norwegian mountain ash berries. Axel Jermstad *Arch Pharm* 269, 68–9(1931)—Both the acid (malic) and sorbitol contents of Norwegian mountain ash berries increase during the ripening period. In French berries the sorbitol increases while the acid content decreases. The Norwegian berries are lower in sorbitol than the French W O E

Chemical examination of the red pigments of some autumn fruits. László Zechmeister and László Cholnoky *Matematik és Természettud Értesitö* 47, 209–17 (German abstract 218)(1930). cf *C A* 24, 3020, 4303—Sixty kg of *Lycium halimifolium* gave 17 g *of a cryst. pigment, the compn of which was found to be* $C_{74}H_{116}O_8$, it is identical with the physalien of Kuhn and Wiegand. No secondary pigments were found Fruits of *Tamus communis* contained lycopine, also fruits of *Solanum dulcamara* Arillus of *Evonimus europeus* contained a xanthophyll like pigment of the compn $C_{40}H_{56}O_2$ Examn. of other fruits, *e g*, *Arum maculatum* and *Sorbus aucuparia* is in progress. S. S. de Finály

Investigations on the action of different ions on the saccharase of Penicillium glaucum. Ella Fehér. *Mezögazdasági Kutatások* 3, 292–315(1930)—The quantity of saccharase in well nourished *P glaucum* is almost proportional to the quantity of added sugar. Scarcity of Ca has no influence, but that of Mg or $PO_4$ ions decreases the saccharase quantity The optimum $p_H$ is 4.5. The no. obtained by multiplying dry-matter content and saccharase quantity of a mold culture is a const. value which is characteristic of the resp. cultures. Dialysis at first increases enzyme action The action is strengthened by the presence of Cl, $SO_4$ and $NO_3$ ions. The enzyme action is, however, diminished by long dialysis and cannot be reactivated with salts The $p_H$ optimum is 4.3 after dialysis. The presence of salts has no influence on this value. The action of saccharase cannot be increased by autolysis. S. S. de Finály

Cyanogenesis in plants. M. E Robinson *Biol Rev.* 5, 126(1930). *Physiol Abstracts* 15, 556—A review G. G

Vegetable proteins. I. The proteins of Dolichos lab lab. Duraiswami Narayanamurti and Coimbatore Venkataromana Ramaswami Aiyar *Biochem J.* 24, 1650–24(1930)—The chief protein of *Dolichos Lab lab* constitutes about 80% of the N in the meal and is obtained in the aq fraction. Benjamin Harrow

Irradiation of Dolichos tyrosinase. Duraiswami Narayanamurti and Coim-

RATORE VENKATAKOMANA RAMASWAMI AIYAR. *Biochem. J.* 24, 1855-8(1930).—The enzyme is most active when it is least charged. BENJAMIN HARROW

Solarization of leaves. RICHARD HOLMAN. *Univ. Calif. Pub. in Botany* 15, 139-51(1930).—In *Passiflora* and *Coleus*, solarization was delayed rather than hastened by an increased $CO_2$ supply, and occurred more slowly, if at all, when the leaves were starch filled. JOSEPH S. HEPBURN

Fermentation phenomena of the Nymphaea coeca and their relation to yeast. J. GRÜSS. *Hoehn. Forsch.* 47, 473-7(1930).—See *C. A.* 24, 5788. S. JÓSA

The enzyme content of dormant and germinating seeds. YUTAKA JONO. *Acta Sch. Med. Univ. Imp. Kioto* 13, 211-38(1931).—The carbohydrate- and protein-splitting enzymes, catalase and urease, are present in the dormant seeds and become augmented during germination. The lipases are present in wheat seeds, beans and peas and likewise increase during germination. In the hemp seed, watermelon seed and pumpkin seed the lipase is largely demonstrable in either the resting or germinating stages. Barley seeds are free from urease. Peas and hemp seeds manifest only a trace of urease which shows no increase during germination. In the soy bean, watermelon seeds and pumpkin seeds urease is found in considerable quantity which increases during germination. B. S. LEVINE

The rôle of silica in living organisms. The biology of the diatoms. EUGENE BACHRACH AND M. LEFÈVRE. *J. pharm. belg.* 27, 241-9(1931).—Under the influence of ill-defined factors certain marine and fresh water diatoms, grown in sterile culture but in the presence of silica, become incapable of forming a siliceous carapace. No loss of vitality results and the diatoms are able to develop and multiply through many generations. The loss of carapace is more or less rapid according to the species. When a diatom divides in spite of the absence of rigid valves, the resulting forms resemble the original but the determination of the species is impossible. The presence of valves is not essential for locomotion. L. A. MAYNARD

Studies on leguminous bacteria and plants. IX. Utilization of different nitrogen compounds as well as of the nitrogen accumulated in the root nodules by leguminous plants. ARTTURI I. VIRTANEN AND SYNNÖVE VON HAUSEN. *Biochem. Z.* 232, 1-14(1931), cf. *C. A.* 24, 3252.—Red clover grows best in media containing amino acids as the N source, and the best results were obtained with hydrolyzed casein. Growth is less with $(NH_4)_2SO_4$ and still poorer with $KNO_3$. The behavior of white clover toward N compds. is just the reverse, since it grows best with $(NH_4)_2SO_4$ and very poorly with amino acids. The amino acids are utilized directly and not as a source of $NH_3$, since the $p_H$ of the medium remains unchanged and $NH_3$ cannot be detected. S. MORGULIS

Biochemical studies in connection with the problem of early budding. ANNELIESE NIETHAMMER. *Biochem. Z.* 232, 1-55(1931).—Either frost or a dry spell, especially the latter, promotes budding. The effect of frost is to increase the amt. of reducing sugar. The sugar content of a twig in the course of a year is subject to great variations and its max. does not coincide with the max. budding. The lability of the parenchyma cells to plasmolysis seems to correspond to the tendency to budding. S. MORGULIS

Choline as the injurious substance in diseased barley. G. SCHROETER AND L. STRASSBERGER. *Biochem. Z.* 232, 412-8(1931).—It is shown that barley extd. with dil. HCl yields lecithin, which on boiling and evapn. of the acid ext. yields choline, so that from every barley and not only from the diseased barley choline can be obtained. Lubs's studies are further criticized because by his method of ppty. choline from the acid ext. with an alc. soln. of $HgCl_2$ lecithines and other substances besides choline are ppd. as complex Hg salts, which were thus erroneously calcd. as choline. S. MORGULIS

The death wave in *Nitella*. III. Transmission. W. J. V. OSTERHOUT AND S. E. HILL. *J. Gen. Physiol.* 14, 385-92(1931), cf. *C. A.* 23, 3004.—When a cell of *N. flexilis* is cut a series of rapid elec. responses are set up, which are transmitted very rapidly. They are followed by slower responses, the speed of which falls off as the distance from the cut increases. The mechanism appears like a mech. disturbance, the intensity of which falls as it travels. The faster responses are probably due to the motion of sap past surfaces which have not been altered. They are possibly similar to elec. changes following a blow on the end of a soft rubber tube contg. Ag-AgCl electrodes. The slower responses seem to be due to alterations in the protoplasm and are usually irreversible. C. H. R.

The sensitivity of Laminaria to external actions and the volatilization of iodine. PIERRE DANGEARD. *Compt. rend.* 192, 500-1(1931), cf. *C. A.* 24, 2160.—The liberation of free $I_2$ from *Laminaria flexicaulis* is provoked by a variety of external actions. T. H. RIDER

The constancy of vegetable composition according to Liebig and the sugar beet

*bred by selections.* ÉMILE SAILLARD *Compt rend* 192, 504-7(1931).—*Liebig* was led to believe that plants had fixed compns. S found that the quantities of basic minerals relative to a given amt. of sugar in the sugar beet decreased as the sweetness increased. The $H_3PO_4$ contained in the entire plant did not bear a const. ratio to the sugar. The relative quantity of base combined with org. acids decreased as the sugar increased. T. H. RIDER.

**The physiology of latex.** MARIA ROIBIN *Jahrb. wiss. Botan.* 69, 587-635, *Chem. Zentr.* 1930, I, 989-90. The methods employed permitted working with very small quantities of latex; thus the latex of the same plant could be examd. under various conditions. Expts. with dye solns. and Li solns. showed that the latex tubes are not particularly adapted for the transport of fluids. The solid matter of the latexes varied between 15 and 30% in the euphorbias examd. When plants cultivated in moist soil were kept in a dry atm. for 24 hrs. the solid matter of the latexes was reduced to one half, this was probably due to the inhibition of photosynthesis and to the transfer of osmotically active substances to adjacent tissues. Degradation of starch was observed in the latex of plants kept in dry air. Latex of plants treated with $CaCl_2$ soln. showed degradation of starch and increase in reducing substances. Inhibition of assimilation by darkening also caused a diminution in solid matter. Treatment of cut off shoots with salt solns. produced a distinct decrease in starch, a pronounced increase in sugar and an increase of solid matter. Glucose soln. (6%) caused a decrease in solid matter. The electrolyte content increases after administration of sugar, which may be due to the formation of acid. The electrolyte content is of the same order of magnitude in the representatives of the different genera and species of the Euphorbiaceae, Moraceae and Compositae, in a dilu. 1:1000 the sp. cond. ranged from $10 \times 10^{-4}$ to $30 \times 10^{-4}$. Cultivating a plant in a dry atm. causes a reduction in cond. which is compensated by transferring the plant to a moist atm. Treatment of cut off shoots with $CaCl_2$ soln. resulted in a strong increase in cond. The total press juice had a considerably smaller cond. than the latex of the same plant, with respect to the order of magnitude it is equiv. to the press juice of the latex free plants from ordinary habitats. The latex has a storing function, this fact does not imply that the substances stored are permanently eliminated from the metabolism. The latex tube system has no conducting function, but it seems to be of importance for the regulation of osmosis. G. SCHWOCH.

**The carbon dioxide assimilation of arctic plants and the dependence of the assimilation on the temperature.** D. MÜLLER *Planta* (Abt. F, *Z. wiss. Biol.*) 6, 22-39, *Chem. Zentr.* 1929, II, 2570.—In Godhavn, West Greenland, the assimilation of 2 arctic plants, *Salix glauca* L. and *Chamaenerium latifolium* (L.) Spach., was examd. in the month of July. From the curves on assimilation and illumination intensity it is found that at midnight in the long day period *Chamaenerium* has a weakly pos. apparent assimilation at temps. of below 10°. The assimilation curves of arctic plants show the same course as those of the hebophilous leaves of Danish plants. With completely open stomata and normal $CO_2$ content of the air the assimilation was examd. at different illumination intensities at 10° and at 20°. The compensation point and the respiratory intensity increase with the temp. With low illumination intensities the apparent assimilation is greater at 10° than at 20°; with illumination intensities larger than 4000 or 9000 lux, resp., it is greater at 20° than at 10°. The course of the curves makes Lundegardh's temp. assimilation curves appear improbable. The stomata of arctic plants are rather wide open during the whole night, in some cases up to 100%. The quantity of the lignified arctic plants per area is lower than that of the subarctic plants, the same is true for the leaf area per surface unit. G. SCHWOCH.

*Differential growth of phytophthoras under the action of malachite green.* LEON H. LEONIAN *Am. J. Botany* 17, 671-7(1930).—Malachite green, at the rate of 1 part dye to 1, 2, 4, 8 and 16 million parts of nutrient soln., was used to induce differential growth in *Phytophthora*. Three organisms failed to grow when malachite green was present at the rate of 1 part dye to 16 million parts of nutrient soln., and 8 others made only a sporadic growth. Twenty-one organisms failed to grow when the amt. of dye was doubled, and 20 others made only a sporadic growth. Only 1 organism was able to make a growth in nutrient soln. with 1 p. p. m. of malachite green. The critical concn. of the dye for the *P. cactorum* group is in the neighborhood of 1 part malachite green in 4 million parts nutrient soln., while that for *P. omnivora* is decidedly higher. J. J. SKINNER.

**Effect of mineral salts upon the transpiration and water requirement of the cotton plant.** BERNARD S. MEYER *Am. J. Botany* 18, 79-93(1931).—The salts employed for the transpiration expts. with cotton in soil were NaCl, $NaNO_3$, KCl, $KNO_3$, $CaCl_2$ and $Ca(NO_3)_2$. The first 4 were applied to the soil in concns. of 0.025, 0.05, 0.1, 0.2 and

0.4% of the soil, with the Ca salts an addnl concn of 0.8% was used. For 4-day periods addition of any of these salts in all the concns employed, with the exception of the 2 lowest concns of $KNO_3$, resulted in a decrease in transpiration as compared with plants growing in the soil to which no salt was added. Transpiration progressively decreased in amt with progressive increases in the concn of any of these salts in the soil. The results were essentially the same whether transpiration was calcd on the basis of leaf area, fresh wt. of the top or dry wt of the top. It is clear that the concns of salts employed with reference to the soil conditions used lie in the range where osmotic effects predominate over specific ionic effects. NaCl in concns of 0.0125, 0.025 and 0.05% of the dry wt. of the soil, and $CaCl_2$ in concns of 0.0125, 0.025, 0.05, 0.1 and 0.2% of the dry wt of the soil, were used in the water requirement study. Cotton plants were allowed to grow under these treatments for 50 days, the usual technic of water requirement studies being followed. The water requirement of the plants treated with NaCl decreased progressively with increased concn of this salt in the soil. The 2 lowest concns of $CaCl_2$ employed resulted in an increased water requirement; beyond that concn the water requirement decreased progressively with increase in the concn of $CaCl_2$ in the soil. A progressive increase in the concn of NaCl or $CaCl_2$ in the soil resulted in a progressive increase in the final water content of the tops of the cotton plants.

J. J. Skinner

Chemistry of the halophytes. II. J. Zellner and E. Zikmunda. *Monatsh.* 56, 197–9(1930). cf. *C. A.* 21, 2718.—The ash content of *Lepidium crassifolium* L. was 10.35%. It had the following compn.: K, 10.50, Na, 21.43, and Mg, 3.46%. The following substances were isolated from *Salicornia herbacea* L. by the use of selective solvents: an unidentified wax alc., m. 64°, a sterol of higher m. p.; resin and fatty acids which were not identified, choline, phlobaphenes, betaine, Au salt, m. 196–8°, a *l* rotatory invert sugar, phenylosazone, m. 203°, oxalic acid, and a considerable amt. of inorg. salts.

C. W. Sonders

Chemistry of the higher fungi. XXI. Polyporus sulfureus L. and Lentinus squamosus Schroet. Julius Zellner and Eugen Zikmunda. *Monatsh.* 56, 200–3(1930). cf. *C. A.* 23, 3005–6.—From the first named fungus were isolated: an unidentified cryst. substance m. 265°, a cerebrin like substance, m. 112–4°, ergosterol, m. 163–5°, fungisterol m. 146°, stearic and palmitic acids, choline, fumaric acid, m. 284°, mannitol, m. 165°, and K H oxalate. The last named fungus yielded mannitol; choline, a phlobaphene like substance, a sugar, phenylglucosazone, m. 206°; and a polysaccharide which when hydrolyzed yielded only glucose. No pentoses were obtained.

C. W. Sonders

Comparative plant chemistry. XXII. Chemistry of barks. 7. Norbert Froschl, J. Zellner and F. Zikmunda. *Monatsh.* 56, 204–11(1930). cf. *C. A.* 23, 3005.—From the bark of the branches of *Morus nigra* L. there was isolated a phytosterol m. 132°, ceryl alc., stearic, myristic, and linolenic acids, $H_3PO_4$, glycerol, tannins, phlobaphenes and a sugar, *phenylosazone*, m. 204°. The following substances were isolated from *Alnus incana* L.: protalnulin, m. 226°, alnulin, m. 260°; alnuresinol, m. 192–3°, an unidentified substance m. 194–5°, Ac deriv., m. 253°, resin acids and phlobaphenes and a sterol like substance, m. 260°, Ac deriv. m. 203°.

C. W. Sonders

The absorption of iodine by the roots of plants. J. Stoklasa. *Protoplasma* 8, 199–214(1929).—Larger amts of I both org. and inorg. accumulated in the organs of plants when the soil contained 1000γ of I per kg. than when the soil contained only 200–400γ per kg. When the I content of the soil was below 400γ per kg. the absorbed I was converted into an org. form. Plants with a low $p_H$ were more sensitive to the toxic effect of I.

M. H. Soule

Hydrogen-ion phenomena in plants. I. Hydrion concentrations and buffers in the fungi. J. I. Armstrong. *Protoplasma* 8, 222–60(1929).—The tissue and expressed sap reactions of 10 species of the larger Basidiomycetes were investigated. For *Hypholoma fasciculare* the inorg. phosphates of the sap accounted for 50% of its total buffering at $p_H$ 6.0–9.0. With *Coprinus micaceus* the inorg. phosphate in the sap accounted for all the buffering at $p_H$ 6.0–7.0, the oxalate at $p_H$ 4.0–5.0. With *Collybia velutipes*, phosphate, citrates and malates accounted for the buffer curve. II. An investigation of the buffer complex of sap from stems of Pelargonium sp. *Ibid* 313–43.—The aerial stems of *Pelargonium* from young and mature plants were cut into short lengths and the sap was expressed by pressure. The juices were passed through Gooch crucibles and the filtrates were used at once for titration or analysis. Phosphate and the characteristic odoriferous acid of the tissues, pelargonic acid, were shown to be unimportant constituents of the buffer complex. Org. acids constituted the major part of the buffer complex at the initial $p_H$ of the sap. The acids found and estd. included oxalic, malic,

citric and tartaric, and the contributions made by all these buffer systems to the buffering exhibited by the sap were considered in detail. **III. The acidity of certain cell walls considered in relation to the higher fatty acids.** *Ibid* 508–21(1930).—Higher fatty acids belonging to the acetic and oleic series together with certain derivs of oleic acid, notably ricinoleic or subernic acid, were tested with a series of 9 indicators that had been used in this series of studies. The virage obtained from any given acid with any given indicator was found to depend upon the avidity of the acid concerned for the indicator base. The base avidities of the acids varied in a peculiar manner with the no. of C atoms in the acid mol. M. H. SOULE

**The accumulation of ions in living cells—a non-equilibrium condition.** S. C. BROOKS. *Protoplasma* 8, 389–412(1929).—Living cells of *Valonia macrophyssa* Kutz were collected from their natural habitat and exposed for different lengths of time to sea water in which the proportion of K had been increased or decreased by the addn. of isotonic KCl or NaCl solns. The concn. of K in the sap ordinarily increased more than that of Na or Cl regardless of whether it was present in more or less than normal concn. in the surrounding soln. The Cl concn. in the sap ordinarily changed in much the same way as the K concn. but to a significantly smaller extent. The Na concn. appeared to have increased first and then decreased, depending upon the length of exposure and the extent to which the sea water was altered. This was explained by supposing (*a*) that the cell is normally in the non-equil. condition with respect to the surrounding soln., (*b*) that it is surrounded by a plasma membrane consisting of a mosaic of anion permeable and cation permeable areas which are of the nature of charged porous films, and as such exaggerate differences between the diffusion velocities of the ions to which they are permeable, (*c*) that the diams. of the pores are variable according to exptl. conditions, (*d*) that the penetrabilities of different ions are characteristic functions of their own effective diams. and of the diams. of the porous membranes. M. H. SOULE

**The influence of frequency of cutting on the productivity, botanical and chemical composition and the nutritive value of "natural" pastures in Southern Australia.** J. GRIFFITHS DAVIES AND A. H. SIM. *Council Sci. Ind. Research (Australia) Pamphlet* No. 18, 5–28(1931). cf. Shutt, Hamilton and Selwyn, *C. A.* 24, 5792.—Five series of pastures, approx. 40 years old, were compared, the 1st 4 being cut every 2, 4, 7 and 10 weeks, resp., and the last was cut only at the end of the season, *i. e.*, November. The yield of dry matter and of crude fiber from the whole pasture was greatest in No. 5, and least in No. 1, the yield of total N and of crude protein varying inversely. However, though this held for the erect species which comprises most of the plants, *Erodium botrys* gave a max. yield of dry matter in No. 1 and a min. in No. 5. The yields of CaO and of $P_2O_5$ from the whole pasture were not greatly affected by the defoliation, but $P_2O_5$ was distinctly least in No. 5. The CaO content of all the species was high, about 2.2% of the dry matter. The yield in series 1 was greatly affected by rainfall, particularly at the end of the season, the yield of any cut being influenced principally after a lag of 2 weeks. The effect of temp. was less marked, but may be a limiting factor near the beginning and end of the season. No significant changes in chem. compn. of the pasture of No. 1 were observed throughout the season. Analyses of the soil and botanical compn. of the various cuts over 2 seasons are given. K. V. THIMANN

**Movement of organic materials in plants.** ALDEN S. CRAFTS. *Plant Physiology* 6, 1–14(1931).—C. suggests that the movement of sugars, amino acids, etc., in plants takes place in the phloem as the channel for conduction with the majority of transport taking place in the cell walls. The functioning of the mechanism proposed is discussed in detail and expts. are described in support of C.'s views. WALTER THOMAS

**Food reserves in relation to other factors limiting the growth of grasses.** L. F. GRABER. *Plant Physiology* 6, 43–71(1931). cf. *C. A.* 22, 1177.—Certain cultural practices with grasses (blue grass, red top, fescue and timothy) are correlated with the utilization and accumulation of labile org. substances—the so-called org. food reserves of plants. The productivity, as measured by both root and top growth, varied inversely with the frequency of defoliation. Frequent and close cutting of the succulent top growth of grasses having abundant reserves resulted in heavy depletion of the available N of the soil. The agronomical aspects of the morphological and ecological relationships of the org. food reserves of the flora of grass lands are also discussed. WALTER THOMAS

**Relation of hydrogen-ion concentration of tissue fluids to the distribution of iron in plants.** R. A. INGALLS AND J. W. SHIVE. *Plant Physiology* 6, 103–25(1931). cf. *C. A.* 23, 865.—The $p_H$ of the tissue fluids of buckwheat, clover, sedum and bryophyllum varied directly with the change of light intensity from day to night (*C. A.* 19, 3293). The range of variation was proportional to the degree of succulence of the plants.

The $p_H$ of the tissue fluids of the stems of buckwheat and clover was always higher than that of the leaves, but in sedum and bryophyllum the differences were small In the above plants and also in tobacco, tomato, asparagus and soy bean the sol (filterable) Fe varied inversely and total Fe directly with the changes in $p_H$ produced by variation in the light intensity. The detn of $p_H$ has no significance unless made on material collected at the same time and grown under approx identical conditions The paper is illustrated with 10 figures WALTER THOMAS

The Corail pea or Adenanthera pavonina. J PIERAERTS, E. CASTAGNE AND L. ADRIAENS *Mat grasses* 22, 8785-7, 8810-12, 8838-41, 8866-8, 8894-6, 8922-4, 8977-8, 9003-4, 9032-4(1930).—The seed of this pea contains neither alkaloids nor tannin Most of the K is found in the spermoderm and in the albumen while most of the P is in the embryo as lecithin The albumen is composed mostly of galacto mannanes The sugars, mostly found in the embryo, are a mixt of saccharose and stachyose The fats of the seeds are the glycerides of oleic, linolic and lignoceric acids The last accounts for 75% of the total solid acids Other acids are found in very small quantities. From its characteristics the oil of the Corail pea must be classed as a vegetable grease However, only the butter of *Parkia africana* possesses similar consts The consts. of *Parkia* butter, Corail pea butter from India and Corail pea butter from Belgian Congo are, resp acidity index 2.5, 0.56, 1.25, sapon index 184.5, 181.4, 176.6, I index 91.6, 87.9, 94 Reichert Meissl index 0.6, 1.22, 0.77, Hehner index 95.5%, 95.5%, 95.3% $n_D^{25}$ 1.470, $n_D^{60}$ 1.4570, $n_D^{55}$ 1.4710 P. THOMASSET

Coloring matter of awobana (KURODA) 10. Thevetin, a crystalline glucoside from the seeds of *Thevetia neriifolia* (AYYAR) 10.

## E—NUTRITION

PHILIP B HAWK

Sun rays and vitamin D. A VAN WYK, F H REERINK AND W MÖRIKOFER *Strahlentherapie* 39, No 1, 80-92(1930).—The authors compared the action of rays from the sun and those from a Hg quartz lamp upon ergosterol soln in hexane and found 2 essential differences, the radiation of the ergosterol soln in the sun rays caused a quicker destruction of the formed vitamin D and also the formation of another decompn product of unknown compn The different distributions of the intensities of the radiation of the 2 sources of light are believed to be the explanation for the differences They found that the relation for vitamin destruction and vitamin formation is 3 times as large with the sun rays as with the Hg quartz lamp Therefore, with sun radiation much quicker decompn of vitamin D will take place so that only a small portion of ergosterol is transformed into vitamin D, while a considerable portion of the latter is decompd F R. GREENBAUM

Blood studies in hemorrhagic anemia. H S MAYERSON AND HENRY LAUFENS. *J Nutrition* 3, 453-63(1931).—Severe secondary anemia was produced and maintained in 27 dogs by the method of Whipple and Robscheit Robbins (*C. A.* 19, 2092) In dogs fed the standard bread S diet (W and R R., *loc cit.*), contg salmon, the av weekly production of hemoglobin was 4 g above the maintenance level With dried apricots the value was 15 dried peaches 7 and lettuce 10 After several weeks of bread S feeding there is a gradual rise in the no of red blood cells accompanied by a decrease in corpuscular vol and corpuscular hemoglobin The percentage of hemoglobin in these smaller cells remains relatively unchanged If lettuce, apricots or peaches are added to the diet, these changes do not occur and they are interpreted as being compensatory reactions to the $O_2$ deficiency occasioned by the low hemoglobin when the severe anemic level is maintained C R FELLERS

The incorporation of vitamins in bread. F F. TISDALL, T. G H DRAKE AND ALAN BROWN *Can Med Assoc J* 24, 210-3(1931); cf *C A.* 24, 2161.—Bread is a particularly suitable carrier for vitamins on account of its universal distribution and large general consumption The refined grain products are deficient Incorporation of wheat germ will supply $B_1$ and F, and of irradiated ergosterol, D. Such procedures can be utilized at no addnl cost to the consumer A T CAMERON

Microbiological studies as a basis for vitamin investigation. WERNER KOLLATH *Wiener klin Wochschr* 44, 277-80, 320-3(1931).—A review D B DILL

Influence of E-vitamin on hypertrophy of female genitalia. F. VERZÁR. *Debreceni Tisza I Tud Tars II Oszt Munkái* 3, 352(1930).—Lack of E vitamin caused sterility in rats Hypertrophy of the uterus was caused in young animals of 50 g wt. by in-

jecting at intervals of 1–2 days 0.5–1.0 cc. concd. ext. of D vitamin without sitosterol. S. S. DE FINÁLY

**Practical significance of alkaline earths in the ash of forages.** L. URBANEK. *Mezőgazdasági Kutatások* 2, 441–51(1929). cf. *C. A.* 24, 4325.—Too much $CaCO_3$ has a toxic action on sheep and pigs. Salt metabolism is disturbed if forage ash contains more than 30 mg. equiv. of alk. earths. S. S. DE FINÁLY

***Role of photoactivity in the detection of the antirachitic effect of substances.*** L. URBANEK. *Mezogazdasági Kutatások* 3, 491–6(1930).—No connection was found between the antirachitic effect and photochemical activity. Many org. solvents showed photoactivity after a previous treatment with ultra violet light, *e. g.*, benzene, toluene, xylene, nitrobenzene, nitrophenol, aniline, ethyl-, propyl- and amyl ales., $CHCl_3$, $CCl_4$, oleic acid, turpentine oil, paraffin oil and cod liver oil. S. S. DE FINÁLY

**The action of white phosphorus and of vitasterol D (Vigantol) on the respiratory metabolism of rachitic young rats.** H. SELL. *Arch. exptl. Path. Pharmakol.* 140,194–204 (1929). *Physiol. Abstracts* 15, 373.—A rachitogenic diet depressed the metabolism of rats. P. injected subcutaneously in oily soln. in doses of $10^{-2}$ to $10^{-3}$ mg. daily caused the metabolism to rise to normal, but did not greatly increase the wt. or cure the rickets. Irradiated ergosterol caused a rise of metabolism and cured the rickets. G. G.

**Protein diet and the number of leucocytes in the intestinal mucosa of the mouse.** H. DE WINIWARTER. *Compt. rend. soc. biol.* 102, 121–3(1930). *Physiol. Abstracts* 15, 368.—An exclusively albuminous diet causes a characteristic invasion of macrophages in the mucosa, which modifies the villous formations. This is accompanied by a considerable relative increase of eosinophiles and intense destruction of leucocytes, the debris of which is found in various coats of the intestine. No similar results are seen on a purely fatty or carbohydrate diet. G. G.

**Determination of vitamin A.** KATHARINE H. COWARD, KATHLEEN M. KEY, FREDERICK J. DYER AND BARBARA G. E. MORGAN. *Biochem. J.* 24, 1952–66(1930).—The vitamin A contents of 2 substances are compared, 2 groups of rats (5–10 in each group) being used, each group is fed on A free diet until growth ceases, and each rat within the group is then given the same daily dose of the substance to be tested. The mean increases in wt. of the 2 groups are calcd. These mean increases are then referred to a curve which relates mean increase to dose of a particular sample of cod-liver oil. BENJAMIN HARROW

**Salicylic acid fruit in the prevention and treatment of rheumatism in children.** J. EPSTEIN. *Arch. Pediatrics* 48, 73–81(1931).—Salicylic, benzoic citric and tartaric acids are antirheumatic. For this reason, certain fruits (strawberries, huckleberries, raspberries, plums, cherries, lemons, grape fruit and melons) should be included in the diet beginning with the second year of life, both as preventives and as a portion of the therapy of rheumatic fever. JOSEPH S. HEPBURN

**Low-fat, high-starch evaporated-milk feeding for the marasmic baby.** JOHN HOWLAND WEST. *Arch. Pediatrics* 48, 189–93(1931).—The marasmic baby usually does not tolerate fats and sugars. A readily digested, high-calorie diet, composed of unsweetened evapd. milk, Ca caseinate and cooked starch, usually is satisfactory. JOSEPH S. HEPBURN

**To better human life by milk. I. II.** W. A. PRICE. *Creamery and Milk Plant Monthly* 20, No. 3, 26–37, No. 4, 46–54(1931).—Data obtained indicate that the vitamin content of dairy products is largely dependent upon the utilization by the cow of a rapidly growing fresh grass that has developed on a soil amply provided with such mineral requirements of the plant as to provide the cow not only with these minerals but with activating substances which are not produced in adequate quantity in the absence of these minerals. Detns. of vitamins A and D were made on butters obtained from various parts of the world. Seasonal variations were found in the quantities of these vitamins present in the butter. Thus in North America vitamin D tends to be low from Nov. to April, rising in May and June, falling in midsummer, sometimes rising in the early autumn with a rapid decline in the fall and early winter. It was found that the vitamin content of butter did not decrease during storage. From the standpoint of public health, therefore, it was recommended that butter should be placed in storage at the season of its greatest vitamin content. A. H. JOHNSON

**Observation on the assay of the antineuritic vitamin. Some of the factors involved in the use of the rat method.** W. H. SEBRELL AND E. ELVOVE. *U. S. Pub. Health Repts.* 46, 917–25(1931).—Results are reported which are in agreement with the experience of others, to the effect that the symptoms of polyneuritis in rats appear to be assocd. with shortage rather than complete absence of antineuritic vitamin. The

curative method for testing antineuritic concentrates on rats may be applied by injecting a suitable soln. of the concentrate, subcutaneously or intraperitoneally. J. A. E.

Nutritive value of soy-bean cake for hens. II. Kozo Suzuki and Tamaki Hayashi. *J. Agr. Chem. Soc. Japan* 6, 901–9(1930).—Soy-bean oil cake was given as protein source of the feed. Twelve parts of bone powder, 4 parts of $CaCO_3$ and 4 parts of NaCl for 100 parts of the cake were supplied. The nutritive value was similar to that of fish meal. It gives results on egg production and wt. of egg similar to those of other animal feeds. III. *Ibid* 910–6.—The chicks hatched from the eggs as above mentioned were also fed with soy bean oil cake. No abnormal signs were noted. Y. Kihara

Vitamin D. III. Eiichi Takamita. *J. Agr. Chem. Soc. Japan* 6, 977–74 1930), cf. *C. A.* 25, 537.—Ergosterol was dissolved in olive oil and treated with ozone. The ergosterol soln. so treated was antirachitic for mice. Excess of ozonation diminished the antirachitic activity. If ozone acted on ergosterol for 3 min. rickets were cured by a dose of 0.05–0.1 mg. ergosterol per day. Vitamin D itself may be 5,6-mono-ozonide ergosterol. Y. Kihara

Soy-bean cake for the fattening of swine. Kozo Suzuki. *J. Agr. Chem. Soc. Japan* 6, 975–8 (1930).—Soy bean oil cake as 20 and 30% was added to a feed consisting of korean 47, maize 30, bone powder 2 and NaCl 1%. The nutritive value of the feed with soy bean oil cake was as good as that with fish meal. The results in fattening were rather superior. Vitamin A, Cl, Na and Ca should be supplied. Y. Kihara

Muramatsu's beriberi bacteria and antiamnosis. Tsuyoshi Akiyama. *J. Agr. Chem. Soc. Japan* 6, 1125–43(1930).—Pigeons fed with polished rice excrete Muramatsu's beriberi bacteria. If the pigeons are fed with a diet deficient in vitamin B, the bacteria are difficult to find in the excreta. Dogs fed with polished rice show the symptom of the sickness but do not excrete the bacteria. The bacteria could not be found in the excreta of mice fed with polished rice. There is no relation between exptl. beriberi and Muramatsu's bacteria. Y. Kihara

Effects of a large quantity of lactic acid in the diet. Ryuzo Sasaki. *J. Agr. Chem. Soc. Japan* 6, 1144–52(1930).—Mice were forced to eat lactic acid as 5.5% of the diet. Ca and especially P of the bone were decreased. Decrease of P in the muscle was also found but it was less than that of the Ca decrease. Y. Kihara

Vitamin C. IV. Vitamin C in seeds germinated under a Mazda lamp. Toichi Matsuoka. *J. Agr. Chem. Soc. Japan* 7, 19–28(1931). cf. *C. A.* 24, 5349.—The seed-rice was germinated under 1000 w. elec. lamp at 28–30°. Vitamin C was produced after 3 days of germination. The detection of vitamin C by Bezssonov's reaction does not coincide with the biological test. Y. Kihara

Effects of alkali disintegration upon the vitamin content of cereal straws. Hiratoshi Iwata. *J. Sci. Agr. Soc. (Japan)* No. 326, 37–45(1931).—The straws of barley, wheat and rice contain some vitamins A and B. The vitamins in the straws were more stable toward 1% lime, especially in the soaking process, than toward NaOH. Y. K.

The study of calcium metabolism. Citrate and urinary excretion of calcium. R. Proverman and L. Brull. *Bull. soc. chim. biol.* 12, 1151–7(1930).—Subcutaneous injection or feeding of tri-Na citrate caused a marked increase in urinary Ca and a decrease in blood Ca. The presence of citrate in body tissues and fluids is thought to have an important relation to Ca metabolism. C. G. King

Loss of vitamin A during the baking of thin butter cookies. Helen T. Parsons, Ina Stevenson, Iva Mullen and Carolyn Horn. *J. Home Econ.* 23, 366–72(1931).—Thin butter cookies, baked at 160° for 10 min., lose 20–25% of their original vitamin A content. Amy Leviscontt

Metallized food in the regeneration of hemoglobin in rat and man. J. L. McGhee. *Science* 73, 347–8(1931).—Milk was left in contact with an alloy of Fe, Cu, Mn and Cu in an ice box and small quantities of these metals were dissolved in it. This metallized milk and control milk were fed to young white rats whose hemoglobin had been reduced to about 75%. Those to which metallized milk was fed showed rapid regeneration. They also showed some storage of these metals. Cu alone was effective but the mixt. of metals was much better. There was a lower mortality among rats fed on metallized milk than on milk to which salts of the metals were added. Tests extended to man indicated similar results. G. H. W. Lucas

The comparative value of irradiated ergosterol and cod-liver oil as a prophylactic antirachitic agent when given in equivalent dosage according to rat units of vitamin D. D. J. Barnes, M. J. Brady and E. M. James. *Am. J. Diseases Children* 39, 45–58 (1930).—Cod-liver oil, administered to infants in doses of 1400 rat units of vitamin

a seasonal variation in litter size, being higher in summer. The omnivorous mothers were heavier at parturition than the vegetarian, but for mothers of the same body weight the young from the omnivorous animals were heavier. The birth weight of the young tended to increase with the age of the mother and the order of the litter up to the fourth for the vegetarian and to the third for the omnivorous rats L A M

*Growth of vegetarian rats on omnivorous diet.* Shiyo Wan and Tung-Tou Chen. *Chinese J Physiol* 5, 71-8(1931).—Young born of vegetarian mothers, but nursed by omnivorous mothers and reared upon an omnivorous diet after weaning, averaged 93% normal in wt at 4 months Young born of and nursed by vegetarian mothers, and placed on an omnivorous diet at 4 weeks, attained wts which were 82% normal Similar young reared upon a vegetarian diet to 4 months and then changed to the omnivorous diet reached wts which were 77% normal "These results show that nutrition during lactation is more important than later in life." L A Maynard

Excessive doses of vitamin D. M Pincherle and V. Nava *Rev clin pediatrica* 28, No 3(1930), *Rev sud americana endocrinol immunol quimioterap* 14, 27(1931).—High doses of vitamin D produce in rats alterations in the bones, the blood vessels, kidneys and spleen The distance of the toxic dose from the therapeutic is great enough to avoid danger A E Meyer

The toxic and calcifying action of irradiated ergosterol. L Michelazzi *Arch. ital biol* 84, 111-7(1931).—Injection of large doses of irradiated ergosterol into rabbits causes pronounced cachexia and deposition of Ca salts in such organs and tissues as normally exhibit no calcification There is also evidence of a hemolytic effect S Morgulis

*The action and the mechanism of the action of excessive doses of irradiated ergosterol in experimental parathyroid insufficiency.* M Cohel. *Arch ital biol.* 84, 119-20(1931).—Large doses of irradiated ergosterol administered previous to parathyroidectomy prevent the occurrence of tetany and of the symptoms of parathyroid insufficiency Irradiated ergosterol in the amts used causes considerable hypercalcemia and also a slight hyperphosphatemia, but the hypercalcemia does not last long following parathyroidectomy; after a variable interval it gives place to hypocalcemia characteristic of parathyroid insufficiency However, the blood P does not increase as much as it usually does in the parathyroidectomized animal so that the Ca/P ratio does not fall nearly as low In animals treated with the ergosterol after the operation the hypercalcemia is transitory, and is followed by hypocalcemia Also in *Arch fisiol* 29, 123-44(1930) S Morgulis

The bread problem. II. The physiological effects of whole-grain bread. I Abelin *Biochem Z* 232, 278-91(1931), cf C *A.* 24, 1144.—Unlike white bread or bread rich in bran, bread made from 100% whole grain flour (as 75% whole wheat and 25% whole rye) has good nutritive value The value of this bread is still further enhanced when the excess $H_3PO_4$ of the flour is largely neutralized by means of Ca salts of org acids Young rats nourished exclusively on pure whole grain bread or on one contg Ca attain their normal body wt and are in good health even after 6 months on such a regime Fed on white bread or on bran bread, the animals grow very slowly, show a disposition to skin and mucous-membrane infections and generally die in 3-4 months Neutralizing the excess $H_3PO_4$ of white bread with Ca had some favorable effect but not nearly so much as in the case of the whole grain bread Whole grain flour may, of course, be of good or poor quality, and the method of prepg the bread is also important in detg its nutritive value For instance, toasting made the bread less nourishing and even injurious Animals fed on toasted whole grain bread manifested bone injuries, became very sick and died S Morgulis

Ammonium bicarbonate together with acid sugar-beet cossettes as a protein substitute. (A feeding experiment on milk goats.) Franz-Hermann Ziemer. *Biochem Z* 232, 393-422(1931).—$NH_4HCO_3$ could replace about 50% of the protein in a ration designed to maintain an increased milk production in goats Sixty-five tables of detailed results are given S Morgulis

The nitrogen balance during dietary corrections of obesity. J M Strang, H B. McCluggage and Frank A Evans *Am J Med Sci* 181, 336-49(1931).—The level of N metabolism in obese patients does not differ from that of normals The rapid reduction of wt by a "maintenance protein diet" produces only a slight depression in the N level even after 28 weeks The total N loss in the period of neg balance is less than 4% of total body N R C Willson

Creatinine excretion in abnormal states of nutrition. H B McCluggage, George Booth and Frank A Evans *Am J Med Sci* 181, 349-55(1931).—The creatinine excretion of obese subjects is close to that of normal ones The excreted creatinine

does not change appreciably when reduced by dietary measures alone The excretion in persons of subnormal wt. is markedly reduced as compared to the normal
R C Willson

**The effect of irradiated ergosterol on the composition of gastric and pancreatic juices.** Walter Bauer, Alexander Marble, Stephen J. Maddock and Josephine C. Wood *Am J Med Sci* 181, 309–413(1931).—Free HCl was reduced in 3 of 4 patients, a questionable reduction occurring in the fourth case The pancreatic enzyme activity was depressed in 1 case The fixed base content of pancreatic juice was not affected Cl ion was decreased and $CO_3$ ion increased and thus a more alk. pancreatic juice resulted
R C Willson

**The influence of vitamin A on the action of viosterol in rickets.** P. Roimer and R Dubois *Rev franc pediatrie* 6, 604–8(1930), *J Am Med Assoc* 96, 305.—Six rachitic children were given either the min effective dose or an insufficient dose of viosterol (from 300 to 600 rat units per day) They were also given daily doses of 3000 rat units of vitamin A The addn of the larger doses of vitamin A did not modify the action of the viosterol in any way The clinical symptoms, results of x ray examn and blood analysis corresponded with those normally obtained by small doses of viosterol
R C Willson

Leich, J Neil **Dietetics in Warm Climates Including Food-stuffs, their Analysis and Role in Disease.** London Harrison and Sons, Ltd 486 pp 25s., net Reviewed in *Indian Met Gaz* 66, 228(1931)

Mellanby, May **Diet and the Teeth.** An Experimental Study Part II. A Diet and Dental Disease B Diet and Dental Structure in Mammals other than the Dog London H M Stationery Office 2s 6d Reviewed in *Pharm. J* 126, 386 (1931)

**Antirachitic products.** Soc des usines chim Rhône Poulenc Fr. 698,040, June 11, 1930. Products having high antirachitic activity are prepd by irradiation of ergosterol with ultra violet rays The ergosterol is sepd from the crude product of irradiation by using the low soly of ergosterol in org solvents such as EtOH, acetone or AcOEt The sepn of the ergosterol is followed up until a dextrorotatory product is obtained, which has preferably a rotatory power in alc soln above 23° for the yellow Hg ray The irradiation of the ergosterol is stopped before the point of max. activity is passed and preferably before it is reached

## F—PHYSIOLOGY

E. K. Marshall, Jr

**Excitability of the reflexes as a function of the $p_H$ value.** M. Mitols *Atti accad. Lincei* 12, 191–4(1930), cf *C A* 23, 3482, 4253.—The effect of changing $p_H$ on the cerebrospinal axis of *Bufo vulgaris* was studied by immersing this for half hr periods in acid solns (HCl, lactic acid), as well as in alk. solns (NaOH, KOH) and noting the reaction Outside of the limits $p_H$ 6.7–7.2, either acids or alkalies promote more and more excitability increasing to clonic convulsions, tetany, and finally total paralysis at values below $p_H$ 6.1 or above 7.6
A W Contieri

**The regulating function of the central nervous system.** M. Mitolo. *Atti accad Lincei* 12, 246–51(1930).—The function of the central nervous system of *Bufo vulgaris* in regulating $p_H$ value has been studied by adding small amts (in mg.) of the substance to 10 cc of the acid mixt, Sorensen's solns being used (0.1 *M* HCl + 0.1 *M* glycocoll, *M*/15 $K_2HPO_4$ + *M*/15 $Na_2HPO_4$) as well as those of McIlvaine (0.1 *M* citric acid + 0.2 *M* $Na_2HPO_4$) Various parts of the nervous system, as brain and spinal fluid, have the same regulating function Time of contact or temp has little effect on the regulating function, there is no difference in the action of isotonic and *anisotonic solns*, *however, in isotonic solns of mixts of* KCl, LiCl, $KIO_3$, *slightly* greater regulation is obtained than in isotonic NaCl alone A neutral strychnine sulfate soln. (2.5 10,000, tetany-producing) raises the power slightly, whereas a soln of 9.5 cc physiol soln and 0.5 cc abs EtOH (narcotic) depresses the action. A. W. C.

**The hydremic curve (fasting) in various short exercises. III.** L. Bracaloni *Atti accad. Lincei* 12, 252–7(1930), cf *C A* 24, 4814.—Previous work suggested that the hydremic curve may vary with the intensity of exercise rather than duration, therefore, 6 subjects were subjected to various forms of exercise: 50 and 100 m race, climbing a 9 m rope, rowing 10, 20, 30 strokes, 10–30 chinnings, 10 leg flexings In all cases the water content of the blood diminished 0.7 to 1.23%, but was recovered in about 15 min., and differed more with the individual than with the form of exercise. A. W. C.

New viewpoints to the problem of the transformation of fat into carbohydrate in the organism. M. Hevze. *Z. physiol. Chem.* 195, 248–64(1931); cf. *C. A.* 25, 494.—In formulating the reactions involved in the transformation of fat into carbohydrate the chief difficulty is the fact that β-oxidation of fatty acids yields 4 C chains such as $AcCH_2CO_2H$ and $MeCHOHCH_2CO_2H$, whereas 3 C chains such as $AcCO_2H$ and AcCHO are required for glucose synthesis. The newly discovered reaction product of $AcCH_2CO_2H$ and AcCHO, viz., diacetylethanol, $AcH_2CAcCHOH$, contains 6 C atoms and by addn. of 2 $H_2O$ and 1 O could yield $C_6H_{10}O_6$. Again, this hydroxydiketone could oxidize to 2 AcCHO, thus effecting the transition from the 4 C to the 3-C chain. Feeding expts. with this ketol show that large amts. are tolerated and frequently disappear entirely. Likewise liver pulp removes the ketol. In such expts. the sugar is first destroyed by yeast fermentation which does not attack the ketol. Disappearance of the latter is then shown by the absence of reducing power. Oxidation by $KMnO_4$ converted the ketol into $AcCO_2H$, identified by prepn. of the *p*-nitrophenylhydrazone.
A. W. Dox

The fate of choline in the blood. Comment on the paper of Irvine H. Page and Erich Schmidt. Fritz Wrede and Ernst Brücl. *Z. physiol. Chem.* 195, 255–9 (1931).—The disappearance of added choline, observed by Page and Schmidt (*C. A.* 25, 322) could not be corroborated. Whether fresh blood, serum or blood heated to 56° was used and whether the analysis was performed immediately or 7 hrs. after adding the choline, the recovery as chloroaurate by the authors' method (*C. A.* 23, 5493) was quite uniformly approx. 80%. Pos. evidence by isolation and chem. identification of the substance should outweigh neg. results by a biol. assay.
A. W. Dox

The occurrence of ether-insoluble lecithins in the brain. Wilhelm Merz. *Z. physiol. Chem.* 196, 10–18(1931).—From the protagon fraction of the brain a white hygroscopic substance was isolated which resembled sphingomyelin in its insoly. in $Et_2O$, petr. ether and MeAc. It becomes vitreous at 65–72° and melts above 140° with decompn. Hydrolysis by $Ba(OH)_2$ in MeOH yielded choline which was identified as the chloroplatinate. Cholamine, the base constituent of cephalin, was not found. The fatty acids identified were palmitic, very little stearic, and about 21% oleic. Since less than 30% of unsatd. acid was found, the existence of natural lecithins contg. only satd. acids is demonstrated. Of the glycerophosphoric acid present 58% was the β-acid identified by its difficultly sol. double salt with $Ba(NO_3)_2$. This is the first instance of a naturally occurring lecithin insol. in $Et_2O$.
A. W. Dox

The follicular hormone. Preliminary paper. Bolesław Skarzyński. *Z. physiol. Chem.* 196, 19–22(1931).—By the method of Marrian, in which 5% KOH is used, a hormone was obtained from gravid urine which in 240–50° and showed the same ultraviolet absorption curve as Butenandt's hormone. Its activity was 9,500,000 mouse units as detd. by a 50% response after 5 injections during 30 hrs. The substance in KOH soln. showed a complete loss of selective absorption spectrum after 72 hrs., indicating a deep-seated change. Possibly the crystals represent an inert substance to which the hormone is assocd. as a difficultly separable impurity.
A. W. Dox

The ammonia content of frog muscle and the reversibility of ammonia formation in the isolated frog muscle. Gustav Embden. *Z. physiol. Chem.* 196, 23–46(1931).—A lengthy and tedious polemic against Parnas (*C. A.* 25, 995).
A. W. Dox

The development and phosphatase activity in vivo and in vitro of the mandibular skeletal tissue of the embryonic fowl. Honor Bridget Fell and Robert Robison. *Biochem. J.* 24, 1905(1930).—cf. *C. A.* 24, 1672.—By the sixth day of embryonic development the future histological structure of the non-ossifying part of Meckel's rod and of a future cartilage bone such as the palato-quadrate or femur is already detd., although at this stage no histological differences between the 2 types of cartilage have yet appeared. The membrane bone surrounding Meckel's cartilage possesses a high phosphatase activity.
Benjamin Harrow

What effect have the hormones of pregnancy on the growth of the fetus and the changes of pregnancy of the mother? F. Siegert. *Arch. Gynäkol.* 143, 72–9(1930).—Both the ovarial hormone and the hormone from the anterior lobe of the hypophysis are increased during pregnancy. The ovarial hormone is excreted in the urine in increasing amts. as pregnancy progresses while the hypophyseal hormone is excreted in large amts. from the very onset of pregnancy and in lesser amts. as pregnancy progresses. While in early pregnancy the blood always gives a pos. test for ovarial hormone, at the time of delivery the blood of the mother gave a pos. reaction in 57.7% of the 52 cases studied and the blood of the child a pos. reaction in 76.5%. The content of hypophyseal hormone is the same in the blood of both mother and child and shows no decrease at the time of delivery. It is probable that the ovarial hormone plays an

important role in the changes in the organism of the mother that accompany pregnancy and that it is excreted in larger amts in the second half of pregnancy because its biologic importance is now lessened The biologic activity of the hypophyseal hormone during pregnancy must remain the same or increase, as in spite of increased excretion in the urine at the end of pregnancy there is no change in its content in the blood The hypophyseal hormone is probably directly concerned with the growth of the fetus The regulation of the amts of hormones seems to be a function of the placenta, in fact it is most probable that the placenta takes on the function of producing a substance identical with *the ovarial hormones and through the fetal portion of the placenta stimulates* the anterior lobe of the hypophysis to increased activity HARRIET F HOLMES

**The calcium content of the blood serum during pregnancy.** M. ADLER *Arch Gynäkol* 143, 236–47(1930) —By use of the method of Kramer Tisdall the Ca content of the blood serum was detd for 14 healthy nonpregnant women, 26 healthy women *in different stages of pregnancy* 6 women *during labor* and 12 women during the puerperium During pregnancy the Ca content of the serum is lowered and the decrease begins as early as the 3rd month The decrease is uniform from the 5th to the 9th month The Ca content rises slightly in the 10th month without reaching the normal level During labor the Ca content increases to the lower limit of physiol variability and the degree of increase seems to be related to the duration of the labor pains Twenty four to 48 hrs postpartum the Ca content drops below the value before labor It remains below normal until the 8th day postpartum and then rapidly returns to the lower normal limit HARRIET F HOLMES

*Potassium and calcium in the menstrual cycle and during pregnancy.* R SPIEGLER *Arch Gynäkol* 143, 218–71(1930) —The K content of the blood undergoes a marked alteration during the menstrual cycle As a rule, the lowest K value is reached during menstruation and then increases progressively in the postmenstrual period to reach its max in the premenstrual period In contrast the Ca content of the blood is very stable and shows no noteworthy change during the menstrual period The opposite behavior of the K and Ca ions results in a marked change in the K Ca ratio In pregnancy the K content of the blood tends to rise in 60% of the cases The Ca content is not altered with the onset of pregnancy but during the course of pregnancy there seems to be a slight decrease in Ca content With increasing pregnancy the K Ca ratio is slightly shifted in favor of the K In comparing the blood of mother and child the ions of the blood of the child are not inconsiderably increased over those of the mother The increase affects both K and Ca but the K Ca ratio in general is increased in favor of K HARRIET F HOLMES

**The modification of the alkali reserve of the blood by pregnancy, labor and puerperium and its behavior in the newborn.** J MALPATTI AND J BURTSCHER *Arch Gynäkol* 143, 272–309(1930) —The alkali reserve of the blood decreases during pregnancy The decrease becomes more marked during labor and is greater in primiparas *than in multiparas* The alkali reserve of the blood increases postpartum but does not reach normal value during the first 3 or 4 days Lactation modifies the $CO_2$-combining power of the blood as is shown by a decrease in the alkali reserve of the blood if the blood is withdrawn at least more than 12 hrs after the beginning of lactation if the blood is withdrawn before this time, this decrease cannot be demonstrated After the decrease in alkali reserve of the blood produced by lactation, there occurs a further increase in $CO_2$-combining power, which does not return to normal even 12 21 days postpartum In a case of vomiting of pregnancy and in a case of *nephropathia gravidarum* the alkali reserve was decreased below that of healthy pregnant women Septic conditions cause a particularly low value for the alkali reserve The alkali reserve of the blood of the newborn child is in general lower than that of the mother The newborn child in the first 21 days of life shows a distinct acidosis that is in general greater than that of the mother during the puerperium HARRIET F HOLMES

**The iodine content of the blood in women under physiologic conditions.** W SCHERINGER *Arch Gynäkol* 143, 319–37(1930) —The total I content of the blood (inorg and org bound I) was detd in 18 healthy women A diet poor in I caused a decrease of about 25% in the I content of the blood After more than 2 days of a diet poor in I, the I content of the blood tends to remain const with an av value of 8γ% Seasonal variations from winter to summer were not observed That the menstrual cycle has an effect on the I content of the blood was confirmed At the onset of menstruation the I content of the blood is increased to 20–25% of the I content in the intermenstrual period Several normal women were studied more carefully with detn of basal metabolism and the Reid-Hunt reaction and the I content of the blood was

pora lutea in the ovaries had no stimulating effect on the development of mammalian tissue J. F. LYMAN

The relation between contraction frequency and lactate accumulation and its bearing upon the economy of tension production and maintenance in striated muscle. M. B. VISSCHER AND P. W. SMITH *Am J Physiol* 95, 121-9(1930).—Lactic acid production in the frog's gastrocnemius muscle is inversely proportional to the frequency of stimulation. The lactic acid coeff of developed tension is a more const factor than is the coeff of maintained tension The slow removal of lactic acid is of advantage in those muscles where maintenance of tension is an important function. Fatigue contracture seems to be due to a depletion to a low level of the store of base for neutralizing free lactic acid J. F. LYMAN

The source of energy for anaerobic contraction in glycogen-poor muscle. P. W. SMITH AND M. B. VISSCHER *Am J Physiol* 95, 130-8(1930).—Lactate accumulation in anerobic contractions to fatigue is entirely balanced by the loss of glycogen in glycogen-poor, as well as in glycogen rich muscle The constancy of the developed tension coeff of lactate at widely varying levels of glycogen content strongly supports the hypothesis that the reactions assocd with lactic acid production yield the energy for the contraction process. J. F. LYMAN

Maternal and fetal blood-sugar changes under various experimental conditions. S. W. BRITTON *Am J Physiol* 95, 178-85(1930).—In early pregnancy, blood sugar changes seem to be readily effected in the fetus in response to changes in the maternal blood In the later stages of gestation, fetal glucose variations are brought about (and then only slightly) only after severe maternal disturbance, such as insulin hypoglucemia, emotional excitement, adrenaline or glucose administration. J. F. L.

Physiological variations of the cardiac output in man. X. The effect of variations in the environmental temperature on the pulse rate, blood pressure, oxygen consumption, arteriovenous oxygen difference and cardiac output of normal individuals. A. GROLLMAN *Am J Physiol* 95, 263-73(1930); cf. *C. A.* 24, 5824.—From 0° to 45° the pulse rate rises progressively, blood pressure falls about 10%, metabolism declines to a min. at about 30°, after which it rises slowly, cardiac output is const. between 0° and 28°, above which the output gradually increases. XI. The pulse rate, blood pressure, oxygen consumption, arteriovenous oxygen difference and cardiac output of man during normal nocturnal sleep. *Ibid* 274-84.—Of the functions studied only the pulse rate rises as a result of awakening of the subject. XII. The effect of the menstrual cycle on the cardiac output, pulse rate, blood pressure and oxygen consumption of a normal woman. *Ibid* 96, 1-7(1931).—No variations in the functions studied were observed as a result of the menstrual cycle XIII. The effect of mild muscular exercise on the cardiac output. *Ibid* 8-15.—*The cardiac output in very mild exercise bears* no simple relation to the $O_2$ consumption. J. F. LYMAN

The mechanism of water exchange in the animal organism. I. The nature and effects of superficial burns. F. P. UNDERHILL, R. KAPSINOW AND M. E. FISK. *Am. J. Physiol* 95, 302-14(1930).—Skin burns, involving about 30% of the total area, were made on anesthetized rabbits by means of a hot iron The subsequent edema and absorption of the fluid are described In the production of such a burn heat was shown to penetrate the body sufficient to raise the temp. of the body cavities temporarily to about 111°F. This is regarded as sufficient to lead to local circulatory changes inducing the formation of ulcers, hemorrhages, etc., which have been ascribed to the effects of a burn toxin II. Changes in capillary permeability induced by a superficial burn. *Ibid* 315-24.—Under the conditions of a burn, capillary permeability is increased. Substances which normally do not pass the capillary wall (*e. g.*, dyes) are found in the edema fluid. Since absorption from the burned area is much slower than normal, increased capillary permeability in one and decreased permeability in the opposite direction may exist. III. The extent of edema fluid formation induced by a superficial burn. F. P. UNDERHILL, M. E. FISK AND R. KAPSINOW *Ibid* 325-9.—With a burn involving about 17% of the total body surface the max. water loss in the edema fluid was about 70% of the total blood vol. IV. The composition of the edema fluid resulting from a superficial burn. F. P. UNDERHILL AND M. E. FISK *Ibid* 330-3.—Edema fluid, produced by an extensive skin burn, is approx. the same in compn. as the serum of the blood of the burned animal, non-protein N, K, Mg and inorg. P are generally higher in the edema fluid than in normal serum, K may be several times higher. Both the serum of the burned animal and the edema fluid contain less globulin than does the serum of a normal non fasting animal V. The relationship of the blood chlorides to the chlorides of the fluid produced by a superficial burn. F. P. UNDERHILL, M. E. FISK AND R. KAPSINOW. *Ibid* 334-8.—Blood Cl shows no diminution as long as blood concn. is main-

tained within normal limits Cl losses may be replaced to a considerable extent. As much as 30% of the NaCl of the blood may be lost to the edema fluid without causing alteration in the Cl content of the blood VI. The composition of tissues under the influence of a superficial burn. *Ibid* 339–47.—Rabbits were burned under anesthesia, about 17% of the skin area being affected, and allowed to live without food or water for 2–3 days In comparing the water, ash and chloride content of the tissues of burned animals with those of unburned controls, no effect of the burn on the compn of the tissues was apparent Presumably the compn of the tissues is conserved in preference to that of the blood When a portion of the skin is burned the Cl content of the entire skin is markedly increased In muscle tissue injured by a burn the $H_2O$ content is increased, the ash content varies but little from normal, but the Cl content is increased even more than in burned skin. The resorption of material from a burned area is very slow VII. Dehydration produced by various means. F P Underhill and M E Fisk. *Ibid* 348–63.—When rabbits are deprived of food and water and in addn. given phlorhizin or hypertonic solns or bled, the skin may lose 20% of its water, the blood may become concd. and the muscles may lose some water, but a marked loss from all the tissues except the liver (and possibly the kidney), which never lose, results in death. VIII. Dehydration by pilocarpine under varied dietary conditions. *Ibid* 364–70.—The repeated injection of pilocarpine causes pulmonary edema and blood concn., a loss of water from the skin and an increase of water in most of the organs of animals receiving fresh vegetables as part of their diet J. F Lyman

The respiratory quotient of resting mammalian muscle as shown by the eviscerated decapitated cat. L Irving and H C. Foster *Am J. Physiol* 95, 429–45(1930).—When over ventilation was avoided and correction made for any change in $CO_2$ content of the muscles, the R Q of the eviscerated decapitated cat was about 0 80 Intravenous injection of glucose caused a slight rise in the R Q to 0.85 After large doses of insulin and glucose the corrected R. Q rose to 0 94, indicating the diversion of oxidation to the principal use of carbohydrate The action of insulin and glucose, in addn. to increasing carbohydrate oxidation and glycogen storage, affects the $CO_2$ equil in muscle, probably increasing muscle capacity for $CO_2$ J F. Lyman

Metabolism. VIII. The effect of estrin injections on the basal metabolism, uterine endometrium, lactation, mating and maternal instincts in the adult dog. M M. Kunde, F E D'Amour, A. J. Carlson and R. G Gustavson *Am J. Physiol* 95, 630–40(1930), cf *C A* 22, 113.—Basal metabolic rate in normal dogs is not changed by the subcutaneous injection of the female sex hormone, estrin In normal and castrated bitches injection of the hormone causes estrus and lactation. J. F. Lyman

The effect of simultaneous injections of the female and male hormones in capons. Mary Juhn, F. E D'Amour and C B Womack. *Am J Physiol* 95, 641–9(1930).—The continued daily administration of both hormones together, or of alternate injections, on successive days, resulted in birds with female plumage and male head furnishings. There was no evidence of antagonism between the sex hormones J. F. L.

The nature of the nerve impulse. I. The effect of carbon monoxide on medullated nerve. F O Schmitt *Am J. Physiol* 95, 650–61(1930); cf *C. A* 25, 732.—Conclusion The action potential of nerve, whether anaerobic or aerobic, requires an oxidation or oxygenation of substances in nerve, and activation of the $O_2$ by a respiratory enzyme similar to that of Warburg is essential J F Lyman

The hormone of the adrenal cortex. F A Hartman, Katharine A Brownell and W. A. Hartman. *Am J Physiol* 95, 670–80(1930), cf *C A*. 25, 1884.—Cortin can be prepd by extg the adrenal cortex with $Et_2O$, which dissolves little adrenaline The $Et_2O$ is distd., and the residue extd with warm 80% EtOH Much inert material is removed by chilling and filtering After removing the alc. the residue (*cortin*) is dissolved in water When it is given subcutaneously to adrenalectomized cats, animals, which otherwise would lose wt. and die, carry out all the life functions normally A case of Addison's disease with a systolic blood pressure of 50 mm. and a pulse of 120 with other characteristic symptoms was revived by the use of cortin. J. F. Lyman

Changes in sugar and lactic acid content of blood caused by burns. M. A. Slocum and H. D Lightbody *Am J Physiol* 96, 35–9(1931).—The concn. of sugar and lactic acid in the blood of rabbits that had been subjected to burns with the adrenal glands intact, and after removal of the glands, indicate that increased activity of the adrenals in a burned animal does not account for the observed increase in blood sugar. J F. Lyman

The oxygen consumption of isolated muscles for isotonic and isometric twitches. Ernst Fischer. *Am J Physiol.* 96, 78–88(1931).—Isotonic twitches with large loads, where only little shortening occurs, have a higher O consumption than isometric

twitches, while isotonic twitches with small loads, and consequently large shortenings, need less O than the isometric twitches The value of 0 380 for the O consumption per g tension and unit muscle length was obtained, with a max. efficiency of 13.8%. The energy liberated in a twitch depends on 2 factors, the length of the fibers during contraction and the work done J F LYMAN

The hemoglobin content of the blood of fowls. H H DUKES AND L H SCHWARTE. *Am J. Physiol.* 96, 89–93(1931) —By using the Newcomer acid hematin method with the Bausch and Lomb "Improved Newcomer Modal" hemoglobinometer, a correction for turbidity disturbance in fowl blood must be applied as follows $C = 0\,91\,U - 1\,49$, where $C$ is the corrected reading and $U$ the uncorrected reading A corrected value of 9 8 g hemoglobin per 100 cc. of hen blood was obtained, for pullets 8.9%, cocks 13 5, pheasants 13 7, wild ducks 14, wild geese 14 9, brants 14 7, swan 13 4, peafowls 12 0, turkeys 10 7 J F. LYMAN

The oxygen pulse in athletic girls during rest and exercise. ELLEN M RADLOFF *Am J Physiol* 96, 126–31(1931) —From 2 to 3 times as much $O_2$ is used per systolic discharge of the heart during exercise as during rest J F LYMAN

The adrenal cortex. I. The effect of a lipide fraction upon the life span of adrenalectomized cats. W W SWINGLE AND J J PFIFFNER *Am J Physiol* 96, 153–63 (1931) —A crude lipide fraction that is capable of prolonging life in an animal whose adrenals have been removed can be prepd as follows Fresh adrenal cortex material is extd 24–72 hrs at room temp with 2 5 vols of 95% EtOH The alc is removed through muslin and filtering The residue is re-extd with 2 vols of 80% EtOH The alc. is distd. *in vacuo* to about 7% of the original vol , each extn is handled separately Each concentrate is extd 3 or 4 times with an equal vol of benzene for each extn The benzene is distd *in vacuo*, the last traces being removed by the addn of 50–100 cc portions of abs EtOH and evapg to dryness The lipide residue is dissolved in corn oil or olive oil with the aid of abs EtOH, the alc being removed by distn *in vacuo* 1 cc represents 30 g fresh cortex Adrenaline is present in the prepn II An aqueous extract of the adrenal cortex which maintains the life of bilaterally adrenalectomized cats. *Ibid* 164–79 —The lipide fraction, as obtained by the method described above, weighing 81 g was treated with 500 cc. acetone in the refrigerator for 24 hrs The residue was extd once with 500 cc. acetone and once with 100 cc. acetone The acetone was distd *in vacuo*, leaving 14 7 g residue This residue was treated in a separatory funnel with 30 cc petr ether (b 30–60°), 74 cc of 95% EtOH and 26 cc of $H_2O$ The 70% alc. layer was washed 5 times with 30 cc. portions of petr ether The petr ether soln. and washings were distd. *in vacuo* and the distribution procedure was repeated The petr ether soln., resulting from the second distribution, was extd twice with 70% alc. The alc. solns were washed successively 5 times with 30 cc. portions of petr. ether in the order 2, 3 and 4 distributions, and finally the third and fourth distributions were washed twice with 30 cc. portions of petr ether The active material, sol in 70% alc., weighed 1 489 g The alc. was removed *in vacuo* to a vol of about 65 cc. and $H_2O$ was added to 100 cc , 1 cc. representing 30 g fresh cortex The ext was kept in the refrigerator overnight, centrifuged and decanted through a Seitz filter The clear reddish brown ext contained 0 5809 g of solids, $p_H = 5.2$, 1 cc. = 0 36 mg adrenaline, *i. e.*, 99 6% of the adrenaline in the original tissue was eliminated III. The revival of cats prostrate from adrenal insufficiency with an aqueous extract of cortex. J J PFIFFNER AND W W SWINGLE *Ibid* 180–90 —Adrenaline was removed from the ext. of adrenal cortex described above as follows The 70% alc.-sol. fraction contg 1 49 g solids and 36 mg of adrenaline was distd *in vacuo*, the residue dissolved in 100 cc. of 95% EtOH and the soln filtered through two 30 g portions of permutite, at the rate of 1 to 2 drops per sec The permutite was washed with one 100 cc and one 300 cc portion of 95% alc The alc. filtrate contained 0 41 g solids and less than 1 mg adrenaline It was coned to about 100 cc and filtered through two 15 cc portions of permutite The filtrate contained 0 40 g solids and about 0 05 mg adrenaline The alc. soln was coned to about 100 cc and 70 cc water added. The alc. was removed and the ext dild to 100 cc with water The resulting milky soln was clarified and sterilized by filtering through a Seitz filter The ext. was crystal clear and very pale yellow It contained 0.29 g solids, 0 05 mg adrenaline, $p_H = 5\,65$ One cc. = 30 g fresh beef adrenal cortex Large doses of this ext can be given without any deleterious effects Cats in collapse from adrenal insufficiency, following removal of the glands, were restored to a normal condition after injection of the ext. J F L.

Water diuresis. D McK. RIOCH *J Physiol* 70, 45–52(1930) —Large vols. of fluids were given through the stomach to normal dogs and the effects on blood and urine observed There was (1) a const lag of diuresis behind the changes in the blood

following the ingestion of isotonic salt solns; (2) a constancy of changes in the blood following the ingestion of isotonic salt solns and (3) an inconstancy of changes in the blood following the ingestion of water. Dilu of the electrolyte concn of the blood is *probably the responsible factor* in instigating a water diuresis. J. F. Lyman

**Water diuresis. IV. Changes in the concentration of electrolytes and colloids in the plasma of decerebrate dogs produced by the ingestion of water.** L. E. Bayliss and A. R. Ure. *J. Physiol* 70, 60–6(1930), cf. *C. A.* 24, 4821.—Conclusion: In dogs the absorption of water from the digestive system results in a fall in the concn. of plasma colloids, which is approx. that which would take place if the extra water were uniformly distributed throughout the tissues. There may be a fall in the electrolyte concn. of the plasma, but this is always less than that of the colloid concn. Intravenous injection of 0.6% NaCl soln. also results in a fall in the concn. of the plasma colloids of the expected magnitude. J. F. Lyman

**The respiratory quotient of the eviscerated spinal cat.** A. B. Corkhill, H. H. Dale and H. P. Marks. *J. Physiol* 70, 85–95(1930).—The R. Q. of the decapitated cat, whose viscera have been removed and whose blood sugar is maintained by artificial addn. of glucose, is usually found to be 1. Somewhat lower values are sometimes found. Excessive ventilation in these expts. was excluded. J. F. Lyman

**Delayed anaerobic heat production of stimulated muscle.** H. Blaschko. *J. Physiol* 70, 96–100(1930).—The occurrence of delayed anaerobic heat after a tetanic stimulus in muscle has been verified. It seems to be due to some real process going on in the muscle, but condensation of water vapor, caused by a temporary rise of osmotic pressure and also the *non uniform* heat production in contraction or control have been excluded as possible causes. J. F. Lyman

**Reactions of denervated voluntary muscle, and their bearing on the mode of action of parasympathetic and related nerves.** H. H. Dale and J. H. Gaddum. *J. Physiol* 70, 109–44(1930).—Evidence is obtained, from a study of the action of drugs on denervated muscle, that vasodilator effects of impulses in the parasympathetic and dorsal root nerve fibers depend upon peripheral liberation of acetylcholine. J. F. Lyman

***The nature of inhibition in the intestine.*** B. Finkelman. *J. Physiol* 70, 145–57 (1930).—When the movements of a certain piece of intestine were inhibited by nervous stimulation, a substance appeared in the liquid passing over the surface of the intestine which had the power of inhibiting a 2nd piece of intestine. Conclusion: The inhibitory nerves to plain muscle act by liberating an inhibitory substance. The effects of this substance are, in all ways, similar to those produced by adrenaline. J. F. Lyman

***The automatic regulation of gastric acidity.*** F. L. Apperly and Joan H. Norris. *J. Physiol* 70, 158–68(1930).—Changes in acidity of acid solns. placed in the stomach were studied. *Conclusion.*—The reduction in acidity observed with solns. above a certain concn. takes place mostly by dilu., the diluting fluid being partly secreted by the gastric mucosa and partly regurgitated from the duodenum, and, in the majority of cases, the reduction in acidity is partly effected by duodenal alkali in addn. J. F. L.

**Interrelations of respiratory and gastric secretion.** C. E. Brunton and M. C. G. Israels. *J. Physiol* 70, 184–94(1930).—*If gastric HCl is derived from the blood* chloride thus: $BCl + H_2CO_3 \longrightarrow BHCO_3 + HCl$, an increased $CO_2$ tension in the alveolar air might be expected during gastric secretion with a subsequent fall during the phase of pancreatic digestion. No such const. shifts were observed. It is argued that any possible excess of alkali resulting from the secretion of amts. of HCl normally produced might be dealt with without necessarily causing a measurable rise in alveolar $CO_2$. J. F. Lyman

***Lactic acid formation and removal with change of blood reaction.*** M. Grace Eggleton and C. L. Evans. *J. Physiol* 70, 261–8(1930).—The lactic acid content of the blood, used to perfuse isolated mammalian muscle, is increased by increasing the alky. of the perfusing fluid. When the acidity of the fluid is increased, the lactic acid falls again, if the blood is perfused through muscle, but not if perfused through lung alone. J. F. Lyman

**The lactic acid content of the blood after muscular contraction under experimental conditions.** M. Grace Eggleton and C. L. Evans. *J. Physiol* 70, 269–93(1930).—The following points were settled: (1) The av. lactic acid content of superficial venous blood is closely parallel to that of the arterial blood, yet individual samples show variations. (2) The lactic acid content of tissues is somewhat less than that of the blood plasma. This difference, up to about 10%, can be accounted for on the basis of the higher water content of the plasma. (3) Lactic acid in the blood and tissues does not come to equil. until at least 10 min. after the end of exercise. (4) The liver removes

lactic acid from the blood, but it is not solely responsible for lactic acid removal (5) In the eviscerated animal (*a*) lactic acid does not rise during rest during the 4 hrs following the operation, and (*b*) glycogen synthesis occurs to a considerable extent in muscles during recovery from exercise (6) In the resting condition the sugar and lactic acid content of the blood are normal under amytal anesthesia, but abnormally high in the decerebrate animal J F. LYMAN

**The diffusion of creatine and urea through muscle.** P. EGGLETON. *J. Physiol* 70, 294–300(1930) —In salt solns contg creatine, in which resting muscles are immersed, there is creatine equil without loss or gain of creatine to the muscle when the liquid contains 80 mg creatine per 100 cc of soln or 65 mg per 100 g of muscle (80 mg per 100 cc of $H_2O$ in the muscle) This indicates that about 20% of the total creatine of resting muscle is in the free state With fatigued muscle equil is obtained at concns of 200 to 300 mg creatine per 100 cc of soln Urea distributes itself between resting muscles and surrounding isotonic salt solns as if the whole of the water in the muscles is capable of dissolving urea J F LYMAN

**The effect of carbon dioxide on the circulation** I R J S MCDOWALL. *J Physiol* 70, 301–15(1930) —Over ventilation has 2 effects (1) a dilatation of blood vessels in certain regions of the circulation resulting from a loss of tone in the vasomotor center (2) a constriction in other regions produced by a different mechanism Accordingly blood pressure may fall, rise or remain unchanged as a result of overventilation J F LYMAN

**Excitable substances in the nerve-muscle complex.** W A H RUSHTON *J Physiol* 70, 317–37(1930) —Conclusion There are 2 different excitable substances in the nerve muscle complex The $\gamma$ substance, which is isochronous with nerve, so far from being the excitable substance of the normal muscle fiber lies in a direction which is usually quite different, and appears to be absent from the pelvic extremity of the sartorious the $\alpha$ substance, on the contrary, seems to have the properties of the excitable element of the muscle fiber J F LYMAN

**The carriage of carbon dioxide by blood.** M N J DIRKEN AND H W MOOK *J Physiol* 70, 373–84(1930), cf *C A* 24, 3157 —An app is described with which it is possible to measure either the $p_H$ or the $CO_2$ tension of a fluid after $CO_2$ has been added, at various moments up to about 4 sec There is evidence that hydration of $CO_2$ is slow dehydration of $H_2CO_3$, while slow, is much more rapid than its reverse If hemoglobin is present, anhydrous $CO_2$ disappears from the fluid just as rapidly as any acid There must be (1) some direct combination between hemoglobin and anhydrous $CO_2$ or (2) a catalytic acceleration of the hydration of $CO_2$ by hemoglobin J F LYMAN

**Selective absorption of carbohydrates.** J. J R MACLEOD, H E MAGEE AND C B PURVES *J Physiol* 70, 404–16(1930) —*The surviving intestine shows selective* absorption for sugars at body temps, but at 4° the intestinal wall behaves like a dead membrane Selective diffusion could not be demonstrated when mixts of sugars were used in place of sep solns of each sugar The selective absorption of glucose is most rapid when the concn of glucose is about 0 75 *M* J F LYMAN

**The vapor pressure of normal human blood.** R. MARGARIA *J. Physiol.* 70, 417–33(1930) —Measurements were made by the use of Hill's thermoelectrical method (*C A* 24, 3695) Expressed in terms of g of NaCl in 100 g of $H_2O$, the values were for men (19 observations) 0 9447 ± 0 00495, for women (16 observations) 0 9269 ± 0 0059 The reality of the difference between the sexes is statistically certain The difference is due mostly to bicarbonate and urea differences After drinking 1500 to 2000 cc of water, values as low as 0 88 were noted and after severe muscular exercise a value of 1 048 was observed J F LYMAN

**The absorption of calcium from the gall bladder.** L M G SACHS AND T. SCHRIRE. *J Physiol* 70, 434–40(1930) —Ca can be absorbed *from the gall bladder, probably* along with water and other substances It is suggested that there is a "Ca circle" in the liver, which provides a mechanism for a continuous supply of Ca to the general circulation J F LYMAN

**The nervous control of insulin secretion.** J HOET AND H ERNOULD Proc Physiol Soc, *J Physiol* 70, i–ii(1930) —A demonstration that vagus innervation of the pancreas is necessary for normal insulin secretion is described When 60 cg glucose per kg rabbit is injected into an animal under allylisopropyl barbiturate of diethylamine" whose kidneys have been removed the blood sugar level comes back to 0 130 or 0 140%, but when also the vagi are cut, the glucemia will stay for hrs. at a level of 0 300 or 0 400% J F LYMAN

**Glycogen recovery in mammalian muscle as an insulin function.** G DEBOIS. Proc Physiol Soc, *J Physiol* 70, ii–iv(1930), cf *C A* 25, 1884 —The glycogen content

*of muscles from cats, whose metabolism had been altered by operations,* was detd immediately after periods of work and after a recovery period of 1 5 hrs. Conclusion: In the absence of liver and pancreas and other visceral organs there is no recovery of muscle glycogen after loss by exercise There is no recovery in a cat under ether with the vagi cut With the vagi intact there is a normal recovery After removal of the pancreas there is no recovery whatever Insulin injection makes recovery possible in a very short time Glycogen recovery after contraction in muscle is an insulin function J F Lyman

*A possible nervous mechanism involved in the liberation of histamine.* R. G MacGregor and S. Peat *J Physiol* 71, 31 5(1931) —Cats were anesthetized, the left lung was removed for analysis, the animal then subjected to the exptl conditions, after which the right lung was removed and assayed The method used was capable of detecting a difference of 20% or more Neither stimulation of the nerves supplying the lungs, nor perfusion with adrenaline, pilocarpine or physostigmine gave rise to any detectable change in their histamine content. J F Lyman

Ovulation. IV. Induction of ovulation in the hypophysectomized rabbit by administration of anterior lobe extracts. Margaret Hill and A S. Parkes. *J. Physiol* 71, 36-9(1931), cf *C A* 24, 5819, 25, 2765 —A hormone, extd from the anterior lobe of ox pituitaries, replaces the function of the removed pituitary in the rabbit in causing ovulation in estrous, pseudo-pregnant or immature rabbits V. The action of the ovulation-producing substance of urine of pregnancy on the hypophysectomized rabbit. *Ibid* 40 6 —Exts of urine from pregnant women induced ovulation in 4 out of 19 trials in hypophysectomized rabbits. Exts of normal rabbits placentas were inactive, but highly active exts were obtained from the placentas of intact or hypophysectomized rabbits previously injected with exts of pregnant urine J F. L

Adaptations of the organism to changes in oxygen pressure. I. Physicochemical changes in human blood at low oxygen pressure. D B Dill, H T. Edwards, A. Föll-ing, S A Oberg, A M Pappenheimer, Jr and J H Talbott *J Physiol* 71, 47-63(1931) —Measurements were made at sea level, 10,000 ft. and 14,000 ft The O transport capacity may be decreased by 20% in normal men at 10,000 ft altitude This large effect may be due to an indirect effect of a small change in O satn of arterial blood upon the limiting value of cardiac output J F Lyman

*The initial and recovery heat production of vertebrate nerve.* D. W. Bronk. *J. Physiol* 71, 130-44(1931) —Heat production of frog nerve has been measured with improved app The recovery heat production is at a max rate immediately after a stimulus of 9-15 sec and continues for some min (11 min at 19° and 7 75 min at 24-5°) at a decreasing rate The initial heat production is 8 9% of the total J F L.

The creatine and phosphorus contents of muscle. Marion Brown and C. G Imbrie *J Physiol* 71, 214 21(1931) —When the concn of creatine in the muscles of cats was increased, following the absorption of creatine from the intestine, the concn of the total acid sol P was also increased J F. Lyman

Studies on the action of the $p_H$ in striated muscle and on their buffering power. S Goldberger *Arch sci biol* (Italy) 15, 505-24(1930) —Varying the H ion concn of the circulating liquid, whether it be toward the acid or toward the alk side, increases the threshold of the excitability and the intensity of the stimulus necessary to produce max contraction, lowers the height of the contraction and leaves unchanged the latent time and the duration of the contraction The muscle retains its buffering power for over 24 hrs when using solns between $p_H$ 3 2 and 10 8, while the more acid or alk fluids cause the loss of such capacity within 45 min The acid solns. also bring about an inexcitability of the muscle, while the alk solns do not The loss of excitability is related to the transformation of the protein anion into cation The size of the edema formed is independent of the H ion concn The variation of the H ion concn. produces a marked vasoconstriction Peter Masucci

Respiratory exchange in asphyxia. Giorgio Mennyey. *Arch sci. biol* (Italy) 15, 52a-54(1930) —The scope of these studies was to clarify certain points in the behavior of the respiratory exchange in man under conditions of asphyxia caused by an abnormal compn of the respired air Voluntary apnea, after normal respiration, may continue until the partial pressure of $CO_2$ and O in the alveolar air reaches a definite value 51 mm Hg for $CO_2$ and 78 mm Hg for O Respiration, for 90 sec , of a gaseous mixt. (7% $CO_2$ and 11% air) similar in compn to that of alveolar air, at the end of the voluntary apnea causes variations in the compn of the expired air, pulmonary ventilation, R Q , elimination of $CO_2$ and consumption of O, these changes, which are enumerated in detail, take place during and after the respiration of the gaseous mixt. The phenomena are observed in the same manner, but less conspicuously, when a gaseous mixt.

contg 7% $CO_2$ and 20% O is respired In this case, during the period of asphyxia there is also a diminution in the elimination of $CO_2$, with a successive increase in elimination in the post asphyxia period For respiration of a mixt contg 11% O without the addn of $CO_2$, the curve of O absorption is the same, but with fewer oscillations than in the preceeding case During the period of asphyxia, the mixt has no action on $CO_2$ elimination, but does cause a slight increase in the post asphyxia period In the respiration of a mixt poor in O as well as in the respiration of a mixt rich in $CO_2$ there is an increase in pulmonary ventilation, but it is less intense than in the respiration of the asphyxia mixt, the increase is greater during the post-asphyxia period than during the asphyxia period In both cases at the end of the 12th min, there is yet an "O debt" The decreased absorption of O in the presence of an excess of $CO_2$ is probably attributable to a displacement in the curve of the dissocn of oxyhemoglobin as a result of the increase of the $CO_2$ tension in the blood PETER MASUCCI

**Variations in certain fermentative properties of fatigued muscles.** EMILIO BECCARI *Boll soc ital biol sper* 5, 1180-4(1930).—The aim was to see whether any quant differences existed between the glucolytic and amylolytic properties of fatigued muscles and normal muscles Fatigue was induced by periodic elec current stimulation of white mice The animals were then bled to death, the dorsal muscles of the legs removed and triturated to a pulp This pulp was suspended in physiol saline at $p_H$ 7.6 and placed in the incubator at 37° The substances fermented were glucose and rice starch The glucolytic power of fatigued muscles in contrast to that of normal muscles was inhibited, but the amylolytic power remained unchanged Since these changes took place even when the lactic acid was removed and when the reaction of the fatigued muscles was the same as the normal, the fermentative action is attributed to the so-called fatigue poisons. PETER MASUCCI

**Studies on pressor changes and on certain blood constants under the influence of mud baths applied in various ways.** C CIPRIANI AND A ROBECCHI *Minerva med* 1931, I, 269–75.—The diffused vascular action of mud baths is accompanied after each application by marked changes in the general arterial pressure, consisting in a lowering of the pressure followed by a return to the original values. In hypertension cases, the lowering is more marked and may lead to an advantageous decrease of pressure at the end of the treatment The variations in arterial pressure are simultaneous to general changes in the blood, during the first phase there are transitory signs of blood serum dilution, and later this is followed by an increased density of the serum P M

**Determinations of blood volume in human beings. III. Preliminary investigations. IV. Results with the vital red method.** C. C. FLEISCHER-HANSEN *Skand. Arch. Physiol.* 59, 243-65(1930).—Injections of 0.5 mg vital red per kg of body wts are used under conditions which insure even distribution of the dye in the blood stream The mean blood wt in 18 men was found to be 5.1% of the body wt, while in 12 women the results varied from 4.8 to 16.5%, the high results being apparently due to elimination of the dye S. MORGULIS

**The fat of sow milk.** OTAKAR LAXA *Ann. fals* 24, 87-8(1931).—At ordinary temp. the fat consists of a granular mass similar to melted butter, light yellowish brown, with a pig like odor, and having the following consts. solidifying point 17–18.5°, m. p. 28°, $n_{40}$ 52 (presumably oleo-refractometer degrees), sapon. no 193.0, Hehner no. 93.7, I no. 58.2, Reichert Meissl no 2.1, Wauters Polenske no 1.2 The mol wts of the volatile acids indicate that caprylic and caprinic acids are present in least amts The insol acids solidify 36.5–37.5°, m 39–40°, have a mol wt of 276.9 and I no 61.9%. The satd acids m 60.5° and have a mol. wt. of 256 Detn of stearic acid via Hehner and Mitchell (*Analyst* 1896, 316) gave neg results Conclusion The compn of the fat is approx oleic acid 64.5, palmitic acid 26.6, myristic acid 2.6, volatile acids (caprylic and caprinic) 1.4, glycerol 4.9%. A PAPINEAU COUTURE

**The unsaponifiable portion of the bile lipoids.** E. P HAUSSLER AND E. BRAUCHLI *Helv. Chim. Acta* 13, 908–15(1930).—In an investigation of the estrus hormone, 3 compds. (I, II and III) were isolated from ox bile by repeated extns. and crystns. They were all colorless, insol in water and KOH, contained neither N nor S, were not pptd by digitonin, dissolved in $CHCl_3$, did not add $Br_2$ and were not decompd by $KMnO_4$ in acid They differed from cholesterol (IV) in their reaction to the Liebermann Burchard and the Salkowski tests and they gave neg results in the Rosenheim, Tortelli Jaffe, Carr and Price, and Pettenkofer tests. None of the 3 acted as an estrogen when injected into castrated rats. I ($C_{28}H_{46}O_4$ or $C_{27}H_{44}O_4$) occurs as an addn compd (V) m 172-3°, $[\alpha]_D^{23}$ (4.7% in $CHCl_3$) −32.5°, with IV. The IV was pptd with digitonin and I, m 185–7°, was obtained from the mother liquor Acetylation of V gave no

identifiable product but benzoylation in $C_5H_5N$ gave a resinous substance, sol with difficulty in 1 tOH; it yielded I, m 191 5°. This I gave an Ac deriv m 169–70°. II crystd out during the crystn of I. It m 217–8° and reacts with $Ac_2O$ but the reaction product could not be isolated III was obtained at the same time as an amorphous powder which yielded crystals m 255–7°. III appears to have 2OH groups and its Ac deriv m 231–2°, $[\alpha]_D^{22}$ (1% in PhH) —51°. C H Peet

**Factors influencing the respiration of erythrocytes. I. Primitive avian erythrocytes** G Payling Wright *J Gen Physiol* 14, 179–98(1930).—The O consumption of normal and "primitive red cells" of fowls' blood was detd during the course of anemia produced by injection of $PhNHNH_2$. "Primitive red cells" have an O consumption at least 20–25 times greater than normal red cells Suspension of the cells in NaCl solns of various concns has little effect on the O consumption of the cells The red cells from anemic blood are sensitive to changes in $p_H$ The max O consumption in NaCl soln occurred at $p_H$ 7 75 The red cells were more sensitive to variation of $p_H$ on the acid side than on the alk side The addn of glucose to the medium increased O consumption of the cells, 0 6% glucose caused a 15% increase above solns which did not contain glucose Low concns of amino acids were practically without effect on O consumption, higher concns of some of them diminished it II. **Mammalian reticulocytes.** *Ibid* 201–13.—The O consumption of rabbit reticulocytes was detd during anemia produced by $PhNHNH_2$ Respiration increased greatly during regeneration, but the O consumption per billion cells throughout the period remained approx the same Respiration of the reticulocytes was affected by changes in $p_H$ of the medium in which they were suspended, reaching a max at $p_H$ 8, the intracorpuscular $p_H$ probably being about 7 75 Variations in toxicity of the suspending medium had little effect on respiration Glycine, alanine and glucose in the suspending medium produced no acceleration in respiration of the cells. Higher concns of glucose tended to depress respiration The material oxidized is largely or entirely contained in the cells when they are liberated from the marrow The O consumption in cu mm per 100 cu mm cells for the fowl and rabbit is as follows primitive red cell, fowl, 140, normal red cell, fowl, 12, reticulocyte rabbit, 70 C H Richardson

## G—PATHOLOGY

H Gideon Wells

Speed of reaction of antitoxins and its significance on the curative value of sera. R Kraus *Anales quim farm* (Chile) 1, 13–8(1931).—Review of the controversy between Ehrlich and Krauss and co-workers on the correlation between the antitoxic value of sera as measured *in vitro* and their actual curative value The Ehrlich method has only a quant value but does not take into account the quality of the antitoxins The curative value is intimately connected with the so-called speed of reaction. C. Abeledo

Urea administration in water intoxication. V J Harding and L. J. Harris *Trans Roy Soc Can* 24, Sect V, 101–10(1930).—Retention of water to produce convulsive symptoms in dogs must exceed 60 cc per kg body wt All animals in such convulsions recover by administration of 10% NaCl, but only 2 of 14 recovered by administration of hypertonic urea solns It is doubtful if the convulsions of epilepsy or eclampsia are manifestations of water intoxication, even though they may be accompanied by a pos water balance A T. Cameron

Effect of certain oxidation-reduction potential indicators on diphtheria toxin. P. J Moloney and Edith M Taylor *Trans Roy Soc Can* 24, Sect. V, 127–32 (1930).—2-Chloroindophenol, phenolindophenol and similar indicators will render the toxin atoxic, oxidation seems to be a factor in the detoxication Its rate increases with increased concn of indicator, and, in the range $p_H$ 6 5–7 5 with increased alky of soln Toxoids may be produced by such indicators which are equal antigenically to those produced by the action of formalin on toxin A. T. Cameron

Studies on hay fever. R Binaghi and G Falconi *Ann chim applicata* 20, 547–58(1930).—The active principle in *Vicia faba* from Sardinia has been shown to be a glucoside having no cyanogen groupings A phytosterol (*vicisterol*) was also isolated, as well as sugar whose compn was not detd The necessity for studying the pharmacology of the above glucoside and its relation to the pathology of hay fever is indicated. A W. Contieri

The partition of amino acids in the blood in anemias. Alexander Simon *Arch exptl Path Pharmakol* 154, 239–46(1930).—The amino-acid contents of the whole blood and of the plasma in various types of anemias are within normal limits The amino

acid content of the cells is somewhat elevated, as is the ratio of amino N of the cell to that of the plasma In the regeneration phase, this ratio returns to its normal values.
H Eagle

**The relationship between creatinuria and muscle glycogen.** Carlo Brentano. *Arch exptl Path Pharmakol* 155, 21–45(1930) —In spontaneous creatinuria, as well as in creatinuria induced by acidosis or narcosis, there is a depletion of glycogen from the skeletal muscles Agents which cause such a glycogen depletion (adrenaline, phlorhizin, convulsions, CO) cause creatinuria H. Eagle

**Studies in edema. II. Diseases with change in the colloid-osmotic pressure.** Hans Horsters *Arch exptl Path Pharmakol* 155, 248–56(1930), cf *C A* 22, 1406 — The av value of the colloid-osmotic pressure is about 371 mm $H_2O$, 40–45 mm. per g. serum protein In essential hypertension it averages 288 mm., 22–30 mm per g protein, the serum protein being usually high In acute nephritis, the colloid-osmotic pressure averages 250 mm $H_2O$, with a low serum protein Lowest values per g protein are observed in uremia (23–29 mm $H_2O$ per g.) In chronic nephritis the serum protein averages 7.7%, the colloid-osmotic pressure, 311 mm $H_2O$ In both amyloidosis and cardiorenal insufficiency there is a lowered colloid-osmotic pressure Normal values are observed in diabetes mellitus except for cases in coma, in which it is very low
H Eagle

**Level of iodine metabolism, unsanitary conditions of life and goiter.** R McCarrison and Clive Newcomb *Indian J Med Research* 17, 1061–1100(1930) —Young rats on a diet of oatmeal, patent flour, linseed meal, $Ca_3(PO_4)_2$ and NaCl, contg 125–250γ $I_2$ per kg., did not develop hypertrophic goiter unless they were kept under unhygienic conditions This type of goiter could be prevented by adding sufficient $I_2$ to the diet to change the urine $I_2$ from 33γ to 85γ per l Another type of goiter (lymphadenoid) may develop even on a diet contg $I_2$ and under conditions of perfect sanitation A statistical analysis of the results obtained with the individual rats indicate that these conclusions were justified, also, that unhygienic conditions may cause splenic enlargement in the animals, not affected by $I_2$ Rats under unhygienic conditions without iodine have comparatively large livers H Eagle

**The iodine metabolism in Basedow's disease and the explanation of the post-operative reaction following thyroidectomy.** Artur Bier. *Klin Wochschr* 9, 819–21 (1930) —Following thyroidectomy, there is a 5–10% fall in blood I, *i. e.*, the post-operative reaction is not due to the mech expression of the thyroid. Instead, it is considered due to a sudden fall of the thyroid secretion, a "hypothyroxic" shock, in an organism on a high level of $I_2$ metabolism, it is best avoided by continued treatment with $I_2$ up to and following thyroidectomy B points to the fact that the post operative urine contains only traces of $I_2$, indicating $I_2$ insufficiency and retention rather than overdosage.
H Eagle

**The cause of icterus neonatorum.** Karl J Anselmino and Fredrich Hoffmann *Klin Wochschr* 10, 97–100(1931) —A review H. Eagle

**The blood cholesterol in arterial hypertension.** C. Alvarez and S M Neuschloss *Klin Wochschr* 10, 244–7(1931) —The blood serum of individuals with normal arterial blood pressure is not satd with respect to cholesterol (57–90% of the total possible soly.), but in 21 of 25 hypertensives the blood serum was supersatd (106–132%) The possible etiological connection between hypercholesterolemia and arteriosclerosis is discussed H Eagle

***A new form of diabetes mellitus in animal experimentation.*** M Majus and O Sternberg *Klin Wochschr* 10, 264–5(1931) —Removal of an adrenal gland from a dog, combined with the surgical implantation of more parathyroid glands, causes the animal to develop glucosuria, and a blood sugar tolerance curve characteristic of diabetes H Eagle

**Demonstration of specific antibodies in vitro in severe allergy to fish and yeast.** Kaete Jaffé *Klin Wochschr* 10, 304–6(1931) —The sera of subjects sensitive to fish and yeast give complement fixation with an appropriate fresh ext. The sera must be used in the active state, possibly because the antibody is thermolabile Only patients with a pos immediate skin test will give the reaction H Eagle

**The occurrence of heavy metals in human gallstones.** R Schönheimer and W. Herkel. *Klin Wochschr.* 10, 315–6(1931) —Cu, Zn, Mn and Fe are all present in gallstones H Eagle

**The clinical significance of the hyperglucemic principle in the pancreas (the so-called initial insulin-hyperglucemia).** Max Börger *Klin Wochschr* 10, 351–4 (1931) H Eagle

**The relationship between cancer and the lipoid metabolism. II.** F. Burgheim

AND W. JOEL. *Klin Wochschr* 10, 397-8(1931). cf *C. A.* 23, 3735.—The presence of large quantities of cholesterol in the immediate vicinity of malignant, as contrasted with benign, tumors may be an important factor in detg their further spread. Malignant tumors contain much more cholesterol than normal tissue or benign tumors.
H. EAGLE

Phenolsulfonephthalein test in surgical kidney disease, with particular reference to its use in ureteral catheterization. HAYAMI HIROSE. *Tohoku J. Exptl. Med.* 15, 369-97(1930).—The prognostic value of the phenolsulfonephthalein test is stressed as well as the value of ureteral catheterization for the test of a single kidney function.
H. EAGLE

The circumvention of the hemolytic and anticomplementary properties of the antigens used in the Wassermann reaction. F. OKOLOV AND L. GRIBANOV. *Z. Immunitäts* 68, 7-13(1930).—By filtering the aq. dil'n. of the antigen through a paper filter, its hemolytic and anticomplementary components can be largely removed without affecting its sensitivity for the Wassermann reaction.
H. EAGLE

The nature of "H" and "O" agglutinogens. M. N. FISCHER AND R. B. HOCHBERG. *Z. Immunitäts* 68, 43-55(1930).—Agar cultures of *B. typhosus* and *proteus X 19* were extd. with water. These exts. combined both "H" and "O" agglutinogens, effecting a coarse- and fine-flaked agglutination, resp. The "H" substance ppts. from the ext. at its isoelec. point as a single voluminous floccule, while the "O" substance ppts. as a fine granular sediment at a somewhat more acid reaction. Both are protein (globulin), contg. the same proportions of C, H, N, S and P, they are considered by F. and H. to be the same substance in a different state of aggregation. The sera of patients with typhoid vary in their pptg. action upon these 2 substances.
H. EAGLE

The purification of hemolytic antibodies. HANS V. EULER AND EDVARD BRUNIUS. *Z. Immunitäts* 68, 124-36(1930). cf. *C. A.* 24, 2179.—By absorbing amboceptor onto the stroma of red cells, and subsequently extg. the agglutinated stroma in weakly alk. reaction ($p_H$ 10-11), one obtains highly active solns. By dialyzing these exts. one obtains a 300-fold purification as compared with original serum.
H. EAGLE

Disturbances in the equilibrium of the serum proteins in the blood serum of lepers. K. SCHLOSSMANN. *Z. Immunitäts* 68, 154-68(1930).—The total protein content of leper serum increases in the early stages of the diseases after the appearance of skin manifestations and decreases in the late stages. The serum globulin is increased in fever and during active phases. The lowest albumin/globulin ratios are obtained in lepra tuberosa and mixta. Those sera giving a positive Wassermann reaction contain large quantities of globulin, but not all sera with increased globulin are Wassermann-pos. In contrast, all syphilitic sera with a low albumin/globulin ratio are Wassermann-pos. The globulin of leper serum is much more stable in the presence of beef heart lipoid than that of syphilitic serum.
H. EAGLE

The effect of phenol upon specific and non-specific complement-fixation phenomena. KARL DREYFUSS. *Z. Immunitäts* 68, 193-210(1930).—The addn. of phenol to the cholesterinized EtOH ext. of beef heart as used in the Wassermann reaction causes an increase in its sensitivity. Phenol also makes lecithin, bacterial exts. and bacterial suspensions give complement fixation in the Wassermann reaction, but non specific positive reactions are thereby obtained. Suspensions of macerated guinea pig heart or aq. exts. acquire Wassermann reactivity by the addn. of phenol, without attaining the sensitivity of the alc. exts. Here again, the phenol predisposes to non-specific reactions.
H. EAGLE

The effect of intracutaneous stimulation upon agglutinin formation. JENÖ SZÉP. *Z. Immunitäts* 68, 274-6(1930).—The intracutaneous injection of a suspension of paratyphoid *B. bacilli* into rabbits is twice as effective in the formation of agglutinins as the subcutaneous injection.
H. EAGLE

The blood-group titer in tuberculosis. HERMANN ZANTROP. *Z. Immunitäts* 68, 277-85(1930).—There is no significant difference in the isoagglutinin titer of tuberculosis, as compared with normal sera. No significant change in titer is observed during a 3 month rest-cure, aside from normal variations. Anti-A agglutinins are usually stronger than anti-B, and sera of group O with a high anti A agglutinin content usually have a high anti-B titer also.
H. EAGLE

The titration of small quantities of tetanus toxin. B. FEIERABEND. *Z. Immunitäts* 68, 286-98(1930).—The indicator used is the local tetanus produced by the intramuscular injection of a mixt. of the serum and the minimal effective amt. of toxin into the hind leg of a guinea pig. As little as 1/500 unit can be detected in this manner.
H. EAGLE

Potassium and calcium in anaphylaxis under blockade conditions. H. M. A.

KUSHNARYEV *Z. Immunitäts* 68, 299-303(1930); cf. *C. A.* 25, 1898.—Blockade of the reticulo endothelial system of a sensitized guinea pig by the injection of India ink, carmine or trypan blue 30 min. before the re-injection of the sensitizing material, prevents anaphylaxis. The usual prophylactic effect of $Ca^{++}$ in anaphylaxis and the accentuating action of $K^+$ are modified when the reticulo-endothelial system has been blocked in this manner. H. EAGLE.

**Amines as antigens.** Z. V. YERMOLAYEVA AND I. S. BUYANOVSKII. *Z. Immunitäts* 68, 312-6(1930).—A series of amines injected into rabbits caused the formation of pptg. and complement-fixing antibodies which reacted more or less specifically with the amine used for injection ($N(Me)_3$, heptylamine, heptadecylamine, etc.). H. EAGLE.

**Residual antigens of vibriones.** Z. V. YERMOLAYEVA AND I. S. BUYANOVSKII. *Z. Immunitäts* 68, 340-50(1930). Twenty-four hr. agar cultures of cholera and clear and cloudy vibriones were suspended in saline, KOH was added up to 5%, and the mixt. kept overnight in the ice box. Acetic acid was added at boiling temp., and the ppt. removed after cooling. The acetic acid pptn. was repeated 5 times, the filtrate neutralized, and pptd. with 5 vols. of 75% EtOH. The EtOH pptn. was repeated 8 times in both acid and alk. reaction. The dry powder obtained is protein free, reduces Fehling's soln. and forms an osazone with phenylhydrazine. The exts. of cholera and clear vibriones gave a strong pptn. reaction with anti cholera serum, but are non antigenic unless a protein is added (serum or gelatin). In marked contrast, the ext. of cloudy vibriones was antigenic as such. This is possibly due to its high N content (4.4%), which indicates impurities. H. EAGLE.

**The immunological behavior of normal serum. III. The appearance of complement.** I. FREIDBERGER AND J. GURWITZ. *Z. Immunitäts* 68, 351-63(1930).—The complement titer of newborn guinea pigs is usually about the same as that of the mother. The fetus of a pregnant guinea pig contains very little complement until immediately before birth, when the complement titer suddenly rises to approximate that of the mother. H. EAGLE.

**Quantitative conditions in the formation of antibodies for lipoids by combination-immunization.** FRANZ HEIMANN AND ELISABETH WEIL. *Z. Immunitäts* 68, 403-8(1930).—Very small quantities of pig serum, as little as 0.005 cc., can be used in conjunction with lecithin as a "Schlepper antigen," to induce the formation of antibodies for the lecithin in rabbits. Similarly, 1-1000 serum used in conjunction with an EtOH rabbit heart ext. suffices to induce the formation of antibodies for the rabbit lipoids. The more serum that is used, the less of the rabbit heart ext. need be used to obtain antibodies. H. EAGLE.

**The suitability of chemospecific antigen preparations for the formation of antibodies to lipoids.** G. L. SELTER. *Z. Immunitäts* 68, 409-27(1930).—The antisera obtained from rabbits following the injection of combinations of beef heart serum and diazotized atoxyl or metanilic acid give complement fixation with common lipoids, including lecithin, beef lipoids and cholesterol. A simple mixt. of the diazonium compd. and the serum possesses this antigenic activity. The antibody against the lipoids is contained entirely in the globulin fraction as obtained by acidification of the serum; the chemospecific antibody remains in the supernatant "albumen" soln. Unlike normal serum this diazonium serum mixt. added to an EtOH ext. of horse kidneys (Forssman antigen) does not make the latter antigenic. H. EAGLE.

**The identity of animal-hair allergens (horse, cat and dog hair allergens).** W. STORM VAN LEEUWEN. *Z. Immunitäts* 68, 427-33(1930). cf. *C. A.* 24, 5844.—The allergens prepd. from dog, horse and cat skin scales and hair are different. The skin sensitivity of human beings to these substances is not detd. by a common factor, yet desensitization of a given skin area with one of these substances frequently brings about a concomitant desensitization to the other 2. This may possibly be due to the fact that the repeated reaction uses up some tissue component necessary for the skin reaction. H. EAGLE.

**Comparative studies in the isoagglutinins in the blood of human beings and of the pig.** S. SCHERMER, W. KAYSER AND A. KARMPFFER. *Z. Immunitäts* 68, 437-49(1930).—The isoagglutinin $\alpha$ (anti-A) of human sera corresponds to that of the pig. Pig serum contains cold agglutinins which make comparison difficult. H. EAGLE.

**The heat susceptibility of complement fixation and flocculation reactions with syphilitic sera.** MEHMED ZÜHDI. *Z. Immunitäts* 68, 450-9(1930).—If syphilitic sera are heated at 60-68° for 5 hrs. before testing, the Wassermann and Kahn reactions are equally affected in 21-60% and the Kahn reaction is more thermostable in 59% and more labile in 19.7%. Z. considers that this indicates a certain independence of the 2 types of test. H. EAGLE.

*The heat susceptibility of complement fixation and flocculation reactions with syphilitic spinal fluids.* MITSUFU CHIBI *Z. Immunitäts* 68, 479–85(1930).—The Kahn reaction is more heat resistant than the Wassermann in spinal fluids. H. E.

*The role of protective substances of the blood in the critical termination of attacks of fever and for the development of immunity in inoculated recurrent fever.* F. PLAUT AND C. GRANOW *Z. Immunitäts* 68, 491–500(1930).—The formation of serum antibodies in patients inoculated with *Spir. dutt'oni* is not related to the bouts of fever, which are the clinical manifestation of the paroxysmal multiplication of spirochetes in the blood. They may, however, play a part in the final cessation of a fever and the death of the spirochetes. The immunity against re-infection for years following the inoculation is not detd. by circulating antibodies, as shown by the absence of protective antibodies for mice. H. EAGLE

*Physical and chemical studies of the virus of hoof and mouth disease. I. Isoelectric point and adsorption.* K. POPPE AND G. BUSCH *Z. Immunitäts* 68, 510–8(1930); cf. *C. A.* 25, 2181.—Three strains of foot and mouth disease virus had cataphoretic isoelec. points at $p_H$ 8.0, 7.6 and 7.8, resp. The virus is strongly adsorbed by 1 g. of charcoal at $p_H$ 6.5–8.4, so strongly that neither the adsorbent or the supernatant fluid is infectious for guinea pigs. This adsorption is weakest near the isoelec. point of the virus. At this reaction, the virus may not be completely adsorbed, moreover, when the charcoal is injected into guinea pigs, there may be a dissocn. of the adsorbed virus, with infection of the animal. Kaolin does not adsorb the virus. H. EAGLE

*The duration of strain-specific antibodies to trypanosomes in rabbits and the significance of the antibody content for the outcome of homologous reinfections.* F. HARTMANN *Z. Immunitäts* 68, 518–30(1930).—Using the Nagana-Prowazek strain of trypanosomes, H. finds that protective antibodies for mice persist in the blood for 17–31 weeks after the therapeutic sterilization of the infected rabbit with neoarsphenamine; they disappear in a few days from the blood of a passively immunized animal. Reinfection with a homologous strain, with the appearance of a chancre, is successful only if the circulating antibody is <1–2 units. Unlike syphilis, no infection without symptoms could be demonstrated, as shown by the injection of organ emulsions of suspected animals into normal rabbits. H. EAGLE

*Studies on blood volume. II. Influence of anaphylactic shock on blood volume.* ISTVÁN S. WENT AND CECIL KENT DRINKER *Magyar Orvosi Arch.* 31, 54–8(1930).—Expts. on guinea pigs showed that blood vol. of animals did not change during anaphylactic shock. Cf. *C. A.* 23, 3942. S. S. DE IVÁLY

*Ratio of sensitizing capacity of anti-anthrax immune sera to their content of precipitin and complement-fixing antibodies.* JÓZSEF TOMCSIK. *Magyar Orvosi Arch.* 31, 211–9(1930). cf. *C. A.* 24, 2501.—Purified ext. of encapsulated anthrax bacilli was prepd. according to Toemiessen. Dil'n of the ext. to 1:1,000,000 gave a ppt. with immune horse serum. The reaction on complement fixing bodies was neg. Immune rabbit sera gave both ppt. and powerful complement fixation in the presence of purified ext. Passive sensitization of guinea pigs could successfully be demonstrated with rabbit sera, being active in complement fixation. The passive sensitizing property of immune sera is approx. parallel to their content in complement fixing antibodies. S. S. DE I.

*Experiments to produce pure serum hemolysin.* LAJOS (LUDWIG) GÓZONY AND FERENC (FRANZ) HOFFENREICH *Matematik és Természettud. Értesitö* 46, 114–25(in German 126)(1929); cf. *C. A.*, 23, 5506.—Enzyme toxins which prevent the effect of lipase also decrease the effect of hemolysin. Methods of lipase production were used for the production of hemolysin since they show some kind of parallelism. Such hemolysin on purification was 40 times more active than the dried serum from which it was produced. Pure hemolysin is cryst. and develops acid from blood corpuscle lipoids and cannot be identified with pancreas lipase. S. S. DE I'NÁLY

*Toxin-producing capacities of recently isolated strains of diphtheria bacilli.* J. M. NEILL, R. C. AVERY, L. V. RICHARDSON, J. Y. SUGG AND B. E. KANE. *Am. J. Hyg.* 11, 399–403(1930). *Physiol. Abstracts* 15, 555.—Strains of diphtheria bacilli of diverse origin had wide variations in toxin producing capacities. A large no. of the filtrates were also tested for their content of the heat stable substance responsible for the "pseudo" reaction of the Schick test, and also for the content of the heat stable constituent responsible for the immediate skin reaction of the diphtheria hypersensitive person. The filtrates varied in their content of these heat stable substances, and the amt. present bore no relation to the content of toxin. G. G.

*The behavior of certain filterable viruses when subjected to cataphoresis.* C. V. NATARAJAN AND R. R. HYDE *Am. J. Hyg.* 11, 652–67(1930). *Physiol. Abstracts* 15,

553 —The myxoma virus of rabbits is electroneg in the range of 4 9 to 9 3 Below $p_H$ 4 9 the virus is quickly inactivated Its behavior in an elec current as a negatively charged particle agrees with the fact that it is readily adsorbed by basic substances The virus of epithelioma contagiosum behaves amphoterically, moving to both anode and cathode in an elec field between a $p_H$ range of 6 4 to 9 3 The encephalitic virus (which had been passed through a series of rabbits by intracranial inoculation) proved to be negatively charged from $p_H$ 7 6 to 8 9 Below $p_H$ 7 6 it is pos Different strains of bacteriophage were tested, and varying results obtained. All attempts to use the method of cataphoresis as a means of sepg the viruses from assocd proteins failed
G G

The chlorine-sodium ratio of blood serum in edema from Bright's disease. M Laudat and A Grandsire *Compt rend soc biol* 103, 893–5(1930), *Physiol Abstracts* 15, 305 —In edema from Bright's disease there is a marked increase of the Cl Na ratio of the serum This is maintained in some cases as the edema disappears, but a relation exists between the hydration of the tissues and the increase of the ratio
G G

The chlorine-sodium ratio of blood serum in Bright's disease. M Laudat and A Grandsire *Compt rend soc biol* 103, 1212–6(1930), *Physiol Abstracts* 15, 378 — The Cl Na ratio varies in cases of N retention in Bright's disease The increased concn of blood urea does not seem to intervene directly in the variations, which depend on assocd factors Prolonged retention of water raises the ratio, vomiting, on the contrary, diminishes it
G G

*Natural hemolysins of human serum.* J Jadin *Compt rend soc biol* 103, 951–3(1930), *Physiol Abstracts* 15, 282 —The content of hemolysins in the blood of the different human groups was detd for sheep corpuscles and for those of guinea pigs The greater no of sera contain both hemolysins, but those of group B are the most active
G G

The serum-antitoxin complex does not carry the alexin through the placenta. L Nattan-Larrier and L Richard *Compt rend soc biol* 103, 1084–6(1930), *Physiol Abstracts* 15, 413, *cf C A* 25, 1574 —Pregnant guinea pigs were immunized passively and actively against diphtheria and tetanus toxins The serum antitoxin complex filters through the placenta, but it does not contain the alexin In one instance the alexin was found in the fetal blood, but this fetus was at term, and so it is believed that the alexin was of fetal origin
G G

Antigenic properties of an extract demonstrated by the Prausnitz-Kustner method. P Vallery-Radot *Compt rend soc biol* 103, 1207–8(1930), *Physiol Abstracts* 15, 413 —When it is desired to ascertain if an ext is actively antigenic, it is enough to inject it into the skin of a human subject at the site of an injection, made 24 hrs before, of serum from an individual whose specific sensibility to the antigen is well established The proof of activity of the ext. is given by a marked local reaction This test provides the best method of demonstrating that an antigenic ext has the required properties for exptl research on anaphylaxis
G G

Action of globulins on the development of transplantable lymphosarcoma of the mouse. J Ricardo Meyer *Compt rend soc biol* 103, 1322–3(1930), *Physiol Abstracts* 15, 415 —Globulin pptd from horse serum with $(NH_4)_2SO_4$ was injected into mice, which were subsequently grafted with a lymphosarcoma, while controls were grafted without injection of globulin The percentage of pos results in the former was 90, in the latter only 50, while the dimensions of the growth were only about 1/3 in the non treated mice Grafting expts performed after the injection of U nitrate (which causes an increase of globulin in serum) show that the action of the globulin in favoring cancer growth is not a direct nutritive one, but that it is secondary to interference with the reticulo endothelial system
G G

Distribution of antibodies in the rabbit organism. O G Bier *Compt rend soc. biol* 103, 1328–30(1930), *Physiol Abstracts* 15, 413 —In rabbits deprived of their kidneys, sensitizing substances injected were maintained at the same concn in the blood during 44 hrs
G G

Diffusibility of potassium in normal human muscle and in the condition of pyramidal and extra-pyramidal contracture. O Sager and E Rothe *Compt rend soc. biol* 103, 1373–4(1930), *Physiol Abstracts* 15, 340 —No K is fixed to the colloids in human muscle All the K diffuses out in time into the surrounding medium The speed of diffusion of K is not the same for normal and pathol muscle; it differs even in the different pathol conditions which are detd by differences of the colloidal state of the fiber-sarcoplasm phases
G G

Blood $p_H$ in cases of cutaneous epithelioma. R. Reding and A. Slosse. *Compt.*

*rend soc biol* 104, 124–7(1930), *Physiol Abstracts* 15, 415.—Variations of the $p_H$ of blood in *different types of tumor* have been reported. In the present investigation 23 cases of skin cancer were examd. The results are contradictory to those of Jaumain. The $p_H$ in the 23 cases varied from 7.41 to 7.47. There is no alteration in $p_H$ in cancer of slow evolution. In case of marked activity it is natural to expect alteration of the physicochem. properties of the blood. G. G.

Excess of blood potassium in cancer. A. Remond and E. Cantegril. *Compt rend soc biol* 104, 293–4(1930), *Physiol Abstracts* 15, 487, cf. *C. A.* 25, 1575.—Excess of K has been found in the blood of 83% of cases of cancer investigated (48). The cases in which it is least marked are those with facial cancer. These observations correspond with those made on the K content of cancerous growths. The content is greatest when proliferative activity is most marked. G. G.

Urinary excretion in normal and nephritic dogs on variable diet. P. Genaud. *Compt rend soc biol* 104, 548–9(1930), *Physiol Abstracts* 15, 457.—Glucosuria always exists in U intoxication and is unaffected by change of food. In the nephritic dog chloride is not retained. The output of urea is greater in the normal animal than in the nephritic animal on a similar diet. $NH_3$ is const. in amt. and is independent of food in nephritis. The excretion of creatinine is not influenced by food, that of creatine is greater in nephritis. Uric acid is about the same in amt. in both cases. G. G.

Non-sugar reducing substances of human blood in pathological conditions. Freda K. Herbert and Marcherita C. Bourne. *Biochem J* 24, 1787–93(1930), cf. *C. A.* 24, 5354.—The concn. of the non-diffusible reducing substances is shown to vary with the hematocrit reading for the corpuscle vol. Benjamin Harrow.

Alimentary intoxication. F. Elmer Johnson. *Arch. Pediatrics* 48, 194–201 (1931).—In a case of alimentary intoxication of infancy, the blood findings were normal. In another case, the blood analysis suggested both acidosis and uremia (80 mg. total non protein N, 161 mg. dextrose, 7 mg. P, 500 mg. chloride per 100 cc. of blood; and $CO_2$-combining power 12.6% by vol.). Joseph S. Hepburn.

Flocculation experiments with variola and vaccinia virus. Leon C. Havens and Catherine R. Mayfield. *Am. J. Pub. Health* 21, 329–43(1931).—Exptl. evidence indicates that the intradermal or intravenous inoculation of vaccinia virus in rabbits is followed by the appearance of sp. flocculating properties in their sera. Vaccination of *the human subject stimulates the production of precipitins against vaccinia virus.* The serum of 4 persons acquired this power to flocculate the virus as early as the 10th day following vaccination. J. A. Kennedy.

The formation of phospholipides during the autolysis of normal and neoplastic tissue. A. H. Roffo and L. M. Correa. *Bull. soc. chim. biol* 12, 1247–54(1930).—Normal dog and rat livers and spleens were autolyzed in NaF soln. and compared with the same tissues from animals with cancer. *Differences were found* in the quantities and rates of hydrolysis of P and fatty acid compds. C. G. King.

Observations concerning the causative agent of a chicken tumor. James B. Murphy, O. M. Helmer, Albert Claude and Ernest Sturm. *Science* 73, 266–8 (1931).—A report of addnl. observation on the properties of a filtrable agent causing chicken tumor. The agent of Chicken Tumor I, a spindle-cell sarcoma, is selectively adsorbed and fixed by certain mesodermal tissues from susceptible animals. The plotted curve of the amt. of ultra-violet light of selected wave lengths required to inactivate the tumor agent shows a significant qual. and quant. variation from the curves for bacteria, typical viruses and bacteriophage. The tumor producing activity of the filtrates can be pptd. out with a protein fraction and purified. The steps in the purification of the agent are outlined and the evidence of an inhibiting principle in the chicken tumor is discussed. B. S. Levine.

*Individual differences in human blood.* Karl Landsteiner. *Science* 73, 403–9 (1931).—Precipitation and agglutination are reviewed with particular reference to blood grouping as a possible indicator of individual differences in human blood. In man there are numerous individual blood differences already demonstrated, and undoubtedly there exist still others which have not yet been established. Whether actually each individual blood possesses a special quality or how frequently there is complete correspondence with the blood of others, cannot be definitely stated at present. B. S. L.

A soluble specific carbohydrate of ragweed pollen. J. H. Black. *J. Allergy* 2, 161–3(1931).—Evidence is presented showing the presence of a complex carbohydrate in ragweed pollen. This substance reacts specifically in the skin and nasal mucosa of ragweed sensitive individuals. Julian H. Lewis.

The stabilization temperature of sera in the Meinecke and Wassermann reactions. Joseph Hohn. *Z. Immunitats* 67, 30–8(1930).—Heating sera at 51° for 4 min. does not

affect the Meinecke clearing reaction and makes the Wassermann reaction sharper If heated in amts less than 0 5 cc. or over 52° unspecific reactions with the Meinecke method are produced A quick Meinecke test in which the centrifuge is used is described JULIAN H. LEWIS

A common antigen in human cells and Shiga bacilli. M EISLER. *Z. Immunitäts* 67, 38–48(1930) —In Shiga dysentery bacilli and in cells of human organs, including *carcinoma cells but not serum, is a common antigen which produces in goats, but not in* other animals, an antiserum that agglutinates the Shiga bacilli and human red cells This antiserum does not hemolyze human red cells and does not contain Forssman antibodies JULIAN H LEWIS

The value of the citochol reaction in the diagnosis of syphilis. D P BOROVSKAYA AND S D ORLOVA *Z Immunitäts* 67, 63–6(1930) —The citochol reaction of Sachs and Witebsky is found to be a sensitive, sp , simple and const test for syphilis J H L

The normal antibodies of rabbits at different ages. E FRIEDBERGER AND D GAJZÁGÓ *Z Immunitäts* 67, 67–74(1930) —Rabbits first form normal sheep hemolysins about the 75th day after birth, this is comparable to man in whom these antibodies are formed during the first year Newborn rabbits have sheep hemolysins in their sera which may have a higher titer than either of the parents These antibodies disappear completely in 8–14 days Blood from the umbilical cord of human babies contains no hemolysins, but because of technical difficulties it is not known if the antibodies are in the general circulation during the first day of life JULIAN H LEWIS

Protein anaphylaxis in tuberculous guinea pigs as compared to non-tuberculous controls. E FRIEDBERGER AND D GAJZÁGÓ *Z Immunitäts* 67, 75-8(1930) — Tuberculous guinea pigs sensitized with sheep serum withstand larger doses of the serum on re-injection than do controls The difference is not marked but is demonstrable JULIAN H LEWIS

The immune bodies in fractions of antiserum for foot and mouth disease. The increase in titer of immune serum after parenteral injection of serum fractions. P v GARA AND K. TRAUTWEIN *Z Immunitäts* 67, 102–11(1930) —The protective action of antiserum for foot and mouth disease resides in the lyophobic euglobulin fraction *This is true of antiserum for the different types of virus and from calves and guinea pigs* It was not possible to increase the antibody content of convalescent guinea pigs by injecting the guinea pigs with immune serum fractions before infection J. H L

The production of lipoid antisera by injections of organ suspensions. FELIPE MORAN. *Z Immunitäts* 67, 115-25(1930) —Injections into rabbits of a suspension of *liver produce an antiserum specific for liver lipoids but this specificity is limited to* within the species Injections of suspensions of thyroid produce a similar but less-marked sp serum Other organs in suspension produce ubiquitous lipoid antibodies With the exception of the lens, suspensions and alc. exts of organs of the eye do not produce organ-sp antibodies Brain-sp antisera react with alc. exts of the retina. JULIAN H. LEWIS

The antagonism between group specific antigen and group specific antibody in rabbit blood. K HARA *Z Immunitäts.* 67, 125–36(1931) —Complement-fixation tests using anti group A human red cell sera as antiserum and native rabbit serum or its alc. ext as antigen show that the serum of rabbits contains group A antigen if the red cells of these rabbits lack the agglutinogen of Group A JULIAN H. LEWIS

The group differentiation of fetal membranes. R. S CHERIKOVER AND O M. SEMZOVA. *Z. Immunitäts.* 67, 240–50(1930) —Neither fetal tissues nor the uterine decidua contain group-sp antigens The antigen found by Oettingen and Witebsky (*Münch med. Wochschr* No 3, (1928)) in the decidua was the heterogenetic Forssman antigen JULIAN H. LEWIS

*The action of carbon dioxide on the coagulation and the complement action of* plasma. HANS J. FUCHS. *Z. Immunitäts.* 67, 266–71(1930).—Increase of $CO_2$ of plasma increases its complement action and coagulation speed as long as the reaction remains alk. or neutral. These properties are decreased when the reaction becomes acid JULIAN H. LEWIS

Complement and anticomplement. HANS J FUCHS. *Z Immunitäts.* 67, 272–85 (1930), cf *C A.* 24, 422 —Complement is considered as a series of chain reactions, one component of which is the middle piece that is identical with prothrombin The middle piece does not occur in the flowing blood, nor is it completely free in plasma and serum but is more or less firmly bound to its antagonist or stabilizer, antiprothrombin There are 3 classes of anticomplementary action The first includes the antiprothrombin excess of hemophilic blood, peptone blood of dogs and heparinized blood; serum inactivated at 56°; high salt concns The second class includes colloids that adsorb the

antithrombin prothrombin complex, such as $Ca_3(PO_4)_2$, $Mg(OH)_2$, $BaSO_4$, $CaC_2O_4$, org sp ppts and bacteria The third class are the phosphatides, especially cephalin, which neutralizes antiprothrombin, permitting the prothrombin to be converted into thrombin which has no complement action JULIAN H LEWIS

**Complement-fixation antibodies against alcoholic extracts of carcinoma in patients with carcinoma and in pregnancy.** L HIRSZFELD, W HALBER, M ŁOKSZTRUMPF, AND J KOLODZIEJSKI *Z Immunität* 67, 286–318(1930).—By using an alc ext of carcinomas fortified with cholesterol carcinoma can be diagnosed in 50–60% of cases with the complement fixation reaction In 5% of the controls with neg Wassermanns the reaction is unspecific. Controls with pos Wassermanns give also pos reactions with the alc ext of carcinomas Some of the carcinoma patients give pos Wassermann reactions In pregnancy 60% of the sera reacts with the alc ext of carcinomas JULIAN H LEWIS

**Demonstration of impedin in bacteria.** M YOSHITOMI *Z Immunität* 67, 353–8(1930).—Typhoid bacilli contain a substance called impedin that inhibits the production of agglutinins when they are used as antigen and that is responsible for the toxicity of vaccines While impedin is present only in the bodies of washed bacteria, they are gradually dissolved in the medium of a suspension on standing Impedin is destroyed by boiling and the resulting prepn is called cocto-vaccine J H L

**The production of coctovaccine.** R TORIKATA AND M. YOSHITOMI *Z Immunität* 67, 358–67(1930).—The optimum period of boiling for the production of coctovaccine in which impedin, a toxic and antagonistic substance, is destroyed is 30–60 min Coctovaccine is also better adapted for use as an *in vitro* antigen JULIAN H LEWIS

**Complement and media of salt solutions** JOHANN SCHUBERT. *Z Immunität* 67, 367–9(1930).—Isotonic zones of various salts are given It is shown that other salts than NaCl may serve as media for complement *Bromides* and iodides enhance the action of complement JULIAN H. LEWIS

**The rate of disappearance of proteins and lipoids from the peritoneal cavity of guinea pigs.** JOHANN SCHUBERT *Z Immunität* 67, 370–2(1930).—By means of chem and serological tests it is found that egg white, cholesterol and lecithin injected into the peritoneal cavity of guinea pigs disappear completely in 24 hrs J H. L

**Conditions and methods for demonstrating carcinoma-specific antigens.** HERMANN LEHMANN-FACIUS AND TADAO TODA *Z Immunität* 67, 373–05(1930).—Carcinoma suspensions heated 0 5 hr at 100° produce in rabbits a serum highly sp for carcinoma cells This specificity depends on lipoid antibodies Individual sp factors or the blood group of the antigen used for immunization have no effect on the specificity of the serum Antisera against boiled suspensions of carcinomas of group A contain, in addn to carcinoma sp antibodies, also antibodies sp for group A. J H. L.

**Experimental studies on the properties of diphtheria anatoxin.** M P. ISABOLINSKII AND V. I GITOVICH *Z Immunität* 67, 441–7(1930).—Guinea pigs injected with anatoxin were immune to toxin as well as to pure cultures of diphtheria bacilli No difference in the antigenic action of the usual anatoxin and Ramon's total anatoxin could be found JULIAN H LEWIS

**Experimental studies on the Abderhalden reaction.** M LURJE, N KORSAEW AND A ROSENBLATT *Z Immunität* 67, 462 74(1930).—Organs of dogs or sheep transplanted into rabbits did not produce positive Abderhalden reactions of the rabbit sera with the organs Pregnancy in rabbits and guinea pigs could not be diagnosed with the Abderhalden reaction The sera of these animals are not suitable for the test because most of the sera without antigen give positive reactions Positive reactions could not be obtained in dogs by immunizing with egg white or foreign organ emulsions but were obtained by transplanting foreign organs or after auto-immunization by injuring certain organs of the dog These positive reactions, however, were not specific. J H L

**Antibodies for leucocytes.** E WITEBSKY AND K KOMIYA *Z Immunität* 67, 480–96(1930).—Rabbits immunized with guinea pig leucocytes produce Forssman antibodies and antibodies that react with alc. exts of guinea pig leucocytes and spleen When immunized with rat leucocytes species sp lipoid antibodies are formed without any organ differentiation The specificity of organ sp antisera is increased by adding lecithin to the organ exts while the nonsp quota is inhibited The organ sp lipoid antibodies of leucocyte antiserum are usually limited to the species Guinea pig leucocyte antisera react exclusively with the homologous exts of leucocytes and spleen but not with those of blood On the other hand, antisera for guinea pig red cells react also with exts of guinea pig leucocytes and spleen Boiled suspensions of leucocytes react with the sp antisera just as well as with native suspensions Leucocyte antisera do not

*cause agglutination or lysis of leucocytes Rabbit leucocytes react with leucocyte* antisera obtained from the rabbit. JULIAN H. LEWIS

**Preservation of complement with sodium acetate and boric acid.** CURT SONNENSCHEIN *Z Immunitats* 67, 512–6(1930) —Complement is better preserved with 10% NaOAc and 4% $H_3BO_3$ added in substance than with 10% NaCl and 4% $H_3BO_3$ (*C A.* 24, 5853) JULIAN H LEWIS

**Influence of temperature on the sensitivity and specificity of the Wassermann reaction with different types of antigen.** GÁBOR OLÁH *Z Immunitats* 67, 517–38 (1930) —The sensitivity of the Wassermann reaction is increased if the serum complement *antigen mixt is incubated at low temps There is, however,* a considerable reduction in specificity of the reaction Many sera react better with exts contg no cholesterol when the test is made at low temps JULIAN H LEWIS

**The action of carbon dioxide on complement.** HANS J FUCHS *Z Immunitäts* 69, 51–7(1930) cf *C A* 24, 5843 —Blood corpuscles with their O displaced with $CO_2$ adsorb the middle piece of complement completely from plasma Hemolysis does not result The plasma treated with the red corpuscles shows a loss of spontaneous coagulability as well as of complement activity This indicates the identity of complement middle piece and prothrombin JULIAN H LEWIS

**The serological relation of the flocculi and the fluid in flocculation tests for syphilis.** D P BOROVSKAYA *Z Immunitats* 69, 76–85(1930) —The flocculi produced in the different flocculation tests for syphilis contain antigen and antibody in various proportions The supernatant fluid in the Meinicke reaction reacts like luetic serum while that in the Kahn and citochol reactions reacts like antigen JULIAN H LEWIS

*Complement fixation with snake venom immune serum* VITAL B FILHO. *Z. Immunitats* 69, 120–33(1930) —The snake venoms differ greatly in their ability to inhibit sp hemolysis In prepg the proper concn for use as antigen in complement fixation expts this had to be taken in account Complement fixation is best obtained when fresh unheated immune serum is used Normal horse serum showed a peculiar reaction in that it produces complete fixation with small doses of certain venoms but none with larger doses There is a strong complement fixation between *Crotalus terrificus* toxin and antitoxin but none between the toxins of the *Lachesis* and their antitoxin. There was an absence of reaction between the toxin and antitoxins of the *Crotalus* group and those of the *Lachesis* group No relation could be established between the complement-fixing power and the neutralizing strength of the *Crotalus* antitoxin JULIAN H LEWIS

**The chemical nature of the heterogenetic antigen in Shiga bacilli.** KURT MEYER. *Z Immunitats* 68, 98–108(1930) —By treating a suspension of Shiga bacilli with antiformin and pptg with alc. in alk reaction, a carbohydrate is obtained comprising approx *0 5 of the total heterogenetic antibody in the original bacilli* H. EAGLE

**The chemical nature of the heterogenetic antigen of the Shiga bacillus.** KURT MEYER. *Z Immunitats* 69, 134–45(1930), cf preceding abstr —The heterogenetic antigen of the Shiga bacillus is a carbohydrate and is different antigenically but not chemically from the carbohydrate that carries species specificity *Ibid* 490–517(1931) — The species specificity and heterogenetic activities of Shiga bacilli reside in the carbohydrate isolated from these organisms Sepn by sp pptn and adsorption of the carbohydrate into fractions corresponding to each of these activities could not be accomplished This indicates that the 2 properties are firmly bound and that they represent 2 reactive groups of a single substance JULIAN H LEWIS

**Respiration of bacteria and immune reactions. Experiments with B. pyocyaneus.** GYULA SURANYI AND JOZEF V PALOCZY *Z Immunitats* 69, 161–8(1930) —Agglutination with immune serum lowers the consumption of O by *B pyocyaneus* This effect is not the effect of agglutination itself but is due to a decrease of respiratory surface *Immune serum and complement producing bacteriolysis increase O consumption at first,* after which there is a complete cessation of respiration JULIAN H LEWIS

**An unusually high degree of anaphylactic sensitization. Acute lethal anaphylactic shock after subcutaneous injection of small doses of antigen.** R. DOERR AND S SEIDENBERG *Z Immunitats* 69, 169–79(1931) —In hereditary anaphylactic sensitization there is a much higher degree of sensitization in guinea pigs than after the usual active sensitization Animals react fatally to subcutaneous injections of 0 2–2 0 cc doses of serum antigen with a latent period of 15–20 min when after other forms of sensitization, except under unusual conditions, there is little or no reaction after subcutaneous injections JULIAN H. LEWIS

**The use of alcoholic extracts of meningococci for complement fixation and titration of meningococcus antiserum.** H. SACHS *Z Immunitäts* 69, 221–39(1930) —The alc. exts of meningococci give complement-fixation reactions with antimeningococcus serum

and can be used to titrate the antiserum. Meningococcus antiserum contains, therefore sp. lipoid antibodies but it also contains non-sp. lipoid antibodies since it gives positive Wassermann and cytochol reactions. The activity of alc. exts. of meningococci is increased by the addition of lecithin. JULIAN H. LEWIS

Complement fixation and flocculation with diphtheria antiserum. F. HÖRING *Z. Immunität.* 69, 244–60(1930).—Alc. exts. of diphtheria bacilli and diphtheria toxin give strong complement fixation reactions with diphtheria antiserum. These reactions are intensified by the addn. of a small quantity of lecithin to the antigens. The flocculation of toxin and agglutination of bacilli by antitoxin are facilitated by the addn. of cytochol. Treatment of antiserum with diphtheria bacilli removes the complement-fixing antibodies for the alc. ext. of diphtheria bacilli but the flocculating antibodies remain. The enhancing effect of lecithin can be substituted with cholesterolized and plain alc. exts. of organs. With none of these reactions is there a complete parallelism with the antitoxin content of the antiserum. JULIAN H. LEWIS

The role of cholesterol in the activation of lipoid antigens. G. F. DE GAETANI *Z. Immunität.* 69, 277–97(1930).—Forssman antigens that are poor in lipoids are activated by the addn. of cholesterol. This effect is due not to cholesterol antibodies but to some physicochem. influence on the antigenic substrate. JULIAN H. LEWIS

The chemical explanation of immune hemolysins. L. JARNO AND L. SZIRANYI. *Z. Immunität.* 69, 298–304(1930). cf. *C. A.* 24, 420.—A study of the enhancing effect of Na cholate and various amino acids on hemolysins and an analysis of inhibition of hemolysins by KCN and caffeine Na benzoate lead to the conclusion that normal and immune hemolysins are to be considered as compds. of cholic and contg. complexes of amino acids. JULIAN H. LEWIS

Is the diphtheria toxin-antitoxin mixture more toxic for tuberculous than for normal guinea pigs? E. FRIEDBERGER AND O. ANDERSON. *Z. Immunität.* 69, 313–7(1931).—Tuberculous guinea pigs show no increased sensitivity to underneutralized mixts. of diphtheria toxin antitoxin mixts. On the other hand they show an increased resistance to anaphylaxis and to other infections. JULIAN H. LEWIS

The consumption of complement in hemolysis. HANS J. FUCHS. *Z. Immunität.* 69, 330–42(1931). cf. *C. A.* 24, 418.—In hemolysis of sensitized red cells by complement there occur, side by side, 2 different reactions. One is the use of prothrombin as the mid piece in complement activity and the other is the conversion of prothrombin into thrombin. The speed of these 2 reactions depends on the conditions existing in the mixt. If the red cells are weakly sensitized the part of the prothrombin not used for complement is changed into thrombin through the action of the cytozyme-phosphatide liberated by hemolysis and of Ca in the serum. The prothrombin undergoing this change can no longer be utilized for complement. This explains the fact that blood fluids contg. Ca lose their complement activity sooner than those that are free from Ca. JULIAN H. LEWIS

Titration and detection of snake venom antisera by intracutaneous tests into guinea pigs. R. OTTO. *Z. Immunität.* 69, 368–78(1931).—By injecting mixts. of snake venom and antiserum intracutaneously into guinea pigs the neutralizing power of the antiserum can be titrated. Of 117 patients only 9 were found to have antivenom in their serum. JULIAN H. LEWIS

Comparison of the antigenic action and toxicity of scarlet-fever toxins modified by heat and by sodium ricinolate. CH. CH. WANG. *Z. Immunität.* 69, 395–401(1931). The immunizing action of scarlet fever cocto-antigen. *Ibid* 402–7. Vaccination with scarlet-fever cocto-antigen. K. SAITO. *Ibid* 408–12. Both heat and 1% Na ricinolate reduce the toxicity of the Dick scarlet fever toxin, but Na ricinolate lowers the antigenic action, while heat raises it as proved experimentally and with patients. *J. H. L.*

The new flocculation tests, especially the Kahn test. CARL SCHLESMANN. *Z. Immunität.* 69, 484–98(1931).—The Meinecke clearing reaction is slightly sharper and more sp. than the Kahn test and is considered the best flocculation test so far devised. JULIAN H. LEWIS

The thermic effect of death and hemolysis. V. V. LEPESHKIN. *Am. J. Physiol.* 95, 473–80(1930).—The hemolysis or the coagulation of protoplasm of red corpuscles is accompanied by the production of heat to the amt. of 2.1–2.4 cals. per g. of dry substance of corpuscles. Death is accompanied by the decompn. of some very unstable compd., probably in this case compds. of hemoglobin. J. F. LYMAN

Experimental arteriosclerosis in the rat. M. SWEENEY AND EMMA SMITH. *Am. J. Physiol.* 95, 620–5(1930).—Arteriosclerosis could not be produced in adult rats (1) by feeding for 7 months a diet contg. 5% NaCl and 10% $NaHCO_3$ or (2) by const. intensive infection for 7 months by weekly injections of *Staphylococcus aureus*. The ingestion of

50 cc. of viosterol over a period of 25 days produced definite arteriosclerosis with densely calcified aortae In one case the renal blood vessels appeared to be calcified.
J. F. LYMAN

Acidity of the gastric contents of normal, cretin and hyperthyroid rabbits. M F. GREEN AND M M KUNDE *Am J Physiol* 95, 626–9(1930) —The total HCl of the gastric contents of normal and cretin rabbits is the same ranging from 0.2 to 0.56%. With exptl hyperthyroidism, HCl of the gastric contents is depressed but not absent
J F LYMAN

Diabetes insipidus. IV. HELEN BOURQUIN *Am J Physiol* 96, 66–77(1931), cf *C A* 23, 3970 —Diabetes insipidus is not a deficiency phenomenon The mammillary bodies, or centers in their vicinity, are essential to it and the polyuria is caused by a diuretic substance, or irritation of hypothetical centers controlling salt and water metabolism
J F LYMAN

Calcium shifts in experimental rickets. J MORELLE Proc. Physiol Soc., *J Physiol* 70, xiii xiv(1930) —In healing of rickets the Ca is at least partly provided (1) by the immediate neighborhood and (2) by the spongious trabeculae which constitute a reservoir of readily available Ca
J F LYMAN

Detection of histamine-like substances in asthmatic sputa and experiments on *their possible bacteriological origin* F A KNOTT AND G H ORIEL *Proc. Physiol* Soc., *J Physiol* 70, xxxi(1930) —Biol assay indicated the presence of histamine in several sputa from asthma patients whose bronchial plugs and mucopurulent masses contained Gram-negative bacilli, apparently allied to the group of Friedlander's bacillus Cultures of these organisms also gave histamine-like effects. In bronchial infection with these bacilli, therefore, one may have one cause of sp., locally produced asthma.
J F LYMAN

The occurrence of a non-heat-coagulable protein in normal and pathological urines. G H ORIEL Proc. Physiol Soc., *J Physiol* 70, xxxvi(1930) —A non heat-coagulable protein can be sepd from the urines of persons suffering from bacterial invasions and especially in such cases of allergy as eczema, urticaria and asthma. The sepn can be made by adsorption on kaolin from acidified urine and elution by adding NaOH to the sepd. kaolin to $p_H$ 8.0 It is pptd by satn with $(NH_4)_2SO_4$ and passes through a semipermeable membrane with difficulty Rabbits can be sensitized with it so that they show the Arthus phenomenon By this technic it can be shown that the substance is not identical when obtained from persons suffering from different diseases Persons suffering from allergic diseases are sensitive to this substance from their own urines and it is possible to desensitize them by minute doses at suitable intervals. J. F. LYMAN

Starch digestion in man. A F HURST AND F A KNOTT Proc. Physiol Soc., *J. Physiol* 70, xxxvii(1930) —A type of intestinal carbohydrate dyspepsia, characterized by the presence of undigested starch in the colon, is thought to be due to a failure of normal secretion of the digestive juice produced by the small intestine and a deficiency of intestinal diastase.
J. F. LYMAN

*Some questions and problems of diabetes research including some evidence of a* metabolic-physiological theory of diabetes mellitus. H CHR GEELMUYDEN *Ergebnisse Physiol.* 31, 1–95(1931), cf *C A* 24, 5369 —"Insulin has no direct influence upon the oxidation of carbohydrates in the animal body It fails to increase the total heat production and metabolism in the animal body It can accelerate carbohydrate oxidation by providing intermediary compds. whose existence conditions carbohydrate oxidation such as muscle work (hypoglucemic convulsions), fat and glycogen synthesis. Furthermore insulin can promote counter reactions of the nervous-endocrine metabolic regulation by which the total oxidation and thereby that of carbohydrates can be accelerated positively or decreased Such considerations probably explain the diverse findings of various authors in their studies of the effect of $O_2$ intake upon insulin The basic reaction of insulin appears to produce a decrease in the formation of carbohydrates from non-carbohydrate materials, this in turn forces the body to burn preformed carbohydrates. This results in an increased R Q and a decreased $O_2$ intake. This basic type of insulin reaction is in accord with the concept of diabetes mellitus as a pathol acceleration of sugar formation from non-carbohydrate materials." C. M. MCCAY

Experimental investigation into the appearance of protein in bile. II. Heteroalbuminocholia. T MATSUDA *Japan J Gastroenterology* 3, 14–17(1931); cf *C A* 25, 328.—Egg albumin injected intravenously into rabbits is excreted into the bile by the parenchymatous cells of the liver This was found after blocking the parenchymatous and stellate cells in turn with $CCl_4$ and Indian ink, resp Rabbits whose livers were injured by $CCl_4$ displayed a decreased ability to excrete foreign protein in the bile.
C. M. MCCAY

Biochemical investigation of the blood in cases of experimental disturbance of liver function II Liver function and protein metabolism. TSUNEJIRO SAWADA *Japan J Gastroenterology* 3, 38–45(1931), cf *C A* 25, 1282.—The livers of rabbits were injured by infection with *Schistosomum japonicum*, by ligation of the ductus choledochus or by P poisoning Such injuries increase the amino acids and serum globulin of the blood and decrease the fibrinogen and serum albumin. C. M McCAY

Jaundice in malarial diseases. Clinical and experimental investigations. I. Clinical research. SANTOSHI SAIKI *Japan J Gastroenterology* 3, 46–53(1931).—The concn of bilirubin in the blood of patients inoculated with malaria was detd at regular time intervals during the course of the attacks Malarial patients suffer from hyper bilirubinemia The excretory function of the liver is impaired This contributes to the jaundice as well as the abnormal increase in hemolysis C. M McCAY

The significance of the liver glycogen in the liver function. III 1. The glucose test in cases where the liver glycogen is diminished. TANESABURO IKUSHIMA *Japan J Gastroenterology* 3, 54–9(1931), cf *C A* 25, 1277,1278.—The blood sugar of rabbits was detd by the Hagedorn Jensen method at regular intervals after the injection of 20 cc. of 25% glucose intravenously After fasting, or after the injection of *adrenaline, strychnine or phlorhizin the blood sugar rises to higher levels and persists* longer after glucose injections Ligation of the bile duct has a similar effect. I believes such phenomena are the result of impaired liver function when its glycogen content is decreased C. M McCAY

Clinical and experimental studies on urobilin bodies. III The urine-, bile- and blood-urobilin-bodies in cases of experimental hepatic disturbance. MASANORI OSHIMA *Japan J Gastroenterology* 3, 67–70(1931), cf *C A* 24, 4833.—A normal rabbit excretes 0.03–0.07 mg of urobilin bodies per day in the urine and 80 times as much in the bile Injury to the liver by either $CHCl_3$ or $CCl_4$ increases the excretion of the urobilin compds In normal rabbit bile the proportion of urobilinogen to urobilin is 5 1 After hepatic damage the urobilinogen increases in the bile C. M McCAY

Autochthonous poisons of a lysocythinic nature in the brain. G PICHINI *Boll soc ital biol sper* 5, 1131–8(1930).—Alc exts of human brain, normal and pathological, were treated with 1 $t_2O$ to ppt. the so-called lysocythins The amt of ppt. from the pathological brains was 5 to 10 times that from the normal brains The senile dementia and the postencephalitic brains gave the most ppt. (0.4–0.5 cg from 800 g tissue) The hemolytic power of these ppts. was absent. When these substances were injected subdurally into rabbits there was an intensive neurotoxic reaction, whereas the material from the normal gave little or no reaction The substances when injected subcutaneously into the ear of the rabbit produced hemorrhagic edema These properties lead to the belief that the substances isolated from the pathological brains belong to the lysocythins and are by products of the scission of one or more phosphatides contained in the nerve tissue PETER MASUCCI

The nature of the period of incubation. ENRICO SERENI *Boll soc ital biol sper* 5, 1150–5(1930).—In most biologic phenomena the interval between the application of an initial stimulus and the response to the same stimulus is very brief, in anaphylaxis, the time between the sensitizing dose and the shock dose is much longer, regardless of the delicacy of the criteria chosen as the index The long period of incubation, however, is a concept essentially bound to the symptomatic aspect of anaphylaxis and not to that strictly immunological The *period of incubation (clinical) of anaphylaxis is essentially* the interval of time necessary for the sensitization of the organs of shock, by the antibodies produced in the organs of production, it consists of the sum of the times necessary for the antibodies to pass in sufficient amts from the producing organs into the blood and from the blood into the various organs in which they are fixed The antigen reaches the organs producing the antibodies more or less rapidly according to the route of introduction, and initiate immediately the production of antibodies. At this moment the true period of incubation comes to an end In passive anaphylaxis, the antibodies have been formed by the producing organs of another animal but the role played by the organs of shock is entirely the same in that they do not play a part in the true immunological process PETER MASUCCI

The inorganic sulfur of the blood in nephropathic cases. UGO DE MICHELIS. *Minerva med* 1931, I, 318–24.—The serum was deproteinized by means of trichloroacetic acid, the filtrate was treated with $BaCl_2$ and the resulting ppt was matched against a known standard $BaSO_4$ suspension The inorg S was detd on 12 normal individuals and on 37 cases suffering from various renal lesions The inorg S in the latter group was markedly higher, often as high as 15 times the normal values There was some relation

between the gravity of the disease and degree of inorg S retention A diagnostic and prognostic value is attributed to detns of this sort PETER MASUCCI

Lipoidolysis and tumors. PIETRO RONDONI *Minerva med* 1931, I, 312–8.—The role played by lipoids in the constitution of protoplasm and in cellular multiplication is discussed R summarizes and reviews his own and the work of others on the relation of lipoid metabolism to tumors, and develops the conception that neoplastic proliferation is accompanied by lipoidolysis phenomena PETER MASUCCI

Renal diabetes. SALVATORE ROMANO *Minerva med* 1931, I, 349–53.—A case of *renal and nephritic glucosuria was studied from the standpoint of glucemia during* fasting, normal alimentary glucemia, independence of glucosuria from the amt. of carbohydrate ingested and absence of diabetic symptoms R concludes that renal glucosuria is probably independent of the renal lesion PETER MASUCCI

Total inorganic calcium and phosphorus in the blood of parathyroidectomized dogs deprived of the large and small intestines with the exception of a portion of the superior duodenum. A BILLI *Boll soc ital biol sper* 6, 6–7(1931).—Inorg Ca in *the serum did not diminish inorg P increased markedly reaching a max of 11 mg* per 100 cc serum The ratio Ca/P after the parathyroidectomy diminished appreciably in respect to the value it had before the operation PETER MASUCCI

The anavenoms. II Immunization by the anavenoms. MAURICE ARTHUS *J Physiol Path Gen* 28, 773–88(1930) cf *C A* 24, 5871.—The anavenoms, prepd by treating the venoms with formaldehyde, when injected repeatedly under the skin of rabbits, confer a certain degree of immunity against the venoms Increasing the no of injections has a greater effect in augmenting the immunity than increasing the size of the dose Cobra anavenom has an immunizing power equiv to the corresponding venom The antigenic property actually resides in the anavenom and is not the result of a min quantity of venom untransformed by the formaldehyde treatment III. Anaphylaxis caused by the anavenoms. *Ibid* 800–15.—When rabbits are repeatedly injected with the anavenom of cobra or *Crotalus adamanteus*, a subsequent injection with the corresponding venom will cause anaphylactic shock, exhibited by lowered arterial pressure and increased respiration This anaphylaxis is no more specific than the anaphylaxis caused by the venoms Shock can be brought about by injecting cobra venom into rabbits which have been prepd with the anavenom of *Crotalus* or *Bothrops* The injection of a dil soln of cobra venom (1/20,000) causes a local, congestive reaction in animals previously injected with anavenom L. A MAYNARD

Physicochemistry of the humoral reactions GAETANO VIALE *Rev sud-americana endocrinol immunol quimioterap* 14, 17–24(1931)(Italian).—Immunity, anaphylaxis, precipitin reaction and other serological reactions are discussed in their relation to $p_H$ and the colloidal and chem structure of the compds involved A E MEYER

The bile salts, bilirubin and cholesterol in blood during jaundice. B VARELA FUENTES, P RUBINO AND E APOLO *Semana méd* (Buenos Aires) 1931, I, 855–62.—The changes of bilirubin in the blood give the most reliable information about the course of the disease. The normal value of 4 mg glycocholic acid per 100 cc. blood is increased parallel with the bilirubin A high value in bile salts in blood coexists often with a neg reaction of Hay in the urine The blood cholesterol can be higher or lower than normal without evident relation to the disease. A E MEYER

Studies on the pathological function of the kidneys in renal disease, especially Bright's disease. I. CAI HOLTEN AND POUL B REHBERG *Acta Med Scand* 74, 479–518(1931).—An interesting discussion of renal function tests. S MORGULIS

The presence of proteolytic enzymes in serum K YOKOTA *Biochem Z* 232, 58–68(1931).—Human serum may hydrolyze animal fibrin to a small extent, but not human fibrin Serum from cancerous or luetic patients likewise is unable to hydrolyze human fibrin, nor does it hydrolyze animal fibrin any more than normal serum does Ligating the pancreatic duct in the rabbit frequently causes a rise in the serum proteases, but the increase is not large S. MORGULIS

Complement fixation by the interaction of normal serum and bacterial suspensions. A contribution to the study of natural immunity phenomena T J MACKIE AND M H FINKELSTEIN *J Hyg* 30, 1–23(1930).—Normal sera from a wide variety of mammals can fix complement with many varieties of bacteria The property is most marked in man, ox, sheep and horse, but there is much individual variation within a species The reactions vary in degree with different species and different strains, the strain differences being more important The reacting principle of the serum is highly thermolabile, being uniformly inactivated at 55° within 30 min Complete inactivation often occurs at 50° to 52° and partial inactivation at 40°. The complement-fixing substance is "absorbed" by bacteria at 0°, which thus become sensitized Thus substance can

be absorbed by other substances than bacteria but not so completely. As a rule the reacting power of bacterial suspensions is destroyed at 55°, but this is influenced by different conditions as the type of medium on which the cultures are grown. The reacting power of the serum is fully developed in young animals These natural antibody-like principles differ from immune antibodies in thermolability JOHN T. MYERS

Transmission of maternal immunity. J. H MASON, T. DALLING AND W. S. GORDON *J Path Bact* 33, 783–93(1930).—*In sheep, cattle and horses, antibodies do not pass through the placenta into the fetal circulation* They do appear in the colostrum and are thus absorbed by the offspring during the first few days after birth. JOHN T. MYERS

The absence of trypanocidal substances in human cerebrospinal fluid. P. REGENDANZ *Zentr Bakt Parasitenk*, I Abt., 120, 89–93(1931) JOHN T. MYERS

The antihemolytic properties of human serum. M C RUBINO-MONTEVIDEO *Zentr Bakt Parasitenk*, I Abt, 120, 145–50(1931) —*Spontaneous inactivation (3 to 5 days in the ice box) destroys complement, but not the anticomplementary properties, which on the contrary increase.* Heating to 56° destroys both properties J T. M.

The dissociation of the diphtheria anatoxin-antitoxin complex and the recovery of the anatoxin. G RAMON, R. LEGROUX AND M SCHOEN *Compt rend* 192, 512–4 (1931). cf *C A* 24, 2173.—Diphtheria anatoxin behaves like toxin in its power to form a complex with diphtheria antitoxin, and in the possibility of dissocn. of this complex in the same manner as that of the toxin-antitoxin complex. T. H. RIDER

*The ultimate fate of arrested grafts of epithelial tumors.* P VLÈS AND A DE COULON *Compt rend* 192, 641–3(1931) —*Epithelial tumors grafted in mice are often* inhibited and apparently disappear by a complete lysis Mice in which a grafted tumor had disappeared were painted with tar at another site, after as long as 130 days, causing, in some cases, a new tumor at the site of the original graft Others showed growths at the site of the painting, only 2 animals showed both T. H RIDER

*The metabolism of neoplasm tissue.* ANNA GOLDFEDER. *Med Dósmadtzalma i Spolecznа* 13, 81–99(1931)(in Russian, English Abstract) —Neoplasm tissue always contains less glycogen (I) than normal tissue. I favors the growth of neoplasm Notwithstanding the presence of lactic acid, neoplasm tissue has a $p_H$ of 7.5–7.7, because of the production of $NH_3$ T. H. RIDER

Spasmophilic forms of infantile enuresis. G MACCIOTTA *Pediatria rivista* 38, 1145–57(1930) —*The investigations were carried out on 24 children with enuresis; the children showed no other symptoms which could be regarded as the cause for the* enuresis. In 17 of the cases M found a decrease of blood Ca, a slight diminution in the H-ion concn of the blood and a more or less marked increase of the galvanic excitability, with inversion or equalization of the anodic formula M concludes from his findings that in these cases the enuresis is a manifestation of an existing spasmophila The therapy with ultra-violet rays, alone or in combination with parathyroid hormone, gave *good results The best results were obtained by the combined treatment with ultra*violet rays and vitamin B *Numerous references are given* G SCHWOCH

The possibility of the occurrence of anaphylactic phenomena in the serum therapy by the oral route. LUIGI AURICCHIO *Pediatria rivista* 39, 289–99(1931) —Five cases of alimentary serum anaphylaxis are reported In 3 of these cases sensitization was produced by parenteral administration of horse serum, slight, transitory disturbances *occurred after oral administration of horse serum preps In the 2 other cases* sensitization was caused by *oral administration of such preps and very severe ana*phylactic reactions, which led to death in 1 case, were observed after injection of serum Expts carried out in guinea pigs showed that specific sensitization can be produced by prolonged gastric administration of horse serum Such animals exhibited only slight and transitory symptoms when they were injected with cattle serum, while with horse serum *anaphylactic symptoms appeared slowly until the animals died on the 3rd or 4th day* after the injection Gastric administration of horse serum was *without influence on* guinea pigs sensitized by injection of horse serum. G SCHWOCH

The electric conductivity of the cerebrospinal fluid in normal pathological conditions. P GORINI *Pediatria rivista* 39, 300–8(1931) —G detd the elec. cond of the cerebrospinal fluid in 73 infants In the healthy infants $K$ was fairly const (168–183 at 35°) *Normal values were also found in acute and chronic diseases and in cases with pathol* alterations of the nervous system excepting *meningitis, in which condition low values* for $K$ were found (min 143) G SCHWOCH

Acute insufficiency of the adrenal glands. AUGUSTO ANTONINI. *Rass clin terap sci affini* 29, 329–50(1930) —A review. Four pages of references are given G S

The *nature of variation of agglutination titer caused by insulin.* M. NOZAKI.

*Keijo J Med* 1, 248–87(1930).—Insulin injected intravenously into rabbits immunized with typhoid bacilli causes a great but temporary increase in its agglutination titer. This increase is considered as not being due to the insulin itself but rather dependent upon hormonal action. A J Vorwald

**Serology of syphilis. IV. A more sensitive antigen for use in the Wassermann reaction.** Harry Eagle. *J Exptl Med* 53, 605–14(1931), cf *C A* 25, 139–40.—*The discovery that there are many substances with the sensitizing properties hitherto* believed peculiar to cholesterol and its derivs and that sensitizer can be added to antigen in very large quantities, many times those currently used, and yet continue to increase its complement fixing efficiency with no danger of giving falsely pos tests, has made possible the prepn of an antigen much more sensitive than any now available for use in the Wassermann reaction. This consists of the EtOH ext of beef heart muscle to which are added 0.8% cholesterol and 0.6% sitosterol, the excess of which crystallizes out on *cooling and is dissolved before using. Details of the prepn are given. There is reason to* believe that this antigen possesses almost the max sensitivity obtainable. The method of prepn insures its being almost satd with antigen-lipoids, and more sensitizer could not be added without increasing the turbidity of its dil'n in saline to a point where it would interfere with the reading of hemolysis. V. **The cause of the greater sensitivity of the ice-box Wassermann, the zone phenomenon in complement fixation.** *Ibid* 615–22.—Serum, in concns greater than 1:25, causes a marked inhibition of complement fixation in general and of the Wassermann reaction in particular. *The serum protein is probably* adsorbed by the colloidally dispersed lipoid reagin complexes, forming a protective film which prevents the fixation (adsorption) of complement. This inhibition explains the zone phenomenon in complement fixation: a weakly pos. serum may give a completely pos. reaction in, *e. g.*, 1:5 dil'n., and yet, because of this serum inhibition may appear completely neg. when tested as whole serum. The greater sensitivity of the ice-box test is due to the fact that the serum inhibition just described is less marked at lower temp., to the prolonged incubation time, making for greater sp. fixation, to a more marked non-sp. destruction of complement by antigen and a spontaneous deterioration in the longer ice box test. Because of the inhibition by serum protein in high concn., a quant. Wassermann technic involving the use of graded quantities of serum is worthless when carried out at 37°. Even the ice-box test, which is less susceptible to this inhibiting effect, will yield a pos. reaction with whole serum only when the circulating reagin exceeds a surprisingly high threshold (6–10 times the quantity which could be detected in dil. serum). C J West

**Inflammation. VII. Fixation of bacteria and of particulate matter at the site of inflammation.** Valy Menkin. *J Exptl Med.* 53, 647–60(1931), cf *C. A.* 25, 1579.—India ink or graphite particles injected into an area of inflammation fail to disseminate to the tributary lymph nodes. When injected into a normal peritoneal cavity they rapidly appear in the retrosternal lymph nodes. When injected into an inflamed peritoneal cavity, they are fixed *in situ* and fail to reach the regional lymph nodes. Graphite particles injected into the circulating blood stream enter an inflamed area both as free particles as a result of increased capillary permeability and also as phagocyted material within leucocytes. *B. prodigiosus* injected into inflamed tissue is fixed at the site of inflammation and fails to disseminate to the regional lymph nodes as readily as when injected into normal tissue; injected at the periphery of an inflamed area it does not readily penetrate into the site of inflammation; injected intravenously, it rapidly enters an inflamed area. C J West

**Congenital protein hypersensitiveness in two generations.** Bret Ratner and Helen L. Gruehl. *J Exptl Med* 53, 677–86(1931).—Hypersensitivity actively induced *in utero* is shown to persist for a longer period than passive sensitization (cf *C A* 21, 449). The degree of hypersensitivity, its duration and its transmissibility appear to be influenced by the time elapsing between the original injection of the parent and parturition. A pregnant guinea pig receiving a parenteral injection of antigen 2–4 days prior to parturition transmits a state of hypersensitivity to 2 succeeding generations. The sensitization of the $F^{I}$ generation is due to the passage of antigen. The sensitization of the $F^{II}$ generation is due to the passage of antibodies formed in the $F^{I}$ generation. This prevents any further transfer of the hypersensitive state. Though hypersensitivity occurs in 2 successive generations, the phenomenon is congenital and not hereditary. C J. West

**Lipoid metabolism. I. Lipoid metabolism in rabbits with fever.** Hidesaku Hamano. *Proc Imp Acad Tokyo* 7, 80–1(1931).—The total fatty acid of the whole blood and plasma is decreased in fever, the max. being reached in 24 hrs. The whole blood total fatty acids return to normal in 60 hrs., the plasma in a shorter time. Choles-

terol and lecithin increase both in whole blood and in plasma in the beginning of the fever; the cholesterol reaches a max. in 24 hrs., the lecithin in 6 hrs.; after this time both decrease and fall below the normal value. The serum protein decreases with the fever and becomes normal in 18–24 hrs. C. J. West

*Daily variations in sugar content of blood and urine in normal and in diabetic persons.* J. Möllerström. *Svenska Läkaresällskapets Handlingar* 56, 211–95(1929); *J. Am. Med. Assoc.* 96, 227.—About 12 000 blood-sugar tests and 7000 urine tests were made on 37 patients. In glycosuria the amt. of sugar excreted varied from day to day even on a const. diet. The excretion was sometimes periodic; thus in diabetics a min. was often noted at midday, even with frequent meals. Excretion of acetone bodies in grave diabetics was also periodic. At certain times of the day, both in normal and diabetic persons, postalimentary glycemia disappeared more rapidly or did not appear. During this stage there was a tendency to spontaneous fall of the blood sugar, sometimes so marked that in spite of ingestion of food the blood sugar was still below the starvation level. R. C. Willson

Kilduffe, Robert A. The Clinical Interpretation of Blood Examinations. Philadelphia: Lea & Febiger. 629 pp. $6.50. Reviewed in *J. Am. Med. Assoc.* 96, 1532 (1931).

Thomsen, Olaf. Antigens in the Light of Recent Research. London: Heinemann. 14s. net.

## H—PHARMACOLOGY

A. N. Richards

Secondary and toxic effects of arsenobenzene preparations. Fritz Brezovsky. *Wiener klin. Wochschr.* 43, 1285–7(1930).—The preps. studied and the % of cases in which secondary effects were negligible were: *neosalvarsan* 37, *novarsenobenzol* (*Billon*) 6, *neoarsphenamine* 40, *myosalvarsan* 4, *arsenated lipoid* 16, *novasurol* 10. D. B. Dill.

Metal salt therapy. Concluding experiments with rabbit tuberculosis. L. E. Walbum. *Z. Tuberk.* 53, 202–9(1929); cf. *C. A.* 24, 426.—On the basis of extensive observations with 42 metals and metal salts the author concludes that Cs and Mn possess a specific healing value in rabbits infected with tubercle bacilli while only a slight action was noted with Ce, Ba, Al, La, Mo, Pt, Ni and Sn, the remaining 32 being without effect. H. J. Corper.

Metallic electrocolloids in the treatment of syphilis. Orlando Rangel. *Bol. clin. brasil. pharm.* 11, 3–22(1930).—Some advantages are given of the use of electrocolloids (Hg and Bi Hg) over arsenicals in the treatment of syphilis. C. A. A.

Clinical test of a new compound in the treatment of arthritis. D. E. Markson. *Am. Med.* 37, 116(1931).—*Novocodeinchophen* was found advantageous in the treatment of arthritis. Rachel Brown.

Field experiences in the use of calcium gluconate. J. Alley Rogers. *J. Am. Vet. Med. Assoc.* 31, 555–6(1931).—A report of the successful treatment of milk fever in cows by the injection of a 10% soln. of Ca gluconate. Rachel Brown.

The curative value of certain bismuth compounds. An experimental study. Sigmund S. Greenbaum with Anna M. Rule. *Am. J. Syphilis* 15, 50–71(1931).—The curative doses of 12 commercial Bi preps. were detd. by the lymph-gland method after intramuscular injections in rabbits. There was variation in the curative dose from 2 mg. per kg. ("bismuthodal") to more than 25 mg. per kg. ("bismodal" and "iodobismuthate"). B. C. Brunstetter.

Intravascular phagocytosis of erythrocytes in *Necturus* following prolonged immersion in lead acetate. A. B. Dawson. *Anat. Record* 45, 345–52(1930).—Extensive phagocytosis of erythrocytes occurs in the circulating blood of *Necturus* following prolonged immersion (15 days or more) in a soln. of $Pb(C_2H_3O_2)_2$. Phys. changes in the erythrocyte, involving loss of typical form and the acquisition of the quality of stickiness (to glass) appear to favor phagocytosis. The destruction of erythrocytes was accompanied by striking changes in the color of the bile. B. C. Brunstetter.

The effect of administration of thyroid substance, of potassium iodide, and of extirpation of the greater portion of the thyroid gland on the epidermis of the guinea pig. Leo Loeb, F. L. Haven, L. T. Genther and Hilda Friedman. *Anat. Record* 46, 65–80(1930).—Administration of thyroid substances or of KI daily to guinea pigs did not cause an increase in the proliferative activity of the epidermis or an increase in the number of epidermal cells. The results suggest that both multiple as well as single doses of these substances may cause a lowering of the proliferative activity and

number of cells Following a not quite complete thyroidectomy no lowering of the proliferative activity in the epidermis nor of the number of epidermal cells took place The results are discussed with reference to their bearing on the problem of the *significance of the internal secretions on the origin of cancer* B C BRUNSTETTER

The chromatophores of cephalopods. III. The effect of some poisons in vitro. E SERENI *Z vergleich Physiol* 12, 329–503(1930) —The action of the following substances on the nerve, the muscle and the zone between nerve and muscle, of nerve-muscle prepns was investigated aconitine, atropine, acetylcholine, betaine, caffeine, cocaine, choline, conine, ephedrine, guanidine, lobeline, phenol, pilocarpine, strychnine, strophanthine, tyramine, veratrine and quinine It was demonstrated that the zone between nerve and muscle is differentiated from nerve or muscle not only pharmacologically but physiologically One section of the nerve, the intermediate zone can be excited only by specific chemical stimuli it is probable that the conduction of impulses from nerve to muscle occurs normally through the intermediate zone by means of a chem mechanism Tyramine and betaine both exert a direct effect on the chromatophores, the first by increasing the excitability of the muscle (thereby resulting in the appearance of pigment clouds) and the second by stimulating the zone between nerve and muscle (which causes a contraction) As both substances occur in cephalopods, it is assumed that they control at any instant the condition of normal chromatophores by their action on the nerve centers Pharmacological analysis confirms the idea that the diffuse expansion of pigment immediately following the application of an elec stimulus to normal cephalopod skin is due to a stimulation of nerve, and not of muscle, fibers B C BRUNSTETTER

Notable cases of poisoning. R FRIDLI *Pharm Monatshefte* 12, 61–2(1931) —An address enumerating certain of the more notable cases of intoxication, either by intent or accident, from ingestion of prepns contg Hg, Cu, As, Ba, Pb, Th, Zn, I, HCl, $CO_2$, EtOH, $CH_2O_2$, acetylsalicylic and salicylic acids, pyramidone, veronal, dial, luminal, opium alkaloids, quinine, atropine, castor oil seed, mushrooms, etc W O E

The chemotherapeutic action of quinine (and its derivatives) in vitro upon Proteosoma praecox (avian malaria). W BORCHARDT *Arch Schiffs Tropen Hyg* 34, 360–4 (1930) —Quinine, hydroquinine-HCl and plasmochin incubated with the blood of infected animals *in vitro* have a definite parasiticidal action, the lethal doses being 0 5, 4, and 0 2 mg , resp , per cc of blood (5 hrs at 37°) These expts indicate that the therapeutic effect of quinine derivs in malaria is due to a direct action upon the parasite *in vivo*. H EAGLE

Experimental studies on the pharmacology of salyrgan IV. Studies on the chemistry of salyrgan. KNUD O MØLLER *Arch exptl Path Pharmakol* 153, 109–19 (1930), cf *C A* 24, 5067 —As shown by potentiometric detns against a Hg electrode, salyrgan produces practically no Hg ions at room temp The addn of acid causes a voluminous ppt of "salyrganic acid" This is only slightly sol in $H_2O$ (1 58000), and somewhat more sol in acid (1 4600 in 2 *N* $H_2SO_4$) In acid soln the Hg ion is formed Salyrganic acid is sol in NaCl soln , probably as a result of the formation of a complex salt The Hg ion concn decreases with increasing NaCl concn The acid is also sol in KCl, $NH_4Cl$, $CaCl_2$, $MgCl_2$, $BaCl_2$, NaI and NaBr, but only very slightly sol in $Na_2SO_4$, $NaNO_3$, $ZnCl_2$, $FeCl_3$ and $HgCl_2$ Salyrgan is excreted in alk urine as such, passing through the body unchanged It is excreted in acid urine as the NaCl salyrganic acid complex H EAGLE

The effect of Germanin upon the blood-coagulation system with particular reference to its prophylactic and therapeutic use in thrombosis. BERNHARD STÜBLR AND KONRAD LANG *Arch exptl Path Pharmakol* 154, 41–9(1930) —Intravenous injection of Germanin causes a slight shift in the reaction of the blood toward the alk side and a *relative increase in the albumin fraction of the serum protein There is a decrease in* the thrombocyte count and an increase in their charge which inhibits their agglutination Germanin has been successfully used in thrombosis and thrombophlebitis H EAGLE

The effect of the intravenous infusion of sugar upon the coagulation system, with particular reference to the pathogenesis of thrombosis. BERNHARD STÜBER AND KONRAD LANG. *Arch exptl Path Pharmakol* 154, 50–8(1930) —The intravenous infusion of glucose causes an increase in blood fibrinogen and globulin, an acceleration of coagulation, *an increase of thrombocytes and a decrease in their elec. charge* The *role of* these changes in causing thrombosis is discussed H EAGLE

Comparative studies on the effects of phenol and some phenol derivatives upon muscle. TAKATOSHI HASEGAWA. *Arch exptl Path Pharmakol* 154, 103–14(1930) — *The narcotic effect of various phenol derivs upon surviving muscle prepns, can be*

readily measured by the time required for complete passivity of the isolated frog gastrocnemius to maximal stimulation The effect of phenol, *p*- or *o*-cresol, and *m*-cresol are in the ratio of 1 2 5 1 75, resp *In contrast, diphenols excite the muscle, and triphenols are only slightly active,* but their ethers are pure narcotics Thymol, β naphthol, mono- and poly nitrophenols have no narcotic effect and cause an intense contraction which develops into death rigor, possibly due to protein coagulation Amino- and sulfo-phenol are ineffective, while benzene causes both narcosis *and reversible contracture* H. Eagle

**The localization of the waking effect of calcium in magnesium narcosis.** Rudolf Schoen and Siegfried Koeppen *Arch exptl Path Pharmakol.* 154, 115–27(1930) — Mg narcosis is due to paralysis of the proprioceptive and labyrinthine reflexes, the waking effect of Ca persists *as long as the reflex centers are intact,* and persists even if the thalamus, corpus striatum and cerebrum are removed from the exptl rabbit. The rigidity following decerebration is removed by Mg, but restored by Ca The waking effect of Ca upon the Mg narcosis is therefore not dependent upon an intact corpus striatum, and is not due to a quieting effect upon the brain stem H Eagle

*Direct and antagonistic effects of magnesium, calcium and potassium chlorides and sodium oxalate upon respiration.* Siegfried Koeppen *Arch exptl Path Pharmakol* 154, 129–42(1930) —Given intravenously, $CaCl_2$, $MgCl_2$ and KCl all increase respiration, given subcutaneously, the first two paralyze respiration, the third is ineffective. *The respiratory paralysis caused by* $MgCl_2$ *is instantaneously stopped by intravenous* $CaCl_2$, gradually overcome by subcutaneous $CaCl_2$, and increased by $Na_2C_2O_4$ Respiratory paralysis due to $CaCl_2$ is removed by the intravenous injection of $MgCl_2$ Neither KCl, $CaCl_2$ nor $MgCl_2$ affects the respiratory paralysis caused by urethan or dial H Eagle

**The pharmacology of gluconic acid a contribution to the effect of free acids in the body.** I. Siegwart Hermann *Arch exptl Path Pharmakol* 154, 143 60(1930) — *Bact gluconicum* was grown in media contg glucose, the gluconic acid formed was repeatedly recrystd as the Ca salt, and the Ca was removed with $H_2SO_4$ Various bacteria *oxidize the free gluconic acid to ketogluconic acid* The *toxicity of the free acid* upon intravenous injection depends upon its concn, and is less if it is given in a soln contg NaCl Org acids in general differ greatly in their toxicity, even when differences in $[H]^+$ and in molar concn are eliminated One important factor in this is that their very *rapid oxidation in the body makes for hypotonicity, partially explaining the protective* action of NaCl II *Ibid* 161 74 —Org acids vary in their ability to form hematin from defibrinated blood, moreover, the activity of each acid depends upon the species of animal from which the blood was taken Although there is a certain correlation between the effective H ion concn and molarity, roughly, $K = m[H^+]^2$, these are not the only two factors the ability of the acid to penetrate into the red cell is very important If, instead of using the intact cell, one uses a soln of hemoglobin, the activity of the acid depends upon the square of $[H]^+$, and is entirely independent of the molarity of the acid The very slight activity of gluconic acid upon the intact cell is due to the fact that it is least sol *in lipoids, and therefore penetrates least into the* cell III. *Ibid* 175–92 —The intravenous injection of org acids causes an increase in minute respiratory vol and frequency, even in the respiratory depression due to morphine Most of the acids, exclusive of gluconic acid, cause a temporary fall in blood pressure *Gluconic acid has no significant effect upon the Ca metabolism of rabbits* and dogs In the former the excretion of Ca in the urine and feces is increased, in the latter, urine Ca is increased and feces Ca decreased The parenteral administration of gluconic acid causes an increase in serum Ca, *i. e.*, a mobilization of Ca, which explains the fact that *it decreases the toxicity of citric acid* Only a fraction of gluconic acid given by mouth is absorbed as such, because of decomposition by yeast and bacteria in the intestine H Eagle

*The antagonism of adrenaline and insulin in the regulation of blood sugar (experiments upon adrenalectomized dogs).* F Meythaler and R Cario *Arch exptl Path Pharmakol* 154, 193–202(1930) —Injections of concd glucose solns into the pancreaticoduodenal artery in adrenalectomized dogs causes a fall instead of a rise in blood sugar, just as it does in normal dogs Injection into peripheral vessels, however, causes a *temporary marked hyperglucemia* This confirms the results of Grafe and Meythaler, who view the blood sugar as the adequate *hormone for the secretion of* insulin, quite apart from any effect of adrenaline There is an antagonistic action between the two in the regulation of blood sugar H. Eagle

*The effect of nicotine, pilocarpine and veratrine upon the isolated submaxillary* salivary gland of the dog. O. Nikolaev. *Arch exptl. Path Pharmakol* 154, 202–10

(1930) —Perfusion of the 3 drugs through the isolated gland has the same effect upon salivary secretion and blood vessels as in the intact animal H EAGLE

*Oxidation of benzene in the isolated livers of warm- and cold-blooded animals.* CHERNIKOV, IDA D GADASKIN AND I I GUREVICH *Arch exptl Path Pharmakol* 154, 222–7(1930) —The isolated livers of cats, rabbits and frogs oxidize benzene to phenol In benzene poisoning of the liver of warm-blooded animals, phenol is found in both free and bound forms, after benzene poisoning of frogs, phenol is found in the cloacal contents The liver may not be the only organ concerned in this oxidation H EAGLE

The effect of snake poisons upon nerve tissue. ARTHUR WEIL *Arch exptl Path Pharmakol* 154, 228–38(1930), cf *C A* 24, 3267 —The poison of *Naja nigricollis* acts like sapotoxin, that of *Bothrops atrox* is similar to Na taurocholate Both affect the medullary sheath, without affecting the affinity of the axis-cylinder for Ag stains A typical Marchi reaction (reduction of $OsO_4$) is given by the fibers affected by sapotoxin and both snake poisons, but not by fibers injured with Na taurocholate The adsorption of sapotoxin or of the snake toxins by the spinal cord follows Arrhenius' formula for the adsorption of amboceptor by red cells rather closely, as well as Schütz' rule H EAGLE

The disappearance of the hypertensive action of the hypophysis in the body. WERNER HARTMANN *Arch exptl Path Pharmakol* 154, 255–62(1930) —The vasopressor action of posterior pituitary exts is less marked if it is injected into a peripheral artery than if it is given intravenously Similarly, passage through the portal capillaries removes some of its activity H EAGLE

Experimental studies in the pharmacology of salyrgan. V. The behavior of mercury in the body after the administration of salyrgan. Continued studies on salyrgan nephritis in rabbits. KNUD O MØLLER *Arch exptl Path Pharmakol* 154, 263–79 (1930) —After the intravenous injection of salyrgan into dogs and rabbits, there is a very rapid excretion of Hg in the kidneys, far more rapid than in man (40% in one hour, 70–80% in 2 hrs ) The urine Hg concn may be as high as 90 mg % in the dog and 370 mg % in the rabbit The development of salyrgan nephritis in the rabbit does not depend upon the reaction of the urine, moreover, the course of Hg excretion is the same in acid as in alk urine Only 3 5% of the Hg is excreted by the liver in 24 hrs in the dog, and only 1% is excreted through the walls of the intestine After repeated injections of salyrgan into dogs only minimal quantities can be found in the organs, chiefly in the kidneys and liver H EAGLE

The sugar economy of the liver. I. The effect of adrenaline and insulin upon the sugar output and glycogen content of the liver. HANS MOLITOR AND LEO POLLAK *Arch exptl. Path Pharmakol* 154, 280–300(1930) —The difference between the sugar contents of the hepatic vein and of the ear vein is increased after adrenaline administration, simultaneously, there is a decrease in the liver glycogen There is no quant. relationship, however, between these two effects After insulin, the sugar content of both the hepatic and ear veins falls within 10 min , but the carbohydrate content of the liver remains either approx const , or shows a slight decrease Adrenaline therefore increases the glucose output of the liver, while insulin suppresses it H EAGLE

Clinical and experimental contributions to the pharmacology of harmine. G MARINESCO, A KREINDLER AND A SCHEIM *Arch exptl Path Pharmakol* 154, 301–16(1930) —Harmine causes clinical improvement in cases of Parkinson syndrome In normal subjects and in post encephalitic parkinsonism it causes an increased excitability of the vestibular app There is a fall in blood pressure and bradycardia, and the vascular reflexes return toward normal The hyperexcitability of the parasympathetic system and the lowered excitability of the sympathetic system characteristic of parkinsonism are also corrected by harmine It has a vagal effect upon isolated frog heart, and reduces muscle and nerve chronaxia in the isolated frog nerve muscle prepn In the patient it has a therapeutic effect upon the pathological chronaxia of nerves and muscles H. EAGLE

The cause of creatinuria. I. Acidosis and creatinuria. OTTO RIESSER AND CARLO BRENTANO *Arch exptl Path Pharmakol* 155, 1–20(1930) —Despite the fact that morphine, urethan and ether narcosis induce both creatinuria and acidosis, the two are not necessarily correlated The degree of creatine formation and excretion is not proportional to the degree of acidosis and alkalosis induced by the administration of alkali may also cause creatinuria H. EAGLE

Pharmacology and pharmacodynamics of salves and medicaments incorporated in salves VI. The pharmacology and pharmacodynamics of unguentum-hydrargyri praecipitati albi, Ph. g. CARL MONCORPS *Arch exptl Path Pharmakol* 155, 51–69

ates the poisoning of the frog muscle independently of $p_H$ There is no relation between the toxic effects of hydroquinone and its effects upon tissue respiration Muscles of fatigued animals or of animals treated with thyroxine are more susceptible to poisoning by hydroquinone, lactic, succinic and pyroracemic acids depress this susceptibility, and cane sugar accentuates it. H EAGLE

The clinical significance of the initial insulin hyperglucemia. MAX BÜRGER *Klin Wochschr* 9, 104–8(1930) —In 22 normal fasting human beings, the intravenous injection of insulin caused an initial hyperglucemia, the max rise averaging 22% of the original blood sugar, this max was reached in 10 min In cirrhosis, this initial hyperglucemia is not observed, in jaundice, it is significantly decreased Both an intact liver parenchyma and a liver store of glycogen are considered necessary for the phenomenon, this explains its absence in Basedow's disease, and its presence in myxedema In diabetes under proper treatment hyperglucemia is also observed, but not in diabetic coma H EAGLE

The venoconstrictor action of carbonic acid and its significance for the circulation KL. GOLLWITZER-MEIER AND HANS BOHN *Klin Wochschr* 9, 872–5(1930) —The inspiration of air with a high $CO_2$ content by dogs causes venoconstriction, demonstrable even in a vein being perfused with a normosal-serum mixt , quite apart from the circulation This constriction is conditioned by a vasomotor reflex, and is not observed in the perfused vein if its nerve supply is eliminated H EAGLE

The retention of uroselectan in the human body. II. The distribution of uroselectan in the animal body. W TOURNÉ AND E DAMM *Klin Wochschr* 9, 1719–20 (1930), cf *C A* 25, 1582 —Thirty five min after the intravenous injection of 10–30 cc of 40% uroselectan into rabbits the animals were killed and their organs examd Uroselectan was found to be stored chiefly in the liver, kidneys, skin, blood and urine A similar distribution was found in dogs The kidney content is ascribed to urine, that of the liver to bile Damage of either the liver or the kidneys leads to storage and excretion in the other organs Widespread kidney damage is a contraindication to the administration of uroselectan H EAGLE

The action of vasopressin and oxytocin upon intestinal peristalsis and the treatment of ileus paralyticus with vasopressin. A WL ELMER, L PTASZEK AND M SCHEPS *Klin Wochschr* 9, 1765–8(1930) —Of the hormones present in posterior pituitary exts , vasopressin stimulates, and oxytocin inhibits, intestinal contractions The former is more active than pituitrin, physostigmine, pilocarpine, atropine, etc., and its therapeutic use in paralytic ileus is indicated H EAGLE

The pharmacological significance of the sterols. HANS SEEL *Klin Wochschr.* 10, 241–4(1931) —A review H EAGLE

The properties and effects of a new class of organic bromine compounds. SIEGWART HERMANN AND MARIE FREUND *Klin Wochschr.* 10, 250–2(1931) —If $Br_2$ is combined with unsatd fatty acids (*e g*, oleic acid), and part of the $Br_2$ is removed, one attains a new type of org combination of $Br_2$, pharmacologically many times more active than the fully brominated compd A quantitatively similar relationship was observed with $Cl_2$ The pharmacol effect of $Br_2$ compds usually depends upon the type of compd rather than the amt of $Br_2$ Multibrol (Na monobromoleate) has no effect; it does not affect blood pressure, respiratory vol or frequency, and does not cause bromism H EAGLE

*The effect of caffeine in hypoglucemic conditions.* GRIEFF AND HAPPE *Klin Wochschr.* 10, 263(1931) —Contrary to the findings of Popper and Jahoda, the symptoms following an excess of insulin depend upon the fall of blood sugar Caffeine alleviates these symptoms, without affecting the blood sugar There is no reason for *assuming that insulin contains two distinct substances, one with a hypoglucemic and* the other with a toxic action Such symptoms as urticaria, and possibly convulsions, may be due to protein impurities H EAGLE

*The circulatory effect of ephedrine.* F HILDEBRANDT AND H MOGGE *Klin Wochschr* 10, 291–4(1931) —The circulatory effects of ephedrine are due not to an increase in cardiac activity, but to a direct action upon the vessel walls Ephedrine may have a toxic action upon the heart H EAGLE

The appearance of indican and aromatic substances in the blood in severe cardiac decompensation and morphine poisoning. J E W BROCHER *Klin Wochschr* 10, 294–7(1931) —In a case of morphine poisoning, coupled with myocardial insufficiency, there was marked retention of urea, uric acid and indican in the blood, with a prompt return of the abnormal blood findings to normal when diuresis was established H E

Gänsslen's liver extract for injection. Further evidence against liver resistance

and in favor of the susceptibility of cord degeneration to treatment. VIKTOR SCHILLING *Klin Wochschr* 10, 301–3(1931). H. EAGLE

*The effect of atropine upon glucemia in human beings.* D DANIELOPOLU *Klin Wochschr* 10, 311–3(1931).—Contrary to current belief, stimulation of the parasympathetic system increases the blood sugar. H EAGLE

The treatment of pernicious anemia with a stomach extract which can be injected. W I NERLE, H KRITCH AND M GANSSLEN *Klin Wochschr.* 10, 313(1931).—Good results are reported in this preliminary report. H EAGLE

A new mechanism of the insulin effect. H SCHWARZ AND M TAUBENHAUS *Klin Wochschr* 10, 313–4(1931).—A preliminary report H EAGLE

Thyroxine and percutaneous sensitization. M. LUCACER *Klin Wochschr* 10, 314(1931).—Thyroxine accentuates the allergic reaction due to percutaneous sensitization, and therefore has a peripheral action H EAGLE

The specific treatment of gonorrhea with soluble gonotoxin. W WOLFFENSTEIN *Klin Wochschr* 10, 354–6(1931) H EAGLE

Experimental studies on the effect of the inspiration of small quantities of [benzine] and [benzene] upon the respiratory organs and the whole body. L TR LARIONOV AND N V LAZAREV *Klin Wochschr* 10, 356–7(1931).—The authors take issue with the conclusions of Schmidtmann (*C A* 25, 1006) H EAGLE

The insulin reaction of the leucocytes of the blood. W STOCKINGER AND K. KOBER *Klin Wochschr* 10, 389–92(1931).—Within 2 hrs following the administration of insulin, there is an abs rise in the no of leucocytes, reaching a max. at the end of the 2nd hr Simultaneously, or a little later, there is a neutrophilic leucocytosis There is no correlation between the hypoglucemia and these changes in the blood picture H. EAGLE

The treatment of lymphogranulomatosis inguinalis, particularly with a copper preparation. W FREI AND J WIESE *Klin Wochschr* 10, 404–6(1931).—Although Sb preps are effective, they work very slowly and irregularly The authors suggest the use of cuprosol H ( a proprietary prepn ) as an adjunct to therapy, particularly effective if given with Stibenyl H EAGLE

Ephedrine in local anesthesia. M KOCHMANN. *Klin Wochschr* 10, 408(1931).—Ephedrine is valuable as an adjunct to local anesthetics, but cannot replace adrenaline H EAGLE

Further studies in the demonstration of Germanin (Bayer 205) in the animal body. HEINZ ZEISS AND KENIA UTKINA-LYUBOVTTOVA *Z Immunitats* 68, 170–81(1930).—Following the intravenous injection of Germanin, the highest concns are found in the serum the drug is also stored in the kidneys, lungs, spleen and liver H. EAGLE

*Colloid-chemical combination reactions of Germanin and protein complexes.* II. The effect of Bayer 205 upon the protein components of the hemolytic system. VASSILI A NOVOSSELSKII *Z Immunitats* 68, 328–41(1930).—Germanin has no effect upon the hemolytic properties of normal or sensitized sheep cells and does not decrease the hemolytic titer of an amboceptor serum It does, however, depress the hemolytic properties of complement H EAGLE

The residual quantities of arsenic remaining in animal organs after the intake of neoarsphenamine E REMY *Z Immunitats* 68, 395–402(1930).—Following the injection of neoarsphenamine into rabbits, considerable quantities of As are stored in the organs, particularly in the spleen, lymph glands, liver, bone marrow and brain for some time R. opens the question as to whether the excess As is ever completely excreted H. EAGLE

3,4-Dihydroxyephedrine and 3,4-dihydroxynorephedrine. RAYMOND HAMET *Compt rend* 192, 300–2(1931), cf *C A* 25, 1590.—Both 3,4 dihydroxyephedrine (I) and 3,4-dihydroxynorephedrine (II) when injected produce a hypertension which, like that produced by adrenaline (III), is increased by cocaine The effect of ephedrine (IV) is decreased by cocaine Large doses of IV are hypotensive but large doses of I and II are hypertensive like III. While IV in small doses has but a slight transient effect on intestines *in vitro*, I and II, like III, have a strong and lasting inhibiting effect. *Conclusion*.—The addn. of a Me group to the β C of III or noradrenaline does not greatly modify the physiol action of these substances, while substitution in the nucleus of ephedrine of 2 phenolic OH groups in the 3,4-position profoundly changes the action of this compd L E GILSON

Lectures in *materia medica*. W A DEWEY *J Am Inst Homeopathy* 23, 1224–34(1930), 24, 186–98(1931), cf *C A* 24, 5377.—A discussion of the physiol action and therapeutic use of *Stramonium*, *Solanum dulcamara*, tobacco, *Capsicum annum* and *Nux vomica* JOSEPH S. HEPBURN

The influence of the intravenous injection of urea on the exchange of substances between the blood and the tissues. H DONOVAN AND D BRENNER *Brit J Exptl Path* 11, 419–38(1930) —Five g. urea was injected intravenously into healthy individuals and patients with various diseases, and the urea, NaCl and $H_2O$ contents of the blood and urine were detd at intervals for a period of 2 hrs after the injection By the time the urea has mixed with the blood (3 min ) 80% has left the blood stream It is suggested that the urea leaves the blood by a process of simple diffusion, passing into the water of the cells as well as into the free water, and that the process is complete in 15 min , when the concn of urea in the blood equals that in the tissues In this respect urea is unique as with no other substance investigated is the distribution uniform over blood and tissues The sudden introduction of urea into the body delays the formation of urea, and may even bring it to a standstill in the first 2 hrs after the injection The osmotic attraction of the urea injected is greatly reduced by its rapidly leaving the blood NaCl also leaves the blood so that the osmotic attraction of dissolved substances in the blood is not raised even 3 min after the injection There is some evidence that except in edematous patients urea injection causes some NaCl to pass out of the body fluids, to be stored in a "dry" form in the salt depots of the body, thus reducing the crystalloid content of the body fluids which had been raised by the injection of urea, but that in most cases of edema, NaCl is liberated from the depots and enters the body fluids It has been suggested that an important factor in the production of edema is a deficient power of the tissues to hold and bind water, which therefore accumulates *in the tissue spaces as edema fluid The writers suggest that in edema the tissues are* also less able to bind NaCl, which also accumulates in the free tissue fluids H F H

The influence of adrenaline on the immediate variation in alkaline reserve. Role of apnea. Comparative action of formaldehyde and acetylcholine. J GAUTRELET D BENNATI, E HERZFELD AND L VALLAGNOSC *Bull soc chim biol* 12, 1100–44 (1930) —Intravenous injection of 0 1 mg adrenaline per kg into anesthetized dogs caused an av rise in alk reserve (I) of 15% in 1–3 min , followed by a rapid fall A condition of apnea is produced but it is not an important factor in relation to I. Apnea produced by intravenous injection of HCHO and acetylcholine is not accompanied by a rise in I. *Injections of 0 0001–0 01 mg adrenaline produced a distinct rise in I* without appreciable apnea Increased respiration may be due to a sudden release of $CO_2$ into the blood stream C G KING

The action of potassium salts on the Golgi apparatus of the liver cells. M SHIRASAKA. *Arb Med Univ Okayama* 1, 481–95(1930); *Physiol Abstracts* 15, 588 —The administration of large quantities of KBr and KI to rabbits causes a marked disturbance in the liver cells. KCl, $KNO_3$ and $Na_2SO_4$ have only a slight effect The halogen ions have a destructive action on the Golgi app of the liver cells and penetrate the bile capillaries, causing an increased bile secretion It would appear that the Golgi app bears no relation to the bile capillaries $KNO_3$ and $Na_2SO_4$ have no action on either the Golgi app or the bile capillaries. G. G

Action of cholesterol and lecithin on the Golgi apparatus of the nerve cells of rabbits. S OKADA *Arb Med Univ Okayama* 1, 503–14(1930), *Physiol Abstracts* 15, 559 — The increase of cholesterol content by lanolin injection favors the development of the nerve cells of rabbits, while the growth of the mitochondria is inhibited Lecithin has the reverse effect G G

Action of potassium and calcium on the Golgi apparatus and mitochondria of the epithelial cells of the kidney. R KAMAKURA *Arb Med Univ Okayama* 1, 515–45 (1930), *Physiol Abstracts* 15, 559 —Repeated injections of $CaCl_2$ bring the Golgi app of kidney cells into prominence but lessen that of the mitochondria KCl has the reverse effect. If, however, the injections are carried on for a longer period, the *reverse effect of the salts, as noted above, is evident* G. G

Action of cholesterol and lecithin on kidney tubule cells. R. KAMAKURA *Arb Med. Univ Okayama* 1, 628–43(1930), *Physiol Abstracts* 15, 560 —Repeated injections of lanolin cause a shrinkage of the cells of the kidney tubules The Golgi app is intensified, while the mitochondria sink into the background Lecithin causes a swelling of the cells, and the mitochondria are intensified Injections continued over a very long time have the reverse effect in the 2 cases. G G

Effect of histamine and peptone on the portal pressure of cats. W. FELDBERG *Arch exptl. Path Pharmakol* 140, 156–67(1928), *Physiol Abstracts* 15, 376; cf *C A* 22, 633 —When histamine or peptone is injected into the jugular vein of a cat, the pressure *in the portal vein falls secondarily to the fall of general blood pressure* This is sometimes followed by a rise, caused apparently by an increase in the resistance of the liver vessels When it is injected in the portal vein, there may be a small preliminary rise

in portal pressure which is probably due to the same cause This constriction of liver vessels is much smaller than that which occurs in dogs, and in some cats it does not occur G G

The action of pilocarpine and physostigmine on the isolated cat heart after degeneration of the vagus nerve W Brandhendler *Arch exptl Path Pharmakol* 140, 168–73(1928), *Physiol Abstracts* 15, 361 —Physostigmine and pilocarpine still act on an isolated cat heart (Langendorff prepn ) after degenerative section of the vagi It is argued that their point of action must be peripheral to the nerve endings G G

The action of pituitary extract and insulin on the secretion and the blood vessels of isolated suprarenals. M P Nikolaev *Arch exptl Path Pharmakol* 140, 229–36 (1929); *Physiol Abstracts* 15, 390 —Ringer soln was perfused through the suprarenals of cattle and its adrenaline content subsequently detd on a perfused rabbit ear. It was thus shown that pituitary (posterior lobe) ext and insulin stimulate the suprarenals to secrete adrenaline G G

Quantitative investigation on the reversibility of the glucosides of squill as a contribution to the mechanism of the action of heart remedies. W. Graf *Arch exptl Path Pharmakol* 140, 375–79(1929), *Physiol Abstracts* 15, 401 —The action of the glucosides of squills was studied on the heart of *Rana temporaria* (Straub's prepn ) The threshold concns for systolic arrest are given scillaren A, $1/1.8 \times 10^6$, scillaren B, $1/3 \times 10^6$, scillaridin B, $1/1.5 \times 10^6$. The action is more easily abolished by washing than is the case with digitoxin, and the drugs act quicker and in lower concns The ease with which the effect could be abolished by washing the heart with various prepns was studied, and the conclusion was reached that the effect depended on a destruction of the drug by the heart rather than on its diffusion out of the muscle The addn of dialyzed serum delayed the effect but did not alter the threshold concn G G

The narcotic action of the vapors of chlorine derivatives of methane, ethane and ethylene. N V Lazarev *Arch exptl Path Pharmakol* 141, 19–24(1929), *Physiol Abstracts* 15, 403, cf *C A* 24, 2182 —*The Cl derivs of* $CH_4$, $C_2H_6$ *and* $C_2H_4$ *were* investigated by exposing mice to their vapors in hermetically sealed glass bottles The min. concn of the vapor necessary to make the animal (1) lie on its side, (2) lose its reflexes, (3) die, was detd for each substance In general it was found that the narcotic action increased with the increase in the no of Cl atoms There were some exceptions to this rule, for instance, $CCl_4$ is less powerful than $CHCl_3$ In these cases it was found that the less powerful compd had a very small soly coeff G G

Investigations on the pharmacology and pharmacodynamics of ointments and medicaments incorporated in ointments. C Moncorps. *Arch exptl Path Pharmakol* 141, 25–104(1929), *Physiol Abstracts* 15, 494–5, cf *C A*. 24, 5863 —I. Ointments and pastes all fall into 2 groups Either the water is the continuous phase and the fat the disperse phase, or *vice versa* The former type is expressed as oil-water in this paper, and the latter as water-oil The properties of ointments vary according to the type to which they belong, and the type can be varied according to the emulsifying agent used II. The adsorption and absorption of salicylic acid from ointments was investigated by following its excretion in the urine of men after the various ointments had been applied for 12–24 hours to the skin of the leg Pasta zinci oxidi, vaseline, lanolin, eucerin and physiol A, B, C, were among the ointments tested. The absorption of salicylic acid was greatest from eucerin (a water-oil ointment) and physiol C (an oil-water one), but both these have a keratolytic action. The amt of salicylic acid absorbed is small, and none can be demonstrated until the strength of the ointment reaches 25%. III. S, on the other hand, is absorbed less from physiol C and eucerin than it is from pasta zinci oxide During absorption it is reduced, and $H_2S$ can be demonstrated in the blood. IV. After 10% S ointments had been applied for 12 hrs, the total S of the sulfates in the urine was increased. G G.

Tests of anthelmintics on the vinegar eel. E Ratti *Arch exptl Path Pharmakol.* 141, 129–41(1929), *Physiol Abstracts* 15, 407 —A description is given of a series of tests made on the vinegar eel, *Anguillula aceti*, in which its resistance to various substances was compared with that of parasitic worms, earthworms and small fishes The vinegar eel withstands acids well, while its resistance to alkalies depends on their lipoid-soly Most of the common anthelmintics were tested, and it was found that the vinegar eel is comparable with the nematodes rather than with the cestodes The anthelmintics tested include morg substances, alkaloids, org halogen compds , benzene derivs , *Filix mas* and terpenes Of the phenol group, it appeared that the higher the mol. wt., the greater the toxicity for vinegar eels, while the toxicity to mammals decreases with increasing mol. wt. Paracymol had the greatest anthelmintic power of the substances

tested It is suggested that the vinegar eel is a convenient exptl animal for the testing of anthelmintics and gives much better results than the earthworm G G.

The curare-like action of tellurites on the frog R Labes. *Arch exptl Path Pharmakol* 141, 142–7(1929), *Physiol Abstracts* 15, 408.—Small doses of $K_2TeO_3$ injected into the lymph sac of frogs were found to produce an effect like that due to curare. One to 2 days after the injection the hind limbs were completely paralyzed and the fore limbs partially paralyzed Stimulation of motor nerves produced no response, but the muscles still responded to direct stimulation Sensation was intact. The paralysis was a peripheral motor paralysis, but it was not possible to demonstrate the presence of Te in the motor end plates G G

The action of histamine and adrenaline on rabbit ears. E Platow *Arch exptl Path Pharmakol* 141, 161–3(1929), *Physiol Abstracts* 15, 364.—Intravenous injections of 0.025 to 0.05 mg histamine into the vessels of a rabbit ear produced dilatation, while injections of adrenaline, even as small as $10^{-6}$ mg always produced a constriction G G

The mechanism of polyphasic action [of drugs] E Rentz *Arch exptl Path. Pharmakol* 141, 183–227(1929) *Physiol Abstracts* 15, 400, cf *C A* 23, 908.—A large no of cases have been collected from the literature in which the most diverse substances produce a biphasic effect on isolated smooth muscle In some cases both stimulation and inhibition occur successively while the drug is still in contact with the tissue, in others the 2nd phase of the effect is only seen on washing out the drug The theories which have been propounded to account for the various cases are discussed and found to be inadequate to explain all the cases quoted, which are all thought to be examples of a fundamental property of the tissue It is pointed out that when biphasic effects are seen in the whole animal, they may be examples of the same phenomenon, and it is unnecessary to postulate special mechanisms such as reflexes to account for them. G G

Tolerance of nerves to poisons. A Lanczos *Arch exptl Path Pharmakol* 141, 248–56(1929), *Physiol Abstracts* 15, 403.—The sciatic nerves of frogs were immersed in solns of urethan, and the strength of current required to stimulate them was measured at intervals of 15 min It was found that a nerve left in a soln of urethan became narcotized and subsequently recovered while still in the soln Also a nerve which had been previously immersed in a weak soln of urethan was not narcotized by a soln which would completely narcotize an untreated nerve Motor-nerve endings, on the other hand, could not be shown to acquire any tolerance to urethan. G G

Pharmacology of the rare-earth metals. II. Yttrium. H. Stemple and M Ding *Arch exptl Path Pharmakol* 141, 273–9(1929), *Physiol Abstracts* 15, 408, cf *C A*. 24, 4839.—Yt ppts albumin, inhibits the action of yeast cells, paralyzes frogs and causes at 1st excitement and dyspnea, and later paralysis and death in mice. It stops an isolated frog heart in diastole In general Yt may be said to resemble Al and Ce in its action, and its toxicity is about the same as that of Ce, except in its local action, in which it is more powerful than Ce. G G.

Sensitivity of the rabbit heart to strophanthin after feeding with irradiated ergosterol. R. Mancke *Arch exptl Path Pharmakol* 141, 280–91(1929), *Physiol Abstracts* 15, 401.—With normal rabbits, a concn of strophanthin of $10^{-4}$ in the perfusion fluid invariably made the heart stop in systole Hearts of rabbits which had been fed with irradiated ergosterol, but in which no pathol changes could be demonstrated, behaved like normal hearts. Hearts of rabbits with pathol changes took a longer time to stop in systole, and before that stopped periodically in diastole They also showed no dilatation of the coronary arteries during the perfusion, whereas in normal hearts a slight dilatation occurred G G

Disposal of digitalis and its action in warm-blooded animals. II. Extra-cardiac consumption of digitalis and the conditions of glucoside combination in the heart. H Weese *Arch exptl Path Pharmakol* 141, 329–50(1929), *Physiol Abstracts* 15, 400, cf *C A* 24, 4840.—It has been shown that only a small proportion of the active principles of digitalis is stored in the heart on intravenous injection An attempt is here made to trace the fate of the rest Various organs were perfused by a cat's heart-lung prepn, and the digitalis (or strophanthus) injected into the arterial cannula going to the organ The lethal dose for the heart was known. The amt. injected in excess of this before the heart stopped was presumed to be stored in the tissue It was thus shown that about half the min lethal dose could be taken up by the voluntary muscles, but the heart and kidneys absorbed the largest quantity in proportion to their wt. By working with almost poisoned hearts it was shown that the different organs allowed no digitalis to pass them till they were nearly satd Uptake of digitalis by the isolated

serum. J La Barre and J Louis Wodon *Compt rend soc biol* 104, 111-2(1930); *Physiol Abstracts* 15, 414 —Guinea-pig uterus *in vitro* was treated with sensitizing serum in Locke's fluid contg tissues from animals sensitized some weeks previously The hypertonic contractions indicated anaphylactic shock This was produced in 1 cornu, the other serving as control The addn of Mg salts effected immediate cessation of the symptoms of shock The salts produce tissue desensitization or render the uterus insensible to stimulation The hyposulfite is the most suitable salt G. G.

Action of hypertonic sodium chloride on intestinal motor activity. L Bouisset and P Fabre *Compt rend. soc biol* 104, 462-5(1930), *Physiol Abstracts* 15, 452 — The record of intestinal contractions taken from a dog shows increase of activity when 10–20 cc of a 30% soln of NaCl is injected into a vein This stimulating influence of hypertonic NaCl is const. G G

Action of vagotonin on glucemia. T Briel G Fuchs, D Santenoise and M Vida covitch *Compt rend soc biol* 104, 768–70(1930), *Physiol Abstracts* 15, 594 — The vagotonic substance secreted by the pancreas and isolated from insulin in pancreatic exts by frequent washing with alc. possesses some hypoglucemic action Its action on the blood sugar is effected through the vagus nerve, thus it differs from insulin, the action of which is direct G G

Anticoagulating action of sulfarsphenamine E Zunz and M A Camacho *Compt rend soc biol* 104, 793–4(1930), *Physiol Abstracts* 15, 571 —The clotting of recalcified oxalated plasma from the rabbit was found to be retarded by the action *in vivo* of sulfarsphenamine. The effect is essentially due to a combination or complex of the arsenical compd with fibrinogen The arsenical compd seems also capable of combining with and hindering the action of thrombin, and it prevents the conversion of proserozyme to serozyme G G

Action of hypertonic sodium chloride in intestinal occlusion L Bouisset and P Fabre *Compt rend soc biol* 104, 847–50(1930), *Physiol Abstracts* 15, 452 —By injection of hypertonic NaCl at varying intervals after occlusion of the small intestine in the dog it has been found that the muscular tone passes through 2 distinct phases In the 1st the wall is sluggish but ready to react violently under the influence of the excitant. The pressure within the lumen rose from 2 5 cm Hg to 8 cm after the injection In the 2nd phase atony is pronounced, and the reactions are weak or neg It requires 5 or 6 days of occlusion to show the complete change G G

Action of camphor and its derivatives on the isolated intestine. H Busquet *Compt rend soc biol* 104, 869–72(1930), *Physiol Abstracts* 15, 550 —Camphor and its sol. derivs, campho-sulfonate and campho-carbonylate of soda, act as excitants of the central nervous system and as cardiac tonics Pure camphor exercises a marked inhibitory action on the isolated intestine, but the derivs mentioned cause a distinct increase of amplitude of the contractions The sedative action of camphor must have been suspected when it was introduced into paregoric, but it is essential, in prescribing it for intestinal spasm, to bear in mind the difference of action from that of the derivs G G

Action of vasomotor substances on albuminuria. A Hanns *Compt rend soc biol* 104, 877–8(1930); *Physiol Abstracts* 15, 529 —Injection of adrenaline in one subject of Bright's disease was invariably followed by diminution of albumin in the urine which lasted some hrs The excretion of water in excess may have accounted for the change In a 2nd case the drug had the opposite effect on the albumin and none on the excretion of water Postural influences on the amt of urine and the albumin content were different in the 2 cases, and it is uncertain if the differences in the action of the drugs were related to this influence G G

*Absorption capacity of dental pulp.* A E Obiglio *Rev soc Argentina biol* 6, 79–98(1930); *Physiol Abstracts* 15, 551 —The 1st molars of dogs were trephined, and substances were introduced into the cavities KI (tested in blood, urine and saliva) and phenolsulfonephthalein (in 24 hrs 4–26% passes into the urine) are easily absorbed In doses varying between 1 and 20 mg the following substances are absorbed apomorphine (vomiting), strychnine (convulsions), atropine (mydriasis and vagus block), cocaine (death), nicotine (death), cyanides (slight symptoms) Absorption of the following substances could not be proved venoms of *Lachesis alternatus* and *Naja tripudians*, insulin and adrenaline Perforation of the tooth produces a slight hyperglucemia G G.

Chemical structure of insulin. Study of some synthetic sulfur compounds having hypoglucemic action. C Ruiz, L. Silva and L Libenson *Rev soc Argentina biol* 6, 134–41(1930); *Physiol Abstracts* 15, 530 —Since S is found in insulin, the hypoglucemic action of S compds was tested in rabbits *per os* and by injection Cyclodecamethylene-

thiourea is insol and inactive Thiophenol, thioacetic acid and 4- or 5-methyl-2-thioimidazole have some activity (blood sugar falls from between 0 099 and 0 132 to between 0 072 and 0 08%) G G

Calcium and magnesium salts and the healing of wounds. G Mazzacuva *Riv patol sper* 5, 327–42(1930), *Physiol Abstracts* 15, 483 —The formation of scar tissue on superficial wounds is hastened by the subcutaneous injection of small quantities of Ca and Mg chlorides G G

Suppression of glucose combustion by adrenaline administration. A. R Colwell *Endocrinology* 15, 25–33(1931) —Cats were anesthetized by means of amytal, and the effects of continued administration of 2 g glucose per hr and 0 001 mg of adrenaline per min per kg upon the total and non protein respiratory quotients, and blood sugar, were detd After 3–5 hrs of glucose and adrenaline, the non protein quotient reached a level near 0 7 and did not change appreciably until the adrenaline was discontinued, whereupon it rose to normal in 4 hrs Therefore, adrenaline interferes with, and may even abolish, glucose combustion W D Langley

The toxicity of amyl nitrites. Otto Gerhardt *Chem -Ztg* 55, 128(1931) —G describes the toxic effects exerted upon himself and his associates by amyl nitrite in the process of its prepn experimentally and on a large scale The toxic products become manifest in the early stages of the nitration of the amyl ales and cause headache, increased blood pressure, general dizziness, noises in the ears, etc. The effects are cumulative, hence the danger of repeated slight intoxications B S Levine

Chlorophyll and its nephrohepatic extracts in experimental anemia. Carlos A Sagastume and José A Pezzani *Rev facultad cienc quím (Univ La Plata)* 7, Pt II 7–22(1930) —Chlorophyll possesses interesting pharmacodynamic properties, the study of which may lead to important therapeutic applications In expti anemias studied S and P found chlorophyll acting as an agent regenerating erythrocytes and hemoglobin B S Levine

The combined action of ultra-violet rays and neoarsphenamine on trypanosoma equiperdum. G Giemsa and V Ellenbogen *Z Immunitäts* 67, 78–82(1930) — Neosalvarsan in amts slightly less than the curative dose injected into mice infected with *trypanosoma equiperdum* causes all the organisms to disappear from the blood in 2–10 days only to reappear within several days Radiation of the mice after the injection of the salvarsan does not alter this course of events, contrary to the findings of Roskin and Romanowa (*C A* 24, 5867) Julian H Lewis

The combined action of ultra-violet rays and a series of trypanocidal substances on trypanosomes. Gr Roskin, A Bichovskaya and S Shishliaieva *Z. Immunitäts* 67, 91–4(1930) cf following abstr —Among several trypanocidal substances novar solan was the only one whose action was enhanced by exposure of the infected mice to ultra violet rays after injection of the drugs Julian H Lewis

The method of combined therapy with arsenicals and ultra-violet light. Gr Roskin *Z Immunitats* 69, 240–3(1930), cf 2 preceding abstrs —G and E failed to confirm the observation of Roskin that mice infected with trypanosomes and injected with ineffective doses of novarsolan are sterilized if the mice are exposed to ultra violet light after injection of the novarsolan This failure is attributed to the fact that Giemsa and Ellenbogen failed to remove the hair of the mice before irradiation J H L

The analysis of the combined action of arsphenamine and ultra-violet light in protozoan infections. G Roskin and K Romanova *Z Immunitats* 67, 94–101(1930), cf 2 preceding abstrs —Serum of mice exposed to ultra violet light can change a non curative dose of novarsolan into a curative one Serum of radiated mice alone has no trypanocidal action Julian H Lewis

Analysis of the combined therapy with drugs and ultra-violet light. Gr Roskin *Z Immunitats* 69, 473–83(1931) —In the serum of mice irradiated with ultra violet light there is a factor transferable to other mice that enhances the effect of neoarsphenamine in the treatment of trypanosome infections in mice This factor is destroyed by heating the serum at 56° for ½ hr and by irradiating the serum *in vitro* with ultra violet light It is adsorbed by kaolin The factor arises from the mesenchyme of the skin and the entire reticulo endothelial system Julian H Lewis

Further chemotherapeutic studies of a new benzenearsonic acid derivative (arsenic preparation 4002). Giemsa *Z Immunitats* 69, 86–99(1930) —Theoretically the arsonic acid compds should be better adapted to the treatment of trypanosomal diseases than the arseno compds, since they are more easily diffusible and do not combine with the colloids of the blood This assumption is borne out by expts which show that As prepn 4002, a benzenearsonic acid deriv, cures trypanosome infections in mice better

than do atoxyl and tryparsamide Syphilis in rabbits is also cured by this prepn given either parenterally or orally JULIAN H LEWIS

**Can biological tests of toxicity of arsenobenzol derivatives be replaced with chemical tests?** H BAUER AND M ROTHERMUNDT *Z. Immunitats* 69, 213–9(1930) —The chem method of Kielbasinski (*C A* 24, 5868) does indicate the full toxicity developed in arsphenamine through oxidative processes JULIAN H LEWIS

**Changing arsphenamine fastness.** HEINRICH CITRON *Z Immunitäts* 69, 464–71 (1931) —Repeated injections of $Na_2S_2O_3$ into mice infected with arsphenamine fast trypanosomes permanently destroyed the arsphenamine fastness The low toxicity of $Na_2S_2O_3$ permits the use of this principle in patients JULIAN H LEWIS

**The behavior of lead in the animal organism II. Tetraethyl lead.** ROBERT A KILLIAN AND FREDERICK THAMANN *Am J Hyg* 13, 478–98(1931), cf *C A* 22, 2800 —The distribution of tetraethyl lead in rabbits following absorption by the skin of the abdomen was detd over short and long periods Any excess was washed off after 60–90 min Inhalation of the lead was prevented Tissues, bones and blood were analyzed by steam distn of the tetraethyl lead from them From pure tetra ethyl lead the absorption rate is rapid from 0.1% in gasoline (the percentage in treated gasoline) absorption was negligible through the skin During rapid absorption the dis tribution in tissue corresponds to that of an oil sol material The compd is rapidly decompd by tissue, so that after a period of 1–2 weeks the lead deposit resembles that of a water sol lead compd The nervous system is very susceptible to lead absorption excretion follows quantitatively that of water sol compds G H W LUCAS

**Brain-water movements during anesthesia** H G BARBOUR *Science* 73, 346–7 (1931) —As a possible explanation of anesthesia, the dehydration of nerve cells has been suggested, but exptl proof of this is a difficult undertaking Anesthetic substances vary in their effect on the water content of the brain as a whole and of certain por tions of it In some ether and morphine expts a hydration was evident and again withdrawal of morphine from young rats and dogs resulted in hydration Other expts have indicated in the first 2 hrs after morphine the cerebrum is dehydrated but the medulla is hydrated This increase in ratio of medulla $H_2O$ to cerebrum $H_2O$ has been found with amytal and others Ether excitement prolonged for half an hour did not cause an increase in the ratio The ratio for normal rats is 0.922 ± 0.003 morphinized rats showed 0.939 ± 0.007 Possibly the colloidal conditions of the cells are altered in such a way as to extrude water G H W LUCAS

**Effect of continuous intravenous injection of adrenaline on the carbohydrate metabolism, basal metabolism and vascular system of normal men.** C F CORI AND K. W. BUCHWALD *Am. J. Physiol* 95, 71–8(1930) —Adrenaline was injected intravenously into normal men for a period of 30 min , 0.00005 mg per kg per min was the lowest rate which still caused a rise in blood pressure, blood lactic acid and basal metabolism, 0.000025 mg per kg per min caused an increase in pulse rate, respiration and blood sugar J F LYMAN

**Effect of adrenaline on sugar utilization in animals under amytal anesthesia.** G T CORI *Am J Physiol* 95, 285–91(1930) —Amytal anesthesia, which in itself has but a slight effect, greatly intensifies the depressive action of adrenaline on glucose utilization Glucose utilization by rats was as follows unanesthetized 98%; un-anesthetized + adrenaline 89%, amytal anesthesia controls 91%, amytal + adrena-line given subcutaneously 40%, amytal + adrenaline given intravenously 27% J F LYMAN

**The effect of various anterior pituitary preparations upon basal metabolism in partially thyroidectomized and in completely thyroidectomized guinea pigs.** W J SIEBERT AND R. S SMITH *Am J. Physiol* 95, 396–402(1930) —Armour pituitary tablets caused a marked rise in the basal metabolism of guinea pigs, independently of the thyroid glands An acid ext of the anterior lobe of the pituitary caused a rise in metabolism only when the thyroids were intact and seemed to depend on stimulation of the thyroid by the pituitary ext. J F. LYMAN

**Depletion of muscle sugar by adrenaline. II.** F BISCHOFF AND M LOUISA LONG *Am J. Physiol* 95, 403–11(1930), cf *C A* 24, 3561 —Adrenaline injected subcutaneously or by the continuous intravenous method (at least 4 times the min hyperglucemic dose) caused a fall in muscle sugar J F LYMAN

**β-Tetrahydronaphthylamine hyperthermia and fat metabolism.** JEAN J. BOUCK AERT AND E SOLOMON *Am J. Physiol* 95, 417–21(1930), cf *C A* 24, 5065 —The increased metabolism observed after injecting β tetrahydronaphthylamine is inde pendent of the exchanges of fat between the liver and the other tissues It is probable

that the excess material metabolized after taking the drug is protein after the carbohydrates have been depleted J F LYMAN

**The action of histamine on the motility of different parts of the intestinal tract.** MARGARET F MACKAY *Am J Physiol* 95, 527–30(1930).—Intravenous doses of 0.25 to 0.50 mg histamine activate a quite characteristic motor response in different parts of the intestine, most marked in the ileum and decreasing toward the duodenum Local application of histamine to the outside of the intestine provoked the typical reactions, but injection of the drug into the lumen of the bowel did not activate a motor response J F LYMAN

**The effect of a solution of acacia in restoring diminished body fluid.** M A WALKER AND N M KEITH *Am J Physiol* 95, 561–72(1930).—Conclusion Acacia has the property of holding the injected fluid in the circulation for a considerable time It does not inhibit renal excretion of water J. F LYMAN

**The heart rate after sympathectomy and vagotomy, and the blood sugar as affected by posterior hypophyseal extracts (pitressin and pitocin).** Z M BACQ AND S. DWORKIN *Am. J. Physiol* 95, 605–13(1930).—In normal cats pitressin, intravenously injected, causes a prompt reduction in heart rate Pitocin has little effect In vagotomized cats, pitressin reduces the heart rate, but to a level far above the av basal rate for a normal animal After removal of both sympathetic chains, pitressin slows the heart when the vagi are intact, but causes marked acceleration when these nerves have been cut In normal animals both pitressin and pitocin, given intravenously, cause a prompt rise in blood sugar which may persist as long as 2 hrs In sympathectomized cats the glucemic effect of pitressin is somewhat less than in normal animals, but not markedly so J F. L.

**The action of parathyroid extract in sympathectomized animals.** Z. M BACQ AND S. DWORKIN *Am J Physiol* 95, 614–9(1930).—The absence of the central sympathetic nervous system does not appreciably influence the response of cats and dogs to parathyroid ext J F. LYMAN

**The effect of adrenaline upon the nitrogen metabolism of rabbits.** O WATKINS AND G VAN S SMITH *Am J Physiol* 96, 28–34(1931).—Intravenous, subcutaneous or intraperitoneal injections of 0.1 mg of adrenaline cause marked rises in blood sugar and urea of the blood in rabbits Since it was shown that the excretion of urea by the kidney is not interfered with, the rise in blood urea is a result of some catabolic action of adrenaline upon protein metabolism The intravenous injection of glucose after adrenaline injection does not affect the rise in blood urea, while glucose and insulin together exaggerate and prolong the urea rise J F LYMAN

**The temporary control of post-operative tetany in thyro-parathyroidectomized dogs by the administration of thyroid hormone.** M M KUNDE, R. M OSLUND AND R. KERN *Am J Physiol* 96, 45–53(1931).—In approx 55% of 31 dogs, tetany, following the removal of the thyroid and parathyroid glands, was temporarily allayed by administering dried thyroids or thyroxine In unoperated dogs, moderately large doses of thyroid or thyroxine caused an elevation in acid sol P of the blood to as much as 100% above normal This high blood P persisted after removal of the thyroids and parathyroids regardless of the decrease in serum Ca J F LYMAN

**The action of atropine and adrenaline on gastric tonus and hypermotility induced by insulin hypoglucemia.** R L. WILDER AND F W SCHULTZ *Am. J. Physiol* 96, 54–8(1931).—The increased tonus and hypermotility of the stomach, which takes place when the blood sugar is markedly lowered following insulin is due, in part at least, to increased irritability of the vagus motor nerves to the stomach Atropine and adrenaline lower this increased tonus without raising the blood sugar J. F. L.

**Thiocyanate contracture in skeletal muscle. Permeability of muscle.** E GELLHORN *Am J Physiol* 96, 203–13(1931).—The immersion of a frog sartorius muscle in a Ringer soln contg NaSCN in a concn. which is below that causing contracture has no direct effect upon the muscle but gives rise to a contracture when this soln is replaced by common Ringer soln The effects of various salts on this indirect contracture were studied. Conclusion The velocity with which NaSCN leaves the muscle cell dets the strength of indirect contracture J F LYMAN

**The physiological action of glyoxals.** A HYND Proc Physiol Soc., *J Physiol* 70, ix–xi(1930).—Solid hydroxymethylglyoxal, prepd by the method of Evans and Waring (*C A* 20, 3692) is as a rule, contaminated with an unstable, highly toxic by product, possibly a thiol deriv There is no essential difference in the effects produced by the monomeric and dimeric forms of hydroxymethylglyoxal There is a close analogy between the effect of glyoxal and of that hydroxymethylglyoxal, but no similarity between that of the latter and glucosone J F. LYMAN

"Dial" as an anesthetic for surgical operations on the nervous system. J. F. Fulton E G T Liddell and D McK Rioch Proc. Physiol. Soc., *J Physiol* 70, xxiii(1930) cf *C A* 25, 2202.—"Dial Ciba" is a liquid prepn of diallylbarbituric acid (10%) combined with small amts of urethan and monoethylurea (to assist soln.) With this anesthetic the spinal reflexes remain active even in profound anesthesia In exptl surgery of the nervous system the drug has 2 important uses (1) It appears to constrict small blood vessels of the brain so that removal of the cerebellum or cerebral hemispheres can be carried out almost bloodlessly without occlusion of any of the great arteries to the head. (2) Animals remain quiescent for a period of 12–36 hrs and thus give opportunity for satisfactory healing of the incision J F Lyman

The influence of adenosine and related compounds upon the coronary arteries in the perfused rabbits heart. A N Drury and A M Weed Proc Physiol Soc., *J Physiol* 70, xxviii–xxix(1930) cf *C A* 24, 2756.—Adenosine dilates the coronary arteries of the heart. Yeast adenylic acid and muscle adenylic acid have about 66% of the effect of adenosine and inosinic acid adenine guanosine and $NaNO_2$ are about 33% as effective as adenosine while thymus nucleic acid and yeast nucleic acid have an inconstant effect a slight constriction is sometimes produced J F Lyman

The selective vasoconstrictor action of pituitary pressor extract. G A Clark *J Physiol* 70, 53–9(1930).—Pituitary pressor ext (pitressin) intravenously injected in cats caused a redistribution of blood so that the intestine contained much less and the muscles more the skin and connective tissues usually contained less but if the blood pressure was greatly increased, might contain more Pitressin exerts its most powerful vasoconstrictor action on intestinal vessels and its weakest action on the vessels of voluntary muscles, while those of skin and connective tissue occupy an intermediate position. J F Lyman

The effect of adrenaline on muscle glycogen. A B Corkhill and H P Marks *J Physiol* 70, 67–85(1930).—Adrenaline alone and adrenaline and insulin together were administered to decapitated cats whose viscera had been removed and the subsequent changes in carbohydrate content of blood and muscles observed Conclusion Adrenaline causes discharge of glycogen from resting muscle Part of this glycogen appears as lactic acid and another part as some unknown substance which is non reducing or has a lower reducing power than glucose does or it fails to be extd. for analysis by the methods used. A similar discrepancy was noted when insulin and adrenaline acted together J F Lyman

The production of hypoglucemia in rabbits by oral administration of precipitated insulin. H. N Mukherjee *J Physiol* 70, 182–3(1930).—The phosphotungstic acid ppt. of crude insulin, administered to fasting rabbits by mouth, lowered blood sugar to the convulsion level within 1 to 2 hrs Beneficial effects have been noted with diabetic patients after its administration. It appears to have no toxic effects J F Lyman

The effect of insulin and other endocrine extracts on the cholesterol content of tissues. E. N Chamberlain *J Physiol* 70, 441–8(1930), cf *C A* 24, 4822.—Overdosage of rabbits with insulin caused a marked decrease in the cholesterol content of the suprarenals, but this effect was not so pronounced if the hypoglucemia was prevented by simultaneous administration of glucose Neither insulin, thyroid nor pituitrin produced any material changes in the cholesterol content of the blood, liver or spleen It is suggested that the synthesis of cholesterol by the adrenals is controlled by the internal secretion of the pancreas J F Lyman

Intraocular pressure. I. The action of drugs on vascular and muscular factors controlling the intraocular pressure. J Colle, P M Duke Elder and W S Duke-Elder. *J Physiol* 71, 1–30(1931).—The effects of adrenaline, pituitrin, histamine, choline, nicotine, atropine, physostigmine and curare on intraocular pressure were detd All the changes observed are compatible with the theory that the aq humor is a dialyzate. J F Lyman

The influence of creatine on the excretion of phosphates by the kidney. Marion Brown and C G Imbrie *J Physiol* 71, 222–8(1931).—The administration of creatine to cats is followed by a temporary fall in the output of phosphates by the kidney, which is most marked when the larger amts of creatine are retained. The concn of P in the blood may be above the normal when phosphates are absent from the urine J F Lyman

Experimental investigation on the fate of bilirubin introduced into the blood vessels. II. The excretion of bilirubin from the liver. 1. The localization of the excretion of bilirubin of the liver. S Saiki. *Japan J Gastroenterology* 3, 1–13(1931), cf *C. A.* 25, 1277.—When bilirubin is injected intravenously into rabbits, it is excreted into the

bile by the parenchymatous cells of the liver This was shown by blocking the reticulo-endothelial cells of the liver with colloidal silver and India ink injections Since neither retarded the excretion of bilirubin, these cells do not function in such an excretion Injury to the parenchymatous cells by injecting the rabbits with hepatotoxins decreased the rate of excretion of bilirubin from the blood, so these cells must be responsible C. M McCay

Experimental study on the influence of poisonous gases upon the pigment-excreting function of the liver and the kidneys. II. Cyanogen. H Yagata. *Japan J Gastroenterology* 3, 80–4(1931) *cf C A* 25, 351 —In rabbits the pigment-excreting function of the liver and kidneys is injured by HCN poisoning The kidneys suffer greater injuries, which increase the dye-excreting function of the liver Similar expts were carried out with rabbits after the administration of such liver poisons as hepatotoxin, $CHCl_3$ and P or kidney poisons such as cantharidin, $K_2CrO_4$ or U nitrate The common liver poisons seem to injure the kidneys so severely when acting with HCN that the liver dye excretion increases Kidney poisons alone increase the dye excretion of the liver but accompanied by HCN the liver excretion is decreased. C. M McCay

The effect of pilocarpine in a case of sympathicotonia in childhood. Eugene M. Landis and J C Gittings. *Am J Diseases Children* 39, 1022–30(1930) —Hyperactivity of the sympathetic portion of the autonomic nervous system, termed sympathicotonia appears to be reduced following the intramuscular administration of physostigmine or the intravenous administration of pilocarpine The symptoms of the disease appear to be aggravated by atropine or thyroid ext F R. Main

The toxicity of α-butyloxy-cinchonic acid diethylethylenediamide hydrochloride (nupercaine). W R Bond and N Bloom *J Lab Clin Med* 16, 447–51(1931) — The min fatal dose of nupercaine, injected subcutaneously, is approx 20 mg per kg for guinea pigs and 25 mg per kg for dogs On intravenous injection, it is 2.5–3 mg per kg for dogs It is rapidly absorbed from the nasal and buccal passages, but very slowly from the bladder or vaginal canal and appears to be rapidly detoxicated *in vivo* F R. Main

Purine elimination in the rat. Pietro Rondoni *Arch sci biol* (Italy) 15, 579–85(1930) —Studies were made on the elimination of uric acid and allantoin in the urine of the rat following the administration of purine free diets and of hyperpurine diets (horse liver and calf thymus) The rat has a high protein metabolism which is further increased following the prolonged administration of a thymus diet Uric acid is essentially the end product of the endogenous purine metabolism, while following the administration of hyperpurine diets allantoin in marked amts is also eliminated The transformation of uric acid into allantoin is a sort of protective action against the accumulation of uric acid and is brought into play by the organism which has been subjected to a forced purine metabolism Repeated applications of $CHCl_3$ seem to reduce the tendency of the rat to transform excess uric acid Peter Masucci

Hematoporphyrinuria and intoxication by fenchone plus sulfonal and camphor oxime plus sulfonal. A Bonanni *Boll soc ital biol sper* 5, 1105–7(1930) —Functional alterations in the liver were induced by administering to rabbits under const diet, sulfonal (I), sulfonal and fenchone (II), sulfonal and camphor oxime (III) The urine of all the animals had a normal color, no albumin was present. In regard to hematoporphyrin, the animals receiving (I) gave results similar to those previously reported by B., while no hematoporphyrin was found in the urine of animals receiving (II) or (III) Peter Masucci

The influence of certain drugs on pulmonary ventilation in normal and phrenicectomized dogs. A Jappelli. *Boll soc ital biol sper* 5, 1125–8(1930) —Pulmonary ventilation was detd. in (*a*) normal and (*b*) phrenicectomized dogs after the administration of certain drugs Morphine HCl in doses of 0.003 g per kg had a depressive action in the normals both as to respiratory frequency and pulmonary ventilation; in the phrenicectomized animals the action was more accentuated and more persistent. *Heroine-HCl* in doses of 0.002 g per kg produced in (*a*) a slight diminution of frequency and a marked diminution of pulmonary ventilation, in (*b*) the injection was followed by an increase in frequency and in ventilation. Eucodale, in doses of 0.002 g per kg produced in both (*a*) and (*b*) a marked and prolonged diminution of frequency and ventilation The other drugs studied were: atropine sulfate, bellafoline, caffeine, lobeline HCl, adrenaline HCl, synthetic ephedrine and ergotamine tartrate The general conclusion is drawn that the respiratory app of the bilateral phrenicectomized dog is relatively sufficient under ordinary conditions but does not function sufficiently when, through the agency of drugs, one seeks to raise its activity Peter Masucci

The influence of physostigmine on the contractile activity of the spleen. P Tes-

TONI *Boll soc ital biol sper* 5, 1128(1930) —Physostigmine produces a polyglobulia which is essentially the concomitant of the degree and duration of the splenic contraction PETER MASUCCI

**Thallous acetate and hematoporphyrin.** P TESTONI *Boll soc ital biol sper.* 5, 1130(1930) —While in Pb poisoning hematoporphyrin appears in the urine, in acute or chronic TlOAc poisoning, hematoporphyrin is absent, although the urine is highly pigmented PETER MASUCCI

**Studies on the calcium-fixing power of the lung subjected to artificial pneumothorax. I. The fixation of calcium in the collapsed lung.** RENATO PACHIOLI. *Boll soc ital. biol sper* 5, 1184–6(1930) —Unilateral pneumothorax treatment (in rabbits) does not cause a greater fixation of Ca in the collapsed lung in contrast to the non-collapsed lung **II. The action of a protracted calcium treatment on the fixation of the metal in the collapsed lung.** *Ibid* 1186–9 —Rabbits were subjected to unilateral artificial pneumothorax and one week later injected daily with 10 cc Ca gluconate soln (10%) for a period of 12–17 days The amt of Ca was then detd in the collapsed and normal lung There was an increase of Ca in both lungs compared with the value found in the lungs of untreated normal rabbits the increase was 4.08% mg for the non-collapsed and 10.03% mg for the collapsed lung PETER MASUCCI

**Cerebral lipoids in relation to hypno-anesthesia.** IVO NOVI *Boll soc ital biol sper* 5, 1190–2(1930) —Crit observations PETER MASUCCI

**Studies on phlorhizin. III. The action of phlorhizin on the isolated heart of the tortoise.** P S ISRAEL *Boll soc ital biol sper* 6, 8–10(1931) —The heart was perfused with Ringer soln contg 0.1% phlorhizin, 15–20 min afterward the ventricular contractions became less and diminished in amplitude, after ½–¾ hr they stopped completely With concns less than 0.1%, the frequency of the contractions diminished without appreciable changes in amplitude the contractions stopped after 5–6 hrs of perfusion Phlorhizin affected the auricles to a lesser degree After washing the heart repeatedly with Ringer soln alone, the contractions became normal 30 min later The heart was then perfused with Ringer soln contg 0.01% atropine sulfate The introduction of phlorhizin induced a phenomenon similar to that already described When the atropine and phlorhizin were introduced simultaneously in the perfusion liquid, there was a marked decrease in the frequency of contractions Adrenaline 0.05% and phlorhizin, when added simultaneously to the perfusion liquid, caused no changes in the contraction of the ventricle or auricles **IV. The influence of phlorhizin on imbibition.** *Ibid* 10–2 —The gastrocnemius and liver of the frog were immersed in Ringer soln contg 0.10–0.15% phlorhizin and weighed at intervals of 1, 2, 4, 6 and 10 hrs. Phlorhizin tended to increase the imbibition after the first 3 or 4 hrs , the increase was 6–10% greater than that of the controls immersed in Ringer soln alone The imbibition was more marked with the liver the increase in wt was about 20% greater than the controls PETER MASUCCI

**The action of synthetic thyroxine on the electric excitability of the vagus nerves.** V. G BARONE *Boll soc ital biol sper* 6, 18–20(1931) —The threshold of excitability of the vagus nerves of the dog was detd before and after the injection of the drug The intravenous injections of 5–6 mg thyroxine were well tolerated by the animals and caused neither a change of arterial pressure nor variations in the frequency of the pulse or respiration Even with repeated injections, there was always an increase of the elec excitability of the vagus nerves lasting 30–45 min The increase in excitability was more marked with doses of 1–2 mg , it was distinct but not so marked with doses of 5–6 mg These results show that in regard to the vagal excitability, this analogy between the pharmacol action of thyroxine and thyroid substances confirms the point that the former has the property of a thyroid hormone PETER MASUCCI

**The effects of intravenous injections of glycine in normal and diabetic individuals.** A COSTA AND V G BARONE *Boll soc ital biol sper* 6, 21–4(1931) —The hyperaminoacidemia obtained by intravenous injections of 5 g glycine is not accompanied by any appreciable modifications of the glucemic titer either in the diabetics or in the normals The hyperaminoacidemia observed after the ingestion of proteins cannot be held as the cause of the hyperglucemia in diabetics The amino acid curve is not noticeably different in the normals than in the diabetics The clinical observation that certain proteins have a marked hyperglucemic power in diabetics in contrast to other proteins, indicates possibly that the hyperglucemia induced by the ingestion of proteins and occurring simultaneously with the hyperaminoacidemia is caused by the presence of special amino acids, among which glycine must be excluded PETER MASUCCI

**Variations in toxicity obtained by certain respiratory drugs after cutting the vagus nerves.** EMILIO TRABUCCHI. *Boll. soc. ital. biol. sper.* 6, 49–52(1931).—The purpose

was to det whether after cutting the vagus nerves a difference might be detected in the immediate m l d of certain drugs which kill by arresting the respiratory function. The expts were made on rabbits using $MgCl$ $SrCl_2$, morphine-$HCl$ and $NaOH$ The solns were injected into the jugular vein A marked difference in the m l d was revealed between the animals having the cut and uncut vagi The percentage diminutions of the m l d in animals having the cut vagi were $MgCl_2$ 38, $SrCl_2$ 37, $NaOH$ 40 and morphine $HCl$ 33 The conclusion is that after cutting the vagi, the respiratory centers are much more sensitive to the paralyzing action of certain drugs, and probably in general, to all drugs which kill by depressing the respiratory centers P. M

**Apnea from strontium.** Emilio Trabucchi *Boll soc ital biol sper* 6, 53–6 (1931).—The injection of $SrCl_2$ solns of various strengths into rabbits produces typical periods of apnea The bilateral cutting of the vagus nerves does not impede the apnea The apnea is probably of central origin, since Sr has little action on the neuro-motor terminal junctions Peter Masucci

**Calcium therapy. Calcium pyruvate** Angelo Puglisi and Domenico Romoli-Venturi *Minerva med* 1931, I, 366–71.—Ca pyruvate is easily sol in water, its aq solns are stable, since neither boiling nor long exposures to ice box temps produces a ppt The salt is easily absorbed when injected intramuscularly or subcutaneously, and on reaching the circulation Ca ions are rapidly liberated The substance is non-toxic and may be administered intravenously in high doses to man, it favorably influences the cardiac function without any noticeable changes in the pressure or in respiration, stimulates the automatic contractions, and increases the muscular tone of the intestine and in general of smooth muscle tissue. Peter Masucci

**The effect of adrenaline on the circulating blood volume in individuals with normal and enlarged spleens and after splenectomy.** Chi shih Yang and Hsiao-ch'ien Chang *Chinese J Physiol* 4, 21–9(1930), cf *C A* 22, 2022.—The injection of adrenaline into human subjects with normal or enlarged spleens, following the inhalation of CO, resulted in an increase in red cells and CO content of the blood but no change in the computed blood vol Splenectomized subjects showed no significant polycythemia The results suggest that "under the influence of adrenaline corpuscles equally satd with CO, as those in the peripheral blood, are suddenly added to the circulation, thereby producing a true polycythemia without appreciable change in blood vol" L A M

**The site of action of thallium.** Hsi Chun Chang *Chinese J Physiol* 5, 79–82 (1931).—The depilatory action of thallium is not dependent upon either thyroid or ovarian activity Suggestive evidence is also furnished that nerve action is not involved L A Maynard

**The effects of histamine, adrenaline and atropine. The sympathetic and vagus systems, acid-base equilibrium, movements of chlorides and water.** P. Saradjichvili and R Rapelin *J physiol path gen* 27, 795–814(1930).—The subjects used were epileptics and chronic alcoholics Subcutaneous injection of histamine causes a reddening of the face, augmentation of pulse rate, increase in $p_H$ of the blood and a decrease in blood chlorides Similar but less consistent results are obtained with adrenaline and atropine It is concluded that the action of the neuro-vegetative system on the acid base equil consists in the modification of the tissues for certain ions, such as Cl, which are retained or expelled according to whether the sympathetic or the vagus system is affected L A Maynard

**Insulin and the hypoglucemic syndrome.** V Zagami *Arch fisiol* 28, 339–71(1930), *Physiol Abstracts* 15, 503.—Insulin in direct application on the centers of the brain, has no influence on the nervous function The influence on the blood sugar is the same as in subcutaneous application A E Meyer

**Choline action on the cardiovascular system.** Vittorio Susanna *Arch fisiol* 28, 432–42(1930).—Choline has a peripheral vasoconstrictor action It causes a transitory decrease of the arterial pressure In vagotomized and atropinized animals, a const increase of the blood pressure is observed The modifying effect on the heart function is due to an action on the sp intracardiac app A E Meyer

**Delayed absorption of pharmaceuticals caused by the vasomotor principle of the hypophysis (Vasopressin).** G Spagnol. *Rev sud-americana endocrinol inmunol quimioterap* 14, 1–16(1931).—In subcutaneous injections of the mixed solns of vasopressin and strychnine or novocaine the absorption, as detd by the onset of toxic symptoms, is considerably retarded Vasopressin is still effective in a dln of 1:15000000, whereas adrenaline has its limit at 1 100000 The action of vasopressin can not be explained by the pressor activity, but by a sp influence on the permeability of the capillaries A. E Meyer

**Sodium bromide and thiosulfite in the treatment of eczema.** Pablo Lavezzo

Influence of radiation on the behavior of silver in the organism. I. Investigations on the whole organism of young rats. Ludwig Pincussen and Wadim Roman *Biochem Z* 232, 202-8(1931).—In untreated young rats receiving injections of $Ag_2SO_4$ equiv to 0.6 mg Ag, 54% of the Ag is found in the organism in the form of AgCl, 28.6% in combination with protein and 17.3% as metallic Ag. Irradiation with the Vitalux lamp increases the portion bound to the protein to 57.2%, while it causes only a slight diminution in the metallic Ag fraction. On the contrary, radiation with the Hg lamp increases the Ag salt fraction to 61.2%, the other 2 fractions being somewhat diminished. S. Morgulis

The life-saving action of portions of plants and of the juices removed from them in the case of otherwise fatal subacute uranium intoxication. Georg Eisner. *Biochem Z* 232, 218-28(1931).—*Rabbits poisoned with very small amts of U almost invariably* die when kept on a diet of oats and water but survive when to this are added beets or fresh green stuffs, also cabbage leaves. The fresh juice of the latter or boiled and *filtered press juice* likewise exerts a life-saving action. Aq. exts. made from alc.-treated material are also quite effective. S. Morgulis

Studies on the relationship between chemical composition and biological action. II. Takaoki Sasaki and Hidenosuke Ueda *Biochem Z* 232, 260-8(1931), cf. *C. A.* 25, 1589.—The Et esters of 2,3-, 2,4-, 2,5-, 3,4- and 3,5-diaminobenzoic acid have been prepd. The HCl salts of these were employed in animal expts. The 2,4-compd. was the most toxic for the mouse, the lethal dose being 3 mg. in aq. soln. (1:50) per 10 g.; the 2,5-compd. is only half as toxic, while the other 3 isomers are about equally active and again half as toxic as the last. For the guinea pig the 3,4- and 3,5-compds. are fatal even in a dose of 0.01 g. per 100 g., while the 2,4- and 2,5-compds. are much less toxic than for the mouse, and the 2,3-isomer is the least toxic. Guinea pigs can at times survive even a subcutaneous injection of 0.1 g. per 100 g. These substances are all amyostatic poisons producing muscular motor incoördination with rigidity. S. Morgulis

Influence of adrenaline on the blood and organ lipoids. Irvine H. Page and Lydia Pasternak. *Biochem Z* 232, 295-309(1931).—After injecting 0.3 mg. adrenaline every 15 min. for 4 hrs. into rabbits there was found a diminution in the phosphatides, cholesterol, fatty acids and total fat of the serum, while in the liver there was an increase in fatty acids, cholesterol and total fat. In the kidneys the phosphatides, fatty acids and total fat were diminished. In the brain the phosphatides were diminished, while the cholesterol was increased, and the fatty acids became somewhat less unsatd. In the heart also the phosphatides and cholesterol were diminished. The effect of adrenaline is the same on lipemic rabbits, though this may be marked by the progressing lipemia. Insulin and adrenaline both cause a lowering of the lipoids in the serum, but the effect of the former is somewhat more pronounced. So far as the influence on the lipoids of organs is concerned, with very few exceptions the two hormones do *not act in the same way*. S. Morgulis

Influence of arsenic and antimony compounds on the enzymic functions of the organism. VII. Buffer capacity of arsenous and arsenic salts. A. N. Adova and I. A. Smorodintzev *Biochem Z* 232, 459-68(1931), cf. *C. A.* 23, 2493.—The buffer capacity of a 1% $Na_2HAsO_4$ is about 1/4 as great as that of $Na_2HAsO_3$. Dilg. $Na_2HAsO_4$ with an equal vol. of $H_2O$ causes a lowering of the $p_H$, dilu of $Na_2HAsO_3$, if moderate, causes a shift of the $p_H$ to the alk. side, but strong dilu (1:50) also causes a lowering of the $p_H$. The buffer effect of 1% $Na_2HAsO_3$ is the same as that of a phosphate buffer and is 6 times as great as that of the citrate buffer. To secure the same $p_H$ in $Na_2HAsO_3$ and $Na_2HAsO_4$ solns., the normality of the former must be diminished *30* times. $H_3AsO_4$ has twice the buffer capacity of a phosphate and 12 times that of a citrate buffer toward alkali. The buffer capacity of 1% $Na_2HAsO_4$ is half as great as that of phosphate toward acid and only 1/4 toward alkali. The buffer capacity *of the phosphate mixt. for alkali is 6 times that of citrate*, but for acid only 1½ times as great. The injurious effect of $Na_2HAsO_3$ injections is attributed to the disturbance of the acid base balance of the organism. S. Morgulis

The fate of colloidal iron administered intravenously. II. Long experiments. Cyril J. Polson *J. Path. Bact.* 32, 247-60(1929).—Fe held by the lungs is essentially a foreign substance and is transferred principally to the liver. It is suggested that the path of the Fe from the lung is by way of the spleen. Fe is probably excreted by the cecum and the kidney, while part of the liver excess of Fe is transferred to the lymph nodes and remains in the body for some time. John T. Myers

The antagonism between trypsin and insulin. Zdzislaw Świder and Julian Walawski. *Med. Doswiadczalna i Spoleczna* 13, 1-24(1931). (In Russian, French

Abstract) —Insulin (I) lowers the tone of isolated rabbit intestine Trypsin (II) restores the movements arrested by I. I and II when mixed have no effect. Boiled I arrests the intestinal movements, but boiled II does not restore them A mixt of I and II boiled arrests the movements I arrests the digestion of casein by II, this action being independent of the $p_H$ It is possible that the antagonism between I and II is due to a combination of the two rather than to the destructive action of II upon I. T H RIDER

**The use of therapeutic effects as end points in the biologic titration of the digitalis bodies.** HARRY GOLD, BEN GELFAND AND WILLIAM HITZIG *J Pharmacol* 41, 89–102 (1931) —Electrocardiograms were taken on cats after administration of tincture of digitalis (German leaf), tincture of digitalis (American leaf), tincture of digitalis ($CHCl_3$ fraction), and tinctures of adonis, ouabain and digitoxin The percentages of the fatal doses producing the following effects were noted first change in T wave, or R-T interval, first increase in P R interval, first appearance of ectopic beats and ventricular fibrillation The degree of individual variability is least for the doses necessary to produce ventricular fibrillation, and by using the latter as the end point it is possible to standardize digitalis with greater precision than by the use of other phenomena C RIEGEL

**Acquired tolerance to and cross tolerance between the nitrous and nitric acid esters and sodium nitrite in man.** L A CRANDALL, JR., C D LEAKE, A S LOEVENHART AND C W MUEHLBERGER *J Pharmacol* 41, 103–19(1931) —Tolerance in human subjects (as measured by headache production) was established by periodic administration of erythrol tetranitrate, ethylene glycol dinitrate, Me nitrate and Am nitrite *No tolerance to Na nitrite was developed Cross tolerance was demonstrated, and* tolerance to Na nitrite was conferred by tolerance to the other substances The effect lasted for approx 10 days after discontinuation of the administration There was no cross tolerance to histamine Tolerance to the action on blood pressure and pulse rate was less easily produced and was less complete C RIEGEL

**The acute toxicity of glyceryl trinitrate and sodium nitrite in rabbits.** THEODORE V OLTMAN AND LATHAN A CRANDALL, JR *J Pharmacol* 41, 121–6(1931) —The lethal dose for sodium nitrite was 80–90 mg and for glycerol trinitrate 45 mg per kg The symptoms of poisoning are given C RIEGEL

**Guanidine structure and hypoglycemia. II.** FRITZ BISCHOFF AND M LOUISA LONG *J Pharmacol* 41, 127–37(1931) —The toxicity, effect on blood urea N, amino acid N and sugar and damage to liver and kidney are reported for di *p*-phenetylguanidine, di-*o* anisylguanidine, benzimidazoleguanidine, benzothioazoleguanidine and benzoxazoleguanidine C RIEGEL

**Further observations on the pregnancy response of the uterus of the cat.** R G GUSTAVSON AND H B VAN DYKE *J Pharmacol* 41, 139–46(1931) —Subsequent to a series of 6–25 injections of urine obtained from pregnant women, the uteri of ovariectomized cats relaxed in response to epinephrine injections, while the uteri of animals having one or both ovaries intact contracted if the ovaries contained mature corpora lutea, or relaxed if no corpora lutea were present C RIEGEL

**A study of the skin vessels in some forms of inflammation of the skin.** G H. PERCIVAL AND C M SCOTT *J Pharmacol* 41, 147–63(1931) —Histamine caused further dilatation, while adrenaline and Bier's spots overcame the existing vasodilatation of dilated minute skin vessels in exfoliative dermatitis, ultra violet erythema, oil of mustard erythema, psoriasis, dermatitis venenata and tinea corporis The results fail to support the hypothesis that the vasodilatation has been produced by liberation of histamine, or a histamine like substance C RIEGEL

**Intestinal bleeding following administration of posterior pituitary extracts.** S J WEINBERG *J Pharmacol* 41, 165–72(1931) —Intravenous injection of toxic quantities *of posterior pituitary extracts and of pitressin into normal unanesthetized dogs was* followed in 6 of 14 cases by intestinal bleeding C RIEGEL

**Chloroform poisoning during narcotization.** A SARTORI *Chem.-Ztg* 55, 222 (1931) —Qual analysis of the vital organs of an 11-months old child that died while subjected to $CHCl_3$ anesthesia showed the presence of $CHCl_3$, especially in the stomach and kidneys neg quant results were obtained, however Hofmann's carbylamine reaction was used for the detection, the detn was made by conversion of $CHCl_3$ to HCl, and absorption in $AgNO_3$ soln W. GORDON ROSE

**The prevention of malaria with Schweinfurth green.** A MISSIROLI *Rivista malariol* 9, 667–705(1930) R. SANSONE

**Insulin therapy in malaria.** C TOSCANO. *Rivista malariol* 9, 734–40(1930) R. SANSONE

Plasmochin in chronic malaria. M Frizzero *Riv sci malariol* 9, 754-8 (1930).—Favorable results were obtained in 4 cases R. Sawsong

Chemical constitution and physiological action. Behavior of the stereoisomers of α-bromoisocapronyl-*l*-asparagine. Maddalena Furia *Boll chim farm* 70, 137-9 (1931), cf *C A* 24, 829.—Differences were found in the physicochem and physiol properties of the stereoisomers of α-bromoisocapronyl-*l*-asparagine The soly of the *l* form (I) in $H_2O$ was 1.8%, the content in the aq soln after extn with oil was 0.503%, and the soly in oil was 1.297% The resp figures for the *d* form (II) were 2.414, 0.688 and 1.720% II produced sleep in shorter time in *Carassius auratus* L. than did I. When returned to fresh water, the fishes subjected to I regained their vitality without passing through a stage of excitement, in contrast to the fishes treated with II. C. S.

The influence of the combination of the alkaline earth chlorides with sodium chlorides on urethan hemolysis. R. Mochlnicki *Protoplasma* 8, 215-21(1929).—When the ion of Ca, Ba, Sr or Mg and the Na ion were present in about equal concns., the max. hindering effect on urethan hemolysis was observed M. H. Soule

The action of narcotics of the urethan series on the colloidal activity of serum. P. J. Jurisic. *Protoplasma* 8, 378-88(1929).—The addn. of certain concns of methyl and phenyl urethan caused gel formation when added to beef serum The gelation was due to an alteration in the structure of the serum M. H. Soule

The action of preparations of beer yeast on chemical processes in the liver and muscles of exercising animals. L. C. Pi-Suñer Bayo, G. Liss and T. Osuna *Anales soc espan fis quim* 29, 193-9(1931).—Previously (*C A* 25, 744) the effect of a prepn. from yeast autolysate on the chem. properties of muscle and liver of normal rats in exercise has been shown These tests were repeated with pure, dry yeast (*Levurinose Blues*) on 20 white rats exercising 1 hr. daily and receiving a regular diet. Ten of these were fed 0.2 g. dry yeast in 2 cc. $H_2O$ per day, the other 10 were held as controls. Glycogen, lactic acid and phosphoric acid content of liver and muscles were detd. after killing Liver glycogen rose appreciably, muscle glycogen less Lactic acid and phosphoric acid contents were slightly higher in muscle and liver of yeast fed rats. IL. C. Pi-Suñer Bayo and G. Liss. *Ibid* 29, 200-5(1931).—Muscular effort was regarded as important as regular muscular activity Dogs were fed daily 2 g. yeast per kg. of body wt. Controls had a normal diet The exercise was 0.75-1 hr. daily on a treadmill, 48 hrs. in all After quick killing the glycogen and lactic acid of liver and muscle and the fat content were detd. In yeast fed dogs the fat content was 6-8 times greater, the glycogen unchanged Glycogen collected in the first few hrs. in liver and muscle is converted into fat, this proving the conversion of carbohydrates into fat in the organism E. M. Symmes

The active principle of Hsi-sin. T. Kondo *Keijo J. Med* 1, 223-47(1930).—By distillation of the Chinese drug, Hsi sin, a yellow, slightly sticky oil was obtained Large doses of this oil administered to frogs, rats and rabbits causes at first an increased irritability with a gradual central paralysis and finally a cessation of respiration With small doses administered over longer periods of time, paralysis affecting first the extremities is the chief symptom The conclusion is that this oil is the active principle of Hsi sin A. J. Vorwald

The pharmacology of Panax ginseng N. Sughara and P. Min *Keijo J. Med* 1, 347-408(1930).—*Panax* when fed to rats augments the action of injected picrotoxin, camphor, caffeine and sodium salicylate, but is antagonistic to the action of chloral hydrate, urethan, alc. and veronal A. J. Vorwald

The pharmacology of Panax ginseng N. Sughara and P. Min *Keijo J. Med* 1, 685-702(1930).—Panax when fed to rats is antagonistic to the action of atropine, and adrenaline but is synergistic with pilocarpine and physostigmine A. J. V.

Pharmacology of the active principles of ginseng. N. Sughara and K. Kin. *Keijo J. Med* 1, 711-72(1930).—Panax acid, when administered to frogs, mice and rabbits, causes first stimulation of the spontaneous movements, then a gradual central paralysis. When applied directly to an isolated frog heart, it causes first a stimulation, then a paralysis Panax acid dilates and then contracts the blood vessels It brings about a decrease and final cessation of peristaltic movements of the bowel Panacens, another active principle, acts likewise A. J. Vorwald

Amino alcohols. VI. Preparation and pharmacodynamic activity of four isomeric phenylpropylamines. Walter H. Hartung and James C. Munch *J Am Chem Soc* 53, 1875-9(1931), cf *C A* 24, 5578.—Four isomeric phenylpropylamines ($PhCH(NH_2)Et$, $PhCH_2CH(NH_2)Me$, $Ph(CH_2)_3NH_2$ and $PhCH(Me)CH_2NH_2$) were prepd by catalytic hydrogenation of an appropriate intermediate A preliminary pharmacol examination of these compds indicates that The optimum skeleton for pressor compds

is $PhCH_2CH_2NH_2$, a shift in the relative positions of the Ph and $NH_2$ groups very greatly decreases pressor potency substitution of a Me group on either of the 2C atoms in the side chain of this skeleton confers oral activity, the presence of the secondary alc HO in $PhCH(OH)CH(NH_2)Me$ serves to decrease the toxicity to a degree that becomes significant therapeutically C J West

**Biological investigation of the active constituents of digitalis leaves.** Yoshito Kobayashi *Proc Imp Acad Tokyo* 7, 76–9(1931).—The LtOH ext was divided into 29 fractions by the use of various precipitants and solvents and their biol action studied The glucosides easily sol in $H_2O$, which are not pptd by NaCl and $(NH_4)_2SO_4$, are less active than those insol or difficultly sol in $H_2O$, as far as cardiac action is concerned C J West

**Parathormone dosage and serum calcium and phosphorus in experimental chronic hyperparathyroidism leading to ostitis fibrosa.** Aaron Bodansky and Henry L Jaffe *Proc Soc Exptl Biol Med* 27, 797(1930), *J Exptl Med* 53, 591–604(1931).—On a low Ca intake hypercalcemia tended to disappear in chronic hyperparathyroidism on a given dose of parathormone (as large as 6 units per kg), apparently because of the reduction of a readily available Ca reserve An increase of either the Ca intake or of the daily dose of parathormone caused a rise in serum Ca and symptoms of overdosage. Hypocalcemia developed in chronic hyperparathyroidism in young puppies on a low Ca diet Tetany occurred at a Ca level which was higher and a P level which was lower than in tetania parathyreopriva of young puppies About 0.1 g of Ca daily was apparently sufficient to maintain the serum Ca at a normal level The serum P in chronic hyperparathyroidism in young puppies continued at or rose above the high level normal for young animals Toward the end of long periods of treatment on large parathormone dosage (about 5 units per kg) serum P approached normal levels, pronounced hypercalcemia was absent but hypotonia and other symptoms of hyperparathyroidism were present A single dose of parathormone caused early in the treatment and on liberal Ca intakes a more marked relative rise of serum Ca than in normal adult dogs, confirming previous observations Later in the treatment and on low Ca intakes this effect was greatly reduced Serum P rose after a single injection of parathormone, even when the effect on the serum Ca was slight or absent The continued effect of parathormone on serum Ca after prolonged periods of treatment and the modified response of the serum P indicate tolerance due to some compensation, rather than immunity The bone lesions, presenting the essential features of ostitis fibrosa cystica in varying degrees of severity, depending on the relation of the parathormone dose to the Ca intake and to the duration of the treatment, were most prominent on low Ca intakes, which permitted the use of large doses of parathormone without fatal hypercalcemia and without symptoms of overdosage C J West

**The effect of iron on blood formation as influenced by changing the acidity of the gastroduodenal contents in certain cases of anemia.** Stacy R Mettier and George R Minot *Am J Med Sci* 181, 25–35(1931).—Responses of reticulocytes were observed (1) after small daily doses of Fe citrates with an alk beefsteak meal, (2) after the same doses with an acid meal and (3) after the same doses followed by a 4- to 12-fold increased dose of Fe The responses after feeding meals with high $p_H$ were slightly less than after low $p_H$, the dose of Fe being const The responses induced by increased doses of Fe indicate that the small doses of Fe were not optimal R C Willson

**Dihydranol. Control of intestinal putrefaction in man by oral administration of 2,4-dihydroxyphenylheptane.** Veader Leonard and Wm A Feiker. *Bull. Johns Hopkins Hosp* 48, 25–38(1931).—The administration of dihydranol in doses of 0.3–0.45 g, thrice daily, destroys the true putrefactive flora of the intestinal tract with great certainty and regularity R C. Willson

**Thymophysin Temesváry.** Erwin E Nelson *J. Am Med Assoc* 96, 352–6 (1931).—Experimentally no difference could be found in the pressor or oxytocic activity of pituitary alone as compared with pituitary plus thymus exts The strength of "thymophysin" ampules examd by pressor and oxytocic methods was found to be from 25 to 33% of that claimed on the labels When equiv doses of pituitary ext and "thymophysin" were compared on the excised uteri or on blood pressure, no differences could be demonstrated R. C Willson

**The renal changes following the intravenous injection of hypertonic solution of sucrose.** H. F Helmholz *Proc Staff Meetings Mayo Clinic* 6, 124(1931).—The epithelium of the convoluted tubules is specifically affected Vacuolar degeneration is evident after 3 hrs Within 48 hrs the swelling of the tubular epithelium is so marked that the lumen of the tubules is practically obliterated The large cells, filled with clear protoplasm, resemble the cell of hypernephroma The epithelium regains its

normal appearance within 10 to 15 hrs after the height of the swelling has been reached As many as 22 injections at intervals of 5 days did not permanently reduce the output of phenolsulfonephthalein or increase the blood urea (1 exception) The chronic changes consisted of irregularities in the lining of the tubules, atrophy of the convoluted tubules lying close to the corticomedullary junction and increase in the connective tissue in this region The glomeruli were unchanged R C. WILLSON

Synthesis and pharmacodynamic action of homoisopapaverine (and laudanosine) (KONEK) 10 Existence of 2 thioimidazole group in insulin (RUIZ, *et al*) 10 Hygienic importance of S. of sulfuretted waters and S baths (GRUNEWALD) 14

Handbuch der experimentellen Pharmakologie Band III, Hälfte 2. Edited by A. HEFFTER AND W HEUBNER Berlin J Springer Cf *C A* 23, 3513

Pathologische Anatomie und Histologie der Vergiftungen. Edited by ELSE PETRI Berlin J Springer 724 pp M 144, bound, M 148

## 12—FOODS

F C. BLANCK AND H A LEPPER

The influence of pasteurization upon the preservation of buttermilk. LEV PIK. *Chem Listy* 24, 396–8(1930) —Sweet cream centrifuged from raw milk was churned for 3 hrs., yielding butter and buttermilk contg 0 9% butter fat. Aliquots (200 cc.) were heated to 87° and poured into wide-mouthed bottles Unheated controls were also prepd All series were inoculated with spontaneously soured milk and were kept at 33°. A few were protected from the air by a layer of paraffin oil The pasteurized buttermilk showed a lesser degree of lysis analyses for pasteurized buttermilk show total N 460 mg., N in casein 23, N in whey 176, analyses for untreated buttermilk show total N 460 mg., N in casein 15, N in whey 184 The heating made the protein more resistant to the action of bacteria The lysis is anaerobic and occurs from 3 to 5 mm below the surface of the soln. The aerobic process occurs in the superior layer and leads to an oxidation of butter The proteolytic bacteria cannot attack the proteins because of (1) the increased insoly and coagulation of the protein and (2) the increased viscosity of the substrate and soln FRANK MARESH

Chemistry in food freezing—storage. J C IRWIN *Refrigerating Eng* 21, 348–9 (1931) —Recent chem., phys and biol investigations on frozen and stored foods are discussed A H JOHNSON

Humidity and air circulation in cold storage. M W BROWNE *Refrigerating Eng* 21, 27–8(1931) —B calls attention to the importance of humidity and air circulation in refrigerated rooms where food products are stored Proper atm conditions operate to prevent loss in wt., the development of bad odors and wilting and to assist in the maintenance of unvarying temp and in the successful storage of the products for extended periods A H JOHNSON

The composition of the wheat grown in Lettland. E ZARIŅŠ AND O AUZINA *Acta Univ Latviensis Kim Fakultat Serija* 1, No 4–6, Fasc. 2, Burtnica (in German) 138, (in Lettish) 127–37(1929) —The results of a study of the compns of 36 samples of wheat are given in 3 tables Table 1 lists the various amts of water, crude protein, fat, starch, pentosans, sugar before inversion, sugar after inversion, crude fiber, mineral matter, Fe, Mn, CaO, MgO, $H_2SiO_3$, $H_3PO_4$, alky of the ash toward methyl orange, total alky., degree of acidity, $p_H$, soly and sp gr Table 2 gives the detn of catalase in the wheat Table 3 shows the amylase content RUSSELL C ERB

Chenopodium quinoa Willd C M ALBIZZATI AND R FALRA *Anales soc cient Argentina* 111, 137–46(1931) —A comparison was made of the protein, fat, carbohydrate and mineral content of the quinoa seed with that of other cereals Phosphorus and K predominate in the mineral fraction A good white flour can be obtained from the seed, which can be mixed with wheat flour for the prepn of bread M H SOULE

The F. A. Q. wheat sample. W. R JEWELL. *J Dept Agr Victoria* 29, 134 (1931) —Analyses of the annual sample of wheat of fair av quality and of the flour, bran and pollard produced therefrom are tabulated K D JACOB

Brabender apparatus for the fumigation of meal moths. JOSEF SPOUSTA *Chem Obzor* 6, 59–62(62 English)(1931) J KUČERA

A practical method for sorting flours according to their bran-meal contents. P NOTTIN AND M LEMOIGNE *Compt rend acad agr France* 17, 239–41(1931) —A soln of pyrocatechol is added to a cup of flour The flour is thoroughly mixed to obtain a homogeneous and not too liquid pat At the end of ½ hr the flours rich in bran are

rose colored, while those with less bran are much lighter in color Phenol, guaiacol, hydroquinone, pyrogallol, gallic acid, diaminophenol and tyrosine were also tested, and while they all gave good results, pyrocatechol was found the most satisfactory The proportions of flour and pyrocatechol can vary between wide limits without modifying the results While this method is not extremely accurate, it furnishes a simple and practical technic for classifying flours J R Adams

**The role of milk constituents in bread making.** L A Allen and J Bell *J Roy Tech Coll Glasgow* 2, 550–63(1931) —A study has been made of the effect on bread of whole milk sepd milk, whey and whey, from which albumin has been removed All milk products improved the color, texture and flavor Albumin has an inhibitory effect on loaf vol This was shown by the fact that loaves made with whey had lower vol than the control, while loaves made with whey from which the albumin was removed had increased vol Addn of egg albumin decreased vol, while milk which had been heated to coagulate the albumin increased vol Dried sepd milk reduced loaf vol unless it had been boiled before drying Lactose had no effect on vol, while lactic acid improved it Whey products increased the rate of gas evolution, while milk reduced it This indicates an inhibitory effect of the casein Amy Le Vesconte

**The metals in the milk industry.** Popp *Landw Vers Sta* 111, 271–91(1931) — The order of decreasing resistance to corrosion of the 5 pure metals which were used is Ni, Cu Fe Zn and Al The best alloy is a mixt of Fe, Ni and Cu J R H

**Testing milk.** P Guarnieri *Atti III congresso naz chim pura applicata* 1930, 484–5 —A cryoscopic method for testing the water content of milk is advocated E Gebauer Fuelnegg

**The freezing point of milk and its applications.** G D Elsdon and J R Stubbs *J Soc Chem Ind* 50, 135–41T(1931) cf *C A* 24, 4338 —A review and critical discussion are given of the methods in use for the detn of the f p of milk, especially in its application for the detection of added water After a fairly extensive experience of the test, particularly of the Hortvet app, the authors are satisfied that it is of the highest value, not only for the detection of added water, but also for proving the purity of a genuine milk when the solids-not fat fall below the min allowed An extensive list of references is given J C Jurrjens

**The occurrence of peptidases in milk.** Alfred Heiduschka and Ernst Komm *Z physiol Chem* 196, 187–94(1931) —Samples of cow, goat and human milk obtained under aseptic conditions were treated with glycyltryptophan and tested for free tryptophan by the Br reaction The results were neg, indicating the absence of dipeptidase Milk contg large nos of bacteria gave a pos reaction Peptidase in milk is therefore of bacterial origin A W Dox

**Easy and exact method for ascertaining the presence of foreign fat in milk and butter.** S Camilla *Giorn farm chim* 80, 10–2, 15–8, 21–3(1931) —After describing the methods given in a previous paper (*C A* 24, 4339) C proposes another simpler method for the detn of foreign fat in butter A sample of the butter to be examd is melted, and 0 3 cc of it is transferred to the butyrometer Then are added 10 cc water-free ether, 10 cc 95% EtOH and after some agitation, 10 cc distd $H_2O$ The butyrometer is stoppered, well shaken and placed in a water bath at 37–40° until the fat has ascended to the top Then the app is allowed to stand at 18–19° for 15–20 hrs When the ethereal layer is limpid, the butter is probably not adulterated However, when partial solidification of the fat occurs, an addn of foreign fat must be suspected. In order to ascertain the foreign nature of the solidified fat, the latter is examd under the microscope The presence of typical stearin crystals is a pos proof of adulteration, since the foreign fats commonly used for sophistication (margarine, etc) contain stearin in various quantities If the presence of coconut butter is suspected, the method just described cannot be used, since coconut butter contains little stearin, if any In such a case 5–6 cc of the melted butter is emulsified with 100 cc of skimmed milk, and the presence of foreign fat is established by means of Quesneville's method G S

**Dissolving effect of sour milk on lead plates.** J Csiszár *Kisérlet Közlemények* 32, 495–501(1929) —Soln of Pb depends on the acid no of the milk, time of exposure and quality of the Pb plate surface In each expt a 0 1 mm thin Pb plate of 12 sq cm surface was treated with sour milk in a 100 cc Erlenmeyer bottle Pb plates with metallic luster were not attached by milk of 24 5 Soxhlet-Hinckel acidity no on exposure during 26 hrs Pb plates of a shiny but rough surface showed a decrease of 0 04 to 0 7 mg Plates with an oxidized surface did not lose more than 0 4 mg Pb Oxidized Pb plates with a rough surface were mostly attacked Milk of 23 8 Soxhlet-Hinckel acidity dissolved 1 5 mg Increase of acidity no also increased the quantity of dissolved Pb to a max Then a decrease was observed S S de Finály

**Small-scale research on spray-drying of milk.** A W. Scott *J. Roy Tech Coll. Glasgow* 2, 456–60(1931) —An app with a drying chamber 6 ft high and 1 ft. square is used to dry milk Milk is forced under low pressure through a capillary tube with a nozzle of 0 005 in. diam against compressed, heated air. From sepd milk, a fine powder is obtained with a soly of 99 5% AMY LE VESCONTE

**The milk powders, single and mixed, and their hygienic control.** VIRGILIO ARTERO *Boll chim farm* 69, 937–43, 981–4, 987–9(1930) —A review G SCHWOCH

**The utilization of dry skim milk in the manufacture of ice cream and cream cheese.** J C MARQUARDT N Y State Agr Sta., *Tech Bull* No 174, 3-24(1931) —Chem and phys analyses of dry skim milk, including moisture, fat, titratable acidity and detns of soly., were made at various intervals, and the quality of mfd goods as related to the apparent soly., of the dry skim milk was followed throughout the work It was concluded that dry skim milk can be kept at 40° or 70°F in sealed containers for 8 months without any deleterious effects on its flavor or soly., but it was impossible to make good ice cream or cream cheese from dry skim milks that had been stored unsealed for more than 60 days Structural changes were observed by the microscope The H ion changes, however, could not be followed by colorimetric methods J K

**The effect of feeding raw and steamed potatoes on the yield and fat content of milk.** K RICHTER, K E FERBER AND N ODAISKY *Wiss Arch Landw Abt B Tierernähr Tierzucht* 4, 695–715(1931) —The yield and fat content of milk from cows on a normal diet were compared with those obtained when 12 kg raw potatoes replaced an equal amt. (starch values) of the diet The fat content did not vary, but the yield of milk decreased 5% Potatoes were steamed and placed in a silo for 3 months, these potatoes were used in an expt similar to the one using raw potatoes, the amt. of milk decreased 4%, and the fat content dropped from 3 4 to 3 14% Analysis showed that the steam treatment had no appreciable effect on the chem compn of the potatoes W G R.

**Milk cows in nymphomania.** F MAYR AND K WURSTER *Milchwirtschaft Forsch* 9, 335–8(1930) —The milk from 3 cows was studied All had an unpleasant odor and taste The fat varied from 3 87 to 4 9, total solids not fat from 8 0 to 16 2, Cl/lactose ratio from 1 49 to 1 80, *n* of the $CaCl_2$ serum from 41 4 to 42 1, elec cond from 37 7 to 42 1 Great care was exercized in selecting animals and collecting data, but the results are rendered of little value, because no data were obtained on the animals before the onset of this condition GEORGE R. GREENBANK

**New chemical developed for testing butter fat.** W G GOSS *Ice Cream Trade J.* 27, No 5, 52(1931) —A modification of the Babcock test for butter fat is given Accurate results are obtained in detg the butter fat contents of ice cream, condensed milks, buttermilk, skim milk cream and milk A H JOHNSON

**Determination of biacetyl in butter.** G TESTONI AND W CIUSA *Ann chim applicata* 21, 147–50(1931) —As a possible method for identifying *pure* butter, a method has been developed for detg the biacetyl in butter The biacetyl is sepd from butter by steam distn and treated in boiling soln with $NH_2OH$, and a few drops of a 0 1% $NiSO_4$ soln and $NH_4OH$ (concd.) A red ppt of nickel dimethylglyoxime is formed The ppt may be weighed or estd colorimetrically Melted and pasteurized butter as well as margarines do not contain any biacetyl, whereas fresh butter contains about 0 0005% Its presence becomes a measure of the freshness of the sample of butter A W CONTIERI

**Fungi found in butter.** M GRIMES V C D KENNELLY AND H A CUMMINS *Sci Proc Roy Dublin Soc* 19, 549–69(1930) B C A

**Manufacture of low-acid rennet cottage cheese** H L WILSON AND C S TRIMBLE *Creamery and Milk Plant Monthly* 20, No 5, 27–32(1931) —The process of mfg low acid rennet cottage cheese is described When the milk contg a starter and rennet has developed an acidity of 0 50 to 0 55%, it is cut into cubes Water is then added and the curd is cooked and finally washed Before creaming with cream or skim milk the curd is allowed to set in the refrigerator for 12 hr At the time of creaming 1 5 lbs of NaCl is added per 100 lbs of dry curd A H JOHNSON

**Composition of some rabbit carcasses.** W K. WILSON *J Ministry Agr* 36, 1203–6(1930) —The chem compn of rabbit flesh (Angora) closely resembles that of chicken, the av protein content differing by less than 1% The compn of the flesh from male and female rabbits was noticeably different, especially in the fat content, females contg 4–6% more fat than the males B C A

**Use of acetaldehyde in the storage of fruit.** S A TROUT AND R G TOMKINS *J Council Sci Ind Research* 4, No 1, 6–11(1931) —Fruit stored in atms contg small quantities of AcH sometimes remained in sound condition for a longer period than fruits stored in air AcH may be effectively introduced into fruit stores in sufficient concns

to check wastage due to mold growth without injuring the fruit The concn controlling mold development without injuring the fruit is about 1 500 Expts were made with grapes, strawberries, raspberries, cherries, plums and oranges The AcH effectively controlled mold growth and decay in all fruits in concns varying from 1.250 to 1·1000. Control was not obtained by dipping fruits in solns of AcH C R FELLERS

**Ethylene oxide as a new fumigant for dried fruits.** J. E THOMAS *J Council Sci Ind Research* 4, No 1, 53–4(1931) —Limited tests showed that 2 lb of ethylene oxide per 1000 cu ft in enclosed rooms was fully effective in destroying eggs, larvae and pupae of the dried fruit moth, *Plodia interpunctella*, in 56 lb boxes of artificially infested sultana raisins C R FELLERS

**Studies of tomato quality. IV. Variability in quality and food value of tomatoes.** JOHN H MACGILLIVRAY *Proc Indiana Acad Sci 38, 159 63(1029)* —In tomatoes taken from the same field dry matter varied from 6 0 to 10 62%, total N from 1 74 to 5 72%, acidity from 3 28 to 11 63% and reducing sugars from 32 38 to 45 70% of total solids H M STARK

**Studies of tomato quality. V. Clearing is not essential in determining reducing sugars of ripe tomato fruit extract.** J H MACGILLIVRAY AND A H WATSON *Proc. Am Soc Hort Sci* 26, 137(1929), *Dept Sci Ind Research Index to Literature of Food Investigation* 2, No 2, 55(1930) E J C

**Organic acids of spinach, broccoli and lettuce.** E K NELSON AND H H MOTTERN *J Am Chem Soc* 53, 1009 12(1931) —Fresh spinach contains 0 31% $(CO_2H)_2$, citric acid and a small quantity of malic acid were sepd by the ester distn method Analysis of broccoli shows that the leaves and buds have materially the same compn and nutritive value Both buds and leaves contain proteins somewhat in excess of that reported in spinach The predominating org acid in broccoli is citric acid, it also contains *l*-malic acid and small quantities of oxalic and succinic acids The proportion of citric and malic acids is 3 2 The org acids of lettuce were found to be oxalic 0 011%, *l*-malic about 0 065%, and citric about 0 048% C J WEST

**Utilization and composition of oriental vegetables in Hawaii.** H L CHUNG AND J C RIPPERTON Hawaii Agr Expt Sta, *Bull* No 60, 64 pp (1929) —The proximate compn, mineral elements and alky of the ash were detd in 56 varieties of oriental vegetables commonly used for human food in Hawaii Of the group of 30 leafy and stem vegetables, all are comparatively rich in Ca with the exception of bamboo shoots, small bean sprouts and tender fern fronds The vegetables classed as Ca deficient are all immature stems Large bean sprouts are exceptionally high in protein, fat and carbohydrates The several cabbage-like plants are characterized by high water content, comparatively low protein and energy values, and high Ca The superiority of the green leaf, non heading Chinese cabbage over the blanched heading variety is marked Kale, radish and turnip greens stand out as rich sources of Ca Of the spinaches, the Chinese variety is superior in Ca but inferior in Fe Both have a decided excess of basic elements Honewort and matrimony vine are rich in protein, energy constituents and minerals and merit greater utilization in the human diet Matrimony vine contains nearly twice as much of the mineral constituents, except P, as does any vegetable in this group Twelve fleshy or pod vegetables were examd, the former are characterized by high water content and low protein and energy values but are very succulent, and the latter by their high protein content and generally high minerals The balsam pear is remarkably high in P (0 107%) and base forming elements The soy bean has not only a high protein content but the protein is of very high quality. Fourteen aquatic and starchy root vegetables showed generally high N free ext, low protein and Ca and moderate amts. of P Kudzu and Chinese taro are among the most desirable foods in this group The lotus root and water chestnut are important and nutritious foods Bibliography C. R FELLERS

**Determination of sand in vegetables.** I RÜB *Chem.-Ztg* 55, 221–2(1931).—Introduce 5 g of an air-dried sample into a Spaeth sediment glass, filled ⅓ full with $CCl_4$. Let stand for 1 hr, stirring several times with a wire Pour off most of the $CCl_4$, transfer the residue quantitatively to a porcelain dish, and remove the org matter by heating at a dull red heat For the detn of sand in rice, add 20 cc 30% NaOH to the ash, heat on a water bath for 15 min, filter, wash and ash W. GORDON ROSE

**Decarboxylation studies on pectins and calcium pectates.** C. M. CONRAD *J. Am. Chem Soc.* 53, 1999–2003(1931) —Decarboxylation of apple and lemon pectins with mineral acids occurs at low concn of acid and is very appreciable with as weak as 0 1% $H_2SO_4$ The extent of decarboxylation of apple pectin in various concns of $H_2SO_4$ and HCl and of lemon pectin in various concns of $H_2SO_4$ is reported for a 16 hr period of boiling Decompn of the galacturonic acid of apple pectin is complete with

12% HCl but is not complete with 18% $H_2SO_4$. A comparative study of the Ca pectate from several sources shows that the rate of decarboxylation with 2% $H_2SO_4$ is approx the same in each C J West

**Photomicrographic studies of sucrose crystals.** Sybil Woodruff and Helen van Gilder *J Phys Chem* 35, 1355–67(1931).—Photomicrographs were made of fondants prepared by partially hydrolyzing sucrose by boiling with one half its vol of water and $KHC_4H_4O_6$, tartaric acid, citric acid or HCl and also of fondants prepared by boiling aq solns of sucrose and glucose or fructose. The moisture content of fondants was about 13%. Glucose, fructose and invert sugar served equally well in regulating the size of crystals. 6–15.8% of invert sugar or 7% glucose or fructose gave most desirable crystal sizes. Sirups contg 43.43% invert sugar or more would not crystallize, and those contg 16.3–23.56% formed a semifluid mass of crystals. Candy observed to be coarse in texture contained crystals 45μ in size, below 20μ seems desirable, as the sense of touch in the mouth can detect gritty texture when the crystals are 25.5μ in size but not when they are below 19.6. The difference of 6–10μ represents the difference between a smooth and a gritty texture. Storing the fondant does not appreciably alter crystal size. Oden I Sheppard

**The determination of phosphoric acid in organic substances especially feed stuffs.** W. Lepper *Landw Vers Sta* 111, 159–61(1930).—Five g of the substance and 2 g $CaCO_3$ are heated to ash. With $P_2O_5$ rich material (0.5% or more) the ash is washed into a 500 cc flask, the dish rinsed with $HNO_3$ and the ash dissolved without heating by shaking with about 20 cc $HNO_3$. The flask is filled to the mark with water, and the $P_2O_5$ detd in 15 cc of the filtrate by the method of Lorenz. With $P_2O_5$ poor material the method is the same, except that a 250-cc flask and 50 cc of the filtrate are used. John R Hill

**The use of copper sulfate in place of mercury for the Kjeldahl analysis.** W. Lepper *Landw Vers Sta* 111, 155–8(1930).—For the detn of crude protein in feedstuffs 1 g of material is heated with 5 g of $CuSO_4.5H_2O$, 15 g $K_2SO_4$ and 20 cc $H_2SO_4$ until the soln has a clear green color (about ¼ hr.). The soln is heated for ½ hr longer and distd in the usual manner with NaOH. John R Hill

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An innovation in meat packing waste treatment (Halvorson) 14. Recent investigations on the constitution of pectins (Bridel) 10. Organic foodstuffs and methods of food analysis (Rubner) 11E. The influence of frequency of cutting on the productivity botanical and chemical composition and the nutritive value of "natural" pastures in Southern Australia (Davies, Sim) 11D. Evaporating milk (U S pat 1,799,478) 1. Fats and waxes (Fr pat 697,572) 27. Irradiating foodstuffs (Austrian pat 121,657) 17. Dyes [for preserving foods from fermentation] (Fr pat 698,076) 25.

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*Carbohydrate foods.* Alois Jodlbauer and Franz Kleinvikel. Austrian 121,732, Oct 15, 1930. The albumin content of carbohydrate foods, especially chocolate or cocoa or confectionery made therewith, is increased by incorporation of yeast.

**Food material from malt-grain residues.** Margaret M Koller. U S 1,799,142, March 31. In treating the residue collected after extg sol constituents from malt grain the acid pressed juice "is sepd from spent grain," and an elec current is passed through the juice for a sufficient time to effect a substantially complete pptn of the suspended solids in the juice and to render the juice alk in character, so that fermentation o the solids is inhibited. These solids are suitable for use as an animal food. App is described.

**Increasing the baking capacity of flours.** F Gruzl and A Szabó. Hung 102,064, Jan 18, 1930. Peroxides stabilized by addn of enzymes or org compds are mixed with the flour or with the leaven. *E g* 3 g asparagine is added to 10 cc $H_2O_2$ and cooled. The cryst product is mixed with 3 g malt diastase, and 0.1–0.5 g of the mixt is added to 1 kg flour or leaven.

**Apparatus for pasteurizing and cooling milk.** Georg Röttger. Ger 516,818, Aug 28, 1926.

**Apparatus for sterilizing milk by heating and cooling.** Bergedorfer Eisenwerk A.-G. Astra Werke. Ger 516,812, Nov 20, 1929.

**Milk of high vitamin and low bacterial content.** Roy R Graves. U. S 1,798,413, March 31. Milk is taken from the cow and transferred to a pasteurizing app under vacuum conditions without release of the vacuum during the transfer, and the milk is allowed to remain under vacuum conditions at body temp for 30–60 min before being pasteurized.

**Sour milk product.** Walter L Kulp. U. S 1,799,303, April 7. There is added

to skimmed milk about 1% of concd tomato juice in which about half the titratable acidity has been neutralized, the mixt is stirred, heated at 96–99° for about 1–25 hrs, cooled to about 38°, and there is then added about 0·25% of a pure culture of *Lactobacillus acidophilus* developed in milk, and the mixt is held at a temp of about 36–38° until a curd is formed The product may also be made with use of yeast instead of tomato juice

**Tubular heat-exchange apparatus suitable for heating or cooling milk or cream.** Fritz G Cornell, Jr (to Jensen Creamery Machinery Co) U S 1,799,356, April 7 Structural features

**Cheese.** Alexander Axelrod Fr 698,478, Dec 19, 1929 Milk is cooled to 30–40°, and submitted to fermentation with ferments such as *Bacillus caucasicus*, kephir yeast, *Bacillus bulgaricus* or peptonizing bacteria, if necessary with the addn of agents to neutralize the lactic acid formed The mass is then thickened to about 1/3 of its vol treated with acid and pressed

**Device for drying and smoking meat, etc.** E Winkelmeller & Co Ger 516,753 Mar 15, 1927

**Use of refrigeration and carbon dioxide in preserving fruits and vegetables, etc.** Charles Brooks (dedicated to the free use of the public) U S 1,798,781, March 31 Food products to be preserved are chilled to a low temp suitable for preservation and simultaneously submerged in an atm having a $CO_2$ content of 15–40% at the beginning of the cooling and which is decreased to 0–10% when a suitable preserving temp is attained

**Conserving animal and vegetable foods.** Richard Willstätter Ger 516,923, Sept 11, 1929 Addn to 513,665 (*C A* 25, 1021) In preserving food by HCN as described in 513,665, inert gases such as air may be present in the HCN current Cf *C A* 25, 2494

**Preserving fruit juices, etc** Henriette A Liesenfeld Landau Fr 698,297, July 2, 1930 Fruit juices, jams, etc, are preserved by bringing them in contact with sugar, either solid or in soln and with a fungicide such as HCOOH, whereby, due to the osmotic action of the sugar and the action of the HCOOH, a sterile product is obtained

**Apparatus for freezing liquid confections, etc.** Hans K Christensen and Louis J Bennett U S 1,798,725, March 31 Various details are described of an app comprising a cylindrical chamber with a screw conveyer within it and a pipe coil around it for circulation of cooling fluid

**Pectin.** Roger Paul and Robert H Grandseigne Fr 698,161, June 28, 1930 An app is described for treating pectic juice with acetone to obtain purified white pectin Cf *C A* 25, 1299, 2193

**Pectin solution from apple pomace.** Elton R Darling and Howard F MacMillin (to Hydraulic Press Mfg Co) U S 1,799,140, March 31 The pomace is subjected to high pressure to remove any remainder of platable juice, it is then broken up, and not more than 10% by wt of hot water is added, and the mixt is subjected to much higher pressure to express the pectin from the pomace

**Beverages.** Eduard O Ornfeldt and Makoto Lorw Fr 698,140, June 27, 1930 "Mate" or Paraguay tea made from the dried leaves of "Ilex paraguayensis" is improved in taste and smell by the action of carbonyl compds, *e g*, AcOH or ketones

**Working up lupine seeds.** Ges für Lupinenindustrie m b H Ger 522,335, June 24, 1924 After the seeds have been steeped in known manner, the swollen seeds, which are those from which the poisonous constituents have been adequately removed, are sepd from the unswollen or slightly swollen seeds by sifting Cf *C A* 25, 1298

**Preserving green fodder.** Gustav Fingerling Ger 522,333, Nov 20, 1925 The fodder is steeped for about 8 days in water which is protected from the air by an oil layer and contains a bactericide in a concn sufficient to disinfect the fodder without rendering it inedible Alternatively, a stronger disinfectant soln may be used, and replaced after a time by water Cf *C A* 25, 1923

**Method and apparatus for preserving green fodder by the cold-pressing process.** Adolph Hupertz Ger 522,331, Jan 8, 1926

## 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S MINER

**Acid-resisting materials for chemical and building industries.** P. N Grigor'ev and I I Silvistrovich *Zhur Prikladnoĭ Khim* 3, 1155–8(1930) —$Na_2SiF_6$ is recommended as a binder for materials contg silicates V. Kalichevsky

**The steam and electric power plant of Imperial Chemical Industries, Ltd., at Billingham** H A Humphrey, D M Buist and J. W. Bansall *J. Inst Elec Eng.* 68, 1233–75, 1276–90(1930) E J C.

**Blowing bulk chemicals about the plant.** E H. de Coningh *Chem. Markets* 28, 497–499, 501, 503(1931) E. H.

**Safety in handling compressed gases.** Robert H Ferguson *Chem. Markets* 28, 505, 507, 509–511(1931). E H

**Smokes and smoke gases.** E Smolczyk *Z ges Schiess-Sprengstoffw* 26, 132–5 (1931).—A discussion of the products of a fire from the standpoint of danger to exposed personnel particularly firemen The greatest danger comes from the smoke, composed of both solid and liquid particles These are present in the largest quantity early in the fire before the temp is sufficiently high to prevent the approach of firemen They frequently contain substances which deaden the nerves in the mucous membrane and act as narcotics, causing sudden collapse The mechanism of this action is described Less dangerous are irritant gases and CO Suitable gas masks contg smoke filters are described A L Kibler

**The toxicity of certain benzene derivatives and related compounds.** Henry F. Smyth *J Ind Hyg* 13, 87–96(1931).—The toxicity of many compds used industrially has been studied The blood changes which Selma Meyer (*C A* 22, 1417) found after benzene, toluene and xylene poisoning have not been in agreement with those reported by American investigators Long exposure showed evidence of lung inflammation and degeneration of internal organs Xylene and toluene, because of their higher b ps., are not so hazardous as benzene, and they are not absorbed through the skin to any extent Aromatic nitro compds act on the central nervous system, whereas amino compds are blood poisons Headache, dizziness, visual disturbances, cyanosis, abdominal cramps, coma and convulsions are characteristic of both Poisoning from amino derivs is less serious but they are absorbed readily through skin as well as through the lungs Aniline poisoning may result in malignant bladder tumors, 25 g is a toxic dose, but 0.4–0.6 mg per l may be breathed for about 1 hr without much effect Toluidines produce less cyanosis than anilines The diamines used in dyeing furs may be very toxic, and poisoning is sudden Some destruction of red cells results A study of guanidine derivs revealed a sharp line between the fatal dose killing in a few hrs and the dose from which there was recovery Death from these resembled cyanide poisoning All these benzene poisons produced one outstanding lesion, namely a tendency to extravasation of blood in the lungs This varied from scattered minute petechiae to massive lobular or lobar hemorrhage The lesions were present in exptl animals and in man In industry, accidental poisoning with any material having a lethal dose over 250 mg per kg *per os* is rare With a limit of 100 mg per kg there is little danger if reasonable precautions are taken Personal idiosyncrasy and the fact that absorption through the skin is often very rapid must be kept in mind G H W. Lucas

**Destruction of mustard gas (dichlorethyl sulfide) in the ground by means of fire.** Hugo Stoltzenberg *Z. ges Schiess-Sprengstoffw* 26, 135–7(1931).—An app is described A. L. Kibler

**Commercial cooling units.** F E Stewart *Refrigerating Eng* 21, 21–6(1931).—The effect of the spacing of fins and design of the box interior are considered in relation to heat transfer characteristics It was noted that max heat transfer was dependent on the total heat load, the resistance offered to free air circulation and the depth of the fin in the direction of air travel over the surface The most effective spacing varied from 3/8 in for fins 4 in deep to 1 in for fins 14 in deep A H Johnson

**Refrigerant properties—some refinements.** H D Edwards *Refrigerating Eng* 21, 106–7(1931).—The phys consts of 15 refrigerants are tabulated A H J

**Economical marine insulation.** E B Joelson *Refrigerating Eng* 21, 13–20 (1931).—Peculiarities in marine insulation, as well as insulants suitable for ship's holds, are discussed Methods and formulas are given for computing economically practical insulation for ships Charts are included to illustrate the use of the author's formulas A H Johnson

**Molding powders for electrical use—wide range available.** J R. Dolphin *Times Trade and Eng Suppl* 28, No 664, 20(1931).—Illustrations of hot and cold molding are shown E M Symmes

**Effect of surface conditions on heat transmission.** S J Kohli *Trans Inst Chem Eng*, Advance copy, 19 pp., Oct., 1930.—The over all and film coeffs of heat transfer through a Cu tube, within which a current of hot air passed, and which was cooled with water outside, were studied with special reference to variations in the character of the surface. Results were obtained for the over all coeff in fair agreement

with Joule and Ser's formula, $k = 16v$ to $19\sqrt{v}$, where $\sqrt{v}$ is the gas velocity in m./sec. K.'s results are summarized by the equations $k$ (over all) $= 16.912v^{0.491}$ and $k$ (air-Cu) $= 16.116(w/a)^{0.486}$, where $w/a$ is the mass velocity. Other formulas are discussed and criticized. Coatings with red, green and violet enamels increased the heat transfer throughout. It is suggested that radiations of short wave lengths may be absorbed and converted into heat energy. At high velocities convection plays an overwhelming part, and therefore the thickness of the air film is important. At lower velocities radiation and absorption are of more importance. The metal water film coeffs. calcd. in a few cases show an increase with the logarithmic mean temp. difference, undoubtedly because of increased convection. These coeffs. are markedly increased by black surfaces on the gas side. B. C. A.

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Porous masses from gypsum [for heat insulators]. (Ger. pat. 522,139). 18.

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**Gaseous reactions.** Nikodem Caro and Albert R. Frank. Fr. 698,169, Aug. 17, 1929. In gaseous reactions substances are added to the gases which may afterwards be removed. Thus in the production of $N_2O_4$ or $HNO_3$ by the catalytic oxidation of $NH_3$ or HCN, steam is added to the gases before the reaction zone and is condensed after the reaction.

**Separating carbon monoxide from gases.** Harald Kremer. Fr. 697,752, June 21, 1930. CO is sepd. from gases contg. it by converting the greater part of it into $CO_2$ and H by means of steam and catalysts and the remainder into $CH_4$ and water by hydrogenation. Details of the process and an app. are described.

**Treating gases with liquids.** Emile Deplasse. Fr. 699,713, Oct. 14, 1929. The known method of washing a vapor by passing it through a liquid, with the use of venturi tubes, is extended to the neutralization, superheating, cooling and purifying of gases, vapors and fluids.

**Recovering organic substances from aqueous solutions or emulsions, or from gas mixtures.** Isidor Traube. Ger. 522,480, Mar. 8, 1928. The solns., mixts., etc., are brought into contact with a powd. ore, *e. g.*, galena or zinc blende. The ore adsorbs the org. substances, which are then recovered by treating the ore with a hydrophile colloid, *e. g.*, gelatin or albumin, or with an org. compd. of stronger polarity than the adsorbed compd. Thus, $C_6H_6$ may be sepd. from a mixt. with water by shaking the mixt. with powd. galena, the adsorbed $C_6H_6$ is reliberated by addn. of a little oleic acid. Other examples are given also. The method may be applied to the purification of water.

**Dispersions of solids.** I. G. Farbenind. A.-G. Fr. 697,099, April 21, 1930. Stable dispersions of metals, metalloids or their mixts. or alloys are prepd. by disseminating the solids in a finely divided state with rubber or like masses previously masticated and dissolving the mixt. in a solvent after the dispersion is pushed to the point where a sample forms a soln. in an appropriate solvent without a deposit even on standing.

**Recovery of solvents such as those used in the manufacture of the alkali metal phenylglycines.** Justin F. Walt (to National Aniline & Chemical Co.). U. S. 1,798,713, March 31. Aniline, an alkali metal cyanide and $CH_2O$ are caused to react in a solvent comprising alc. and water to form a reaction mixt. contg. an alkali metal phenylglycine, alc., aniline, $NH_3$ and water. Liquids are vaporized from the reaction mixt., the vapors are condensed and $NH_3$ is sepd. from the condensate. Substantially all the condensate is refluxed and brought into contact with the vapors, and the operations of distn., condensation, sepn. of $NH_3$ and return of condensate are continued until the

condensate contains only a small quantity of $NH_3$. A portion of the condensate is then withdrawn from the system, while the distn. and condensation are continued. App. is described.

Combustible solvent containing hydrocarbons. Wolf Krumbhaar and Elliott Morrell. Fr. 627,500, June 17, 1927. Light hydrocarbons used for cleaning, etc., are rendered incombustible by a content composed of a light petroleum distillate and a compd. of the formula $R_2=N-X-FA$, in which R is H, an alkyl group or a substituted alkyl group; X is an alkyl group or a substituted alkyl group and FA is a fatty acid such as oleic, stearic or palmitic acid.

Desulfurizing extraction agents. Gewerkschaft Mathias Stinnes. Ger. 517,000, Apr. 30, 1929. Ammoniacal extn. agents used in depurifying materials are desulfurized by passing into an agent, such as Cu cement or bog iron ore which absorbs $H_2S$, but leaves the $FeOH$ still in the free state.

Deflocculating colloids. Walter O. Robinson to New Jersey Zinc Co. U. S. 1,790,877, April 7. For promoting the deflocculation of solids in a liquid medium such as mineral pulps, the material is treated, without added heat, with prepd. white waste liquor.

Heat carriers for high temperatures. I. G. Farbenind. A.-G. Fr. 627,313, June 13, 1928. A mixt. of org. liquids stable at 300°, such as binary or ternary mixts. of $CH_3Ph_2$, $Ph_2$ and $Ph_2O$, are used as heat carriers.

Drying storage-battery plates or other articles with heated gases. Willard L. Repinhart (to Willard Storage Battery Co.). U. S. 1,790,214, April 7. The articles are placed in a chamber through which a heated gas is passed until a predetd. amt. of the moisture has been carried away, and the chamber is then connected in series with another chamber cont'g. wet articles. An arrangement of app. is described.

Filter for gas and smoke masks. Harry A. Kuhn and Wm. A. Boyle (Boyle to Kuhn). U. S. 1,790,194, March 31. A fibrous cellulose material is impregnated with activated charcoal in a discrete condition.

Brine for refrigerators, etc. Robert Mayrhofer. Austrian 121,988, Nov. 15, 1928. The corrosive action of the brine on metals is reduced by adding a small quantity of an org. nitro compd., e. g., picric acid.

Condenser with flat sinuous coils suitable for condensing gases in refrigerating systems. George Hilger. U. S. 1,790,795, March 31. Structural features.

Condenser suitable for ammonia condensation in refrigeration. Charles H. Wertz. U. S. 1,790,824, March 31.

Pipe-coil condenser suitable for condensing ammonia. Gustaf M. J. Backqvist (to Platen-Munters Refrigerating System, Aktiebolag). U. S. 1,790,081, March 31.

Insulating materials. I. G. Farbenind. A.-G. Fr. 627,312, June 13, 1928. Insulating and coating materials are made by mixing and molding under heat and pressure waste wood, peat or residues from the acid treatment of peat, or lignin from the saccharification of wood, with condensation products of urea and aldehydes or their polymers. Cf. C. A. 24, 754.

Heat-insulating material suitable for lining flues, ovens, etc. Arthur J. Ross (to Armstrong Cork Co.). U. S. 1,790,253, April 7. After laying down a substantially dry facing mix of cementitious material such as cement, sand and asbestos, there is placed over this a body material comprising a dry siliceous earth mixt. cont'g. water, and liquid from the body material is utilized by the facing material.

Waxing paper and wrapping it around wire. Neil C. Lanyon (to National Electric Products Corp.). U. S. 1,790,892, March 31. App. and various details of operation are described.

Electrical insulators. Edmund Burke (to Brown Co.). U. S. 1,790,580, April 7. Impregnated insulators are formed with a stem member composed of long wood fiber and a comminuted absorbent filler such as wood flour and with a flange member having a greater amount of absorbent filler and a smaller proportion of fiber.

Cold-molded insulation. Roy E. Coleman (to Monowatt Elec. Corp.). U. S. 1,790,004, March 31. A binder is formed by heating and mixing an asphaltic substance, a drying oil and a dispersing medium in the form of a fatty acid of a drying oil. The binder is mixed with filler material such as finely divided asbestos, and the mixt. is cured.

# 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Recent progress in water supply.** C A EMERSON, JR., H B CLEVELAND, H. F. FERGUSON, J C PRITCHARD AND ROBERT S WESTON *Public Works* 61, No 6, 23–4 (1930) —The report discusses advances made in methods for the improvement of water color, taste, odor and softening For color removal superchlorination followed by dechlorination is effective when the Fe content of the coloring matter is high Chlorinated copperas has been used effectively, as well as filters loaded with ferric hydrate H ion control and improved mixing devices have decreased the cost of color removal Progress has been made in eliminating mud balls from filters The use of air during filter washing has been recently introduced Filter sand may be kept clean by employing velocities sufficient to produce 50–60% expansion of the sand bed Variations in temp must be corrected for by varying the wash water velocity Cleaning of filter sand may be accomplished by the use of caustic soda Improved methods for recovering phenols at coking plants have reduced considerably the tastes and odors caused by industrial wastes *Activated C filters are especially effective for removing objectionable* odors and tastes Another method is pre ammoniation Improvements in filter plants include the use of mech devices to replace cleaning by hand and the utilization of the coagulating effect of sludge from the coagulating basin on the silt contained in raw water The zeolite and lime soda water softening processes have been improved by the adoption of re action tanks, settling basins and mech mixers and conveyers

C C RUCHHOFT

**Philadelphia water supply and health.** ANON *Public Works* 61, No 5, 29–30 (1930) —The report of the Philadelphia Hospital and Health Survey Comm gives the following data concerning the city's water supply Water intakes are located on the Schuylkill and Delaware rivers Both rivers receive domestic sewage and trade wastes from numerous municipalities Av *B coli* indices at the Schuylkill intakes vary from 10,000 to 34,500 per 100 cc, and at the Delaware intakes the av is 21,000 per cc Because of a total flood tide travel of 5 95 miles per tide of the Delaware River, the major pollution is caused by the city of Philadelphia In all there are 29 sewer outlets The city is operating 2 obsolete and overloaded sewage treatment plants which handle about 10% of the total flow By-passing of raw sewage into the rivers is common During the summer months, there was no dissolved O content in either river The O content of the Delaware intake samples is often 30–40% of satn Five filtration plants are in operation, but no provision is made for adequate preliminary storage or for prefiltration All filter plant effluents are chlorinated, the dosage being regulated according to the *B coli* index of the treated water and not by the residual Cl data Each plant is operated according to the policy of the individual filter plant superintendent The water supply has not been approved by the Pennsylvania Department of Health or the U S Public Health Service, since July, 1925 Numerous cases of cross connections were reported In 1913, 1300 cases of typhoid were attributed to pollution caused by cross connections

C C RUCHHOFT

**Water-supply problems in Holland.** F A LIEFRINCK *Public Works* 61, No 9, 19–20(1930), cf *C. A* 24, 3294 —Water has been one of the enemies of the inhabitants *of the Netherlands Much of this water is salt or brackish Because of unfavorable* geo-hydrological conditions difficulties are encountered in providing fresh potable water Sixty one % of the population, divided over 444 communities, now has water supplies In rural districts water supplies are built by a combination of several communities The Government Bureau of Water Supply coöperates and often takes over the financial risks of new enterprises Of the 444 water supplies 142 are drawn from dunes, 253 take ground water outside of dunes and 49 have river water supplies The dune supplies are taken from typical lens shaped fresh water accumulations The water is captured either by means of shallow wells (Haarlem), by open channels (Amsterdam) or by covered drains (the Hague) Future problems arise because of the reclamation of the Zuider Zee which will add some 550,000 acres of fertile land to the country. One of the 4 polders will be ready for occupation in 1931 The soil of these new polders has been under salt water for centuries, so there is little hope of finding fresh water for the population which will settle there

C C RUCHHOFT

**Improvements to the Bluefield water supply.** GEO D NORCOM West Va Univ. Eng Expt Sta., *Tech Bull* No 3, 49–56(*1930*) —To increase the quantity of the Bluefield Water Supply a slab-type dam was built to impound the waters from several springs Storage capacity for water now amounts to 172,000,000 gallons Daily chem

and bacterial examns. of the water are made. Alga control is practiced to eliminate tastes and odors. A. L. Elder

**Water-treatment works of Ida, Kansas.** M. P. Harrold. *Water Works and Sewerage* 77, 296–9(1930).—Water for this town, obtained from the Neosho River, is at present settled and chlorinated before distribution. The hardness of the water varies from 140 to 500 parts per million, principally on account of Ca carbonate, which represents 65–75% of the total hardness, and Mg, which is usually lower than 20 parts per million. During low flow, the chloride content is as high as 500 to 700 parts per million, because of the effect of oil-field pollution; most of the year the chloride content is less than 400 parts per million. The new filtration and water softening plant is designed to treat 2 million gallons per day with provisions for extension of the plant facilities. Raw water will be delivered by the present low-service pumps to the mixing chamber below the chem. application room. Lime is applied at the entrance of this chamber, and the water has a retention period of about 9 min. and a velocity of 0.8 ft. per second. The water next goes to the reaction tanks for about 30 min. The discharge from the reaction tanks passes to the existing preliminary settling basins for a 3-day retention period. The water is then aerated and passed to a chamber for carbonation. Aeration is obtained by the use of a Sacramento spray nozzle, and $CO_2$ from a natural-gas generating plant in the chem. head house is distributed through a grid system on the floor of the carbonation chamber. A 30-min. retention period is provided in this unit. Following this the water is treated with alum, and it then goes to the filters. There are 3 filter units, each capable of filtering 667,000 gallons per day. Storage is provided for 2,750,000 gallons. Cl is applied at the entrance to the last reservoir. C. C. Kneeland

**Present-day water-treatment processes.** A. E. Clark. *Public Works* 61, No. 9, 50(1930).—C. discusses recent standard practice in clarifying, filtering and chlorinating water, with examples from Tennessee practice. C. C. Kneeland

**Treatment of water and its effect on ferruginous incrustations.** Arthur Goffit. *Water and Water Eng.* 33, No. 387, 121(1931).—The primary causes of Fe oxide incrustations are acidity of the water, dissolved Fe, Fe bacteria and dissolved O. Dissolved Fe may be partially ppd. and removed by aeration and filtration, which also tend to eliminate dissolved O where present in excess under pressure. The ultimate source of the incrustation is dissolved Fe in the water itself. Addn. of lime or other alkali to water counteracts acidity, but only slightly retards bacterial action. Addn. of lime in sufficient quantity to be effective is costly and makes it unsuitable for certain technical processes. No useful results are seen from the addn. of Na silicate until prohibitive costs are reached. This seems true, in general, of addn. of chemicals. Filtration removes only a part of the Fe bacteria. The only sure means of preventing red-pecking after scraping is to recoat pipes after scraping. Alice W. Epperson

**Water of wells and rivulets of the northern bank of Lake Balaton.** G. Rozlozsnik. *Magyar Biol. Kut. Int. Munkái* 3, 125–45(1930).—Waters from Tihany to Aszófö were examd. Wells mostly originate from cracks of dolomite or limestone, therefore the salts consist of Ca and Mg $HCO_3$. The water of the rivulets contains less salt, since bicarbonates are ppd. Data of 12 detailed analyses are given. S. S. de Finály

**Floating matter contained in the Danube water at Budapest.** T. Takács. *Hidrol. Közlöny* 10, 53–6(1930).—Water of the left part of the Danube contained 0.2196 g. l. floating matter (av. of 9 detns.) that of the right part only 0.1874 g. l. The av. of the 2 is 0.2035 g. l. The Danube water above Budapest (at Lipót) contained 0.2002 g. l. floating matter. Dams proved to be of no influence on the floating-matter content. The above data mean that the floating matter content of the Danube amts. to about 10,000,000 metric tons in a year. Analyses of the floating matter gave: $SiO_2$ 18.05, $TiO_2$ 0.21, $Al_2O_3$ 3.61, $Fe_2O_3$ 0.56, FeO 1.27, CaO 35.20, MgO 6.45, $P_2O_5$ 0.24, $Na_2O$ 0.59, $K_2O$ 0.96, MnO 0.06, water (driven off above 110°) 5.76, $CO_2$ 25.79% (total 99.43%). The large content of $CaCO_3$ was caused by ppn. of bicarbonates during evapn. of the soln. Mech. analyses gave: clay (under 0.002 mm.) 10.20, silt (0.02–0.002 mm.) 30.13, fine sand (0.2–0.02) 56.22, sand (2–0.2 mm.) 3.35%. Microscopical examn. showed that it consists mostly of crystals of calcite. In addn., quartz, biotite, plagioclase, orthoclase, microcline, green and brown fragments of amphibole, limonite, garnet, pyrite and hypersthene were found. S. S. de Finály

**Efficiency of water-purification plants on the Great Lakes.** H. W. Streeter. *Water Works and Sewerage* 77, 295–300(1930). cf. C. A. 25, 1316.—The lake system studied provides approx. 10,000,000 people with drinking water and receives sewage and industrial waste equiv. to a population of five and one-half million persons. There is a striking similarity in all plants in regard to the existence of a well-defined relationship between the bacterial quality of the raw water and the corresponding quality of the effluent at each

successive stage of purification The marked variability in av bacterial efficiency between plants was found to be the outstanding dissimilarity. *In comparing the bacterial* efficiency of the Great Lakes plants with Ohio River plants it was found that the former were slightly less efficient with chlorination included and considerably less efficient with chlorination excluded It is suggested that these divergencies might be due to the differences in the chem compn of the 2 waters The study further indicates that a *B coli* index of 4500 per 100 cc represents an upper limit of permissible pollution With av indexes ranging below 1000 per 100 cc the majority of plants would be overburdened for a very small proportion of the time The following areas are listed in their order of decreasing intensity of pollution extreme southern end of Lake Michigan, extreme western end of Lake Erie, outlet of the Detroit River and southern shore of Lake Erie between Cleveland and Sandusky C C RUCHHOFT

**Laboratory-control tests and their practical significance.** PERKINS BOYNTON W Va Univ Eng Expt Sta., *Tech Bull* No 3, 103–6(1930) —Perkins emphasizes the necessity of lab -control data *E g*, the water of the West Fork River coagulates best between a $p_H$ of 6 2 and 6 8 Detns of turbidity at 3 hr intervals make it possible to predict the amt of alum needed From 5 to 10 parts per million of alkalinity should remain in the water after treatment A L ELDER

**Analysis of water from the Odiel river (Huelva).** L BLAS *Anales soc españ fis quím* 29, 162–3(1931) —High mortality of fish in the Odiel River led to analyses which showed 0 45 mg $As_2O_3$ per l and $p_H$ 4 7, quite sufficient to explain the mortality and migration of fish E M SYMMES

**Chemical analysis of the water of "Margit" well of Zánka-Vérkut (Hungary).** F MARSCHALL *Hidrol Kozlony* 10, 136–40(1930) —The dissolved matter totalled 1707 87 mg /l S S DE FINÁY

**Chemical analysis of the waters of Cave Aggtelek (Hungary).** R MAUCHA *Hidrol Közlony* 10, 201–7(1930) —The data for analyses of 6 samples are given The content of org matter is small S S DE FINÁY

**Chemical analysis of Szent István mineral water of Parád (Hungary).** F MARSCHALL *Hidrol Közlöny* 9, 100–3(1929) S S DE FINÁY

**Chemical analysis of the temperate springs of Dunaalmás (Hungary).** K EMSZT *Hidrol Kozlony* 9, 104–6(1929) —The waters of 2 springs were analyzed both belong to the group of earthy, simple thermal waters contg $H_2S$ and $HCO_3^-$ S S DE F

**Attempt to control cyclops in a water plant.** E M JOHNSON *J Am Water Works Assoc* 23, 582–5(1931) —Treatment of filters with a concd soln of $CuSO_4$ and prechlorination for 1 hr with 1 5 parts per million Cl was ineffective To date an effective dosage or treatment has not been found D K FRENCH

**Determination of the nitrate content of drinking water.** Ö SZAKÁCS *Kisérlet Közlemények* 33, 330–5(1930) —A rapid method consists in adding $Ph_2NH$ in $H_2SO_4$ to 10 cc water, shaking the mixt in a bottle with glass stopper, cooling the liquid quickly and within about 5 min comparing it with a standard soln made of basic Cu carbonate, $K_2Cr_2O_7$ and rosolic acid equiv to 60 mg $N_2O_5$ per l The standard soln should be diluted to the concn desired S S DE FINÁY

**Pre-ammoniation at Springfield, Illinois.** CHAS H SPAULDING *Public Works* 61, No 5, 35–6(1930).—See *C A* 25, 1607 C C RUCHHOFT

**Combined nitrogen in rain water.** C SRIKANTIA *Half-Yearly J Mysore Univ* 4, 195–8(1930) —Sixty two samples of rain water collected in Bangalore over a period of 1 year were analyzed for $NH_3$, $N_2O_3$ and $N_2O_5$ The amts found show a max in April The total rainfall was 32 40 in., giving 1 37 lb $NH_3$ per acre, 0 861 lb $N_2O_3 + N_2O_5$ per acre and a total of 2 40 lb of combined N per acre GEORGE CALINGAERT

**The taste problem solved.** JOHN R BAYLIS *Water Works and Sewerage* 77, 299–304(1930) —The elimination of tastes in water has been along 2 lines One is to prevent the taste from being more pronounced when Cl is added to the water, and the other is to eliminate all objectionable tastes by removing them from the water by changing them to inoffensive compds The success of the superchlorination treatment depends upon the power of the Cl to break down the offensive compds and also on the effectiveness of the dechlorinating process The most common tastes, such as those produced by microörganisms and by the phenolic compds, are readily changed to inoffensive compds with Cl With superchlorination all bacterial life is destroyed, the oxidizable org matter is reduced and the water is more likely to remain stable when stored $SO_2$ is a very effective dechlorinating agent In practice, it is best to add an amt of $SO_2$ equivalent to residual Cl present Na bisulfite is also used for dechlorination. The most successful treatment for the removal of tastes is the Cl activated-carbon process The water is superchlorinated, and a residual Cl content of 0 5 to 1 0 part per

million, prior to dechlorination, is sufficient if there has been 3–4 hrs' contact time. Charcoal, I, ignite and activated C are dechlorinating agents. Activated C is best suited for the purpose and removes the excess Cl as well as offensive compds. not changed by the Cl. Another process is the $NH_3$–Cl treatment. $NH_3$ is added to the water prior to Cl. This is done to prevent chloro tastes. The Cl unites with the $NH_3$ to form a chloramine, a weak oxidizing agent which does not readily oxidize the org. material present in the water. Chloramine is a more effective bactericide than Cl. It prevents after-growths. It eliminates objectionable odors and tastes. It allows a 50% reduction of the amt. of Cl required for actual sterilization. It retards the oxidizing action of the Cl and prevents its absorption, thus allowing practically all the Cl to be available for germicidal action. More time is required to sterilize the water with chloramine than with Cl. $KMnO_4$ has been used to eliminate taste-producing compds., but it gives the water a slight bitter and astringent taste. Ozone has not been used extensively to eliminate tastes because of its cost, but it may be quite effective. C. C. Pitchford

Substances producing taste in chlorinated water. L. B. A. Adams. *Water and Water Eng.* 33, No. 387, 109–13(1931).—$CHI_3$ taste in chlorinated water may arise from the presence in the water of (a) certain products of destructive distn. of coal, (b) certain salicyl derivs. of natural origin, (c) unknown products of bact. metabolism or decomps., and of purely chem. action, (d) iodides of natural occurrence. Taste may be due to a no. of org. substances, confined to the lower monohydric phenols of the benzene series, their monocarboxylic, aldehydic, alcoholic derivs. or their inorg. salts. Tastes more nearly resembling those met with in actual practice are produced by phenol, monohydric phenols with substituted groups in the ortho position or inorg. iodides. Para compds. yield tastes resembling $CHI_3$, less, but of greater pungency than the tastes of meta compds. The strongest tastes are produced by phenol, *o*-cresol, salicylaldehyde and *o*-hydroxybenzyl alc. The tastable products are probably mixts. of *o*- and *p*-chlorophenol, trichlorophenol or their homologs. As *o*-chlorophenol possesses the strongest taste and more nearly resembles $CHI_3$, it may be said that the substances producing more intense tastes yield a greater proportion of *o*-chlorophenol.

Alice Whitson Jefferson

Prevention of chlorophenol tastes. Chas. R. Cox. *Public Works* 61, No. 5, 77 (1931); cf. *C. A.* 24, 1164.—Expts. concerning the effectiveness of superchlorination, $NH_3$ treatment and $KMnO_4$ treatment disclosed the following. Superchlorination is effective but expensive. $NH_3$, when used before or with Cl prevents formation of chlorophenols. $KMnO_4$ is feasible and economical. It is necessary to compensate for its influence upon the results of the *o*-tolidine test for residual Cl. C. C. R.

The determination of total alumina in filtered water. F. O. Baldwin. *Water Works and Sewerage* 77, 311(1931).—The new method for the detn. of unpptd. alum is simple, rapid and sensitive to 1 part in ten million as $Al_2O_3$. The reagents required for the test are: (1) Three tenths % aq. soln. of alizarin red S (alizarin sodium monosulfonate) in 2 *N* $H_2SO_4$. (2) Satd. soln. of $NaHCO_3$. Filter through alumina free filter paper and add 2 cc. distd. water per 100 cc. of filtrate. The strength of this soda soln. should be held close to a normal soln., that is, 5.4% $NaHCO_3$ (Arm & Hammer bicarbonate may be used). (3) Fifty % AcOH made with the highest grade reagent and boiled distd. water. Use the following procedure: To 50 cc. of the freshly collected and well-shaken water add 1 cc. of No. 1. Use phosphorus acid flasks, size 2½ oz. Boil 2 min. on the hot plate, neutralize with No. 2 to just barely purple by adding the soda soln. very carefully drop by drop, then add exactly 0.5 cc. excess, boil 2 min. and cool in *cold water*. When cold, add 1 cc. of No. 3, let stand 1 min. and compare with the color standard sealed in pyrex 2½ oz. flasks similar to the above flask. These color standards are sealed in partial vacuum and have to be standardized very accurately. C. C. Pitchford

Spectrographic determination of cations of some Spanish medicinal mineral waters. L. S. Piña de Rubies and C. Serment d'Argent. *Anales soc. espan. fis. quim.* 29, 440–46(1931).—Spectrographic tests in the ultra violet region of dry residues from 43 medicinal mineral waters identified Pb, Cu, Ag, Sn, Mo, Ga, Ge and Ti, in addn. to the usual elements. E. M. Symmes

The relation between the fixed residue and electrical conductivity in mineral waters. E. Bovalini and L. Vallasi. *Ann. chim. applicata* 21, 51–73(1931).—To approximate the compns. of natural waters a large no. of solns. were prepd. of the following 6 types: (1) from $Ca(HCO_3)_2$ alone, (2) from $SiO_2$ with $NaOH$, (3) from $SiO_2$, $Ca(HCO_3)_2$ and different amts. of $NaOH$, (4) from $SiO_2$, $Ca(HCO_3)_2$ and different amts. of $NaHCO_3$, (5) from $SiO_2$, $Ca(HCO_3)_2$ and different amts. of Ca and Mg as sulfates, (6) from $SiO_2$ and $Ca(HCO_3)_2$ plus various salts. The fixed residue at 180° and *E* at 15° were detd.,

and the ratio $r$ = fixed res /$K$ was calcd Results for $r$ varied from 584 to 4100 The only uniformity is observed for waters of the same type but varying concn , in which case $r$ varies less than 20% A W CONTIERI

**Influence of water plants on the electrical conductivity of Balaton water and of bicarbonate solutions.** GY LUDÁNY *Magyar Biol Kut Int Munkái* 3, 482–5 (1930) —Water plants cannot decrease $K_{18}$(= 4 5 × $10^{-4}$) of Balaton water to 0 5–0 8 × $10^{-4}$ Five g Potamogeton was used in 100 g water, and $K$ was measured in 3 hrs by Pleissner's app The value of $K$ at first decreased, then increased in diluted Balaton water An increase of cond was found under the influence of light at far higher $K$ values than those obtained by Ruttner in the water of Lunzer Sea The cond under the influence of light at first increased, then decreased in $Ca(HCO_3)_2$ solns Plants liberate $CO_2$ in the absence of light Ruttner's phenomenon was observed on the 3rd day, under $p_H$ 8 5 and $K_{18}$ 0 9 × $10^{-4}$ S S DE FINÁLY

**Protozoölogical examination of water.** MISE N L WIBAUT *Chem Weekblad* 27, 526–9(1930) —Tabulations of the nos of bacteria (*B coli*) and protozoa present in previously sterilized waters at successive intervals after seeding show that in most cases both increase at first, the latter much faster than the former after the period of increase both decrease The conclusion is drawn that the protozoa can entirely eliminate the bacteria in most cases Comparative tests of the no of protozoa and bacteria present in a water may be used to det the date of infection of the water with bacteria B C A

**Direct method for the quantitative study of bacteria in water, and some considerations on the causes which produce a zone of oxygen minimum in Lake Glubokoje.** S I KUZNETZOV AND G S KARZINKIN *Zentr Bakt Parasitenk* , 2 Abt , *83*, *169–74(1931)* — The diminished content of O in the water below the temp leap can be easily explained by its continuous consumption by bacteria The greater d of these water layers precludes their rising to the surface in consequence of wind circulation Thus the O in them cannot be renewed by that of the atm The sharp increase in d of the water of the temp - leap layer contributes to the retention of the dead organisms of the plankton This favors the increased development of bacteria JOHN T MYERS

**Gas production and $p_H$ determination of coli-aerogenes cultures in sugar broths.** C C RUCHHOFT, J G KALLAS AND BEN CHINN *J Am Water Works Assoc* 23, 565–81*(1931)* —*Buffering broths with 0.2% $K_2HPO_4$ is recommended to control $p_H$ and* increase gas production The effect of the initial $p_H$ values with different media is stated. D K FRENCH

**Private cross-connections and similar menaces to the quality of water.** JOEL I. CONNOLLY. *Water Works and Sewerage* 77, 309(1930) —To prevent water pollution through submerged inlets to fixtures and direct waste connections, all water pipes and waste pipe installations must be carefully supervised Safer fixtures should be developed, and devices to prevent back pressure provided All direct water connections to waste pipes should be severed Submerged inlets should be removed, and the water should enter over the rim of the fixture, or a non-siphoning device should be installed C. C. RUCHHOFT

**The use of sea water for the regeneration of base-exchange materials in water softening.** HORACE INGLESON AND BASIL A ADAMS *J Soc Chem Ind* 50, 123–4T (1931) —Sea water contg $Na^+$ 1 092, $Mg^{++}$ 0 127, $Ca^{++}$ 0 046 and $K^+$ 0 043% was used to regenerate glauconite "Kenzelite " It was possible to substitute sea water for NaCl solns usually used to regenerate water softeners Further studies will be made to det whether or not a film of $CaSO_4$ forms on the sand during the regeneration process It was considered that sulfate ions in the sea water might ppt the Ca ions during treatment of the filters with sea water A L. ELDER

**Development of railway water-supply practice.** C R. KNOWLES *J Am Water Works Assoc* 23, 481-94(1931) —An historical review is given of what has been done, with an outline of the organization and purpose of the American Ry Eng Assoc. and the Natl Boiler Feed Water Comm. D K. FRENCH

***Boiler water chemistry.*** W. G LEEMANN *J S African Chem Inst* 14, 22–32 (1931) —A review. E. H.

**Boiler feed waters.** F. W W BUTLER. *J S African Chem. Inst.* 13, 7–20 (1930).—A review E. H.

**The need of chemical supervision of boiler feed water.** HEINRICH PROSKE. *Chem -Ztg* 55, 226–7(1931) —An analysis of feed water showed the following: residue on evapn 216 4 mg /l , residue on ignition 152 4 mg /l , loss on ignition 64 0 mg /l , NaCl 2 46 mg /l , $SO_3$ content 38 76 mg /l , $SiO_2$ 13 2 mg /l , CaO 54 4 mg /l , MgO 17.09 mg /l , total hardness 7.38, carbonate hardness 3 50 The water was clear, free from Fe and $Al_2O_3$, gave a neutral reaction with litmus and a weakly alk. one with phenol-

phthalein The preheater tube of a boiler supplied with this water became clogged because of a hard deposit, 95 61% of which was sol in hot water The water soln of this scale presented the following compn · $Na_2SO_4$ 67 45 $Na_2CO_3$ 29 15, $NaHCO_3$ 0 14, $Fe_2(SO_4)_3$ 1 20, NaCl 1 02, $SiO_2$ 0 30, $CaSO_4$ 0 34, $MgSO_4$ 0 06, $H_2O$ 0 34% R C F

**Modern boiler feed water treatment methods.** A I Warner *Chemical Markets* 28, 279–83(1931) —The use of Na aluminate has improved water treating methods Diagrams of exptl glass boilers are shown A L Elder

**Boiler feed water treatment in Great Britain.** A W. Chapman *J. Am Water Works Assoc* 23, 547–50(1931) —A review involving softening, embrittlement, naturally soft surface waters and high pressure operation D K French

**Embrittlement and protection of steam boilers.** Fredrick G Straub *Power Plant Engineering* 35, 100–3(1931) —See *C. A.* 25, 1311 G L Kelso

**Prevention of boiler scale.** Gy Bölcsházy. *Technika* 10, 325–6(1929) —Ca is added to the boiler in the form of coned lime water A 10% soln of Na carbonate is added separately The deposit should be removed daily Alk water destroys varnish insulations of heating tubes, therefore rubber or soft Cu rings should be used for insulation S S de Finály

**Blow-down losses and the means for their correction** A R Mourro *Pulp Paper Mag Can* 31, 495–7(1931) —A discussion is given of the reasons for the losses which occur in boiler blow-downs, and the means for their correction From a discussion of the effects of surface tension and concn of sol salts and insol matter, it is concluded that the function of the blow down valve is the reduction of concn of sol salts, and that the reduction of concn of suspended matter is incidental and is efficient only to a degree It is further concluded that reduction in blow down is dependent upon the efficient elimination of suspended matter and the reduction of sol salts of the feed water Conditions which existed in several actual cases and the steps taken for the correction of the losses involved are described A Papineau Couture

**Unusual corrosion problems** F B Porter *J Am Water Works Assoc* 23, 534–7(1931) —Two cases of corrosion, one attributed to electrolysis and one to distd. water action at high temps are described D K French

**Sewage treatment at Schenectady** Morris M Cohn *Public Works* 61, No 5, 30(1930) —A description of the plant operation for 1929 is given Because of the inadequate capacity of the plant, an av of 0 61 m g d of sewage was wasted directly to the river Trash collected from the bar screens is plowed under Sludge is dried and sold to farmers at 25 cents per load The demand has exceeded the supply Av analysis of dried sludge shows 1 09% $P_2O_5$, 1 72% N and 6 4% ether insol matter A manual-controlled soln feed chlorinator is used for the prevention of odors during the summer months The av prechlorination dosage was 4 p p m Sludge analysis indicated the following averages 94 8 moisture, 65 9% org solids and $p_H$ 6 8 Fly life on the sprinkling filters was controlled by flooding for a period of 24 hrs C C Ruchhoft

**West Side sewage-treatment works, Sanitary district, Chicago.** *J. Western Soc Eng* 36, 90–110(1931) General problem. Langdon Pearse *Ibid* 90–2 Chemical and biological features I W Mohlman *Ibid* 92–4 —Chem settling makes it possible to decrease the amt of air required in activated sludge treatment and results in a substantial removal of the heavier sewage solids with a decrease in over-all vol of sludge Design of the West Side sewage-treatment works L C Whittemore *Ibid* 94–7 Mechanical engineering features Homer I Steffa *Ibid* 97–100 Construction methods L B Barber *Ibid* 100–5 Electrical engineering features. John T Hawley *Ibid* 105–7 Operation. A H Goodman *Ibid* 108–10 —The beginning of the world's largest sewage purification plant has proceeded with only minor operating difficulties W. H Boynton

**Pasadena's sewage-disposal plant.** G K Hooper *Municipal Sanitation* 2, 174–6(1931) —This plant serves a combined population of 121,000 The *activated-sludge* process is used, preceded by an equalization tank and grit chamber Part of the effluent is diverted for irrigation purposes, and the remainder discharged into a stream The sludge is converted into a *com fertilizer* Fifty lb of this material per annum per unit of population served is obtained Receipts from sales of fertilizer practically cover labor costs of operating the entire plant G L K

**Barrington sewage-treatment plant.** E Bender *Public Works* 61, No 9, 33 and No 10, 21(1930) —The sewage of Barrington, N J, is clarified and treated by mech aeration The settled effluent is filtered through sand and chlorinated The sludge-digestion tanks and covered sludge beds are provided for digesting the activated sludge C C. Ruchhoft

**Sewage chlorination for the protection of masonry sewers against disintegration.**

LINN H ENSLOW *Water Works and Sewerage* 77, 306(1930).—Sewers are often attacked by the $H_2SO_4$ produced in septic sewage by bacteria. This can be prevented by chlorinating the sewage, the chlorination suppressing biological action and simultaneously preventing odors and reducing the O demand. Cl is applied during max. sewage flow, about 9 to 12 hrs. daily. The quantity of Cl used is about 5 parts per million.
C. C. R.

**Laboratory studies of sludge digestion.** A. M. BUSWELL AND S. L. NEAVE. Ill. State Water Survey, *Bull.* No. 30, 84(1930).—The major nitrogenous constituents were shown to be urea, nucleoproteins and simple proteins, and their degradation products. The hydrolysis of urea to $NH_4$ carbonate was rapid and complete. Insol. proteins were hydrolyzed and peptized slowly in acid sludges ($p_H$ 5.0) but rapidly above $p_H$ 6.4. Fatty acids, $NH_3$ and free amino acids were the normal products, but amines also were produced in acid sludges. Fatty acids were decompd., with the production of $CH_4$ and $CO_2$. Amino acids were in part resynthesized into bacterial protein. The purine fraction of the nucleoproteins suffered almost complete destruction. During the remobilization in forms of N, not more than 5% of that present escaped as gaseous N. $NH_3$, living bacteria and amino acids were the main nitrogenous end products. Besides proteins, the sewage solids were shown to contain grease (soaps and fats), crude plant fiber and humus-like bodies. Grease degradation was demonstrated, and lower fatty acids, $CH_4$ and $CO_2$ were found as end products, thus grease was proved to be an important source of $CH_4$ in digestion tank gases. The degradation of lower fatty acids was studied to det. the biochem. mechanism involved. For the degradation of lower fatty acids (and by inference for higher ones) an anaerobic oxidative mechanism has been demonstrated in which water acts as the oxidizing agent. Methane and $CO_2$ were produced in nearly *theoretical yields. This mechanism probably has the same wide application in anaerobic processes that the β oxidation mechanism has in aerobic metabolism.*
F. W. TANNER.

**Chemical studies on sludge digestion.** S. L. NEAVE AND A. M. BUSWELL. Ill. State Water Survey Division *Circ.* No. 8, 3–9(1930).—See preceding abstract. F. W. T.

**Two questions on sludge digestion answered.** JOHN R. DOWNES. *Water Works and Sewerage* 77, 247–8(1930).—D. discusses the necessity of using circulating pumps for heating coils of sludge-digesting tanks and also the necessary pitch for the floor of digestion tanks. Pumps are preferable to secure equiv. heat transfer at a lower initial water temp. The lower water temp. is necessary to prevent baking sludge on the outside of the heating coil. D. recommends a 60° slope for the bottom of the digestion tanks when sand and grit are present. If grit chambers and screens are used, a slope of 18 in. in 19 ft. is sufficient.
C. C. RUCHHOFT.

**Molds utilized to make sewage sludge inodorous.** CHESTER G. WIGLEY. *Public Works* 61, No. 5, 38(1930).—Sewage sludge from sedimentation tanks having a detention period of 45 min. is pumped onto sludge drying beds. When dried so as to be shoveled easily, it is removed and spread for further air drying. It is then ground or broken up and stored in a dark building where mold growths complete the deodorization. The ground material is used as a *fertilizer* and sells for $20 per ton. The av. analysis after treatment is N 1.96%, available N 0.76%, $P_2O_5$ 0.62%, potash 0.13% and organic matter 35.9 per cent. The process has been patented.
C. C. RUCHHOFT.

***Trickling filters.*** *JOHN R. DOWNES. Water Works and Sewerage* 77, 313(1930).—Different factors must be considered. The type of influent, the depth of the filter and other factors det., to a large extent, the operator's method. In general, the sewage should come to the filters as fresh as possible and with the least possible suspended matter, which will provide against filter-clogging. This keeps down odors at the sprays and passes on to the sprinklers the fine particles which can be better treated aerobically in the filters than anaerobically with the sludge. Clogging of trickling filters is more likely to be due to growths on the bed than to the sewage solids themselves. Such growths can be eliminated by chlorinating or using bleaching powder. Odors also can be controlled by the use of Cl in sufficient quantities to oxidize the $H_2S$. The other objectionable feature of trickling filters is the presence of the filter fly. The only method of control at present is that of submerging the filter media at regular intervals, by which means the eggs, larvae and pupae are washed out of the filter bed. The adult flies are best destroyed by spraying the walls and walks with kerosene.
C. C. RUCHHOFT.

**Present practice in industrial-waste treatment.** ERNEST W. STEEL. *Public Works* 61, No. 9, 21(1930).—A review is given of the methods used for treating milk wastes, beet sugar waste, corn product wastes, cannery wastes, packing house wastes, tannery waste, textile and wool washing wastes, paper mill wastes, coke by product wastes, acid wastes and mine wastes. The methods suggested for various wastes include

coagulation, sedimentation, treatment on sprinkling filters or coke filters and activated sludge treatment. It is pointed out that there is no satisfactory treatment for wool-scouring wastes. C. C. RICHMOFF

**Treatment of trade wastes, a necessary feature of stream-pollution control.** W. W. HOOVER. W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. 3, 75–83(1930).—A review is given of some of the research projects which have led to the recovery of valuable products for industry and at the same time decreased the pollution of streams into which industries had been dumping wastes. A. L. ELDER

**An innovation in meat-packing waste treatment.** H. O. HALVORSON. *Municipal Sanitation* 2, 166–70(1931).—Biol. treatment of sewage from a meat packing plant killing 5000 hogs daily was found to be too costly and did not allow for protein recovery. The waste from this plant carried $120–300 worth of N per day. Chem. pptn. methods were unsatisfactory because of the high cost of filtering and drying the ppt. By use of Cl 80% of the org. N was pptd., and suspended solids were reduced 95%. The best results were obtained with the strongest sewage. The sewage is subjected to a short period of settling, a thorough mixing with Cl and final sedimentation in a Dorr thickener. From 1500 to 1700 lb. of Cl are used per day. Five tons of sludge are recovered per day from 750,000 gallons of sewage. The dry sludge will contain 8.5% $NH_3$. At $30.00 per ton for the sludge the plant will be self-supporting. G. L. KELSO

**Stream-pollution investigations in West Virginia.** L. KERMIT HENDON. W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. 3, 68–74(1930).—The activities of the State Water Commission are outlined. A report of the pollution of Cheat River indicated the pollution of the river from the following sources: 80 coal mines discharging acid waters, a tannery with a biochem. O demand equiv. to 13,000 people, 7 sawmills, a wool washing plant, cement factory, blanket factory and domestic sewage from 10,000 people. No satisfactory program for eliminating the pollution from coal mines is available at this time. A. L. ELDER

**Atmospheric pollution in 1929–30.** JOHN B. C. KERSHAW. *Engineer* 151, 257–9 (1931).—A review of reports on conditions at Hamburg, Germany, and at Southport and Salford, England. D. B. DILL

**Hygienic importance of sulfur, of sulfuretted waters and sulfur baths.** MAX GRÜNEWALD. *Pharm. Presse, Wiss. prakt. Heft* 1931, 38–40.—A general discussion is given of the element in its varied forms and combinations, its therapeutic application and reputed effect on the animal economy. W. O. E.

**Solving the garbage problem in Alton, Ill.** THOMAS BUTLER. *Public Works* 61, No. 5, 51(1930).—By the adoption of a municipal system of rubbish and garbage collection and disposal, a savings of $35,000 per year was effected. C. C. RICHMOFF

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Process water in the pulp and paper industry (SPLITTGERBER) 23. Treatment and disposal of wool washing effluent (SMITH) 25. Treatment of suint liquors from wool-scouring (KING) 25. Coating concrete [reservoirs] (Fr. pat. 698,562) 20. Fertilizer from distillery and sugar factory residues (U. S. pat. 1,799,176) 15. Recovering organic substances from aqueous solutions [in purification of water] (Ger. pat. 522,480) 13.

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NURSE, C. J. Purification and Disposal of Sewage. London: Crosby Lockwood and Son. 4s. 6d. Reviewed in *Water and Water Eng.* 33, 187(1931).

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Composition for preventing boiler incrustation. HERMANN JURESCH. Austrian 121,756, June 15, 1929. The compn. comprises powd. gallnut 5, powd. pine bark 2, powd. larch bark 2 and resin or grafting wax 1 part. 100 g. of the compn. are used for 1 cubic m. of very hard water.

Sewage-disposal apparatus. WM. W. SAYERS and MARCUS B. TARR (to Link Belt Co.). U. S. 1,799,150, April 7. Structural features.

Filter suitable for filtering water as drawn for use. ANTON C. MENGE. U. S. 1,800,093, April 7.

Sewage treatment. FREDERICK W. SPERR, JR. (to Koppers Co.). U. S. 1,799,444, April 7. Sewage is aerated in the presence of a compd. of a metal, the sulfide of which is insol., such as $Fe(OH)_3$, and a foam is maintained on the surface of the liquid during the aeration. App. is described. Pine oil may be used as a flotation agent.

# 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J J SKINNER AND M S ANDERSON

**Agriculture and soils of the coastal plain of Palestine. Soil survey of the Jaffa Sub-district.** H E. Z RACZKOWSKI *Palestine Dept Agr and Forests, Agr. Leaflets* 11 Ser., *Soil Survey* No 1, 24 pp (1929) *Expt Sta Record* 61, 17 8—The usual soil survey information is given, with the addn of some detailed chem and mech analyses given in an appendix G G

**Investigation of soils and of the mineral content of pasture grasses at Waranama Ranch, Berbice River.** R R FOLLETT-SMITH *Agr J Brit Guiana* 3, 142–59(1930)—Both soils and pastures examd were deficient in CaO, phosphate and potash, and grazing cattle became quickly emaciated The feeding of bone meal to cattle is recommended B C A

**Negative values in Neubauer-Schneider tests of soils.** M GRAČANIN *Z Pflanzenernähr Düngung u Bodenk* 18A, 115–8(1930)—Neg values for phosphate assimilation in Neubauer tests are ascribed to the transference of phosphatic material from the germinating seeds to the soil and its subsequent fixation by the soil The phenomenon is characteristic of highly adsorptive soils deficient in phosphate B C A

**Water condition of the soil and plant growth.** HANS GRADMANN *Naturwissenschaften* 19, 257–64(1931)—A review dealing with the mechanism of utilization of soil water by plants, mobility of water in soil, etc Many references are given B J C VAN DER HOEVEN

**Soil moisture content at which barley wilts.** L SMOLÍK *Bull Czechoslov Acad Agr* 1930, *166—Barley plants can utilize, at least partly, the hygroscopic moisture* of soils, particularly in heavy soils B. C A

**The problem of the accuracy of soil moisture determinations.** D S KUZNETZOV *Zhur Opuit Agron Yugo Vostoka* (*J Expt Landw Südost Eur Russlands*) 6, No 1, 155–80(1928), *Expt Sta Record* 63, 716—K presents the results of a math treatment of data on the moisture of a soil under sunflowers The moisture content was detd on each 10-cm layer to a depth of 200 cm For each layer 8 borings were made, so that each plat gave 160 detns The genetic horizons in the soil investigated were found not to influence the moisture content From a math point of view it was more rational to det the moisture on each 10 cm layer A sharp break in the moisture content and its constancy could be noted at a depth of 100 cm It is important to note the presence of a correlation between corresponding values of moisture in 2 different 10-cm layers on the one hand and 2 different borings on the other. The correlation value of the moisture in two borings is detd by the distance between them The character of the change in the accuracy of individual measurements of moisture within the m layers (0–100, 100–200 cm) or of independent expts is analogous to the character of the change in the constancy of the moisture, both the accuracy and constancy being measured by the same mean quadratic departure G G

**The coagulation of aqueous suspensions of soil with barium sulfide and calcium sulfide.** B G ZAPROMETOV *Pochvovedenie* 24, No 3–4, 37–42 (in German 43–60) (1929)—Z. compared the coagulation powers of CaS and BaS for soil suspensions and for mastic with those of $BaCl_2$, $CaSO_4$, $CaCl_2$ and $Al_2(SO_4)_3$ If 0 05 *N* (0 02 *N* of $CaSO_4$) *solns were used, a comparative value could be obtained for each of the cations.* BaS and CaS were effective as coagulants and were adsorbed by the mastic, $BaCl_2$ and $CaCl_2$ were also effective as coagulants but were not adsorbed by the mastic J. S JOFFE

**Replaceable bases and water sorption of soils.** L SMOLÍK. *Bull. Czechoslov Acad Agr* 1930, 10—The moisture absorbing capacity of soils satd with different bases varied with the base used in the order $Na > Ca > Mg > K > NH_4$. B C. A

**Degree of saturation of the adsorptive complex in Moravian soil types.** B. MALÁČ. *Bull Czechoslov Acad Agri.* 1929, 853 B. C. A.

**Role of humus in the absorption complex.** L KOTZMANN *Mezögazdasági Kutatások* 2, 537–55(1929)—No connection was found between the total amount of org. matter and that of alkali- or $NH_3$-sol matter detd by the method of Grandeau Hilgard. The $NH_3$-absorbing capacity of humus ppts made from different soils is the same, indicating an equiv wt of 308 The $NH_3$-absorbing value for soils is much larger than the satn values detd by the method of Hissink The conductometric titration value stands between above data S S DE FINÁLY

**Optical method for the investigation of humus.** G I. POKROVSKII *Pochvovedenie* 24, No 1–2, 124–30(in English 131–6)(1929)—P. presents a photometric method for

the detn of humus. The method is based on the well known phenomenon of reflection and absorption of light by variously colored, variously dispersed substances or by a difference in compn of the substances exam'd. A description of the app as well as a math discussion of the formula employed is given, and data presented check with the chem methods. J. S. Joffe

**Chemical changes in the organic matter [of soils] during the natural decomposition of the humus layers of woodlands. I. Variation in pentosan content.** A. Němec. *Z. Pflanzenernähr. Düngung u. Bodenk.* 18A, 65–104(1930).—The decompn of pine, fir and larch needles does not commence until after that of the cell wall substance. In general the pentosan content (ash free basis) decreases as humification proceeds although this relationship is less marked in soils under deciduous trees. Humification precedes pentosan decompn. Matter sol. in $C_6H_6$-alc. is decomposed at a relatively greater rate than is the total org. matter and is greater in pine than in fir soils in a similar stage of humification. The high proportion of resin in the needles tends to inhibit the normal humification process. The I consumption of $C_6H_6$-alc. exts. varies directly with the amt. of material extd. The nitrifying power of these soils is closely allied to the amt. of $C_6H_6$-alc.-sol. matter present, the latter becoming toxic when present in quantities exceeding 5% of the ash free dry matter. B. C. A.

**Occurrence and distribution of salinity in a virgin mallee soil.** J. E. Thomas. *J. Council Sci. Ind. Research* 4, No. 1, 12–9(1931).—Water sol. salts and chlorides were detd. at 1 ft. intervals to a depth of 16 ft. At the surface the Cl content in parts per 100 000 was 0.029, at 4 ft. 0.134, at 10 ft. 0.182, and at 16 ft. 0.278, indicating that leaching action had concd. the salts at the greater depths. The botanical flora of the soil was decidedly halophilic. Diagrammatic soil profiles and mech. analysis are given. The study was conducted with a view to possible future irrigation. C. R. Fellers

**Can a water extract serve as an index to characterize the degree of salt treatment of soils?** D. I. Tarasov. *Pochvovedenie* 24, No. 3–4, 61–99 (in English 99–101)(1929).—Analyses on aq. exts. of 5 different alkali soils are reported. They show that $H_2O$ exts. all of the sol. salts, which indicates that the chlorides and sulfates are not in an adsorbed state. The methods used are described in detail. An English summary is given. J. S. Joffe

**The biodynamics of alkali soils.** M. I. Prikhodko and M. I. Belikova. *Pochvovedenie* 24, No. 3–4, 145–66(in English 167)(1929).—On soils in the open field NaCl hindered the activity of *Azotobacter*, whereas $Na_2SO_4$ stimulated their multiplication, and the amt. of N fixed was just as great as that in the check plots. *Clostridium pasteurianum* developed better on the NaCl soil, especially in the upper horizons. Anaerobic as well as aerobic decompn. of cellulose was also stimulated by treating the soil with salt. Nitrification was stimulated in the soils treated with $Na_2SO_4$ but not in those treated with NaCl. The alky. of the soils also increased because of the salt treatment and subsequent leaching by rain water. J. S. Joffe

**Repeated soil extractions according to the method of Th. Saidel for the estimation of the solubility of the potassium in the soil.** H. Linsegang. *Landw. Vers.-Sta.* 111, 261–9(1931).—The Saidel method for the detn. of the soly. of the K in the soil is not of much value for practical use but gives some information as to the mechanism of soln. John R. Hill

**Replaceable sodium in soils.** K. K. Gedroiz. *Pochvovedenie* 24, No. 1–2, 1–14 (in English 14–21)(1929).—Ten g. of soil (if it contains more than 0.1% replaceable Na) or 100 g. (if less than 0.1% of Na is present) is mixed with 10% c.p. $CaCO_3$. 1000 cc. $H_2O$ is added and a current of $CO_2$ is passed into the mixt. for 2–3 hrs. The Na is detd. on the filtrate. If sol. Na salts are present, they are washed out before the soil is treated with the $CaCO_3$ and $CO_2$. The soil is washed until dark streams of humus begin to appear. J. S. Joffe

**The method of determining the lime requirement of the soil.** V. M. Filipenya. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 642–5(1930).—*By a method similar to* that of Yarusov, F. calcs. the lime requirement from a detn. of the hydrolytic acidity by the $CH_3COONa$ method. He uses the coeff. 2.0 instead of 1.75, figuring that the acid extd. represents only 50%. F. used the Trenel potentiometer for the detn. of the $p_H$. J. S. Joffe

**A simplified method for determining the lime requirement by the hydrolytic acidity of the soil.** S. S. Yarusov. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 638–42 (1930).—With the equation (1) $[H^+] = K[AcOH]/[AcONa]$ as a basis, Y. deduces a series of equations from the reactions which take place when a soil is treated with AcONa for the detn. of hydrolytic acidity. From the $p_H$ or the $[H^+]$ it is easy to det. the AcOH concn. in the soln. and, hence, the hydrolytic acidity without titrating the

soln By substituting the numerical values of formula (1) in terms of mg Ca the following equation (2) is obtained $[H^+] = 1.8 \times 10^{-5} (X/5000)$ or $[H^+] = 3.6 \times 10^{-9} X$ ($1.8 \times 10^{-5}$ being the dissocn const of AcOH), where $X$ is the content of AcOH in 250 cc expressed in terms of mg Ca Hence (3) $\log [H^+] = \log 3.6 \times 10^{-9} + \log X$ or (4) $p_H = 8.4437 - \log X$ In this equation $X$ consists of 2 components the content of AcOH in the original soln of AcONa before the detn and the AcOH obtained by the reaction of the acid soil with the AcONa, or $X = X_0 + X_1$ Substituting for $p_H$ in (4) its value 8.2 (the original $p_H$ of the AcONa) and solving, $X_0$ (calcd in terms of Ca in 250 cc) = 1.75 mg If $X_1$ is multiplied by the coeff 1.75 (the Kapper coeff for podzol soils) the hydrolytic acidity is obtained In practice the detn is made as follows A sample of soil (100 g) is mixed with a 1.0 *N* soln of AcONa ($p_H$ 8.2) in the ratio of 1:2.5 and shaken for 1 hr The soln is then filtered and $p_H$ detd Let the $p_H$ be 6.8 then from equation (4) $Y = 44$ Subtracting 1.75 mg ($X_0$) gives $X_1 = 42.25$ *mg of Ca By multiplying this by 1.75 (the Kapper coeff)* the hydrolytic acidity is detd directly in terms of Ca, and thus the lime requirement is detd directly without titrating J S Joffe

**The influence of calcium sulfide on the percolation of water through the soil.** A N Rozanov *Pochvovedenie* 24, No 3-4, 34-5(in German 35-6)(1929).—Expts with CaS as a coagulating agent on heavy clay soils have shown that when applied as the salt it is more effective than $CaSO_4 \cdot 2H_2O$ as measured by the percolation of water Applications of CaS also decrease the alky of the soil and increase the $SO_3$ content and CaO Adsorption expts with mastic have shown that the Ca from CaS is adsorbed in a quantity of 80-83%, whereas only 37-40% is adsorbed from $CaCl_2$ J S J

**Biochemical investigations on arable soil** Alb J J Vandevelde A Verbelen and L. Dekoker *Compt rend* 192, 706-7(1931); *cf C A* 24, 4881.—Three soil factors are detd the volumetric acid value the volumetric alk value and the volumetric value of adsorption The volumetric acid value is obtained by shaking 5 g of soil every hr for 9 hrs with 40 cc of distd $H_2O$ and 10 cc of 0.1 *N* $H_2SO_4$ or HCl The flask is then allowed to stand for 15 hrs, after which 25 cc of the liquid is decanted and titrated with 0.1 *N* NaOH From this is calcd the acid retained by the soil or the volumetric acid value The alk value is obtained in a similar way by treating the soil with NaOH and titrating with $H_2SO_4$ The difference between the amt of 0.1 *N* $HC_2H_3O_2$ retained and 0.1 *N* HCl or $H_2SO_4$ retained is called the volumetric value of adsorption The volumetric acid values and volumetric values of adsorption follow the order obtained in using dyes or centrifuged milk, and these values increase as the concn. of the $H^+$ diminishes The volumetric alk value generally decreases as the corresponding acid value increases J R. Adams

**The direct method of counting bacteria in relation to the adsorption capacity of the soil adsorbing complex.** N N Malchevskaya *Pochvovedenie* 24, No 3-4, 131-43 (in German 143-4)(1929).—By the Vinogradski method of direct microscopic count, bacteria counts were made on several soils, samples were taken from the resp horizons Two counts were made on each soil sample (1) as the soil appeared in nature and (2) after the soil had been satd with Na by the Gedroiz method It was found that by dispersing the soil—through satn with Na—the no of bacteria increases. J S Joffe

**Colloidal content and related soil factors as indicators of [forest] site quality.** I. T. Haig *Yale Univ School Forestry Bull* 24, 33 pp (1929), *Expt Sta. Record* 63, 420-1.—The main purpose of the work was to measure the value of colloidal content as an indicator of site quality, and to make such incidental observation of the value of other soil measures as the character of the data would permit The conclusions are considered sp for the brown, slightly podsolized forest soils of southern Connecticut and of certain adjacent territory, and to be applicable particularly to such of these soils as occur commonly in the vicinity of New Haven Colloidal content and silt-plus-clay content are fair measures for site quality The org.-matter content varied between 2 and 10% and was without significant influence on soil fertility The value of soil type as an indicator of site quality cannot be accurately estd with the data available A knowledge of the soil class (the textural quality of the A horizon or surface soil) permits classification of soil quality within approx one broad site class G G

**Additional data on the mutual coagulation of colloids in the soil.** V N Simakov. *Pochvovedenie* 24, No 1-2, 22-77(in German 78-123)(1929).—S tested out the crit concns of $MnO_2$ with a const quantity of $Fe(OH)_3$ at which mutual coagulation would take place He found that the zone of coagulation is at a point between 0.577 and 1.227 moles of $MnO_2$ for 1 mole of $Fe(OH)_3$ Mutual coagulation of $Fe(OH)_3$ and $SiO_2$ takes place within narrow limits from 2.757 to 3.452 moles of $SiO_2$ for 1 mole

of $Fe(OH)_3$. With an excess of $Fe(OH)_3$ the mixt. becomes pos., whereas with an excess of $SiO_2$ the mixt becomes neg. Mutual coagulation of $Fe(OH)_3$ and Na-satd. soil suspension takes place within a definite zone, for 1 $Fe_2O_3$ (by weight) it takes 3 753–8 043 unit weights of Na satd soil. Two zones were noted at which a stable mixt. of the 2 colloids persists either an excess of $Fe(OH)_3$ or of the soil suspension. These mixts. behave differently towards electrolytes, with an excess of the soil suspension the point of coagulation with an electrolyte is equal to that of a pure suspension. With an excess of $Fe(OH)_3$ the mixt is sensitive to the anions. Mutual coagulation of $Al(OH)_3$ and $MnO_2$ takes place as follows: It takes 1 mole of $Al_2O_3$ to 0.085–0.447 of a mole of $MnO_2$, or for 1 mole of $MnO_2$ it takes 2.237–11.765 moles of $Al_2O_3$. A comparison with the $Fe_2O_3$ sol shows that 1 mole $MnO_2$ will take 0.815–1.733 moles of $Fe_2O_3$ against 2.237–11.754 moles of $Al_2O_3$. Thus, the $MnO_2$ is 6.8 times as effective for the $Al_2O_3$ as for the $Fe_2O_3$. With $SiO_2$ the relation is 1 $SiO_2$ to 0.577–1.302 $Al_2O_3$, whereas with $Fe_2O_3$ the relation is 1 $SiO_2$ to 0.290–0.363 $Fe_2O_3$. With the soil suspension the relation is: 1 unit weight of suspension to 0.228–0.810 unit weights of $Al_2O_3$. Just as with $Fe(OH)_3$, an excess of $Al(OH)_3$ in the mixts is sensitive to anions, but the proportions are not the same as for the $Fe(OH)_3$. From the data obtained calcns were made for the coagulation values of each sol in terms of another or a combination of them. Thus from the $Fe(OH)_3$ data 1 mole of $MnO_2$ = 2.813 $SiO_2$, or 1 $SiO_2$ = 0.355 $MnO_2$. From the $Al(OH)_3$ data 1 $MnO_2$ = 3.879 $SiO_2$ or 1 $SiO_2$ = 0.258 $MnO_2$. By combining 2, 3, 4 or more sols of the same charge, the amt. of the sol of the opposite charge can be calcd. by taking the figures for each individual sol. Numerous examples and calcns are given. J. S. Joffe

Proportions of easily and difficultly mobilizable acid within the zone of exchange acidity in soils, and the bearing of buffer values on this. S. Goy, P. Müller and O. Roos. *Z. Pflanzenernähr. Düngung u. Bodenk.* 18A, 104–14(1930); cf. *C. A.* 24, 5094.—Differences in the exchange acidity values of soils as detd. by Daikuhara's method (*C. A.* 9, 500) and by electrometric titration are attributed to the varying proportions of easily and difficultly sol. acids present. The latter are not necessarily recorded by Daikuhara's process. Electrometric titration curves are adapted to show base fixing areas and areas characteristic of easily and difficultly sol. acids. In humus soils there is a greater proportion of difficultly sol. acids concerned in producing exchange acidity than is the case with mineral soils. Buffer values of soil are calcd. from electrometric titration curves (in *N* KCl) over the range *p*H 6.8–7.2. Detn. of exchange acidity in soils by this means is limited to mineral soils with less than a prescribed buffer value. B. C. A.

The colorimetric determination of phosphoric acid in hydrochloric acid and citric acid extracts of soils. R. G. Warren and A. J. Pugh. *J. Agr. Sci.* 20, 532–40(1930).—The colorimetric detn. of $P_2O_5$ in HCl and citric acid exts. of soils, by a method involving the evapn. of the ext., ignition and acid extn. of the residue with either the Denigès or Fiske-Subbarrow methods of color development, was satisfactory only with light soils. Clay soils gave low results because of the presence of larger amts. of Fe. A method is given in which the org. matter and Fe are removed by treatment with $NaMnO_4$ and $K_4Fe(CN)_6$. For HCl exts. 20 g. of powd. soil (1 mm.) is boiled for a short time with 70 cc. of concd. HCl and allowed to digest on a water bath for 48 hrs. The soln. is then cooled, diluted, filtered and made up to 250 cc. Fifteen cc. of this ext. is treated with 0.5 cc. of 20% $NaMnO_4$ and kept on a hot sand bath for about 15 min. The liquid (which should now be free of any brown Mn ppt.) is cooled, diluted to about 30 cc., and treated with 6 cc. of 10% $K_4Fe(CN)_6$ followed by 5 cc. of 10% $MnSO_4$ soln., the mixt. is shaken frequently. After standing several min. the mixt. is titrated with $NH_4OH$ until the blue color just turns purple. 3.5 cc. of 2 *N* $H_2SO_4$ is added, the whole is transferred to a 100 cc. volumetric flask, made up to vol. and filtered. Aliquots of the filtrate are taken for color development by the Fiske-Subbarrow or Denigès method. For citric acid exts. 25 g. of soil (2 mm.) is shaken for 24 hrs. in a half liter bottle with 250 cc. of 1% citric acid (extra citric acid equiv. to the $CaCO_3$ present being added). The soln. is then filtered. Seventy-five cc. of this filtrate is treated in a 300 cc. Kjeldahl flask with 10 cc. of concd. HCl and 12 cc. of 20% $NaMnO_4$, this is allowed to stand ½ hr. and then vigorously digested until no Mn ppt. remains. The mixt. is then transferred with a min. of water to a 100-cc. volumetric flask, and 4 cc. of 10% $K_4Fe(CN)_6$ is added drop by drop with shaking. After several min. the mixt. is titrated with $NH_4OH$ as in the method for HCl exts. 1.5 cc. of 2 *N* $H_2SO_4$ is then added and the soln. made up to vol. After filtering, the color is developed in an aliquot as with HCl exts. The results are in good agreement with the gravimetric method. P. R. Dawson

**The phosphoric acid and lime content of some arctic and Norwegian soils.** E. G. Doerell. *Superphosphate* 4, 105–9(1931).—Uncultivated soils from 5 localities in Spitzbergen and Norway contained 0.2–3.8 mg. of readily sol. $P_2O_5$ per 100 g. of soil, as detd. by the Dirks method. Two samples of soil from potato fields contained 3.8 and 17.4 mg. of readily sol. $P_2O_5$ per 100 g. There was no connection between the $P_2O_5$ content of the soil and the type of rock from which the soil was derived. K. D. Jacob

**Distribution of assimilable phosphoric acid in the soil under influence of factors of production.** L. Dworák. *Kisérlet. Közlemények* 33, 336–43(1930).—Oats were grown in expt. containers filled with an alk. (limed) soil and with a weakly acid one. Fertilized alk. soils showed evidence of translocation of some of the added $P_2O_5$. The greatest amt. of $P_2O_5$ was consumed in the horizon 10 to 20 cm. in depth. Unfertilized soils showed no evidence of translocation of the native $P_2O_5$. These soils showed the highest content of citrate-sol. $P_2O_5$ in the horizon 10 to 20 cm. in depth. As young plants oats require a large amt. of $P_2O_5$. S. S. de Finály

**Laws of solubility of phosphates and potash in mineral soils.** R. Ganssen. *Mitt. Lab. Preuss. Geol. Landesanst.* No. 9, 1929.—The influence of the $Al_2O_3$ content of soils on the soly. of K and phosphates is indirect. A high $Al_2O_3$ content in soil usually corresponds with a high proportion of base-exchanging silicates which tend to "fix" K, and also with relatively large amts. of $Al_2O_3$ gel, with which phosphate combines. Humus increases the soly. of phosphates in soil by decreasing the proportion of active $Al_2O_3$. B. C. A.

**The fineness of grinding phosphates for podsolized soils.** N. D. Smirov. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 765–9(1930).—Eight different raw phosphates, among which were also Florida and Tennessee phosphates, were ground up to various degrees of fineness, and their effects were studied in pot expts. on podsolized soils. It was found that the fractions with a fineness of 0.01 mm. and lower gave 75% and 100% effects, resp., in comparison with acid phosphate. Ural and Florida phosphates gave but slight effects, whereas Tennessee phosphates and apatite gave no effects even with the finest fractions. J. S. Joffe

**The influence of liming chernozem on the yield and chemical composition of wheat.** V. N. Kharchikov. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 751–9(1930).—The results of 5 years' liming expts. on chernozem with N, P or a combination of the 2 are summarized as follows. At a moisture content equal to 40% of the total moisture-holding capacity limestone alone increased at times the yield of wheat, also in combination with P there was an increase. The neg. results were more frequent than the pos. At 60% of the total moisture-holding capacity there was an increase on the unfertilized plots as well as on the plots fertilized with either N or P. With N and P together liming gave neg. results. The N content of the wheat increased whenever the lime depressed the yield, but it decreased the N content whenever the yield increased. Caustic lime was more effective than limestone in connection with monosodium phosphate when the amt. of phosphate did not exceed the amt. added with manure. With $(NH_4)_2SO_4$ the caustic lime produced very little effect. Analyses of the wheat show that caustic lime increased the N and P content of the grain, indicating that the $Ca(OH)_2$ is capable to mobilize the N and P content of the soil. J. S. Joffe

*Nitrogen transformation in cultivated soil.* F. Hansen. *Tids. Planteavl* 35, 713 (1929).—$NH_4$ salts applied to soil at the end of April or early in May are completely converted into nitrate by the end of June. After plowing in liquid manure or farmyard manure, the $NH_3$ contents are converted into protein like substances which by mid June are being rapidly mineralized at a rate which exceeds the assimilation of $NH_3$ by the microörganisms. Nitrification of the $NH_3$ derived from well rotted manure is more rapid than that of ammoniacal fertilizers. The effects of various nitrogenous fertilizers on soil reaction are discussed. B. C. A.

**Soil and cane composition in relation to Lahaina failure at Waipio Substation.** F. Hansson. *Repts. Assoc. Hawaii Sugar Tech.* 6, 33–7(1927); *Expt. Sta. Record* 63, 148.—Many factors are causally active in the so-called Lahaina disease, or failure of root development, in the cane of that name. Chem. influences supposedly assocd. with growth failure are (1) high salt concns. in the soil soln., (2) sol. salts of Fe and Al in the upland acid soils and (3) lack of availability in one or more of the major plant foods. But Lahaina failed in some cases where soil conditions were to all appearances normal, and in order to obtain information regarding this failure in good soils, exptl. plats were planted at the Waipio Substation, the results from which are tabulated and discussed. The failure of Lahaina at Waipio is not assocd. with an injurious salt content in the soil, harmful acidity or a shortage of the major nutrients. Studies of the

compn of the poor Lahaina cane from Waipio contrasted with good Lahaina from Maui showed a lower percentage of potash, a higher content of $SiO_2$ and a higher Mg CaO ratio in the Waipio canes Spectroscopic examns of the ash of poor Lahaina cane from Waipio compared with the ash of the cane from Maui showed the presence of B and Pb in practically all of the latter and in but few cases of canes from the former station The effect of these rarer elements is being tested at Waipio, as no conclusions appear safe at this time regarding their definite function in plant nutrition G G

**Sulfate sulfur in certain types of soils.** H Stremme. *Chem Erde* 5, 254–9 (1930) —Peaty soils from the neighborhood of Danzig contain small amts of sulfates, free $H_2SO_4$ and sulfide S, which vary at different depths and in different seasons of the year (cf Schroedter, *C A* 23, 5448) B C A

**The role of peat in increasing the absorption capacity and buffer properties of soils** D V. Druzhinin *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 645–50(1930) —From a series of pot expts where peat, satd with Ca was used with or without fertilizers, with or without $CaCO_3$ on podsolized soils it was found that peat increases the buffer capacity and thus the adsorption capacity of the soils Especially is this important in connection with physiologically acid fertilizers J S Joffe

**[Relation among] soil, fertilizers and chemical composition of plants.** D J Hissink *Chem Weekblad* 27, 529–33(1930) —Examples are given to show that while the proportions of mineral constituents in the plant depend primarily on the plant itself, they are also dependent on the minerals present in the soil or added as fertilizers Analysis of the plant and the soil cannot, however, suffice to det the nature and amt of fertilizer which will produce the best crop B C A

**Fertilizer inspections. Report for 1930.** W. C. Robertson *J. Dept Agr Victoria* 29, 136–40(1931) —Analyses of official inspection samples of fertilizers marketed in Victoria are tabulated K D Jacob

**The results of a five-year field experiment on the influence of various fertilizers on the yield and the reaction of strongly acid-exchangeable sandy soils.** H Rössler and L Schmitt *Landw Vers-Sta* 111, 293–326(1931) —KCl, kainite and $K_2SO_4$ were used over a period of 5 years without any increase in soil acidity $(NH_4)_2SO_4$ should not be used on sandy soils which are readily subject to acid exchange without previous application of lime Of the alk reacting fertilizers, $CaCN_2$ exerts the greatest neutralizing action $K_2CO_3$ has a harmful effect on the soil acidity J R H

**Action and value of hot-fermented stall manure.** F. Löhnis *Z Pflanzenernähr Düngung u Bodenk* 9B, 268–72(1930), cf *C A* 24, 1924 —A reply to recent criticisms (Gerlach, *C A* 24, 3852, Ehrenberg, *C A*. 24, 5098) B C A

**The composition of manure and chemical manures.** L. Brétignière *J. agr. prat* 55, 269–70(1931) —A comparison of the analyses of manures made in 1926 and 1931 shows that the amts of N, $P_2O_5$ and $K_2O$ are greater in the samples taken in 1931, while there is a decrease in the CaO and MgO content The decrease in CaO and MgO appears to be due to the $H_2O$ used and the methods of wetting the manure piles The N, $P_2O_5$ and $K_2O$ increases seem to be brought about by the use of complementary fertilizers on the soil J R Adams

**The decomposition of organic manures. III. The decomposition of green manures.** Sigeru Osugi and Taro Goto *J Agr Chem Soc Japan* 7, 138–56(1931) —The quantities of moisture, C and N of air dried green manures, vetches, winter vetches, serradella, *Lespedeza bicolor* Turcz and oats were estd for the various stages of growth The C/N ratio is generally larger according to the growth stage of the plants The decompn of these green manures in the field proceeds more readily for younger plants than for older ones The less the C/N ratio is, the easier the decompn is There is the same relation under paddy-field conditions, but the decompn is generally slow During the growth of these plants, protein and water sol N compds decrease while hemicellulose, cellulose and pentosans increase markedly The changes in the other constituents are not remarkable or regular Therefore, the C/N ratio becomes larger for the older plants Y Kihara

**The practical preparation of artificial manure.** Delucq *J. agr. prat* 55, 238–9 (1931) —The straw is spread on the field until there has been sufficient rain to soak it thoroughly It is then mixed with cyanamide, urea or $(NH_4)_2SO_4$ and $CaCO_3$ and stacked on a bed of natural manure After standing a month this artificial manure is ready to be spread on the fields J R Adams

**The decomposition of the green parts of lupine in the soil.** Z P Uspenskaya. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 635–8(1930) —Green lupine in the blooming stage was added to 5 kg of soil at the rate of 100 g and 200 g, which was equal to 5.0 and 10 g of N Another series was prepd to which 0.5% $CaCO_3$ was added

Pptd. phosphate and raw phosphates were used as the source of P. The plant used was millet The soil was a podsolized loam The course of the decompn of lupine in soil was followed simultaneously with the pot expts The 100-g application of lupine gave just as good results as those obtained with $(NH_4)_2SO_4$, the 200-g application gave a higher yield The lime with the 100-g application gave just as good results as the 200-g application alone Lupine with $(NH_4)_2SO_4$ gave the highest yield The amt of org matter increased, but the increases with the 100- and 200 g applications were the same The $p_H$ of the ext decreased because of formation of the acids The amt. of absorbed $NH_3$ increased more in the soils in which lupine was used than in the soils which received $(NH_4)_2SO_4$ Composits of lupine at the rate of 5 and 10 g of lupine for 200 g of soils were prepd These were sampled after 10, 20, 35, 60 and 85 days The reaction became more alk on account of $NH_3$ formation The nitrate content in the first period decreased with or without addns of lime From the third period on the nitrates appeared in the soils without lime With the lime, nitrification was decreased In all cases there were considerable amts of $NH_3$, especially with the lime With the increase in nitrate content the amt of absorbed $NH_3$ decreased

J S Joffe

**The effect of the main forms of nitrogen fertilizers.** V P Brl'skii *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 600–13(1930).—From a series of expts for 3 yrs with various forms of N on the different soil zones with several crops the following conclusions have been made (1) In the podsol zone on the forest gray soils and on the degraded chernozem N gives large yield increases (2) In the southern chernozems—pre-Caucasian and Azov types—N, as well as a complete fertilizer does not give any appreciable increases The deep chernozems occupy an intermediate position (3) A definite relation has been noted between the physiol reaction of the N sources and the K and P fertilizer and yield increase in the various soil zones In the podsol zone the basic N salts added to an acid K-P fertilizer gave better results than the physiologically neutral or acid N salts A similar tendency was observed on the forest gray soils and degraded chernozems In the southern chernozems the acid N salts were better with the acid K-P fertilizer (4) The physiologically neutral salts—$CaCN_2$, $(NH_4)_2CO_3$ and urea—give considerable increases in yield, but at times they are the poorest sources of N This is due to the instability of the first 2 and to the methods of applying them (5) $NaNO_3$ and $Ca(NO_3)_2$ proved to be the best sources of N Whenever a physiologically acid salt was required, the $NaNO_3$ and $Ca(NO_3)_2$ were not as good as the others *By careful manipulation* the $CaCN_2$, $(NH_4)_2CO_3$, and urea can be used to just as good advantage as the other N fertilizers. No objection was found to the use of $(NH_4)_2SO_4$, especially when lime is to be used $NH_4NO_3$, when added to an acid fertilizer, was not so effective as the other forms of N, but with a neutral fertilizer it was as good as any av. N carrier $NH_4Cl$ proved to be inferior except on the chernozems Almost all forms of N seem to decrease the starch content of potatoes

J. S Joffe

**Organic industrial wastes as nitrogen fertilizers.** S P Gusev *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 614–32(1930).—Stomach contents from slaughter-house wastes contg 0.18% N, 0.86% $P_2O_5$ and 0.55% CaO and stomach contents with 1.27% N, 1.51% $P_2O_5$ and 1.04 CaO were tested in pot and field expts The results with potatoes and oats indicate that these wastes can be utilized to advantage, but since their keeping qualities are poor and the low fertility value prohibits long hauls they can be used only in the vicinity of the slaughter houses Mineralization expts.—*accumulation of nitrates as an index*—show that these substances are slowly mineralized and the addn of lime increases the amt and speed of mineralization Waste products from the leather industry have a high N content—from 8.82% in leather shavings after tanning to 5.83% in the green hides. But the N is not available Composting these for 5 months, even with $CaCO_3$, gave no available N Vegetation expts in pots and fields showed that leather waste decreased the yield of oats These products have to be treated with either acids or alkali before they can be used as a N source. From the data available at the Inst for Fertilizers, the alkali treatment is preferable Other wastes from the leather industry, like the inside trimmings from the raw hide, which contain about 1.86% N were tried out and proved to be useful, but they can be used locally only Horn shavings contg 13.97% N, 0.124% $P_2O_5$ and 0.55% CaO and French burned horn contg 14% N were tried in pot expts. with oats The results show that 50% of the N was utilized Various tobacco dusts contg about 2.35% N were used in pot expts with oats It was found that the N is rapidly mineralized, and in the early stages accumulations of $NH_3$ were injurious Wastes from intestines when dried gave a material contg 11–12% N which is very readily available. The

pulp from the fruits in the fruit juice industry, contg up to 1.5% N, proved to be of no value except the residues from cherry juices, which was somewhat beneficial for oats. Bouillon from steamed dead carcasses with a N content of 1.0% proved to be readily available and can be used locally. Blood meal obtained from blood, after the albumin has been sepd out, with 10% N content, is readily available. Ground peat, contg 1.48% N, on oats was not effective because of its slow availability. Sewage waste was tested in pot expts., it was found to be of some value, but its bulkiness is a hindrance in its utilization. Feathers and down proved to be easily mineralized. They contain 6.09% N. The large vol. these materials occupy makes them hard to handle. Wastes from fats used in margarine contain 1.73% N, but they gave neg. results. Shells from sunflowers proved to be injurious, producing denitrification reactions. Wastes from the sausage industry gave very good results. Fish scrap contg 9.92% N and 7.36% $P_2O_5$ gave very good results with oats. Wastes from the wool industry gave fairly good results in vegetation expts. with oats. Waste from the silk industry contg 10.44% N and 2.2% $P_2O_5$ are easily mineralized and give good results. J. S. J.

Action of various nitrogenous fertilizers on acid soils. D. Meyer. *Z. Pflanzenernähr. Düngung u. Bodenk.* 9B, 474(1930). The injurious effects of cyanamide on acid soils previously referred to (cf. Meyer and Obst, *C. A.* 24, 5098) are limited mainly to acid soils poor in humus and of low biol. activity. B. C. A.

Nitrogen fertilizer for the potato. Jean Deterre. *Engrais* 46, 207–11(1931).—A discussion of the problems arising in the fertilizing of potatoes. The proper fertilizer is one with a phospho-potash base and with N in the $NH_4$ form. J. R. Adams

Nitrogen top-dressing of wheat. Experiment with various forms of fertilizer. A. Y. Montgomery. *New Zealand J. Agr.* 42, 193–02(1931).—$(NH_4)_2SO_4$ was the most satisfactory N fertilizer for the top-dressing of wheat, followed in order by $NaNO_3$, urea, Ca cyanamide and Calnitro. Because of its poor phys. condition, it was difficult to apply small quantities of urea through a drill, while it was impossible to drill Calnitro. The irritating effects of Ca cyanamide on the eyes and skin of the operator constitute a serious drawback to its use as a fertilizer. The yield of flour, percentage of protein, and the baking qualities of the flour were not affected to a significant extent by the different N fertilizers. K. D. Jacob

The effect of nitrogen fertilizers on the yield and quality of sugar beets. A. G. Mikhalovskii. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 633–5(1930).—Urea, Ca cyanamide, Chili saltpeter, $(NH_4)_2SO_4$, Leunasaltpeter and $NH_4Cl$, together with a mixt. of P and K, were tried out on degraded chernozem soils for beets. $(NH_4)_2SO_4$ proved to be most effective, followed by urea, $NH_4Cl$ and Leunasaltpeter. $NaNO_3$ and $CaCN_2$ gave neg. results. The highest sugar content was obtained with $NaNO_3$, the sugar content was increased 1.5%. This is followed by urea. Leunasaltpeter and $NH_4Cl$ decreased the sugar content in the beets. The amt. of "injurious" N which accumulates in sugar beets is affected variously by the different N sources. $CaCN_2$ gave the highest value, followed by $NaNO_3$. In expts. without P the yield increase for N was only 5%, whereas with P it became 15%. J. S. Joffe

The effect of mineral fertilizers and manure upon the quality of sugar beets. I. A. Strachenko. *Nauk. Zapiski Tsukrovoi Prom.* 10, 477–90(1930).—With repeated application of mineral fertilizers the $p_H$ of the soil decreases. Easily sol. compds. in the upper layers move downward and therefore increase the fertility of the lower layers. The mineral fertilizers, compared with manure, decrease the sucrose and maltose content in the beet. The development of the beet is better in the first part of the summer with manure and in the second part with mineral fertilizers. V. E. Barlow

Fertilizing action of magnesia. Ch. Brioux and Edg. Joffs. *Compt. rend. acad. agr. France* 17, 201–7(1931).—Pot tests with white mustard show that the addn. of a fertilizer contg. MgO to a soil low in total and assimilable MgO produces a marked increase in the dry wt. of the crop and in the MgO content of the dried material. The MgO also appears to favor the absorption of $P_2O_5$ but has little effect on the absorption of N. Similar expts. with maize indicate an increased yield and quantity of MgO in the dried plant, but the MgO has no apparent influence on the absorption of $P_2O_5$ or N. The addn. of a MgO-bearing fertilizer to a field planted in sugar beets gave a marked increase in the yield. J. R. Adams

The action of chemical fertilizers on nature meadows. R. Bonnicel. *J. agr. prat.* 55, 230–1(1931).—A preliminary report on the effect of fertilizers on soil plots of various geological formations shows that the most efficacious fertilizer is not necessarily the one contg. the elements that are deficient in the soil. The natural richness of some of the soils in $K_2O$ does not impede the action of added $K_2O$. J. R. Adams

A study of the composition of pineapple plants at various stages of growth as in-

fluenced by different types of fertilization. J M HORNER. *Hawaii. Pineapple Canners' Sta Bull* 13, 42 pp (1930), *Expt Sta Record* 63, 641 —The pineapple crop removes more potash from the soil than any other mineral constituent, under the conditions of the expt an av of 1456 lbs per acre of $K_2O$ as compared with 491 lbs of N and 111 lbs of $P_2O_5$ The rate of growth was very similar on all plats, being slightly but not significantly greater on the potash areas Potash constituted about 37, 32 and 45%, resp, of the total ash in the leaves, stems and fruit. There was a very close similarity between the potash and total-ash curves The greatest content of total and reducing sugars was reached at fruiting time, being apparently correlated with the age of the plant Starch content was highly variable, starch continuing to accumulate on some plats even during the time of fruit formation when large quantities of sugar were being produced The ratio between N and Ca was observed to be fairly const N stimulated growth for a short time but did not appear to have an enduring influence. P did not cause as large growth as did the other nutrients, and in excess quantities actually depressed growth H recommends the shredding of pineapple waste and its return to the soil G G

The availability of phosphatic fertilizers as shown by an examination of the soil solution and of plant growth. A W GREENHILL *J Agr Sci* 20, 559–72(1930) —In pot expts conducted with an acid soil deficient in $P_2O_5$, liming with $CaCO_3$ at the rate of half the CaO requirement increased the concn of $P_2O_5$ in the soil soln from about 0 7 p p m to about 1 p p m, and at the rate of twice the CaO requirement to over 2 p p m *Phosphates depressed the concn on the lightly limed soils and had variable effects on those heavily limed* The superphosphate treated soils showed rather lower concns than those treated with slag Cropping raised the concn on the lightly limed treatments, but on the heavily limed reduced it on the control and had a variable effect on the phosphate treatments The concn of $P_2O_5$ in the untreated soil was practically const After treatment it fluctuated considerably, but tended to become more *const later There was no indication of relationship between the concn and the soil*-moisture content The heavily, compared with the lightly, limed treatments produced more extensive tillering and higher yields Phosphates increased the yields, particularly of grain, but had no effect on tillering Slag and superphosphate were equally effective on the heavily limed soil, but the latter was the more effective on the lightly limed No correlation was apparent between crop growth and the concn of $P_2O_5$ in the soil soln *The possibility of plant roots taking up phosphate directly is suggested* In further pot expts higher yields were obtained from freshly treated soils than from soils treated a year before sowing on the lightly limed treatments, while the reverse was the case with the heavily limed On the soils treated the previous year the heavily limed treatments gave higher yields than the lightly limed on the freshly treated soils the 2 gave similar yields with early sowings Slag and superphosphate gave similar results throughout, and their application was more effective on the freshly treated soils than on those treated the previous year P R DAWSON

Quantitative analysis of phosphoric acid. VI. Determination of phosphoric acid in a phosphate fertilizer. M. ISHIBASHI *Mem Coll Sci. Kyoto Imp Univ* 13A, 291–301(1930), cf *C A* 23, 4645, 4907, 25, 2663 —I 's improved volumetric phosphomolybdate method is especially suitable for the detn of small quantities of $H_3PO_4$ For the extn of free $H_3PO_4$, $Me_2CO$ is more satisfactory than either alc. or ether. B. C. A.

Experiments with increasing dressings of phosphoric acid on Riesling and Burgundy vines. C. DREYSPRING AND H KURTH *Superphosphate* 4, 93–103(1931) — The height, no of knots, internodes and thickness of the wood of young grape vines were in direct relation to each other, and to the amt of phosphate fertilizer applied, up to 150 kg of $P_2O_5$ per hectare The total wt. and percentage of $P_2O_5$ in the wood of the vines were also directly related to the amt of phosphate applied K D J.

The decrease in citrate-soluble phosphoric acid in Rhenania phosphate. K. SCHARRER *Landw Vers Sta* 111, 1 10(1930) —Fifteen samples of Rhenania phosphate were kept for a year in cork stoppered vessels at room temp All showed a decrease in citrate-sol $P_2O_5$ But only 5 showed losses (0 3–0 54%) greater than the exptl error The decrease is due to the action of moisture JOHN R. HILL

The production of precipitated phosphate from Aktyubinsk raw phosphates. K. K. APUSHKIN AND L M GUREVICH *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 740–8 (1930) —Increasing the concn of $H_2SO_4$ from 15 to 25% decreased the coeff of decompn of raw phosphate from 95 to 93 1%, but the concn of $P_2O_5$ in the ext. increased from 5 86 to 10 67%. At a 25% concn of $H_2SO_4$ (the stoichiometric quantity) the pulp was so thick that it barely flowed on the filter By dilg the acid with wash water

the viscosity of the pulp increased, and it worked nicely even with 30% $H_2SO_4$. Even with 10% $H_2SO_4$ below the stoichiometric quantity the coeff. of decompn. was as good as with optimum concn. With a 15% concn. of $H_2SO_4$ with 10% below the stoichiometric the time factor is of no importance. By using a 4% concn. of $H_3PO_4$ to dil. the 15% $H_2SO_4$, the coeff. of decompn. decreased 2%, but the amt. of $P_2O_5$ in the ext. increased 2 to 3%. With 8% $P_2O_5$ the coeff. decreased slightly, and the amt. of $P_2O_5$ increased up to 15.78%. The most economical procedure for the production of pptd. phosphate was thus 15% concn. of $H_2SO_4$ diluted with water, the time of contact being 40 min. A 5.2% soln. of milk of lime gave from the Aktyubinsk exts. a ppt. of 37.5 to 40.8% $P_2O_5$, of which 90% is citrate sol. if dried at 80%. J. S. Joffe

**The new complex ammonium phosphates and the raw materials for their manufacture.** Ugo Orlandi. *Industria Chimica* 6, 18–22(1931).—The 3 complex phosphates $NaNH_4PO_4$, $KNH_4PO_4$ and $MgNH_4PO_4$ have become very important in the *fertilizer industry* since the development of the manuf. of synthetic $NH_3$. The raw materials used and the manuf. of the above 3 fertilizers are described, and their role as fertilizers is noted. A. W. Contieri

**Manufacture and use of insecticides and fungicides. V. Organic compounds.** Arthur S. Carlos. *Fertilizer, Feeding Stuffs and Farm Supplies J.* 16, 222–3(1931); cf. *C. A.* 25, 765.—The manuf. and use of *nicotine, pyridine, hellebore* and *pyrethrum* prepns. are briefly discussed. K. D. Jacob

**Fumigants.** C. L. Williams. *U. S. Pup. Health Repts.* 46, 1013–31(1931).—This is chiefly a discussion of the use of *HCN*. Other fumigants are briefly mentioned. J. A. Kennedy

**The control of loose smut in wheat.** D. B. Adam and R. T. M. Prescott. *J. Dept. Agr. Victoria* 29, 141–5(1931).—Practically complete control of loose smut of wheat (*Ustilago tritici*) was obtained by soaking the seed in water at 120°F. for 1 hr. and 40 min. The treatment had a depressing effect on the germination of the seed, the effect increasing with the length of time of treatment, but the total yield of the crop from the treated seed was not affected. K. D. Jacob

**"Target spot" of tomato seedlings.** S. Fish. *J. Dept. Agr. Victoria* 29, 132–3(1931).—The percentage of "target spot" infection, caused by the fungus, *Macrosporium solani*, on tomato seedlings was reduced from 97 to 17.5 by spraying with Bordeaux mixt., prepd. in the proportions of 6 lb. $CuSO_4$ and 4 lb. CaO to 40 gallons water. K. D. Jacob

**Heart rot of fodder and sugar beets.** E. Gaumann. *Landw. Jahrb. Schweiz* 44, 143–50(1930).—The disease occurs exclusively on alk. or neutral soils. When the $p_H$ falls below 7.8, beet cultivation is unprofitable because of the disease. Susceptible varieties contract the disease at $p_H$ 7–7.2, while the resistant varieties remain healthy at $p_H$ 7.6. Where soil conditions are critical the use of resistant varieties may serve as control of the disease. Omission of N from the fertilizer caused an increase in the infection. George R. Greenbank

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Molds utilized to make sewage sludge inodorous (Wigley) 14. Determination of $p_H$ by means of an Sb oxide electrode (Di Gleria) 7. Some properties of commercial nitrates of lime (Matignon) 18. The influence of frequency of cutting on the productivity, botanical and chemical composition and the nutritive value of "natural" pastures in Southern Australia (Davies, Sim) 11D. Use of HCN gas (Fr. pats. 697,023–4) 18.

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**Fertilizer.** Hans Brenek (to Rhenania Verein Chemischer Fabriken A.-G.). U. S. 1,799,882 April 7. A mixt. of raw phosphate, silica and alkali metal carbonate *is heated, in* the absence of steam, to about 1200°. The mixt. used contains about such amounts of $P_2O_5$, CaO and $SiO_2$, and at least such an amount of alkali metal oxide as would be present in a mixt. of $Ca_2Na_2P_2O_8$ and $Ca_2SiO_4$ having the same content of $P_2O_5$ and CaO as the raw phosphate employed.

**Fertilizers.** Paul Askenasy, Alfred Stern, Friedrich Nessler and Andreas

VON KREISLER Ger. 516,970, Dec 23, 1928 A mixt. of $NH_4H_2PO_4$ and $KH_2PO_4$ for use as a fertilizer is prepd. by treating an aq. soln of $NH_4H_2PO_4$ with a suitable amt. of KCl. The soln is preferably hot. Examples give the proportions of KCl $NH_4H_2PO_4$ as 1:1 and 1:2 A 94 6% yield of $NH_4H_2PO_4$ $KH_2PO_4$ is given

**Fertilizers.** GASVERARBEITUNGSGES M B H Fr 697,580, June 17, 1930 Fertilizers are kept stable by adding salts such as $Ca(NO_3)_2$ or $CaCl_2$ which have hygroscopic properties in amt. sufficient to oppose any change of moisture content of the fertilizer

**Fertilizers.** I G FARBENIND A -G Fr 697,916, June 26, 1930 The double salts $K_2HSO_4$ $NO_2$ or the double salt $(NH_4)_2HSO_4$ $NO_2$ or the mixts of salts obtained, as the double salts mentioned, by directing nitrous vapors into a $H_2SO_4$ and $HNO_3$ soln of K or $NH_4$ salts are mixed with appropriate substances for forming compd. fertilizers Cf *C A* 25, 2236

**Fertilizers.** SOC CHIM DE LA GRANDE PAROISSE (AZOTE ET PRODUITS CHIMIQUES). Fr 697,966, Oct 1, 1929 A compd fertilizer is made by the action on natural phosphate of gases coming from the oxidation of $NH_3$ without a preliminary transformation into $HNO_3$ A mud of phosphate suspended in water may be used Cf *C A* 25, *1026*

**Fertilizers.** KUNSTDÜNGER PATENT-VERWERTUNGS A G Fr 698,155, June 27, 1930 In the treatment of phosphatic rock by $HNO_3$ and pptn of $CaSO_4$ by $K_2SO_4$, the reaction products are dild by the addn of a soln contg phosphoric acid or an $NH_4$ salt or both before pptn of $CaSO_4$ A mixt of phosphoric acid and $CaSO_4$ obtained by dissolving phosphatic rock in $H_2SO_4$ may be used as addn

**Fertilizers.** ALFRED MENTZEL Fr 698,424, July 5, 1930 Granular or fragmented masses such as fertilizers contg easily volatilized or decomposed substances are stabilized by coating the grains with a more stable substance which is volatilized and condensed on the grains $NH_4HCO_3$ may be coated with $NH_4Cl$, urea or $(NH_4)_2SO_4$

**Fertilizer.** KIYOSI OKADA and OSAKA ALKALI TOYI KABUSHIKI KAISHA Japan 89,510, Dec 11, 1930 Extract of $Ca_3N_2$ is mixed with $H_3PO_4$, $K_2SO_4$ or $(NH_4)_2SO_4$ is added, $CaSO_4$ filtered off $CaSO_4$ and the soln concd and mixed with $NH_3$, $K_2CO_3$, $Ca_3(PO_4)_2$ to neutralize the remaining free $H_3PO_4$

**Moisture-proof fertilizer.** KÔTA OSADA and NIPPON KALI KOGYO KABUSHIKI KAISHA Japan. 89,509, Dec 10, 1930 The fertilizer is a mixt. of $(NH_4)_2SO_4$ 40, Ca perphosphate 46 5, KCl 13 5, $Ca_3N_2$ 2 and $H_2O$ 5–10 parts

**Fertilizer from distillery and sugar factory residues.** ZDENKO METZL (to Soc. anon Selbi, Soc d exploitation de licences de brevets industriels) U S 1,799,176, April 7. In prepg. a dry and non hygroscopic fertilizer from alc distillery or sugar factory residue and superphosphate, the manuf is effected in 2 sep stages at different temps, the residue being heated in the first stage to about 70° with a quantity of superphosphate the wt of which is about equal to that of the residue, while in the second stage the temp. is raised to about 130° to complete the expulsion of water and org acids set free in the first stage.

**Ammonium potassium phosphate fertilizer.** KASEI KUNE and KATAKURA BEIKOKU HIRYO KABUSHIKI KAISHA Japan 90,174, Feb 6, 1931 Excess of $H_2SO_4$ is mixed with Ca perphosphate to make a soln contg free $H_2SO_4$ and $H_3PO_4$ in the ratio of 2 1. $Ca_3N_2$, $(NH_4)_2SO_4$, KCl and org matter such as soy bean cake are added The whole is kept for about 24 hrs in a brick chamber to complete the chem reaction The product is sol in $H_2O$ and contains no cyanamide

**Insecticide and fungicide.** FREDERICK W SULLIVAN, JR., and ELMER W ADAMS (to Standard Oil Co of Ind.). U. S 1,800,114, April 7 A compn capable of being dispersed in water to form a relatively stable horticultural insecticidal and fungicidal emulsion comprises mineral oil, an As compd such as Pb arsenate, an oil sol Cu rosin soap, a non soap colloid such as glue and mineral oil sulfonic soap

**Fungicides and insecticides.** FRITZ LEIMBRANDT. Fr. 697,038, June 18, 1930 Compds contg Cu and As which are valuable fungicides and insecticides are prepd by transforming Schweinfurt green (a mixt of arsenite and acetate of Cu) with salts formed from a strong base and an acid which is weaker than AcOH and preferably stronger than arsenious acid, *e g*, a fatty acid of high mol wt, the amt of salt being such that the 2AcOH residues of the Schweinfurt green are changed. An example is given using Na palmitate

**Insecticide.** YUZIRO TUBAKIMOTO and DAIICHI KÔGYÔ SEIYAKU KABUSHIKI KAISHA. *Japan 90,229, Feb 10, 1931.* *The insecticide is a mixt of sericin, Cu soap, gum arabic, agar agar and $PbHAsO_4$*

**Protecting plants against insects, etc.** RICHARD SCHLÖGL. Austrian 122,023,

Nov. 15, 1930 Use is made of the sulfurous waste waters from the manuf. of films, artificial silk, etc., from viscose

Anticryptogamic products. Soc. Seloxyde Fr 698,604, Oct. 8, 1929 An anti-cryptogamic paste is obtained by mixing a hydrated oxychloride of Cu and a compd such as a base, a carbonate or a basic salt capable of displacing HCl from this oxy chloride

Seed disinfectant. Morris S Kharasch and Max Engelmann (to E. I du Pont de Nemours & Co) Can 300,904, Mar 31, 1931 Org mercury compds are produced by the reaction of $HgCl_2$ with $PbI_4$ in the presence of a hydrocarbon solvent. These compds are used in the prepn. of seed disinfectants. *Cf C. A. 24, 4579*

Seed disinfectant. Morris S Kharasch, Max Engelmann and Wendell H. Tisdale (to E I du Pont de Nemours & Co) Can 300,905, Mar. 31, 1931 A seed disinfectant in dust form comprises HgCl, tolanite, activated carbon and lime, the total amt. of diluent being not less than 90% by wt. *Cf C. A. 25, 2237.*

*Organic mercury compounds and dust disinfectants containing these compounds.* Morris S Kharasch and Max Engelmann (to E I du Pont de Nemours & Co) Can. 300 903, Mar 31, 1931 A seed disinfectant comprises the product of a reaction between $HgCl_2$ and $PbEt_4$ obtained directly in dust form in the presence of an inert solid diluent.

## 16—THE FERMENTATION INDUSTRIES

C. N FREY

Science and the fermentation industries. Arthur R. Ling *J Inst Brewing* 36, 446–55(1930) —An outline is given of the rise of scientific education along brewing lines and the need for its continuation. Peter J F Weber

Progress and development of the fermentation industries. A. Fernbach. *Chimie & industrie* 25, 570–6(1931) —A brief review A Papineau Couture

Influence of $p_H$ on alcohol recovery in cane-molasses distilleries. N E Lamont. *Intern Sugar J* 32, 630(1930), *Sugar Abstracts* in *Facts About Sugar* 26, 88 —In expts. made by the author the following acidities were maintained during fermentation of molasses washes in the wash before entering the vat, and before fermentation commenced, 4 4, on completing the filling of the vat, 4 0, after fermentation, 3 7, and 12 hrs. after fermentation was stopped, 3 6 Ordinarily, the yield of alc. wash was 5.5% (alc. of 42.5 Cartier), but repeated expts. along the lines indicated above gave a yield of 6.5 and over This practice is therefore being continued as standard, once a week the vats are thoroughly washed and disinfected. G G

Sulfurous and lactic acids in the production of fruit wines. Rüdiger and K. Sichert *Wein u Obst* 11, 500–8(1930) —The addn of lactic acid (2–6 g per l.) to perry prepd. from pears low in acid is recommended in place of that of $H_2SO_3$. B C. A

Institute of Brewing research scheme. I. The prediction of extract. L. R. Bishop *J Inst Brewing* 36, 421–34(1930) —A statistical study made of the analytical data of the Institute research scheme shows, in any one variety of barley, that the N content is in reverse relation to the yield of ext. of the resulting malt. For one type of barley the ext. of the malt can be predicted within close limits by the equation $E = 110\,1 - 11.2\,N + 0\,18\,G$, where $E$ = ext. in lb per quarter of dry malt, $N$ = N % of dry barley and $G$ = wt. in g of 100 dry barley kernels. The equation assumes similar modification of the malt, although individual maltsters can adjust the const. (110 1) to their requirements. Also for other varieties of barley, predictions can be made with reasonable accuracy by a change in the const. of the equation. Peter J F Weber

Adsorption in the brewing industry. J Raux. *Brasserie & malterie* 21, 6–12, 22–4(1931) —*An address outlining* the nature and laws of adsorption and the part it plays in beer making A. Papineau Couture

Steam turbine as power source in brewing. H. Herbracht *Wochschr. Brau* 47, 549–54(1930). S. J

The Elmocid process (a new way of disinfection). F. Stockhausen *Wochschr. Brau* 47, 523–8, 545–9, 561–4, 575–9(1930) —A new process of disinfection was developed by the Elektro-Osmose Gesellschaft. Two products are used "Alkaline-Elmocid" (0.58% NaCl and 0 4% NaOH, $p_H$ 13 07) and "Acid Elmocid" (NaCl and $HNO_3$, both in 0 1 *N* concn., $p_H$ 1.07) Alk. Elmocid is generally used, whereas Acid Elmocid is preferred for Al tanks and pitch-coated equipment. The efficiency of these products

was carefully investigated, and the reports are favorable in both small scale lab and large-scale factory expts The disinfecting action of "Alkaline Imocid" was found to be somewhat greater, or at least more rapid, than that of the acid product The advantage of Alkaline Imocid over hypochlorite is emphasized by its chem stability. It can be used over again several times and brought up to its original strength Conclusion The process can be used successfully in breweries S Józsa

**Fluorescent indicators in acidity determinations of colored wines.** Y. Volmar and J. Mª. Clavera *Anales soc espaň fis quím* 29, 217–54(1931) —The application of the volumetric method with the fluorescent indicators acridine and umbelliferone in Wood light to exact titration of total acidity in red wines was studied Umbelliferone at a concn of 4 to 6 drops per 5 cc. of wine dild. to 100 cc. gives a change at exactly $p_H = 7$ E M. Symmes

**Malt dust, its disturbing effect on fermentation.** K. Schuster. *Wochschr. Brau* 47, 481 3(1930) The last portions of malt from large concrete silos often showed unsatisfactory fermentation attributed to malt dust Expts on a small scale proved this assumption the fermentation was sluggish at first, the head was undeveloped and coarse in texture The final attenuation is reached in the vat; the yeast does not settle well and shows a dusty or powdery character The beer leaving the vat is cloudy; the haze in many cases cannot entirely be removed S advised handling and transporting the malt carefully, avoiding rough treatment, to minimize the formation of dust Too fine grinding will cause similar troubles S Józsa

**Determination of liquefying power of malt amylase.** L Fletcher and J B. Westwood *J Inst Brewing* 36, 550–7(1930) —Investigation of the method of Józsa and Gore (*C A* 24, 1170) shows results to be relative if all conditions are kept const *Within certain limits the changes taking place during liquefaction comply with Kjeldahl's law of proportionality*, but it is necessary to increase the proportion of enzyme to substrate to get near 100% liquefaction, since Józsa and Gore's curve, as well as tests made, shows that with the low ratio of Józsa and Gore, liquefaction comes to a practical standstill at 90% Peter J F. Weber

**Observations of some malting and brewing trials with a six-rowed winter barley.** H. Lloyd Hind *J Inst Brewing* 36, 435–9(1930) —Growing, malting and brewing tests of a British-grown 6 row barley Peter J F Weber

**Action of ultra-violet rays on the germination of barley in malting.** R. De Fazi. *Atti Accad. Lincei* [6], 11, 1022–4(1930) —The action of ultra violet rays on germinating barley accelerates the germination even at low temps (10–15°), prevents mold growth, facilitates the formation of enzymes and increases the vitamin content. Expts on the large scale show that malt of improved quality is obtained in this way B. C. A

**Swedish brewing barley, its cultivation, improvement and brewing value.** C. Wirth *Wochschr. Brau* 47, 483–6, 495–8, 505–8(1930) —The principal barley-growing districts are the provinces Schonen and Östergötland and the islands Gotland and Öland The early ripening barleys are chiefly cultivated, and great importance is attached to purity of type. The details of cultivation are given These Swedish barleys which are better suited for pale than for dark beers, have a rather high moisture content (17–17½%), and drying is advisable The samples showed a low protein content and high yield on ext The worts saccharify well, and the beers obtained show a good head forming power S Józsa

**The nitrogen content and "quality" of barley.** L R Bishop *J Inst Brewing* 36, 352–69(1930). cf *C A* 24, 1029 —A résumé of studies made and suggested required knowledge to lead to a sound, quant method of assessing barley value P J F W.

**Barley husk.** H Lüers *Wochschr Brau* 47, 557–61, 571–5(1930) —The aq extn of various constituents from barley husk was studied under different conditions Detailed analysis of the husk gave fat 2 22, pentosans 37 05, protein 5 9 and ash 5 9 The ash analysis showed $P_2O_5$ 5 70, $SiO_2$ 64 91, Ca 2 77 and Mg 2 06% The results showed that the acids might be removed from the husk by a suitable alk treatment in the steep Barley was subjected to a preliminary steep contg 0 2% NaOH. The malt was equal to the check, and the pale beer was finer and milder in flavor L suggests such steeping for barleys having a rough and coarse husk It is not necessary, however, when dark malt and beer are processed S Józsa

**Modern wine-making methods.** J A Dorrow. *Can Chem Met* 15, 93–4, 97 (1930) —The control of microörganisms, the development of wine yeast-control factors *and temp control are discussed* W. H Boynton

**Improvements in the fermentation and maturation of beers.** L. Nathan. *J Inst Brewing* 36, 538–60(1930) —A comparison of the English brewing methods and

the Nathan System, which consists essentially of quick removal of boiled wort from the hops, aeration with sterile air and removal of volatile constituents, chilling and removal of suspended matter, and pitching with pure, culture yeast The fermentation is regulated by passing finely subdivided $CO_2$ into the fermenting liquid, purifying the $CO_2$ after use and subsequently using the $CO_2$ to remove young flavors from the fermented beer after sepn from the yeast Beer is then further cooled and satd with $CO_2$ The production of a 12% original gravity beer requires 12 days' time

PETER J F WEBER

**Studies on tannin. II. Determination of the "tannin-N" and the tannin number as a new method for defining the protein conditions in beer.** H FINK AND W. RIEDEL *Wochschr. Brau* 47, 491–4, 501–5 511–5(1930), cf. *C A* 24, 2830 —The authors found that the amt of nitrogenous matter pptd from beer is a measure of the amt of complex proteins of high mol wt An analytical method is developed The term "tannin N" is suggested for the proteins pptd by tannin The tannin no of a beer is the fraction (expressed in %) of the total proteins pptd by 1% (tannin no I) and 2% (tannin no II) pure tannin solns. under exactly specified conditions *The method is similar to the* procedure applied heretofore for the detn of coagulable N The new method gives results which can easily be duplicated It is immaterial whether the tannin soln is run in rapidly from a pipet or added drop by drop, but the subsequent filtration is facilitated if the tannin soln is run in rapidly and the mixt cooled as prescribed Low temps are more favorable for the pptn Various tannin prepns will give different results, and comparative estns should be made with the same prepn The tannin-protein pptn is not in proportion to the tannin concn but decreases in higher concn The character of the beer is not altered by the tannin pptn, and the tannin no is not changed by pasteurization Dark beers show a higher tannin no than pale ones Export beers which are especially fit for pasteurization show very low tannin nos.

S JÓZSA

**Thirteenth report on the trial of new varieties of hops, 1929.** E S. SALMON *J. Inst Brewing* 36, 533–8(1930)

PETER J. F. WEBER

**Some recent ideals on the evaluation of hops.** THOMAS K. WALKER. *J. Inst Brewing* 36, 440–6(1930) —The aspect is given of researches in progress toward correlating analytical data of hops, with the results to be expected in practice

PETER J. F WEBER

**Analysis of hops.** W WÖLLMER *Wochschr Brau* 47, 521–5(1930) —The method was proposed by W (*C A* 23, 4011) and was adopted, with some modifications, as a standard method by the Analysis Commission of the German Brewing Industries. The sampling and prepn of samples (reduced to a fine uniform powder) are standardized Moisture is detd at 104–105° for 3 hrs The exact details of the estn are given

S JÓZSA

**A colorimetric method for the determination of the soft resins of hops.** JOHN M GUTHRIE AND GEORGE G PHILIP *J Inst Brewing* 36, 455–9(1930) —A preliminary report A 0.5% soln of U acetate in MeOH, filtered from insol matter and added to MeOH solns of α- and β hop resins, produces an orange-yellow color of such intensity as to be capable of measurement by comparison with a standard MeOH soln of α-resin The ratio of the color of the α resin to that of β resin is as 1 1+4 17, which relation is similar to the ratio of concn of α- and β resin of equal antiseptic value, i e, 1 1+4 3 (cf Ford and Tait, *C A* 20, 2892) As adapted to the soft resin detn of hops, 10 g of finely minced hops are extd with 100 cc of MeOH with continuous agitation for 10 min The supernatant liquid is decanted through a folded filter, and 20 cc of the filtrate is measured into a separatory funnel, 40 cc of 0.25 *N* $H_2SO_4$ is added and extn of the resins is made with 4 successive portions of 40–50 cc. each of petroleum ether The petr ether exts are filtered into a 200-cc volumetric flask, the filter paper is washed with petr ether and the vol is made up to 200 cc Ten cc is then put into a 100-cc volumetric flask and the solvent evapd by immersion for a few min in a water bath at 40°, and the residue is dissolved at once in MeOH Ten cc of the 0.5% *U* acetate soln is then added and the vol adjusted to 100 cc The color is then compared in a Hellige colorimeter with a wedge of a standard color made up with 0.015 g α resin per 100 cc The colorimeter reading multiplied by 0.15 gives the sum of the α resin and the colorimetric equiv of the β resin in terms of α-resin, expressed as % of the hops Results are in good general agreement with gravimetric results using the formula $\alpha + (\beta/4.3)$ Where α- and β resin are required separately, total soft resins are detd by evapn of a sep portion of the petroleum ether ext., and the % of each resin is calcd from the colorimetric relationship of the 2 resins.

PETER J. F WEBER

Manufacture of sulfite spirit from waste pulp liquors in Germany during the war period 1914–18 (Sembritzki) 23. Proteolytic enzymes. VII. Peptidases of green malt (Sato) 11A. Coating concrete [fermentation vats] (Fr. pat. 698,562) 20. Fertilizer from distillery residues (U. S pat. 1,799,176) 15.

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Ethyl alcohol. August Uick Ger 522,380, Aug 14, 1923 In the manuf. of EtOH by fermentation, saccharification of starch is effected with very finely cut up or comminuted malt, as distinct from bruised or crushed malt.

Gluconic acid. Siegwart Hermann and Pharmaceutische Werke "Norgine" A.-G Ger 522,147, Feb 20, 1927 Gluconic acid is prepd by fermenting nutrient solns contg saccharose or glucose with a ferment present in a material stated to be known in Japan as "kombucha" Thus, an ext of Russian tea may be treated with 7 5% of sugar and inoculated with kombucha After standing for 20 days at 15–40°, the mixt. is evapd to remove AcOH, then dild again, neutralized with $CaCO_3$ and evapd to recover Ca gluconate

Fermenting cellulosic materials. Herbert Langwell Ger 522,146, Sept 10, 1925. See U S 1,602,306 (*C. A* 20, 3771)

Apparatus for the production of distilled liquors using a naked gas flame. Emile Gazagne Fr 698,446, July 5, 1930

Distilling flask for determining the acidity of wine, etc. Martin Vialatte (Soc. A r. b.) Fr 698,630, July 7, 1930

Hopping wort. Karl S Felix Ger 522,145, Dec. 24, 1927 The hops, enclosed in a perforated container, are boiled with the wort in known manner, and the container is lifted out and rinsed The hops are then treated with water under pressure at 110–125°, and the resulting ext is added to the boiling wort

Beer. Heinrich van de Sandt Fr 698,375, July 4, 1930 Vitamins are added to or produced in beer at a stage in the production of the beer when no destruction of the vitamins would take place

Beer. Otto Borg Ger 516,978, June 28, 1929 Colored beer is deprived of its bitter taste by treating with $O_3$ in the cold

Yeasts. Hugo Windesheim and Friedrich W Thiele Fr 698,316, July 2, 1930. The fermenting power of yeasts is increased by adding cholesterol, cholesterol compds or substances resembling cholesterol in a fine state of subdivision The cholesterol may be in the form of an emulsion with fats Phosphates or superphosphates may be added at the same time

Degrading yeast. I G Farbenind A.-G. (Otto Ambros and Erwin Walz, inventors). Ger 520,853, Jan 3, 1928 Addn to 517,499 (*C A.* 25, 2157). Yeast is subjected to enzymatic degradation, preferably under sterile conditions, until the greater part has become sol in water The sol portion is then sepd from the insol. residue, without heating, and the soln and the residue are separately worked up Thus, yeast may be liquefied with AcOEt, brought to a hydrion concn. of $p_H$ 6–7 by addn of dil aq $NH_3$, and allowed to stand for several days until tyrosine begins to sep This is removed by means of a fine sieve, and the liquid autolysate is centrifuged to sep the undissolved portion This contains all the ergosterol, which may be isolated by alk sapon Leucine, etc., can be isolated in known manner from the liquid portion.

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## 17—PHARMACEUTICAL CHEMISTRY

W. O. Emery

General occurrence of alkaloids in Buxaceae. E Martin-Sans *Compt. rend.* 191, 625–6(1930).—The occurrence of alkaloids (usually situated in morphologically distinct secretory cells) in 9 species of *Buxaceæ* has been demonstrated microchemically, no alkaloid was detected in *Daphniphyllium macropodium*, which is possibly not to be included among the *Buxaceæ* B. C. A.

Vacuum microsublimation of synthetic drugs. R Eder and W Haas. *Mikrochem., Emich Festschr.* 1930, 43–82.—Various methods available for the sublimation of small quantities of material are described The types of sublimate obtained with Eder's microsublimation app and with Diepolder's vacuum app are described, and details, including photomicrographs, are given of the results obtained with a no of synthetic drugs Four groups are recognized, according to the ease with which a crystalline sublimate is obtained Although the m p is of little significance for the sublimation process, the difference between the sublimation temp and the m p is

a deciding factor as to whether or not well-defined sublimates can be obtained. Tables are given showing for a no. of drugs the m. p., mutual and optimum sublimation temps., and the nature of the sublimate, and these data, in connection with the crystal form of the sublimate, serve in most cases for identification. Sepn. of a mixt. of such compds. by sublimation is rarely possible, as for the majority the sublimation temp. lies between 100° and 140°. B. C. A.

**Crystallographic investigation of microsublimates of synthetic drugs.** W. Haas. *Mikrochem., Emich Festschr.* 1930, 83–119.—Details are given of the detn. of the optical properties of sublimates, and tabulated data are presented for a no. of synthetic drugs, comprising the appearance and crystalline form of the sublimate, the extinction, interference colors, optical character, dispersion and $\epsilon$, $\alpha$, $\beta$ and $\gamma$. B. C. A.

**Infusum radicis ipecacuanhae.** K. H. Bauer and K. Herrle. *Pharm. Zentralhalle* 71, 513–8(1930).—Infusions of concns. below 1:400, prepd. by the method of D. A.-B. VI, contain the bulk of the alkaloids present as detd. in the original drug by the D. A.-B. VI method (ammoniacal ether extn.). More concd. infusions contain less of the original alkaloids, thus a 1:20 infusion contains only about one half. Concn. *in vacuo* of dil. infusions results in considerable decrease of alkaloid content. Decoctions prepd. by the above method contain the same amts. of alkaloid as infusions of equal concn., and prolonged treatment does not raise the yield in either case. When the residue from a concd. infusion is again extd., a further quantity of alkaloid is removed, but the total yield remains deficient. Infusion of such a residue with dil. HCl brings the total yield almost to that indicated by the D. A. B. VI detn. Infusion of the original drug with dil. HCl (2 g. with 40 cc. of water and 10 cc. of 0.5 *N* HCl, followed by a 2nd infusion with 50 cc. of water) gives, however, higher values for the alkaloid content than does the German official method, the figures from the latter representing only about 87% of the alkaloid present. The original drug therefore, contains alkaloid in a form (possibly glucosidic) that is removed neither by infusion nor by ammoniacal ether extn. B. C. A.

**Chemical composition of the [Russian] tobacco crops of 1927 and 1928.** V. Balabucha Popcova and V. Zapolskii. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 66, 52 pp. (1930).—A large no. of data for tobaccos grown in different parts of Russia are given. B. C. A.

**Steam-air method of treating tobacco.** P. K. Dopokov, I. I. Losev, A. O. Reppik and A. A. Smirk. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 68, 36 pp. (1930).—By the method described which consists in treating the leaves with steam and air, and effects uniform moistening and sorting the time occupied is reduced to a few min., all the conveying of the tobacco being by mech. devices. At the same time the nicotine (recovered as sulfate), $NH_3$ and MeOH are considerably diminished in amt., and the flavor is improved. The process has been tested on a semi mfg. scale with satisfactory results. B. C. A.

**Polyphenols of tobacco.** A. Smirk. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 69, 7–13(1930). cf. *C. A.* 24, 2235.—From the ppt. formed by addn. of basic Pb acetate to the aq. ext. of unfermented tobacco (Tyk Kulak), a substance may be isolated which dissolves readily in water, exhibits tanning properties and gives an intense green coloration with $FeCl_3$. It does not reduce Fehling soln., but yields a reducing methylpentose (rhamnose) on acid hydrolysis, which takes place only with difficulty. The substance is apparently a glucoside, another of its components being a depside, contg. both caffeic and quinic acids. Treatment with alkali hydroxide soln. yields protocatechuic acid. B. C. A.

**Inositol in tobacco.** A. Smirk. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 69, 15–8(1930). cf. preceding abstr.—The aq. ext. of fermented tobacco (Tyk Kulak) contains a considerable proportion of inositol, and this may play a part in the biochem. processes resulting in the formation of nicotine and may serve to explain the presence in the nicotine mol. of a 6-membered ring which is absent from the protein mol. When tobacco seeds are treated with dil. mineral acid and the resulting soln. is pptd. with alkali, phytin is obtained to the extent of 7–10% on the dry matter of the seeds. B. C. A.

**Acids of tobacco. II.** A. Smirk and Platnicki. U. S. S. R. State Inst. Tobacco Inv. *Bull.* 69, 19–26(1930). cf. *C. A.* 23, 4771.—The ethereal ext. of fermented tobacco (Samsun) contains citric, caffeic and probably chlorogenic acids. Although the presence of quinic acid has been observed by various authors, it could not be detected and it may form one of the components of chlorogenic acid. B. C. A.

**Content of formic acid in tobacco.** A. Smirk and S. Kashirin. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 69, 29–32(1930).—By using a modification of Fincke's method

for detg HCOOH (*C. A.* **7**, 3983), it is found that this acid is present in both fermented and unfermented tobaccos to the extent of 0.02–0.17%. Tobaccos of high and low grades contain rather more than those of medium quality. Fermented tobaccos are richer in the acid than unfermented ones, the proportion increasing with the energy of the fermentation process. Both HCOOH and its salts diminish the strength of flavor of tobacco. B. C. A.

**Determination of the essential oils of tobacco.** V. V. Semenova. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 69, 45–53(1930).—The following procedure does not det. the total essential oils in tobacco, but serves for obtaining a comparative measure of the proportions present in different tobaccos. Five g. of the finely-divided tobacco, heated in a flask in a boiling water bath, is distd. in a current of steam under definite conditions, 4 cc. of water being distilled from a small boiler to furnish the steam. Air is drawn through the app. at const. rate (30 bubbles in 15 sec.) during the whole time of the distn. and for 30 min. afterward and passes through 3 washing vessels each contg. 3 cc. of $H_2SO_4$ (d. 1.84). The whole of the acid, together with washing water, is made up to 20 cc. and mixed, and is then compared colorimetrically with standard solns. of tobacco essential oils in $H_2SO_4$. B. C. A.

**Free nicotine or free alkalinity of tobacco.** A. Shmuk and M. Chmura. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 69, 65–9(1930); cf. *C. A.* **24**, 2235.—The content of nicotine in tobacco is related to the reaction of the material. Distn. in a current of steam of tobacco which has not been rendered alk. yields high proportions of nicotine (37–40%), which increase progressively as increasing amts. of alkali are added. Extn. of tobacco with light petroleum gives considerably smaller yields of nicotine. The proportion of free nicotine present is much greater than that calcd. theoretically from the degree of hydrolysis of nicotine salts and the dissocn. consts. B. C. A.

**Steam distillation of nicotine from tobacco.** A. Shmuk and M. Chmura. U. S. S. R. State Inst. Tobacco Inv., *Bull.* 69, 71–80(1930).—Addn. of CaO and NaCl to tobacco not only shortens the time of steam distn., but results in increased yields of nicotine. B. C. A.

**Estimation of hexamethylenetetramine methylenecitrate and of hexamethylenetetramine in the presence of each other.** D. Marotta and F. Di Stefano. *Ann. chim. applicata* **21**, 150–4(1931).—The method of estg. these 2 compds. in the presence of each other depends on the fact that the methylenecitrate is decomposed by alkali with liberation of $CH_2O$, while $(CH_2)_6N_4$ is stable. Dissolve 0.4–0.5 g. of the mixt. in 100 cc. $H_2O$, neutralize with 2 *N* NaOH, distil the liberated $CH_2O$ into another flask, and det. according to Romijn (*Z. anal. chem.* **36**, 18(1897)). To the remaining liquid add 100 cc. water and 50 cc. of 5% $H_2SO_4$, collect the $CH_2O$ liberated from the base and det. as above. A. W. Contieri.

**The preparation and properties of colloidal aluminum hydroxide for medicinal use.** J. J. L. Zwikker. *Pharm. Weekblad* **68**, 328–43(1931).—A series of $Al(OH)_3$ prepns. was made for the purpose of obtaining a product with the properties of "Alucol" a com. $Al(OH)_3$ prepn. used in the treatment of gastric disturbances. The desirable properties which distinguish "Alucol" from other $Al(OH)_3$ prepns. are ready dispersion in dil. HCl, slow neutralization, and gelatinization with concd. HCl. Such a prepn. was eventually obtained by the method of Kohlschütter (*C. A.* **14**, 242, **17**, 2983) *in which a solid cryst. Al salt is treated with $NH_4OH$.* A product practically identical with "Alucol" was obtained as follows. Powd. $Al_2(SO_4)_3$ was allowed to stand 4–5 days at room temp. or 18 hrs. at 40° with 10 vols. of 6% $NH_4OH$ contg. 5% $(NH_4)_2SO_4$, the ppt. washed with tap water and finally with distd. water, then dried at 40° and finely powdered. A. W. Dox.

**Micro melting-point determinations of drug products.** L. Kofler and W. Dernbach. *Arch. Pharm.* **269**, 104–14(1931).—*A report of results obtained in the examn.* of some 54 different D. A.-B. VI drug products by the use of Kofler and Hilbck's app. (*C. A.* **25**, 1121). Except with dionine, scopolamine-HBr, terpine hydrate and cocaine-$HNO_3$, the m. ps. observed by the micro method showed satisfactory agreement with those obtained with the usual macro procedure. The exceptions to the rule find probable explanation in the water of crystn. or constitution of the substances noted. W. O. E.

**Essential oil of Taiwania cedar.** Kinzo Kafuku and Ryo Kato. *Bull. Chem. Soc. Japan* **6**, 65–74; *Chem. News* **142**, 273–6(1931).—The wooden chips of *Taiwania cryptomerioides Hayata* give on steam distn. 0.23% of an oil, consisting chiefly of sesquiterpenes and sesquiterpene alc. The sesquiterpenes in the oil are mainly cadinene, with a little humulene and caryophyllene. From the cadinene a new oxidation *product*, $C_{15}H_{22}O_2$, m. 142–3°, was obtained. The sesquiterpene alc. in the oil, for which the

authors suggest the name "taiwanol," closely resembles cadinol of Semmler and Jonas From cadinol no cryst phenylurethan could be obtained, but with taiwanol it affords a cryst phenylurethan, m 134-5°, and furthermore, it gives a neutral oxidation product m 170° if oxidized with $KMnO_4$ in AcMe soln W O E

**Color of tinctura valerianae aetherea.** G Deiming *Apoth Ztg* 46, 47-8 (1931).—Ethereal tincture of valerian freshly prepd is bright yellow, and, as the D A -B VI states, becomes darker with age W O E

**Reaction of cod-liver oil and castor oil.** Lad Ekkert *Pharm Zentralhalle* 72, 209–12(1931).—The tests specified in the U S, Italian, German, Dutch and Hungarian Pharmacopeias for cod liver oil are reviewed The behavior of this oil, as also that of castor oil when treated with aldehydes and concd $H_2SO_4$, is described Thus, if 1 drop of cod liver oil is dissolved in 1 cc *strong* EtOH, *then treated with 3 drops of* 1% aldehyde, and the mixt thereupon underlaid with 1 cc concd $H_2SO_4$, a color zone develops After shaking the liquid is examd under the quartz light The various color changes are described when different aldehydes are used W O E

**Biological differentiation of morphine-containing tinctures of varying potency.** K. Feist and F Klatt *Apoth Ztg* 46, 30(1931).—Evap 1.5 g of the sample (opium tincture) to dryness on the steam bath, add 3 cc dil AcOH and again evap to dryness *to expel excess acid, then dissolve the residue in* 1.5 cc distd $H_2O$ Inject the clear soln subcutaneously in the back of a white mouse, and note the typical tail reaction and subsequent death of the animal Addnl samples are prepd as above, from which 1 cc and 0.5 cc, resp, are injected in other mice If the 1st died in 3 min, the 2nd in 7 and the 3rd in 22 min, a basis of comparison is established for opium tincture, which is about 10 times stronger in morphine content than cholera drops, the 2 prepns under consideration in the present paper W. O L

**Tincture diacolation.** H Breddin *Pharm Ztg* 76, 400–2(1931).—The results obtained in the prepn of a few special tinctures, notably of sabadilla, by the process of diacolation are reported with favorable comment W O E

**The reactions of oleum jecoris and oleum nigrum.** L. Ekkert. *Magyar Gyógyszerésztud Társaság Értesitoje* 7, 115-20(1931).—One cc oil is dissolved in 1 cc concd ale., *3 drops of* 1% *ale solns of the aldehyde are added and 1 cc concd* $H_2SO_4$ *is poured* in a layer underneath The colors of the rings and liquids given by oleum jecoris with the different aldehydes before and after thorough mixing and in the light from a quartz lamp (Q) are, resp (1) *HCHO*, rust brown ring, brown and (Q) light yellow liquid, (2) $PhCH_2CHO$, reddish brown ring, rust red and (Q) light pink liquid, (3) *BzH*, rust red ring, rust red and (Q) reddish yellow liquid, (4) *2 furaldehyde*, ring dark red underneath and dark green on top, liquid violet red and (Q) Bordeaux red, (5) *anisaldehyde*, dark brown ring, dark violet and (Q) Bordeaux red liquid, (6) *salicylaldehyde*, dark red ring, blood red and (Q) reddish violet liquid, (7) *vanillin*, ruby red ring, carmine-red and (Q) reddish violet liquid, (8) *cinnamaldehyde*, dark red ring, then dark reddish violet and (Q) brownish red liquid, (9) *piperonal*, ruby red ring carmine red, and (Q) orange- to brick red liquid The colors given by oleum nigrum *under the same conditions were* (1) (2) or (3) brown ring, reddish brown and (Q) light olive green liquid, (4) dark brown and dark green ring, dark red and (Q) liver-red liquid, (5) carmine red ring, dark violet and (Q) liver red liquid (6) yellow and red ring, blood red and (Q) grayish olive-green liquid, (7) ruby red ring, carmine-red, and (Q) liver red liquid (8) dark red ring, carmine red and (Q) olive-brown liquid; (9) ruby red ring, carmine red and (Q) brownish yellow liquid S. S de Finály

**Proposed standards for fennel fruit.** De Graaf *Heil u Gewürzpflanzen* 12, 41 (1929), *Quart J. Pharm and Pharmacol* 3, 282.—*Recommendations are put forward* for the fixing of an international standard for fennel fruit The chem requirements with which the fruit should comply are as follows *Bitter fennel*, first quality—volatile oil at least 5% ash not more than 8%; sand content not more than 0.2%. *Sweet fennel*, first quality—volatile oil at least 2.5%, ash and sand content as for bitter fennel G G

**Sirup of ferrous iodide.** G Kullerud *Norg Apot Tids* 29 (1929); *Quart. J Pharm and Pharmacol* 3, 544.—Small quantities of sirup kept in half filled bottles in the dark became pale yellow after 2 months On exposing these bottles to bright sunlight the color was not affected, but a portion of this sirup in a completely filled bottle became colorless after 3 days' exposure to sunlight The author concludes that, in completely filled vessels, sirup of $FeI_2$ does not become colored, in opened bottles the sirup can be kept for nearly 2 months Decompn is caused by the O of the air, and not by light G G

**Determination of chlorine numbers of drugs.** J Stamm *Farm. Notisblad* 39,

21; *Quart J Pharm and Pharmacol.* 3, 253–4.—To det. the Cl no ext 0.25 g of finely powd drug with boiling water and make up to 250 cc. Transfer 3 portions of 5, 10 and 15 cc., resp., to stoppered conical flasks and make up to 25 cc with water To each flask add 25 cc. of a filtered 0.1 *N* soln of chlorinated lime, followed by 2 cc of 20% $H_2SO_4$. Let the flasks stand out of direct sunlight for 5 min., add KI, and after a further 5 min titrate with thiosulfate soln Make a blank detn at the same time The Cl no is the no of cc of thiosulfate used up by 0.025 g of the drug The chlorinated lime soln must be used fresh but may be kept in the form of a more concd filtered soln contg about 20 g of active Cl per l G G

**Chlorine numbers of drugs.** K Killinen. *Farm. Notisblad* 39, 125(1930), *Quart J Pharm and Pharmacol* 3, 254.—K records the Cl nos of a large no of drugs, detd according to the method of Stamm (see preceding abstract) The Cl no depends upon the age, ripeness and manner of preservation of the drug In many cases there appeared to be a difference between fresh and old samples, though in general the no of samples examd was not sufficient to draw final conclusions in this regard G G

**Ethylene as a dental anesthetic.** Harry M Selden *Dental Cosmos* 73, 454–7 (1931).—$C_2H_4$ has its place as an anesthetic in major surgery in hospitals where adequate precautions can be taken against explosions $C_2H_4$ in mixts with other gases ($CO_2$, $O_2$) is not suitable as a dental anesthetic because of the danger of either explosion or asphyxia Joseph S Hepburn

**The principles and methods of biological assay.** J M Watt *J S African Chem Inst* 13, No 2, 41–7(1930) E H

**Recent advances in medicinal preparations in Germany.** Konrad Schulze *Mfg Chemist* 2, 103–5(1931).—Brief discussions are given of *Eupaverine* (1-(3,4-methylenedioxybenzyl)-3-methyl-6,7-methylenedioxyisoquinoline), *Fantan* (phenylcinchoninyl urethan, $PhC_9H_5NCONHCO_2Et$), *iodine sticks* (a colloidal I prepn.), *Gultajod* (an I-contg tablet), *Lacarnol* (a "heart-hormone" *e* prepn consisting of specific parts of the heart muscle together with skeletal muscle and other body tissues), *Pantocaine* (*p*-butylaminobenzyldimethylaminoethanol), and *Sympathol* (*p*-hydroxyphenylethanolmethylamine) E H

**Posterior pituitary preparation.** C G MacArthur *Science* 73, 448(1931).—Beef lobes were repeatedly treated with acetone, ether, petroleum ether and a mixt of 70 parts alc., 25 AcOH and 5 water The final ext was moderately sol in boiled distd water, easily sol in dil acids and alkalies and was pptd by Cu and Zn salts It seemed to be a polypeptide containing labile S It gave a strong reaction on blood vessels and isolated uterus Mary L Lear

**Limitations of phenol-coefficient tests in determining germicidal activities.** Geo F. Leonard *J Infectious Diseases* 48, 358–65(1931).—The phenol coeff. test is limited in value when applied to substances, like certain Ag prepns., that have a high bacteriostatic action By adding the transfer test to the regular phenol coeff test, one can readily det which products are actually germicidal and which have only a restraining effect on bacterial growth A method for testing growth restraining action is described which depends on color changes rather than turbidity to det growth and is therefore applicable to substances that cloud the media Both the mild and strong Ag prepns have high bacteriostatic action, restraining typhoid and staphylococcus cultures in dilns of 1:5,000 to 1:20,000 Colloidal Ag prepns have a feeble bacteriostatic action, restraining growth only in dilns of 1:50 or 1:100 Julian H Lewis

**Organic antiseptics. A bacteriologic study of a new series.** W. Lric Drake and Fitzgerald Dunning *J Infectious Diseases* 48, 366–71(1931).—A series of derivs of resorcinolsulfonephthalein and of halogenated resorcinolsulfonephthalein was prepd and tested bacteriologically The introduction of halogen atoms did not greatly increase the bactericidal activity of the parent compd., resorcinolsulfonephthalein The Hg deriv is considerably more bactericidal than the parent substance The increase in bactericidal activity is greatest when both Hg and halogen atoms are introduced The various halogens when added along with Hg increase the bactericidal activity in the order: Cl, Br, I Di Hg derivs are not greatly more bactericidal, but are considerably more toxic than the corresponding mono-Hg compds The Na salt of monohydroxymercuridiiodoresorcinolsulfonephthalein proved to be by far the best compd of this series from a therapeutic standpoint Julian H Lewis

**The influence of irradiation on adrenaline. I. The action of ultra-violet rays (of artificial light) and of sunlight on adrenaline.** Bunjiro Terata and Ryôichi Ito *Folia Pharmacol Japon* 12, No 1, 74–81, Breviaria 5–6(1931).—The action of adrenaline decreases with an increase in color of its soln When adrenaline is treated with ultra-violet light, there is an increase in potency The soln also gains strength

*when* irradiated with artificial light, but when *10 sunlight units* are applied the action is decreased. The action of the soln *does not correspond* to the color developed. Exposure to sunlight increases the *adrenaline* action, but over-exposure is injurious. The color developed is no *indication of the strength*. Adrenaline soln left unstoppered loses its strength, but this *may be* revived by irradiation with Röntgen, *ultra violet* or sunlight rays. G H W Lucas

Studies on *"ovarmina" (Erba)*. V. Cianci *Boll soc. ital biol sper* 6, 55–9 (1931) —"Ovarmina" when tested by the Allen Doisy technic contains not less than 150 rat units per cc Peter Masucci

Cod-liver oil of Japanese Dorsches *"Tara."* X. K. Kawai. *J. Pharm Soc Japan* 51, 177–95(1931), cf *C. A.* 25, 381. F I Nakamura

Pharmacognostic study of Aralia *chinensis* L. var. glabrescens Matsum. T. Muneda. *J. Pharm. Soc Japan* 51, 200–6(1931). F I Nakamura

The iconoclast. Frederic Walker *J. Chem. Education* 8, 885–95(1931) —W. calls attention to the lives and works of Paracelsus and Galen showing how each took exception to the established authority of medicine of his day and pleaded that progress is possible only as the result of expt. E R Schierz

Behavior of quinine salts with some acids and salts. V Macri *Boll chim farm* 69, 497–500, 503–4, 507–10, 539–40, 543–6(1930) —A detailed description of the reactions of quinine salts with some org and inorg acids and salts is given G S

Practical contribution to the preparation of solutions for hypodermic use. Gino Baratieri *Boll chim farm* 69, 1029–31(1930) —The app permits the sterile filtration, measuring, and filling in vials of solns for hypodermic injection The filtration can be carried out with suction and the procedure can be performed in an atm of an inert gas. G Schwoch

Somnival Erba and Passiflorine Béolet. Vittorio Zanotti *Boll chim farm* 69, 1031–2(1930) —Somnival Erba and Passiflorine Beolet are fluidexts of *Passiflora incarnata*, which contain an essential oil and tannin The reactions given by the essential oil are described. G Schwoch

The Italian Pharmacopeia in its fifth edition. Serafino Delani *Giorn farm. chim* 80, 101–11(1931) G Schwoch

Chemical constituents of the bark of Melicope erythrococca. T G H Jones and M White *Proc Roy Soc Queensland* 41, 154–7(1929) *Australian Sci Abstracts* 9, 28 —The results confirm the view of Cohen (*C A* 2, 1447) that lupeol is a mixt. of 2 substances, one, however apparently present to a much greater extent than the other J D S.

Essential oils from the Queensland flora. I. Baeckea virgata. T G H Jones and M White *Proc Roy Soc Queensland* 42, 49–51(1930), *Australian Sci Abstracts* 9, 40 —The essential oil was from one lot of leaves collected near Goodna; yield 1% $d^{15.5}$ 0.9021 $[\alpha]$ +18°, $n$ 1.4742 The principal constituents were *d*-α-pinene, cineol (30%), aromadendrene, a sesquiterpene alc. and possibly pinocarveol. J D S

The preparation of the tinctures of plants. B Cristini *Ann soc. pharm chim Sao Paulo* 2, 91–8(1931) —A critic of methods in use with recommendation that the procedure of the U S P be followed. M H Soule

Preparation used in the treatment of addiction to morphine, heroine and cocaine. F Mastrangioli *Ann soc pharm chim Sao Paulo* 2, 106–11(1931) —A discussion with an attempt to det. the compn. of these substances. M. H Soule

The handling of balsam of Peru. F Pitombo *Ann soc pharm. chim Sao Paulo* 2, 138–43(1931) —The method of collecting pure balsam of Peru and the phys. consts. of this substance are given. The materials frequently used as adulterants are discussed M H Soule

New method of evaluation of canthariides. L. J Olivella Riu *Anales soc españ fis. quim* 29, 164–9(1931) —The dry material is extd. to completion with a mixt. of acetone and HCl, the soln. evapd., and the crystals obtained are purified by 90° alc. and petroleum benzine satd. with HCl and cantharidin, then recrystd from acetone and washed with petroleum benzine. Material from all parts of the world varied in cantharidin content from 0.060 to 1.825%, differing markedly from the value 0.60% accepted by the Brussels International Conference The cantharidin obtained m. 216°. E M Symmes

Australian sandalwood oil. W H. Simmons. *Chemist and Druggist* 114, 80 (1931) cf *C A.* 25, 773 —The statements of Walmsley are refuted, those of Penfold, Marr, etc., are upheld. S Waldbott

Dog fat. J Pritzker and Robert Jungkunz *Pharm Acta Helv* 6, 55–63

(1931)—Dog fat has long been used in Swiss and Austrian domestic medicine In 7 samples of supervised origin and 2 com samples, consts were detd and the results tabulated They largely agree with results from hog fat except that the Bömer no (m.-p. difference, cf *C. A.* 8, 1174, 2433) is lower in dog fat (67-69) than in hog fat (not below 71) An admixt of hog fat to dog fat may thus be detd to a certain extent. Adulteration of 1 sample of dog fat with hog fat was established on the basis of the Bömer no as well as by the method of Grossfeld and Simmer (*C. A.* 24, 5173) for the sepn of the solid from the liquid fatty acids, and by means of the method of Kreis and Roth (*C. A.* 7, 1815) of fractional crystn The Grossfeld method also demonstrated for dog fat (as previously shown for hog fat) the absence of unsatd solid fatty acid S WALDBOTT

Comments and criticisms on the (British) pharmacopeia revision. A. J. JONES *Pharm J* 125, 647(1930), 126, 10(1931), cf *C A* 25, 1919—*In the prepn of infusum digitalis*, the use of a concd infusion should be expressly prohibited Similarly, in the use of industrial methylated spirits for the prepn of galenicals the cases where its use is objectionable should be specifically noted Addnl suggestions are made Syrupus ferri phosphatis compositus. E R MEACHEM *Ibid* 126, 10, 31—To prevent pptn when the formula given by the subcommittee is followed, the partial substitution of $H_3PO_2$ for $H_3PO_4$ has been suggested (cf J H Franklin) but was not adopted New expts show that sirups contg 2% + of dil $H_3PO_4$, Brit Pharm Codex, when exposed to bright light for 2 5 months remained clear, the others not contg $H_3PO_2$ gave a heavy ppt Use the formula of the subcommittee, modified Fe (wire) 4 3 g, $H_3PO_4$ (d 1 75) 28 cc, dil $H_3PO_2$ 20 0 cc, $CaCO_3$ 8 9 g $KHCO_3$ 1 0 g $Na_2HPO_4$ 1 0 g, cochineal 3 4 g, sugar 700 g, $H_2O$ to make 1000 cc Add the $H_3PO_2$ to the mixed solns just before filtration into the cold sirup Cataplasma kaolini. J H RIDGEWAY *Ibid* 126, 31—To avoid retention of the total $H_2O$ of reaction in the subcommittee's method of mixing $B(OH)_3$ and glycerol, dissolve the $B(OH)_3$ in the glycerol and heat with vigorous stirring to expel as much $H_2O$ as possible before adding the kaolin Estimation methods. J F LIVERSEEGE *Ibid* 126, 31—Suggestions are made on the definition and method of detn of the sapon no in pharmacy, on "normal pressure" reading in measuring NO gas from sweet spirit of nitre, etc In the *detn of As*, the use of strips of $HgCl_2$ paper in place of a cap permits of quant comparisons when allowed to act overnight in the cold The use of a hot plate is condemned, as it gives erratic results Practical notes. J J BLACKIE *Ibid* 126, 4 7, 16–18, *Chemist and Druggist* 114, 20–31(1931)—Detailed comments and suggestions are made and discussed on exts., glycerins, infusions, ointments, tinctures and waters Pharmacopeia revision. DAVID HARLEY *Pharm J.* 126, 109–12, *Chemist and Druggist* 114, 185(1931).—An extensive discussion by H and others The substitution of other oils for olive oil in linimentum camphorae proposed by the subcommittee is strongly deprecated S WALDBOTT

Liquor plumbi subacetatis fortis. J E WOODHEAD *Pharm J* 126, 28(1931).—Examn of 38 samples of semi-official lotions contg definite vols of Goulard's ext., Brit. Pharm (*A*) indicated excess of Pb present In 4 com samples of *A*, the required min of Pb subacetate was exceeded by an av of 16 0% W suggests that if the present formula for *A* be retained, d should be between 1.275 and 1 290, and the Pb subacetate content between 26 5 and 28 0%, which figures conform to actual conditions. S WALDBOTT

Psyllium seeds. HUBERT B FIGG *Pharm J* 126, 29(1931)—The seeds of *Plantago psyllium* L., fleawort, are used as a mild natural laxative in chronic constipation The mucilage test differentiates the (worthless) pale variety of seeds from the medicinal dark variety. Cover a small quantity of the seeds in a test tube with about 3 or 4 times their wt of $H_2O$ After a short time only the dark seeds have swelled to a semisolid mass which will remain in place when the tube is inverted S WALDBOTT

Phenol-water mixtures. G J W. FERREY *Pharm J* 126, 58(1931).—Detns of f. p. of PhOH-$H_2O$ mixts. (78 1–96 17% PhOH) gave results which agreed well with those of Rhodes and Markley (*C. A.* 16, 670) The f p of the liquid carbolic acid (80% PhOH, 20% $H_2O$) proposed by the subcommittee for the new Brit Pharm. is 3.1°; the sp. gr. close to 1.0615 F. suggests that the limiting values for $H_2O$ 19.4–21.9%, sp. gr. 1 062–1 060, f. p. 2 3–3 4° be adopted for the new liquefied carbolic acid. S. WALDBOTT

The preservation of sirupus acaciae, Brit. Pharm. Codex. H. A TURNER *Pharm. J.* 126, 160(1931).—With mucilage of acacia and sirup of acacia fermentation takes place quickly when preservatives are not added, but addn. of BzONa or $CHCl_3$ prevented fermentation, but not formation of acidity. As the use of BzONa may be

objected to, the use of 0.25% $CHCl_3$ is recommended (*cf. C. A.* 23, 5010; 24, 202, 5938). S. WALDBOTT

The pharmacist and the pharmacopeia. W. A. KNIGHT. *Pharm. J.* 126, 161 (1931).—In some cases the pharmacopeial tests are unnecessarily strict and too elaborate for the ordinary pharmacy, *e. g.*, the As test (5 p. p. m.) in $NaNO_3$ of "reagent" quality, where a simpler darkening test with soln. of $H_2S$ or $(NH_4)_2S$ should suffice. K. suggests that the Brit. Pharm. tests be of 2 classes: (1) Delicate and complicated but important tests, *e. g.*, those for biol. products which are bought in sealed containers under guarantee. (2) Tests of identity and purity which are within the pharmacist's scope to perform. S. WALDBOTT

Linimentum camphorae, modified. A. N. WHITE. *Pharm. J.* 126, 184 (1931).—Rub down camphor, 1 oz., with essential oil of camphor 0.5 oz. and add sufficient olive oil to make 10 oz. A clear non-pptg. and satisfactory liniment results. The formula is recommended for adoption in the Brit. Pharm. S. WALDBOTT

Notes on some leguminous seeds. G. E. TREASE. *Pharm. J.* 126, 211–2 (1931).—Pharmacognostical descriptions and photographs are given of the seeds of *Cassia fistula*, *Tamarindus indica* and of *Indian* and *Alexandrian senna*. S. WALDBOTT

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Extracts obtained in the manufacture of ethereal oils from conifers (BOBROV) 22. New and improved methods in the formation of pharmacologically important amines. II. Synthesis of β-arylethylamines from aromatic aldehydes and carboxylic acids (KINDLER) 10. Problems of the technical manufacture of papaverine [and laudanosine] (KONEK) 10. Constitution of hydroxyoleic acid from oil of ergot (MATTHES, KÖRSCHNER) 10. The properties and effects of a new class of organic Br compounds (HERMANN, FREUND) 11H. Amino alcohols (HARTUNG, MUNCH) 11H. Condensation products [for use in pharmacy] (Fr. pat. 698,525) 25.

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Epitome of the Pharmacopeia of the United States and the National Formulary. Prepared under Authorization of Council on Pharmacy and Chemistry of the Am. Med. Assoc. 4th ed. Edited by R. A. HATCHER, ERNEST E. IRONS, TORALD SOLLMANN AND WM. A. PUCKNER. Chicago: Am. Med. Assoc. 238 pp.

TSCHIRCH, A. Handbuch der Pharmakognosie. 2nd ed., enlarged. Lfg. 6. Leipzig: Bernhard Tauchnitz. M. 8. *Cf. C. A.* 25, 1335.

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Medicinal composition containing agar. FERDINAND W. NITARDY (to E. R. Squibb and Sons). U. S. 1,799,804, April 7. In prepg. liquid products contg. agar in a quantity greater than that which would normally form a firm jelly in the presence of water, the agar is dissolved in hot water in the proportions required to form a firm jelly, and the soln. is cooled and stirred to produce a semi-liquid mass of comminuted jelly particles and the latter are emulsified with a mixt. of a laxative oil and water.

Irradiating medicaments, foodstuffs, etc. OSKAR RIED. Austrian 121,657, Oct. 15, 1930. The activating effect of ultra violet rays on medicaments, foodstuffs, etc., is enhanced by subjecting the materials to the action of other rays, *e. g.*, Röntgen rays or rays of long wave length, before, during or after irradiation with ultra-violet rays.

Apparatus for making physiological salt solution in large quantities. RUDOLF A. HARTMANN. Ger. 522,495, Aug. 3, 1927.

Calcium carbohydrate compounds. ERNST STERN. Ger. 522,302, Oct. 13, 1925. Assimilable products of therapeutic value, mostly sol. in water, are prepd. by treating solns. or suspensions of carbohydrates of the sugar type with $Ca(OH)_2$ at a temp. not exceeding 60°. The concn. of the $Ca(OH)_2$ is gradually increased during the initial stage of the process, *e. g.*, up to 5% of CaO, calcd. on the carbohydrate. After about 12 hrs., the product is dried *in vacuo* at a temp. not above 70°. The feeble alky. of the product may be removed by incorporating a sol. acid salt, *e. g.*, $NaH_2PO_4$.

Cyanamide-formaldehyde condensation product. I. G. FARBENIND. A.-G. (Hans Schmidt, inventor). Ger. 522,056, Sept. 11, 1924. Cyanamide is condensed with

$CH_2O$ directly or in aq soln, yielding a nitrogenous product useful as an *intermediate for drugs*, etc The cyanamide may be prepd from an aq soln of its Ca compd, and the condensation may be accelerated by means of alkali Examples are given. Cf *C. A.* 25, 1645

Ephedrine and structurally similar substances. Richard H. F. Manske (to Eli Lilly & Co) U. S. 1,799,110, March 31. Numerous details and examples are given of the prepn of ephedrine and structurally similar substances by a process which consists in: (1) the condensation of a diketone of the general formula RCOCOR′ with a primary amine of the general *formula* $H_2NR''$ *in which R is a benzenoid radical*, R′ is $H(CH_2)_x$, with $x$ any desired integer including zero, and R″ is an org radical which contains a C atom by which it is linked to the N atom, (2) the subsequent hydrogenation of the product of the first step Ten detailed examples of the process are described

Vitamins. Tiburius Reiter Fr 697,367, Jan 30, 1930 Substances contg ergosterol are vitaminized by treatment with ultra-violet light, only rays the wave length of which is above 2,800 A U are used

Gland extracts Georges L A Pellerin Fr 698,564, June 20, 1930 In extg opotherapeutic products from animal glands, the glands are stabilized at the moment of killing so that the products are preserved in full vigor Thus the glands are removed when the animal is killed, kept for 10–20 min at 40° in the absence of air, then cooled to about 4° at which temp stabilization is definitely established

Anesthetics. Schering-Kahlbaum A.-G (Walter Schoeller and Hans G Allardt, inventors) Ger 522,064, Aug 11, 1928 Alkamine esters of aminobenzoic acid having an alkoxy group substituted in the nucleus, are prepd by the customary processes from monoalkoxy-nitro- or -amino-benzoic acids or their derivs Thus, 4-nitro-3-methoxybenzoyl chloride may be heated in $C_6H_6$ soln with $Et_2NC_2H_4OH$, and the product reduced with $SnCl_2$ and HCl, yielding *diethylaminoethyl 4-amino-3-methoxybenzoate-HCl*, m 156° Examples are given also of the prepn of *diethylaminoethyl 4-ethoxy-3-aminobenzoate-HCl*, m 162–3°, and *diethylaminoethyl 3-amino-4-methoxybenzoate-di-HCl* m 223°

Bactericides. Theodor Sabalitschka and Nährmittelfabrik Julius Penner A.-G Ger 522,005, April 17, 1927 Use is made of water-sol products obtained by fusing esters of carbocyclic acids with sugar A suitable product is prepd by fusing Me *p*-hydroxybenzoate 1 with sugar 9 parts

Compositions of silicates with other compounds Henri Baland Fr 698,543, June 18, 1930 Solid compns are made from alkali silicates sol in cold water and products such as *antiseptics* or *dyes*

Face powder. Yuzi Nagai and Takuzi Nisimura Japan 89,531, Dec. 11, 1930 The powder is a mixt of $TiO_2$, talc, fibroin prepd from HCl soln of silk, glycerol, $H_2O$ and perfume.

Hair shampoo. Henri Ciaudo Fr. 697,993, Aug 5, 1929 A hair shampoo contains $CCl_4$, EtOH, acetone, PrOH and essential oils

Fumigating rooms, etc. Farbsalz Ges m b H Ger 522,316, Feb 10, 1928 In fumigating rooms, etc, by strewing them with cyanides unstable in the air, the evolution of $H_2S$ from sulfide impurities in the cyanides is hindered by adding to the cyanides an oxidizing agent, *e g*, $PbO_2$ or $MnO_2$ The action of the oxidizing agent may be enhanced by adding also a powd dehydrating agent, *e g*, $CaCl_2$

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E M Symmes

Phosphoric acid. W. C. Weller *J. S. African Chem Inst* 12, 50–7(1929).—A review of the methods of manuf E. H.

Concentration of phosphoric acid by submerged combustion. C. Featherstone Hammond *Trans. Inst Chem Eng*, Adv copy, *March 24, 1931, 6 pp*—*In the Hammond* unit the burner is central in a refractory-lined combustion chamber, wholly submerged below the level of the liquid The fuel gas and air are adjusted for complete combustion Seger cones showed a temp. in the combustion zone of 1740°. The burner is made of non-corrosive metal cut from the solid, instead of from sheet or rod Trapping the exhaust showed 0.02% loss of $P_2O_5$ in concg from 43° to 111° Tw The acid is practically free from contamination, and the burner has a long life. High thermal efficiencies are obtained E. M Symmes

Improvements effected in the production of nitric acid by oxidation of ammonia.

GIACOMO FAUSER. *Chimie & industrie* 25, 556–69(1931).—See *C. A.* 25, 382.
A PAPINEAU-COUTURE

New applications of ammonia. M H. MERRISS *Compressed Gas Manufacturers' Assoc 18th Ann Repl* 1930, 28–37(1931).—At present about 32 5% of the synthetic $NH_3$ of the U. S A is employed in agriculture For other purposes the percentages are. 17 for explosives, 12 for refrigeration, 20 for miscellaneous purposes and 51 for chemicals and acids $NH_3$ is used as an alkali, a reducing agent, a source of $HNO_3$, H and N, a fertilizer material and a means of prepg foods, treating rubber and purifying drinking water. A good bibliography is included W. H. BOYNTON

Data and experiences in the manufacture of artificial nitrate. T. SZAFFKA *Technika* 11, 126–35(1930), cf *C. A.* 25, 2525.—Expts were carried out on concg 29 7° to 31 8° Bé $HNO_3$ and a waste acid contg 69–70% $H_2SO_4$, 5–10% $HNO_3$ and 20–25% water. The usual heating with steam dilutes the acid, therefore heating with warm air was tried successfully. The detailed literature of patents on the concn. of $H_2SO_4$ is listed The boiler method is advised for artificial nitrate factories. The manuf of $NaNO_3$ and its decompn to $HNO_3$ are described. S S DE FINÁLY

Some properties of commercial nitrates of lime. CAMILLE MATIGNON *Compt rend* 192, 777–80(1931).—The 2 principal forms of com nitrate of lime used in the *fertilizer industry* are the Norwegian, contg 13% N and 22 to 23% $H_2O$; and the ammoniacal nitrate of lime, contg about 5% $NH_4NO_3$ and 14% water Both varieties are very hygroscopic. A sample of the ammoniacal form increased in wt 42% after 2-hr. exposure to the air, and 72% after 6 hrs., then dissolving The possibility of spontaneous combustion of these products during shipment or storage was investigated Thermochem data are presented to show that decompn of both forms is endothermic and cannot occur spontaneously at ordinary temp Ammoniacal nitrate of lime, which is the more active form, was mixed with org combustibles such as might be derived from the containers in which it is usually shipped, and the mixts were heated gradually Up to 300° the combustibles in the mixts were unchanged Combustion first occurred between 320° and 350°. Com nitrates of lime, therefore, should not be susceptible to spontaneous combustion during shipping and storage Actual absence of such accidents verifies this conclusion There is no warrant for increased insurance rates based on spontaneous combustibility R. H LOMBARD

New process for the recovery of sodium nitrate in Chile. MAX SELIGMANN *Z Ver. deut Ing* 75, 513–6(1931).—Descriptive E. H

Separation of soda ash from brines of the Lake Tanatar. S Z MAKAROV. *Zhur. Prikladnoi Khim* 3, 1031–40(1930); cf *C A* 24, 5438.—Possibility of sepg soda ash from $Na_2SO_4$ is shown V. KALICHEVSKY

New procedure for manufacturing permanganates. LASZLÓ DE PUTNOKY AND BÉLA DE BOBEST *Matematik es Termeszettudományi Értesito* 47, 751–67 (in German 768–9) (1930).—*Pyrolusites with a low $SiO_2$ content are dissolved in $H_2SO_4$, forming $MnSO_4$*; more ore and HF are added to the soln., producing $MnF_3$, the electrolytic oxidation of which requires less current As the electrolyte contains 10% $H_2SO_4$ and 5% HF, special diaphragms should be made, which are resistant to this acid mixt Expts proved that material contg 90 parts fluorite and 5 parts cryolite formed into diaphragms and burnt at 750° is resistant, its loss of wt amounting to only 0 1% daily The anodic liquid should be worked up instantly, since it decomps quickly. Permanganates of alk. earth metals can be made directly, those of alkali metals indirectly only. The process is therefore not economical for producing alkali permanganates S S DE F.

Working up cyanide solutions to give potassium ferrocyanide and the preparation of potassium ferricyanide by treatment with compressed air and subsequent electrolytic oxidation W GLUUD, W KLEMPT, K KELLER, FR BRODKORB AND CL DIECKMANN *Ber ges Kohlentech* 3, 385–94(1931).—Cyanide solns are converted into $Ca(CN)_2$ which is converted into $Ca_2Fe(CN)_6$ by treatment with $FeSO_4$ From this, $K_4Fe(CN)_6$ is obtained by double decompn with $K_2CO_3$ To obtain the ferricyanide, the method found most successful was *oxidation of $Ca_2Fe(CN)_6$ with compressed air* in an autoclave, $CO_2$ likewise being present to remove $Ca(OH)_2$, since the action is reversible in presence of an alkali From 90 to 95% of the ferrocyanide can be oxidized in this manner To complete the oxidation of the remainder, the soln is electrolyzed between Ni electrodes, at a c. d of 0 01–0 005 amp per sq cm., an initial e m f. of 7–8 v and a final e. m f of 10–12 v A porous diaphragm is used, and a small quantity of CaO is added to the anode compartment to neutralize the free $H_4Fe(CN)_6$ formed there
H. STOERTZ

Increasing the purity of common salt. THOS B BRIGHTON AND CARL M DICE *Ind Eng Chem* 23, 336–9(1931).—Purification of solar salt made from Great Salt

Lake brine is described Special attention was paid to elimination of odor and color L. A. PRIDGEON

Is solid-carbon dioxide manufacture as a kiln by-product practical? C. L. JONES *Pit and Quarry* 22, 53–7(1931). E. H.

Chromite in 1929. LEWIS A. SMITH. *Bur. Mines, Mineral Resources of the U S* 1929, Pt. 1, 203–29 (preprint No 10, published March 5, 1931) E. H.

Colloidal graphite as a protecting medium for automobile radiators. O STEINITZ. *Automobiltech Z* 34, 236(1931) —A suspension of a colloidal graphite of 0 000001 mm diam in water (about $^1/_{10}$%) prevents the sedimentation of salts on the walls of the app and inhibits the corrosive action of the water on metal parts A A BOEHTLINGK

Revivification of bleaching earths. O ECKART *Seifensieder-Ztg* 58, 200–1 (1931) —A revivified earth recovers on the av 60% of its original bleaching power The oil is first extd. by some solvent and the solvent and the earth are then roasted or burned. P. ESCHER

The manufacture of bromine in France. M KALTENBACH. *Chimie & industrie* 25, 543–55(1931) —A detailed description of the process in use in French Br-mfg plants, dealing more particularly with the latest refinements in the processes for the manuf and refining of the Br A PAPINEAU-COUTURE

Properties of iodine. J LANZA *Anales soc españ fis quim* 29, 221–34(1931) — Aq I solns show marked supersatn phenomena, which explains many high soly results There is a max soly at 60° of I in $H_2O$ or aq KI soln In the system $H_2O$–KI–I contg an excess of the 2 latter components there is a reciprocal soly of KI for I, so that a soln satd with KI can still dissolve considerable quantities of KI when I is added, and reciprocally In dil solns the molar relation KI I is practically const between wide concn and temp limits E M SYMMES

An outline of the manufacture of carbon black. D F CRANOR AND L J VENUTO *Am Paint J* 15, No 26, 21–2(1931) —The history, manuf., uses and testing of carbon black are discussed briefly G G. SWARD

Preparation of copper-chromium oxide catalysts for hydrogenation. RALPH CONNOR, KARL FOLKERS AND HOMER ADKINS *J Am Chem Soc* 53, 2012–3(1931) — $(NH_4)_2CO_3 H_2O$ (71 g.) in 400 ml $H_2O$ is added to a soln contg 50 g $Cu(NO_3)_2 3H_2O$, 5 4 g $Ba(NO_3)_2$ and 77 g $Cr_3(NO_3)_4 15H_2O$ in 575 ml $H_2O$, the ppt. washed twice with 50-ml portions of $H_2O$, dried at 100–10° overnight, ground to a powder and heated to approx. 230°. C. J WEST

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Utilizing C saturated with O [for manufacture of CO] (Ger. pat. 506,274) 21. Apparatus for carbonating solutions (U S pat. 1,799,354) 1.

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Packing for autoclaves, etc. I G FARBENIND A.-G (Otto Leuchs, inventor). Ger 511,761, Jan 9, 1925. The packing consists of fibrous material soaked in starchy fatty acids or derivs The example mentions asbestos fiber soaked in glycerol and treated with the Na salt of a starchy fatty acid.

Nitric acid. E I DU PONT DU NEMOURS & Co Ger 522,167, May 7, 1929 See Brit 336,638 (*C A* 25, 1953)

Use of hydrocyanic acid gas. SOC. FRANÇAISE DU GAZ SANOS Fr 697,923–4, Sept 24, 1929 App are described for emitting an alarm gas along with hydrocyanic acid gas to prevent poisoning of persons thereby.

Sulfuric acid. RICHARD ZEH Fr. 697,884, June 25, 1930 See Ger. 509,703 (*C. A.* 25, 778)

Removing fluorine compounds from gas for sulfuric acid manufacture. TAKESABURO IKEBE, TAITU OTANI, TATU KIKUTI AND MITSUI KOZAN KABUSHIKI KAISHA Japan 89,600, Dec. 18, 1930 F compds are removed from $SO_3$ by passing through a layer of inorg material, such as pieces of glass or bricks contg $H_4SiO_4$ or sand and then washing with $H_2SO_4$ (30° Be.) contg alkali sulfites, sulfates or nitrates Silica gel or $K_2SiF_6$ or the like is recovered from the washing liquor

Ammonia synthesis. ALPHONS O JAEGER (to The Selden Co.). Can 310,208, Apr 7, 1931 $NH_3$ is synthesized by passing a gaseous mixt contg. H and N at an elevated temp over a contact mass contg at least one dild "permutogenetic body," at least part of the diluents being Fe-contg products Cf *C A.* 24, 1941.

Alkali nitrates. FRIEDRICH JOST Fr 698,404, July 4, 1930. An alkali nitrate is made from an alkali chloride, $HNO_3$ and $NH_3$ by using an alkali sulfate as intermediate product The latter is transformed by $HNO_3$ into alkali nitrate and a soln. of alkali bisulfate in $HNO_3$ The alkali nitrate is sepd and the soln neutralized with $NH_3$ and alkali chloride. The alkali sulfate formed is reutilized Cf *C. A.* 24, 1943

Aluminum-alkali chlorides. Metallges. A.-G. (Freiherr Conway von Girsewald, inventor) Ger. 522,031, July 5, 1923. Al is treated with a fused heavy metal chloride, *e. g.*, $PbCl_2$, in the presence of an alkali chloride. The heavy metal is obtained as a by-product. An example is given.

Cyanogen compounds. Georg Bredig and Egon Fild. Ger. 522,253, Dec. 8, 1922. A mixt. of a volatile N compd., a considerable excess of a volatile C compd., and a substantial amt. of H is passed at a dull red heat over a metal oxide, other than an oxide of a metal of the Pt group. Thus, a mixt. of $NH_3$ 5, CO 15, and H 50 pts. by vol. may be passed over $Ce_2O_3$ at 600°, yielding HCN. Other suitable oxides are $Al_2O_3$, $ThO_2$, and $ZrO_2$.

Nitrates from nitrites. Friedrich A. Henglein (to I. G. Farbenind. A.-G.). U. S. 1,798,533, March 31. Nitrites such as those of K or Na are treated with O at temps. of 180–500° in the presence of a catalyst of the group consisting of the alkali metal hydroxides, alk. earth metal oxides or their mixts. (at least one of the reaction materials being in the fused state).

Metaphosphates. I. G. Farbenind. A. G. (Otto Balz and Ernst Mische, inventors). Ger. 522,169, Nov. 29, 1929. Alkali or alk. earth metaphosphates are prepd. by heating the corresponding monoorthophosphates to about 400–500° in the presence of inert solids which do not soften or melt at the reaction temp.

Separating potassium phosphates and aluminates. I. G. Farbenind. A. G. Ger. 522,168, Nov. 24, 1929. Solns. contg. phosphates and aluminates of K, with or without KOH or $K_2CO_3$, are treated with $NH_3$ gas. The soln. seps. into two layers, the upper contg. mainly aluminate, and the lower contg. the phosphate with some aluminate. The layers are sepd., and the sepn. is completed by moderately dilg. the lower layer with water and repeating the treatment.

Phosphorus halides. N. V. Electro-Chemische Industrie. (Henri C. J. H. Gelissen, inventor). Ger. 522,270, Sept. 26, 1928. See Fr. 664,850 (*C. A.* 24, 926).

Zirconium salts. Deutsche Gasglühlicht Auer-Ges. m. b. H. Fr. 698,193, June 28, 1930. Ores of Zr contg. $ZrO_2$ and $SiO_2$ are attacked or dissocd. by alkali in amt. such that for one mol. of $ZrO_2$ one mol. of alkali oxide is used. $Na_2ZrO_3$ and $Na_2ZrSiO_5$ are formed, and if $SiO_2$ is present to excess $Na_4Zr_2Si_3O_{12}$ is also formed.

Alumina purification. Basil T. Horsfield (to Aluminum Co. of Am.). U. S. 1,798,261, March 31. For obtaining substantially pure alumina from alumina partially purified by reaction of a reducing agent at high temp. with assocd. oxide impurities such as Fe, Ti, Si and Ca oxides, the partially purified alumina in subdivided form is passed countercurrent through a stream of acid reagent of gradually increasing strength so that some unreduced oxide impurities are dissolved, and is then passed countercurrent through a stream of wash water contg. acid in quantities decreasing to zero.

Ammonium sulfate. Wm. G. Adam. Fr. 697,657, June 19, 1930. Crystals of $(NH_4)_2SO_4$ which have little tendency to agglutinate on standing are made from an aq. soln. contg. a small proportion of a free acid and a small proportion of an appropriate metallic salt favoring the formation of elongated crystals, *e. g.*, $Fe_2(SO_4)_3$. Cf. *C. A.* 24, 5048.

Ammonium sulfate. Patentverwertungs A.-G. "Alpina." (Soc. Anon. pour l'Exploitation de Brevets "Alpina." Patente Exploitation Cy. "Alpina," Ltd.). Fr. 698,485, Jan. 31, 1930. $(NH_4)_2SO_4$ is made by neutralizing $H_2SO_4$ with $NH_3$ in 2 or more steps, the lye being cooled between each step. An app. is described.

Barium hydroxide. Friedrich Rüsberg and Gustav Clauss (to Rhenania-Kunheim Verein Chemischer Fabriken A. G.). U. S. 1,799,939, April 7. Ba silicate is subjected to fine grinding in the presence of water to cause hydrolyzing of the finely ground material. Cf. *C. A.* 24, 5115.

Calcium cyanamide. Nikodem Caro and Albert R. Frank. Fr. 698,231, June 30, 1930. $CaCN_2$ and other cyanamides are prepd. free from dust by treating the ground carbide in the form of pieces or briquets. Cf. *C. A.* 25, 1041.

Bleaching powder. Soc. elettrica ed elettrochimica del Caffaro, Achille Carughi and Carlo Paoloni. Austrian 121,976, Nov. 15, 1930. Bleaching powder contg. more than 40% of active Cl is prepd. by chlorinating a suspension of $Ca(OH)_2$ in $CCl_4$ or other inert non-solvent for $Ca(OH)_2$ and $CaOCl_2$. The $Ca(OH)_2$ is ground in the inert liquid before, during or throughout the reaction, which is effected at a temp. above 40°. When the reaction is finished, the mixt. is cooled to below 20° and the product is dried. App. is described.

Bleaching powder. I. G. Farbenind. A.-G. Fr. 698,361, July 3, 1930. See Ger. 508,167 (*C. A.* 25, 781).

Bleaching lye. I. G. Farbenind. A.-G. Fr. 698,753, July 8, 1930. A lye for

bleaching and other purposes contains $Na_3PO_4$ and sol glass. It is made from phosphoric Fe contg Si (obtained in the electrothermal manuf. of P) by reaction with $Na_2CO_3$ and air, leaching the product with water and evapg to dryness

Lime from limestone. GLENN H. NILES (one-half each to Doherty Research Co and Arthur E Truesdell) U S. 1,798,802, March 31. A charge of limestone is heated in a kiln under a subatm pressure which varies in different portions of the kiln. Heat for burning is supplied by means of a circuit of hot gases which are passed upwardly through the charge, then removed from the top of the charge and reintroduced at a controlled rate and pressure into the lower portion of the charge admixed with heating gases in sufficient volume to maintain lime-burning temps, and the amt. of air employed is limited to that which is supplied at a controlled rate and pressure to produce the heating gases App is described

Iron oxide and sulfur dioxide. HORACE FREEMAN (to The Sulphide Research Corp, Ltd) Can 311,130, May 5, 1931 Iron sulfide ore is passed in finely divided form through a zone in which it is preheated to ignition temp. by contact with hot furnace gases, and through a second zone in which it is heated to fusion temp and burned with a deficiency of gaseous oxidizing agent whereby most of the S is oxidized and through a third zone in which it is further heated to a state of fusion and is burned with an excess of gaseous oxidizing agent whereby substantially all the Fe and the residual S are oxidized, and finally through a fourth zone in which the fused particles are chilled sufficiently to avoid agglomeration

Potassium phosphate. ROBERT D PIKE U S 1,799,479, April 7 In making $K_3PO_4$ from KCl and $H_3PO_4$ in a single furnace operation, a mixt. of KCl is furnaced with sufficient $H_3PO_4$ to form the tri-K phosphate and with sufficient $H_2SO_4$ to drive off substantially all the HCl, and a carbonaceous reducing agent such as coal or coke is added to complete the conversion of the furnace contents An arrangement of app. is described.

Sodium sulfate from natural deposits. ARTHUR T W WARNKEN (one half to Emanuel Johnson). U. S 1,798,993, March 31 The natural deposit is covered with fresh water which is then subjected to natural temp conditions of day and night so that the water is heated during the day to collect the $Na_2SO_4$ and cooled during the night to ppt. the material, and the warmed water is led during the day to a collection vat

Purification of carbon dioxide. RALPH H MCKEE Can 310,569, April 21, 1931. $CO_2$ contg low-boiling hydrocarbons is purified by cooling under a pressure of approx. 400–1000 lbs per sq in to provide a density of the $CO_2$ of approx. 5–60 lbs per cu. ft., and contacting with activated C, silica gel, solid paraffin in granular form or a heavy odorless oil such as refined white petroleum oil

Apparatus for making solid carbon dioxide of high density. MASATOSI OHKOTI, YOSITOSI OYAMA and INSTITUTE OF PHYSICAL AND CHEMICAL RESEARCH. Japan 89,547, Dec. 13, 1930

Gaseous sulfur compounds. KOLOMAN VON SZOMBATHY, KORNEL KELL and PAUL SCHMITZ. Fr 698,165, June 28, 1930. Ores contg. a metal and S are mixed with C and, while heated to incandescence, are exposed to a current of gas contg. steam. $SO_2$ as well as $H_2S$ is obtained if an excess of air is mixed with the steam. $Fe_2O_3$ may be added as a catalyst Fr 698,166 describes an app for absorbing $H_2S$ and $SO_2$ in gases by means of a finely divided concd soln of polythionates sol in water, *e. g.*, pentathionates or hexathionates of alkalies or alk earths The S which seps is extd from the soln and dried, while the soln freed from S is returned to the reaction vessel The process is accelerated by adding to the soln small amts of alcs, *e g*, 1–2% of glycerol, *and keeping the temp at 45–65°.*

Continuous calcination of gypsum. ALVA W TYLER U S 1,798,857, March 31. Finely divided raw gypsum is moved through a chamber in a stream of superheated steam at a suitable pressure; the superheat of the steam over its temp. of condensation at the pressure is sufficient to impart to the gypsum the heat necessary for its calcination without reduction of the steam to its temp of condensation App. is described. *Cf. C. A* 24, 1720

Catalytic reduction of carbonyl compounds. ALPHONS O. JAEGER (to The Selden Co). Can 310,207, Apr 7, 1931. Carbonyl compds are catalytically reduced by reaction with reducing gases in the presence of a contact mass contg a dild "permutogenetic body."

Hydrogen. JOHN S BEEKLEY (to DuPont Ammonia Corp). U. S 1,799,452, April 7. A mixt. of steam and $CH_4$, in the vol. ratio of at least 2:1, at a pressure of 1–50 atm. and at a temp. below 600°, is subjected to the combined action of a Ni cata-

lyst and magnesia (the latter being present in the proportion of at least one mol of MgO per mol of $CH_4$ in the gaseous mixt.) Cf. *C. A.* 25, 1345

Hydrogen. Heinrich Bomke Ger 516,843, Oct. 17, 1926 H is prepd. by passing water gas or similar mixts over a MgO catalyzer $CO_2$ absorbents may also be mixed with the catalyzer A suitable catalyzer mixt. is given by burned lime contg MgO

Hydrogen. Patentverwertungs A.-G. "Alpina" (Soc. anon pour l'exploitation de brevets "Alpina" Patente exploitation Cy. "Alpina," Ltd.). Fr. 698,481, Jan 31, 1930 H is obtained by washing coke-oven gas with water under pressure The gas which is first liberated from the water on reducing the pressure contains 20–35% of H and is returned to fresh unwashed gas

Hydrogen and other gases. George F Jaubert Fr 698,706, Oct. 9, 1929 Gases such as H are prepd with or without pressure by interposing between the liquid (caustic alkali or other) and the solid substance (Si or other) to be attacked by this soln., a partition or pocket made of appropriate material attackable itself by the reaction liquid but with less rapidity, to permit the charging of the reservoir which is to contain the gas under pressure, and the closing of it before the reaction takes place.

Graphite and hydrogen. I G Farbenind A.-G. (Hans Bahr, inventor) Ger. 516,991, Oct 4, 1929 Graphite and H are produced by the decompn of hydrocarbons in metal baths App for leading the hydrocarbons into the molten metal at suitable temps and at a suitable velocity is described In examples, hydrocarbons are led into fused Fe and fused Cu at 1300°

Active carbon Akt.-Ges. für Stickstoffdünger (Theodor Geis and Walter Pechtold, inventors) Ger 516,881, June 6, 1923 Highly active C is prepd by heating flue ashes of all varieties (*e. g.*, from coal, lignite, peat and wood fuel) to about 1000°, and not exceeding 1050° Cf *C A* 24, 1710

Apparatus for production of activated carbon. Wm M Williams (to Activities Ltd.) U S 1,798,827, March 31 Carbonaceous material such as coal dust is injected in a tangential direction into a combustion chamber in the form of an elongated furnace of rounded cross section Cf *C A* 24, 1710

Apparatus for producing carbon black by partial combustion of hydrocarbons. Chauncey Matlock (to Monroe Louisiana Carbon Co.) U. S 1,798,614, March 31. Various structural details are described

Adsorptive charcoal. Bernardino Oglietti Fr 698,752, July 8, 1930 Charcoal having the power of adsorbing gases and vapors, decolorizing charcoal and charcoal resembling lamp black are prepd by calcining, in the absence of air, residues obtained by evapg solns of org substances obtained by treating vegetable materials with hot solns of NaOH or KOH, washing the residue with water, treating it with strong mineral acids ($H_2SO_4$, HCl, etc.), washing with water, drying and grinding

Phenol-formaldehyde condensation products. Edward S Hole U. S 1,799,816, April 7 A non-sticking condensation product is made by condensing carbolic acid and $CH_2O$ by boiling in the presence of an alkali salt and ddg the material with water while it is still boiling, cooling the dild mixt., and subsequently adding more water contg a Cr salt The product is suitable for coating or impregnating

White phenol-formaldehyde condensation product. Tyozi Ariyama and Tyutaro Sibuya Japan 89,615, Dec. 19, 1930 A mixt. of ammonium or alkali borate, sol salts of Sn, Ti or Sb, HCHO and PhOH is heated to give a white condensation product.

Condensation products from formaldehyde. Ludwig Orthner Fr. 697,678, June 19, 1930 A mixt of glycolic aldehyde, trioses and tetroses is prepd. by heating an aq soln. of $CH_2O$ with the addn. of an alk reacting condensing agent such as $Pb(OH)_2$ until the reducing power of the reaction liquid for cold Fehling soln. has reached a max.

Gelatinizing urea-formaldehyde condensation products by heating with sucrose. Oscar A Cherry (to Economy Fuse and Mfg Co.) U S 1,799,954, April 7.

Artificial substances I G Farbenind A.-G Fr 697,693, June 19, 1930 A mixt. of vinyl compds or a mixt of one or more vinyl compds is polymerized with other compds capable of being polymerized and contg the group $=C=CH_2$, if necessary in the presence of a catalyst and a solvent and adding fibers and emollients Thus Et acrylate and vinyl acetate are polymerized together Other examples are given. Cf *C A* 24, 4128

Molded articles. John H Schmidt (to The Bakelite Corp.). Can. 309,680, Mar 24, 1931 Molded articles are made by shaping a fusible resinous substance of glycerol-polycarboxylic acid type in a mold, converting it while under pressure into an infusible resin, removing it from the mold and hardening it by further application of heat. *E g.*,

a mixt of 200 parts by wt of glycerol with 400 parts of phthalic anhydride, with or *without fillers or coloring materials*, is allowed to react at 140–200° to incipient gelation, and then poured into molds and heated under pressure until gelation occurs and the resin passes into the infusible state (the essential requirement is that the chem or phys change from fusibility to infusibility should take place in the mold and preferably under the molding pressure) The shaped article does not tend to lose its form or alter its dimensions on further heating

**Plastic materials.** C F Boehringer & Soehne G m b H Fr 698,321, July 3, 1930 The elasticity of plastic materials and objects made therefrom having a basis of cellulose derivs is increased by producing, either by addn, subtraction or substitution a layer free from or poor in plastifying agents. Thus, the articles may be dipped in ether or sprinkled with a soln of ethylcellulose in $C_6H_6$.

**Plastic materials.** Soc anon de décoration architecturale et mobilière. (Gustave Moncany, inventor) Fr 697,435, June 14, 1930 A plastic material capable of being molded is made by mixing plaster, fibers and asbestos powder and incorporating albumin or dextrin, molding, baking, dipping into a bath of water and glycerol, baking again, dipping into synthetic resin in alc. and baking Fr 697,436 describes a plastic material from asbestos fiber and paper beaten up with a synthetic-resin varnish to which metallic fibers may be added

**Plastic materials.** Thomas & Cie G m b H Fr 698,213, June 30, 1930 Pentamethylenediaminedisulfine is used as a constituent of plastic materials, either as the principal constituent or as a flux or softening agent.

**Porous masses from gypsum.** Riebenhold & Co., Vereinigte Kieselguhr- und Korkstein-Ges. Ger 522,139, Mar 6, 1929 Gypsum is mixed with relatively large amts of substances which increase the porosity of the product, *e g*, sugar or glue, and to compensate for the delaying action of these addns on the binding of the product, *there are added also accelerators of the binding, e g, a sulfate or a nitrate* The products are useful as *heat insulators, filter stones*, etc.

**Unbreakable transparent sheets.** Louis C. F. Pechin Fr 698,411, July 5, 1930 Unbreakable transparent sheets are made from condensation products of phenols with aldehydes, having transparent sheets of celluloid as interior or exterior supports.

**Silica gel.** Kozo Ikawa, Sizuka Isikawa and Mitsui Kozan Kabushiki Kaisha Japan 89,590, Dec. 18, 1930 Silica gel is manufd. by introducing $Cl_2$ or a mixt. of $Cl_2$ and a gas which does not react with alkali into water-glass soln. The product is washed with $H_2O$ and dried The filtrate contains about 80% NaOCl

**Adsorbents from gels.** Fritz Stoewener (to I G. Farbenind A.-G.). U S. 1,798,766, March 31 Part of the water sol impurities are removed from a gel such as that of silica by washing, the material is partially dried, washed again and then completely dried

**Material for drying gases.** Kozo Ikawa and Mitsui Kozan Kabushiki Kaisha Japan 89,593, Dec. 18, 1930 Anhydrous $MgSO_4$ is mixed with porous or colloidal material like $CaSO_4$ cement, silica gel, activated C, Japanese acid clay, powdered glass, $Al_2O_3$, etc. The product absorbs much $H_2O$, and can be used repeatedly by drying with heating

**Dehydrating material suitable for use in show casings, buildings, etc.** Howard H. Baker. U. S 1,798,862, March 31. A solid molded mass is formed of $CaCl_2$ 99% and 1% of metallic particles such as iron filings Sawdust may be added.

**Adhesive.** I. G. Farbenind. A.-G Fr. 697,874, June 25, 1930. A cold adhesive is made from condensation products of urea, thiourea or their derivs. with aldehydes or their polymers, water, and, if necessary, acids, salts or substances liberating acids and substances which increase the consistency of the adhesive.

**Adhesive for gummed paper.** Ferdinand W. Huempfner (to Mid-States Gummed Paper Co.) U. S 1,799,797, April 7. Paper or fabric is coated with an adhesive comprising a mixt. of 2 resinous gums (such as pontianak and copal) having different rates of soly. and a small percentage of non-drying vegetable oil such as castor oil.

**Cement.** Conrad Mahler. Fr. 698,010, May 13, 1930. A cement for repairing porcelain, etc., consists of a mixt. of flowers of chalk, freshly slaked lime, milk casein, quartz powder, glass powder, asbestos powder and coloring material.

**Cement.** Myron E. Delaney (to The Bakelite Corp.). Can. 310,617, April 21, 1931. A cement comprises about equal parts by wt. of a wax, such as chlorinated naphthalene, ester gum and about 5% of rubber latex This cement is used for securing glass to glass or metals, wood to wood, etc

**Clutch-facing fabrics treated with lead oleate.** Samuel P. Howe. U. S. 1,798,605,

March 31 A fabric such as that for use as a clutch facing is treated with Pb oleate Mica, Pb wire, Pb linoleate and asbestos also may be used in the material

Composite sheet material such as fiber and bakelite products. LOUIS T. FREDERICK (to Fibroc Insulation Co.) U. S. 1,799,506, April 7. Fibrous particles such as comminuted scrap canvas are felted by the action of suction operating through a pervious backing strip such as textile fabric which forms a part of the finished sheet, and the latter is treated with a suitable resin such as reactive "bakelite" compn. App. is described.

Impregnated bands. BAKELITE CORP. Fr. 698,358, July 3, 1930. Fibrous materials and plastified resinoids are mixed in the presence of water. The mixt. is formed into bands which are dried, superposed and united by compression and heat.

Emulsions. FREDERICK W. ATACK. Can. 309,760, Mar. 24, 1931. Stable, fluent emulsions are made by emulsifying a chlorinated hydrocarbon with water and Turkey red oil in the presence of a colloidal silicate, *e. g.*, 67% $C_2HCl_3$, 4.5% Turkey-red oil, 2% bentonite, 26% water, 0.45% ammonia (d. 0.89).

Sealing composition. ERNEST R. HANSON and MYRON E. DELANEY (to Bakelite Corp.) Can. 309,681, Mar. 24, 1931. A sealing compn. is prepd. by melting a wax-like halogenated naphthalene and dissolving gilsonite therein. This compn. is adapted for use in the manuf. of fixed *elec. condensers*.

Potting compositions. MYRON E. DELANEY (*to The Bakelite Corp.*). Can. 311,044, May 5, 1931. A potting compn. comprises 25–40% of a wax-like chlorinated naphthalene, 20–30% of gilsonite and 30–50% of montan wax and has a flow point ranging from 80° to 100° and a viscosity of less than 100 at 130°. This compn. is used on fixed elec. condensers, dry batteries, etc.

Arc-resistant composition. FRAZIER GROFF (to The Bakelite Corp.) Can. 309,679, Mar. 24, 1931. An article resistant to the carbonizing action of an elec. arc is prepd. by causing phenol to react with tung oil and a methylene-contg. agent in proportions to yield a resinoid product, admixing a cellulose filler therewith, partially baking the mixt. and molding under heat and pressure. Cf. *C. A.* 25, 1046.

Wetting, etc., agents. H. TH. BÖHME A.-G. Fr. 698,380, July 4, 1930. Wetting, cleaning, emulsifying, etc., agents are prepd. by sulfonating amines or hydroxyamines of the aliphatic series contg. more than 8 C atoms. Examples are given of the sulfonation of octadecenylamine. Cf. *C. A.* 25, 2532.

Wetting, etc., agents. CHEMISCHE FABRIK VORM. SANDOZ. Fr. 697,350, June 13, 1930. Monoaryl esters of glycerol and glycol are used along with carboxylic or sulfonic acids as wetting and emulsifying agents.

Wetting, foaming, dispersing and emulsifying agents. I. G. FARBENIND. A.-G. (Karl Daimler inventor). Ger. 521,035, Jan. 26, 1929. Quaternary ammonium salts suitable for the above purposes are prepd. by converting $Et_2NC_2H_4OH$ into a quaternary salt by reaction with a aralkyl halide, and then esterifying the OH group by means of a fatty acid chloride contg. at least 5 C atoms in the mol. Thus, a mixt. of $Et_2NC_2H_4OH$ and $PhCH_2Cl$ may be kept at 80–100° until the $PhCH_2Cl$ has disappeared, and oleic acid chloride then run in.

Wetting, cleansing and emulsifying agents. I. G. FARBENIND. A.-G. Fr. 698,637, July 8, 1930. There are introduced into org. compds. aliphatic, cycloaliphatic, mixed aliphatic-aromatic or aromatic radicals contg. alc. OH groups, ethylenic double bonds or sulfuric ester groups and also other reactive groups. (The esterification of COOH groups of fatty acids contained in fats and oils and their sulfuric esters is excepted.) The products are converted into sulfuric esters or their salts if they do not already contain sulfuric ester groups. Thus a mixt. of BuOH contg. HCl and the product obtained by the partial chlorination of fish oil are boiled under reflux and the product is sulfonated. The Na salt of the product has a high wetting and emulsifying power. Other examples are given. Cf. *C. A.* 25, 2824.

Detergent. E. KOLOZSY. Hun. 102,126, June 11, 1930. An aq. dispersion of natural or artificial latex is mixed with ethereal or other org. perfume and inorg. or org. filling materials.

Waterproofing agents. CHARLES H. THOMPSON and WM. J. MCGIVERN. Fr. 697,800, June 24, 1930. A product useful for waxing, waterproofing, etc., consists of an emulsion prepd. by adding to molten wax an alk. compd., *e. g.*, NaOH, KOH, $Et_3N$ or ammo compds., and with or without a protein soln. or a colloidal substance. The emulsion may be mixed or combined with soap and used as a supplying agent.

Anti-freeze solution. CHARLES V. MCAVOY (to *McAvoy Products Co.*) U. S. 1,798,547, March 31. See Can. 299,764 (*C. A.* 24, 3093).

Freezing mixtures. EMIL HUSEMANN. Ger. 516,880, Aug. 10, 1929. A freezing

mixt which maintains a low temp for a considerable time is obtained by adding ice to an aq -salt mixt below a layer of specifically heavier non miscible liquid such as $CCl_4$. The salt soln may contain glycol and the salt is preferably in granular condition

"Artificial" (imitation) snow. MAX C BAUMANN U S 1,800,187, April 7. A white readily crystallizable org acid such as benzoic and salicylic acid is mixed with a light-colored adhesive material such as sugar, potato flour and alum

Stiffening sheet material such as toe boxes of shoes. WILLIS A BOUGHTON (to Bennett Box Co) U S 1,799,949, April 7 A material such as cloth, leather or paper is treated with a sol silicate and glycerol Cf *C A* 24, 2848

Porous water-laid felt. HENRY P SHOPNICK (to Arden Box Toe Co) U S. 1,799,931, April 7. A porous water-laid felt is made with a preponderating proportion of long fibers bonded together with a smaller proportion of the gelatinized corium portion of untanned animal skins This product is suitable for use as a *box toe stock*

Planographic printing process. VALENTIN DIETZ (to American Multigraph Co) U S reissue 18,013, March 31 Reissue of original pat No 1,741,758 (*C A* 24, 1191)

Stencil sheet. SHINJIRO HORII. U S 1,799,793, April 7 A base of fibrous material such as Japanese yoshino paper is coated with a compn comprising a gelatinous org colloid such as gelatin dispersed in water in admixt with naphthenic acids Cf *C A* 25, 1958

Transfer. WINTHROP S. LAWRENCE (to Kaumagraph Co). U S 1,799,754, April 7 A paper base permeable to steam and free from any filler which would prevent the passage of steam is provided with a surface marking comprising a dye sol in water and embodied in a surface film such as a gum arabic compn which is sol in water, so that if steam is forced through the base it can act directly upon the film and dye Cf *C A* 25, 605

Cigaret tips. I G FARBENIND A -G (Walter Becker, inventor). Ger 516,716, Oct 6, 1929 Use is made of an under layer of resinous polymerized vinyl derivs and a water proof over layer In an example, the over layer is the product of cellulose acetate, tricresyl phosphate and acetone, and the under layer of bronze powder and vinyl resin

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G E BARTON, C H. KERR

Opacification of glass by blast lamp. M A BESBORODOV AND M F. SHUR. *Keram. i Sticklo* 6, 466–70(1930) —The authors describe tests made to ascertain the dependence of the velocity of glass opacification on (1) the chem compn of the glass; (2) the kind of flame used, (3) the method of working the glass, and (4) the quantity of cullet used in the glass Fifteen kinds of glass were treated with reducing and oxidizing flames. The results are tabulated and show that the velocity of opacification depends on the chem. compn. of the glass Glass contg CaO and alkalies becomes opaque most rapidly; glass contg ZnO becomes opaque less rapidly. Glasses having a high content of $Al_2O_3$ and $B_2O_3$ become opaque only with reducing flames With oxidizing and reducing blast flames they do not become opaque at all The presence of MgO in glass seems to aid opacification Glass contg $Al_2O_3$ (9 3%) does not become opaque when worked with any kind of flame Glass contg PbO becomes opaque less rapidly in a reducing flame than in an oxidizing flame A high quantity of $SiO_2$ aids opacification. All glasses become opaque more rapidly in a reducing flame than in an oxidizing flame The opacification of glass is a reaction taking place on the surface of glass through the building of new formations by the red hot gas particles Some formations have the character of crystals, others that of amorphous efflorescences The quantity of cullet does not influence the opacity of glass while being worked in a blast lamp flame. A series of other salt compds besides NaCl was tested to det their influence on the opacity of glass KCl removes the opacity completely and more rapidly than NaCl Br and I salts of K and Na also remove opacity, although the glass is not as transparent as when KCl is used Boric acid removes opacity in glasses contg $B_2O_3$. $Pb_3O_4$ and ZnO also remove opacity M V. KONDOIDY

Glass technology and industrial progress. W. E. S TURNER *J. Soc Glass Tech.* 14, 173–84P(1930) —A general discussion by T. and others. H F. KRIEGE

Progress in glass technology under the auspices of the glass delegacy. ANON. *J. Soc Glass Tech* 14, 307–13T(1930) —The annual rept. of the Glass Research Delegacy includes a list of the departmental publications. H F. KRIEGE

**International glass standards.** ANON *J Soc Glass Tech* 14, 158 9 P(1930) —The Deut Glastechnische Ges and the Soc of Glass Technology agreed upon the following standards (1) For general comparative purposes the thermal expansion of glass shall be detd for a mean temp of 50° over a range of 25° ± 5° to 75° ± 5°. The specimens shall be 5 6 mm thick and normally free from strain as detd optically The symbol of mean linear coeff of thermal expansion shall be $\alpha_{25}$. With measurements made at high temps a test piece shall be used only once and the rate of heating shall be 2° per min (2) The viscosities and the corresponding temps important in the characterization of glass are (*a*) $10^{7}$ c. g s units—furnace working temps, (*b*) $10^{6}$ c. g s. units—temp of the lower limit of the working range, (*c*) that at which a break occurs in the temp property curve This is given as $10^{14}$ c. g s. units where the property considered is elec cond (3) The symbol $T_g$ shall replace all other conventions to denote the transformation temp of glass The max point on the complete thermal-expansion curve for glass, namely, its softening temp, shall be denoted by $M_g$. H F KRIEGE

**Thermal endurance of glass.** W. J. A WARREN *J Soc Glass Tech* 14, 313–29T (1930) —The thermal-endurance data proposed by Gould and Hampton is critically examd Their formula is $\theta\sqrt{l}$, where $\theta$ is the min temp difference causing a tall conical beaker (200 cc. capacity) contg hot wax to fracture when plunged into cold water and $l$ is the max thickness in the bottom of the beaker along the course of the fracture W finds it necessary to specify that the max thickness shall lie within the concave part of the bottom in order to have concordant results Circumferential fractures give very slightly higher and more consistent values than transverse cracks Uneven distribution of the glass has no apparent effect where the ratio of max /min thickness is 1.5–2 0 The thermal endurance of beakers of sheet glass compn was found to be deteriorating several months after manufacture The best value of $\alpha$ in the formula, thermal endurance, $B = \theta/a^{\alpha}$, was found to be 0 36–0 40, where the beakers average 1 4 mm in thickness A more satisfactory expression is $B = \theta + (l-1)A$, where $A$ is a const for any definite compn which is deduced from a few beakers tested by putting $A = B/3\ 75$ H F. K

**A provisional standard test for the thermal endurance of glass.** ANON *J. Soc Glass Tech* 14, 160–3P(1930) —The test procedure accepted by the Glass Standards Comm of the Soc of Glass Tech uses a tall conical beaker (200 cc.) 140 mm. high, 72 mm diam base and 49 mm diam top as the standard article The thickness of the beakers should be as close as possible to 1 mm The beakers are tested from 2 to 48 hrs after manuf to avoid irregularities due to weathering, etc Beakers of satisfactory standard of annealing are selected Paraffin wax is melted in each beaker to form a layer 4 5 cm deep and heated to a few degrees above the temp desired When the immersed thermometer reads the desired temp such as 75°, the beaker and contents are plunged into water at 15° ± 1° If fracture does not occur the process is repeated at the next higher heating temp The testing should begin at a temp low enough to insure a no of chillings before rupture occurs The heating temps. increase in steps of 5° The difference between the temp of the chilling bath and the temp to which the beaker was last heated before fracture occurred is recorded, likewise the thickness of the beaker along the fracture and the *max* thickness in mm Any beaker having a min thickness less than ½ its max thickness along the fracture is rejected The results of 10 beakers whose max thickness is 0 9–1 9 mm. are averaged to obtain the thermal endurance of the glass according to the equation: thermal endurance = temp difference × $\sqrt{\text{thickness in mm}}$ H F. KRIEGE

**Calculation of the tensile strength of glass.** O KNAPP *Glashütte* 60, 364(1930), *J Soc Glass Tech* 14, 290–1A —I or the purpose of calcn of the tensile strength, it is assumed that this is an additive property dependent on the silicates present in the glass, and that when the $SiO_2$ content is 50–66 6 mols % the oxides are present as *monosilicates* and the excess $SiO_2$ is present as free oxide Similarly, when the $SiO_2$ content is 66 6–75 or 75–80 mols % the oxides are present as di- or tri silicates The tensile strength of such a glass is then readily calcd by use of factors, deduced from the data for tensile strength published by G Gehlhoff and M Thomas (*C. A* 22, 1448) A table shows the value for the tensile strength of 22 of Gehlhoff and Thomas's glasses as calcd (*a*) by A Winkelmann and O Schott's factors, (*b*) by Gehlhoff and Thomas' method and (*c*) by the above-mentioned factors The percentage deviation of each of these from the observed value is shown Methods (*b*) and (*c*) are fairly accurate but (*a*) gives rather high values G G

**Critical investigation of the methods for the determination of the resistance to**

**chemical attack of glasses** ERNST REXER. *Keram. Rundschau* 38, 387–90, 421–5, 464–5, 506–7, 546–8, 560–4, 590–3, 624–7(1930) —The methods now in use for testing the attack of water on glass were critically investigated Methods using crushed samples, the Mylius "surface samples" and autoclave samples were tried Relations between soly and size of sample, fineness of sample, character of surface and amt of strain were obtained H INSLEY

**Effect on the properties of a soda-lime-silica glass of repeated melting in platinum. The x-ray pattern.** W E S TURNER *J Soc Glass Tech* 14, 351–3T(1930), cf *C A.* 25, 788 —No change in phys properties was observed unless a chem change was produced by the repeated meltings in Pt H F K

**Development and trend of the mechanical production of white hollow glass ware.** A WENDLER. *J Soc Glass Tech* 14, 353–68T(1930) H F K

**The supposed diphasic nature of glass.** F W PRESTON *J Soc Glass Tech* 14, 349–50T(1930) —Double refraction has been noted in glass allowed to cool under pressure P suggests that this phenomenon may be due to the presence of ultramicroscopic crystals with some orientation H F K

**Use of borax in glass manufacture.** EDWARD MEIGH *J Soc Glass Tech* 14, 164–72 P(1930) —A general discussion by M and others H F KRIEGE

**The development of tank-block production.** HANS HIRSCH *Keram Rundschau* 38, 291–5, 312 5, 343–6(1930), cf *C A* 24, 5121 —A no of commercially made tank blocks were divided according to $Al_2O_3$ content into 2 classes Besides chem analyses, phys tests for sp gr, porosity, compressive strength, abrasive hardness (resistance to wear), resistance to thermal shock, resistance to molten glass attack and to $Na_2CO_3$ attack and refractoriness were made Although results show ambiguity due to differences in methods of manuf as well as compn, it is concluded that low porosity with only fine pores present, high d, uniformity in compn and structure and high strength give the best tank block and that, other things being equal, blocks high in $Al_2O_3$ give better resistance to glass attack than those low in $Al_2O_3$ H INSLEY

**The thermooptical properties of glasses rich in silica.** F RINNE *Keram Rundschau* 37, 772(1929), *J Soc Glass Tech* 13, 371A —The *n*s of glassy substances were detd for wave lengths of 735–440$\mu\mu$ for temps between —160° and 1000° The following substances were used (*a*) fused quartz, (*b*) hyalite ($SiO_2$, 3 4% $H_2O$), (*c*) hyalite ($SiO_2$, 4 84% $H_2O$), (*d*) opal ($SiO_2$, 8 5% $H_2O$), (*e*) opal ($SiO_2$, 9 73% $H_2O$) As the water content increased, the *n* was lowered The dispersion was const A max was detected in the *n* temp curve at 0° with glass (*e*) No sepn of water could be detected in an opal on cooling in liquid air G G

**Elimination of waste in the glass industry.** GEO. H MILES *J. Soc Glass Tech* 14, 185–95 P(1930) —General H F. KRIEGE

**Continuous kilns for the burning of clay products.** J WILLIAMSON *Trans Ceram. Soc* (England) 30, 21–32(1931), cf *C A* 25, 789 H. F KRIEGE

**Manufacture of bricks for road paving in the U. S. A. and Holland.** G A HODSON. *Trans Ceram Soc.* (England) 30, 37–45(1931) H. F KRIEGE

**Oil fuel and the brick industry.** I LUBBOCK *Trans Ceram Soc* (England) 30, 68–80(1931), cf *C A* 25, 1066 —To offset the higher cost of oil over coal 3 economies are claimed for oil fuel (*a*) reduction of time of burning, (*b*) elimination of under burned brick, (*c*) saving labor costs for coal and ash handling Various types of fuel-oil burners and oil-fired kilns are described H F KRIEGE

**Use of garbage slags for manufacture of slag bricks.** R GRUEN *Städtereinigung* 22, 71–8(1930) —A description of the new practice of refuse disposal at Cologne Chem analyses of garbage slags and their phys properties and the compn and test data on the phys properties of brick manufd from this slag are given E I. S

**Advances in the production of hollow tile.** ALFRED HIELSCHER *Tonind-Ztg* 55, 379–82, 420–3(1931) —*Modern machinery is described* B A SOULE

**Method for determining the workability of clay and ceramic masses with the ball plastimeter** WILLI M COHN *Tonind-Ztg* 55, 238–40(1931) —An app is described for measuring the workability of clay mixes It consists of a ball 20 mm in diam. attached to a plunger which is surmounted by a flat plate The ball is made to rest on the mud and weights are placed on the plate The depth of penetration of the clay into the mud is measured on an attached scale The depth of penetration depends on the water content of the mud, the pressure on the plunger and the time the pressure is applied Expts were made with one clay, by varying one of these factors and holding the others const The method is not claimed to be a measure of plasticity but rather a measure of the pressure component (yield value?) of the workability R F F

**Solid fuels in the fine ceramic industry.** A. JAESCHKE *Keram. Rundschau* 37,

541–5, 561–2 593 6, 631–4(1929).—Temps required for burning different kinds of ceramic ware are given and various fuels are evaluated E I S.

**The effects of various gases in the kiln on the burning of bright gold for gilded ceramic wares.** AKIRA NAKATSUCHI *J Soc Chem Ind, Japan* 34, Suppl binding, 67–9(1931).—$SO_2$, $H_2S$, CO, $CO_2$ and $H_2$ are found to be injurious, but not at low temps The best practice is to burn at 300°, sweep out the gases and heat to 750°. V F H

**Gas permeability of pyrometer tubes in relation to temperature.** W. MIEHR *Tonind -Ztg* 55, 149(1931).—Contrary to general belief, the permeability of ceramic pyrometer tubes to gases was found to decrease materially with increased temp This was explained by assuming that gases have a higher viscosity at high temp Detns of the viscosity of $CO_2$, $N_2$ and producer gas at 1220° confirmed this assumption R F FERGUSON

**Acceleration of the drying of ceramic products.** P P BUDNIKOV, G V. KUKOLEV AND L L MANDELCRÜN *Tonind Ztg* 55, 409–11(1931).—The drying time may be lowered 50% by addn of electrolytes, especially 0.5% $FeSO_4$ or 0.25% $Al_2(SO_4)_3$. B A SOULP

**Silicates high in alumina.** VLADIMÍR ŠKOLA *Chem Listy* 25, 30–4, 59–61(1931).—The phase diagram for the system $Al_2O_3$-$SiO_2$ is evolved and discussed in connection with the production of corundum, sillimanite, andalusite, etc FRANK MARPSH

**Some of the newer uses for silicon carbide.** CHARLES MCMULLEN *Trans Electrochem Soc* 59, preprint 6 pp (1931).—Important recent adaptations of SiC are recorded and discussed In recuperators cylindrical tubes are used In the "Carborradiant" combustion chamber a mixt of air and fuel is injected into a SiC box The Thornhill Anderson furnace has an arched overhead combustion chamber made of SiC Other applications include boiler furnace walls, heating elements, therapeutic lamps, resistors for radio equipment and lightning arresters The physical properties of SiC are tabulated C G F

**Grog.** C R F TURRELFALL. *Trans Ceram Soc* (England) 30, 1–18(1931); cf. *C A* 25, 783.—The best fireclay grog is made from raw lumps calcined at high temps and crushed to have a splintery shape To make low porosity brick it is best to use grog with high porosity H F KRIEGE

**Refractory materials Observations on the behavior of refractory materials in continuous vertical retorts.** A T GREEN *Inst Gas Eng* 1930, Communication No 22, Pt 3, 9–26, *Gas Eng* 47, 689 91(1930), *Gas J* 192, 720–4.—Most cases of "holing" were found to originate in the interior of the retort rather than in the combustion chamber Foreign substances such as Fe compds and alkali from coal, cause superficial disintegration or corrosion The reducing atm prevailing in the retort accentuates the slagging action of iron slags The viscosity or stickiness of the slag at the surface is important in its influence on the passage of the charge through the retort High-alkali slags cause augmented stickiness for alkali silicates are low melting Material in the zone 6 to 12 ft from the top of the retort often peels off in thin layers Examn of these flakes showed a very slight increase in Fe content. The alkali content increased from 0.52% to 0.73%, the sp gr decreased from 2.36 to 2.32 Flaking often takes place during the scurfing operation The surface in contact with the scurf has probably been weakened at definite planes by (*a*) depositions and impregnations, (*b*) constitutional changes in the $SiO_2$ in the surface layers resulting from previous high temp scurfings, (*c*) a general spalling tendency of a $SiO_2$ product. Joints and jointing cements are considered A H DIERKER

**Refractory materials for electric furnaces. II. Copper and its alloys, including bronze, gun metal, brass, copper-nickel and phosphor-bronze** ALFRED B SEARLE *Metal Ind* (London) 38, 333 5(1931) cf *C A* 25, 1650.—The most important types of elec furnace for melting copper, brass, bronze, etc., are the direct arc, the indirect arc, the induction and the granulir resistance The direct arc type furnaces are suitable only for bronzes and alloys contg less than 6% Zn, while the indirect arc types are applicable to all Cu alloys The Pb content of the alloy dets the type of lining—magnesite being preferable when Pb is present, though Zn may react with a MgO lining In the Ajax-Wyatt furnace for melting yellow brass, a lining consisting of a refractory cement of a compn corresponding to a mixt of fireclay, $SiO_2$ and asbestos fiber is often used Fireclay bricks are generally satisfactory Silica bricks are used for the roof and the parts of the sides not coming in contact with slag Pure magnesia bricks fully burned and enclosed in steel cases, show long life Zirconia bricks are highly refractory but very expensive The use of fritted linings has increased widely he range of metals for the linings of industrial furnaces of the Ajax Wyatt type and

has increased greatly the no of runs obtainable without relining the furnace W. H. BOYNTON

**Refractory clays in Calhoun and Pike counties, Illinois.** J E LAMAR. *Ill State Geol Survey, Rept Investigations* No 22, 43 pp (1931) R. F FERGUSON

**The determination of aluminum oxide in refractory clays.** R BIAZZO. *Ann. chim applicata* 21, 3–12(1931) —Where only the amt of $Al_2O_3$ is to be detd, time is saved by volatilizing the $SiO_2$ by means of $H_2SO_4$ HF, detg $Al_2O_3 + Fe_2O_3$ and then detg $Fe_2O_3$ in the ordinary ways and obtaining the amt of $Al_2O_3$ present by difference $Al_2O_3$ was detd with less than 0.25% error by this method A W CONTIERI

**The possibility of andalusite as a refractory.** FRANK H RIDDLE *Trans Electrochem Soc* 59, preprint 16 pp (1931) —The com development of $Al_2O_3$ $SiO_2$ refractories stimulated the search for deposits of a natural mineral of this so-called "sillimanite type" Regardless of the proportions in which the 2 oxides occur to begin with, after exposure to furnace temps mullite, $3Al_2O_3$ $2SiO_2$ is formed with one or the other oxide in excess Many expts have shown that andalusite of proper grain size and proportion, when held together with a min amt of a plastic aluminous bond such as clay, makes a very desirable refractory It is const in vol during calcining An extensive deposit of andalusite has been located in Mono County, Calif About 350 million spark plug cores have been made from this andalusite Important localities of cyanite, sillimanite and dumortierite are briefly described Tests on andalusite refractory are detailed, demonstrating its superiority over other refractories of this class C G F

**Works tests on refractories and service conditions.** R. J SARJANT *Trans Ceram Soc* (England) 30, 46–65(1931) —Load tests indicate serviceability Changes in porosity and d on firing to 1450° give useful indication as to probable service behavior Simulative slag resistance tests are valuable if classified according to type of refractory and use Reliable spalling tests are hard to get and to interpret in terms of service conditions Heat cond data have definite economic value For magnesite refractories, optical detn of the % periclase present and the d and porosity changes before and after firing to 1600° are important tests Chem analysis, particularly as regards $SiO_2$, MgO and CaO, provides the most essential information regarding dolomite refractories In silica refractories the degree of conversion and bond are most important characteristics, while in fireclay bodies bonding of the clay is very important Refractory cements should be examd by all available tests both alone and built up with refractory units H F KRIEGE

**Thermotechnical possibilities and requirements in the ceramic, especially in the refractory-materials industry.** W BRASS *Sprechsaal* 62, 445–7(1929) —Thermotechnical conditions in the ceramic industry and their causes are investigated Good results were obtained in tests carried out on an old chamber oven making use of gas-analytical app. E I. S

**The effect of smelter atmospheres on the quality of enamels for sheet steel** ANDREW I ANDREWS AND EMANUEL A HERTZELL Univ Ill Eng Expt Sta, *Bull* No 224, 15 pp (1931), cf *C A* 25, 1650 —The presence of $N_2$, $CO_2$ and reducing atms in the smelting furnace is not deleterious to sheet steel enamels, but $SO_2$ is extremely harmful H L OLIN

**Notes on the manufacture in New Zealand of electrical porcelain.** E. W. ACKLAND *Proc. New Zealand Soc Civil Eng* 16, 274–86, 287–302(1929–30) —This is a 98% local industry Methods of manuf are outlined E I S

**A study of the electrical strength of porcelain.** JOHN O KRAEHENBUEHL AND CULLEN W PARMELEE *Trans Electrochem Soc* 59, preprint 15 pp (1931) —The paper records some of the existing inconsistencies in the literature concerning solid dielectrics, particularly porcelain Observations show that the puncture track is largely a matter of chance and depends upon flaws A statistical study was made of a particular body, prepd under controlled conditions The paper does not try to define a test method or a specification, but shows the importance of a complete study of the test data C G F.

**The microstructure of some porcelain glazes.** CLYDE L THOMPSON Univ Ill Eng Expt. Sta., *Bull* 225, 24 pp (1931) —Glazes studied fell within the compn range of (0.3 $K_2O$, 0.7 CaO), 0.4 to 1.0 $Al_2O_3$, 2.0 to 8.0 $SiO_2$ A series of glazes was made from the usual potters' materials and examd microscopically A second series was made from pure chemicals and the primary crystalline phase sepg from each glass and its temp of equilibrium were detd Conclusions (1) Good mat glazes owe their matness to crystn (2) $Al_2O_3$ plays a double role in mat glazes, furnishing an essential constituent of the crystallizing mineral and also regulating the viscosity to prevent

under crystal growth. (3) Many of the bright pressed glasses are not all glass but contain undissolved quartz, and show traces of devitrification. (4) An excess of either $Al_2O_3$ or $SiO_2$ will cause devitrification, while a greater excess will cause immaturity. (5) The $Na_2O$ introduced by the feldspar has a definite effect on the compn. of the mineral sepn. from the melt upon crysts. H. L. Olin

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Mirror-surface lacquers (Ehrts) 24. Prevention of explosions in mirror-silvering materials (Ehrts) 24.

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Glass. Corning Glass Works. Fr. 667,570, June 17, 1929. Glass which has been frosted *e. g.*, elec. bulbs, is prevented from "aging" by washing it in an aq. soln. of $AlF_3$.

Glass making. Ernst Hagens. Fr. 667,418, June 14, 1929. App. for rolling plates of glass is described.

Melting glass. Gustav Keppeler. Fr. 667,544, June 24, 1929. In melting glass the mixt. contg. finely divided $SiO_2$, sweated in known manner, is submitted to a brisk elevation of temp. so that trapping of the fusion gas is not possible and the sweating material, before melting, remains as completely as possible in the action of the flame.

Paddle mechanism for circulating molten glass. John Mowcrity, Ltd., and Alexander F. McInnes. Ger. 522,470, Feb. 15, 1929. Brit. 290,623 (C. A. 24, 2556).

Apparatus for feeding molten glass. Thomas F. Pearson. Ger. 522,500, April 25, 1929. Corresponds to Brit. 221,145.

Mold for glassware. Wm. T. Barker, Jr. (to Hartford-Empire Co.). U. S. 1,728,126, March 31. Structural features of a mold with pipes in its walls for circulation of a temp.-controlling fluid.

Glass-forming apparatus suitable for manufacture of blow-molded ware. Edward H. Lorenz (to Hartford-Empire Co.). U. S. 1,728,191, April 7. Structural features.

Mold for forming glass articles such as bottles. Orrett C. Norris (to Tygart Valley Glass Co.). U. S. 1,728,217, March 31. Mech. features.

Apparatus for manufacture of stemmed and footed glassware. Virgil O. Conwell (to Federal Glass Co.). U. S. 1,728,278, March 31. Structural features.

Decorating and annealing lehr for glassware. Virgil Mumbollard (to Hartford-Empire Co.). U. S. 1,728,552, March 31. Structural features.

Electric furnace for glass manufacture. Harry F. Hitner (to Pittsburgh Plate Glass Co.). U. S. 1,729,271, April 7. Structural and elec. features.

Cooling furnace for sheets of glass. N. V. Mij. Tot Beheer en Exploitatie van Octrooien. Fr. 667,572, June 24, 1929.

Roll-conveyor lehr for intermittently prepared sheet glass. N. V. Maatschappij tot Beheer en Exploitatie van Octrooien. Ger. 520,255, June 26, 1929.

Roller apparatus for conveying intermittently prepared sheet glass to the lehr. S. C. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny & Cirey. Ger. 522,416, Oct. 14, 1927.

Method and plant for making sheet glass with wire insertions. Hermann Müller-Sievers. Ger. 522,687, July 19, 1928.

Sheet- and plate-glass manufacture. Wm. Wellenreuth (to Libbey-Owens-Ford Glass Co.). U. S. 1,729,232, April 7. Mech. features.

Method of making glass articles showing marbled or veined effects. Jenaer Glaswerk Schott & Gen. Ger. 522,417, Dec. 4, 1928.

Laminated glass. George B. Watkins (to Libbey-Owens-Ford Glass Co.). U. S. 1,729,075, March 31. Laminated products such as those comprising glass sheets with an intervening sheet of cellulose or the like are subjected to the action of a solvent bath such as triacetin for a sufficient time to cause a "flowing" of the intervening sheet material to form a seal at the edges. Cf. C. A. 24, 2556.

Kiln for firing ceramic ware. Robert H. Youngman and Robert H. H. Pierce. U. S. 1,728,297, March 31.

Kiln (with preheating, firing and cooling zones) for treating ceramic ware. Frank M. Hartford (to Harrop Ceramic Service Co.). U. S. 1,729,930, April 7.

Direct-fired tunnel kiln and heating system for ceramic articles. Isaac Hartzell, Anthony M. Kopler and Frederick H. Norton (to Babcock & Wilcox Co.). U. S. 1,729,256, April 7. Various details of construction and operation are described.

Channel ceramic furnace. F. A. Meynard. Russ. 12,519, Feb. 29, 1931.

Brick kiln. Bonnesser & Co. m. b. H. Ger. 516,970, Feb. 13, 1929. Details of fuel loading are given.

Insulating brick. Edwin B. Forse (to Carborundum Co.). U. S. 1,728,934,

March 31. An insulating brick suitable for lining furnaces is made with a dense facing, having a permeability of less than 100 units through the brick and facing and a permeability of over 300 units when the facing is removed. The facing may be formed of vitrified clay 4, unbaked clay 4 and Na silicate 2 parts

Refractory material. SANDFORD S COLE (to Koppers Co) U. S. 1,798,972, *March 31.* *A refractory material suitable for use in furnace or coke-oven construction* is formed from a silica body such as ganister mixed with a ferric salt such as $FeCl_3$, lime, an org acid such as lactic acid and with $Ca(CNS)_2$ and water, molded, dried and fired Cf *C A* 24, 3873

Abrasives. BAKELITE CORP Fr 698,090, June 26, 1930 A supple phenol resin such as that described in U S 1,590,079 (Byck, *C A* 20, 3090) is used for binding abrasives to supple supports

Enameling iron VEREINIGTE CHEM FAB KREIDL, HELLER & Co Ger 522,472, Nov. 4, 1923 Fe articles, particularly sheet Fe, are provided with a colorless ground-enamel coating, free from CoO or NiO by applying a suitable mixt of readily fusible and difficultly fusible substances in the form of a moist pulp and then heating the article for a short time, so that the difficultly fusible substances do not completely dissolve in the readily fusible substances with the result that a coarse-grained coating is produced A suitable mixt contains borax 36 3, feldspar 36 3, quartz 32, soda 6, $NaNO_3$ 6 $CaF_2$ 1.8 and kaolin 10 parts

## 20—CEMENT AND OTHER BUILDING MATERIALS

J C WITT

Chemical constitution of cements. FERRARI *Ind cemento* 25, 6(1928); *Ceram Abstracts* 9, 259—F reviews the literature dealing with the chem constitution of calcareous cements and cites references dating between 1785 and 1925 G G

White cements. L. NICOL *Baumarkt* 29, 451–2(1930), *Ceram Abstracts* 9, 1017–8—White cements are classified as portland, "marble," magnesia and special cements. White portland cements include all those which chemically are similar in compn. and in properties to the gray portland cement. The white portland cements examd had on the av the following compn: lime 51–2, $SiO_2$ 13–24, $Al_2O_3$ 6–13, $Fe_2O_3$ 0.2–0 6, $SO_3$ 0 4–1 5, MgO 0 2–0 4, potash salt 0 3–2 0, loss on ignition 2 3–6 0%. In every white portland cement the $Fe_2O_3$ was replaced by $Al_2O_3$ down to a small part; its properties are similar to those of the ordinary gray portland cement, except that the white cement sets more slowly because of the higher degree of gel formation From 10 to 25% of fine white quartz sand should be added to the white cement in making the concrete, and the mixing water must contain no Fe. A plant at Stettin made a good white Stern cement of the following av. compn: lime 58–60, $SiO_2$ 19–20, $Al_2O_3$ 12–14, $Fe_2O_3$ 0 3–0 6, $SO_3$ 1 0–1 5, loss on ignition 5–6, MgO 0 1–0 3, and potash soda 0.3–0 5% A good French white cement is the Le Noble cement, which has the following compn lime 62 75, $SiO_2$ 22 00, $Al_2O_3$ 5 90, $Fe_2O_3$ 0.25, MgO 0 60, $SO_3$ 0 55, alkalies 0 20, loss on ignition 9 15% "Marble" cements are, in general, not to be used for outside work, for they are not hydraulically hardening cements They comprise double-calcined gypsum with addns of alum A Luxemburgian marble cement has the following compn. lime 67 80, $SiO_2$ 20 20, $Al_2O_3$ 1.25, $Fe_2O_3$ 0 25, MgO 1 38, $CO_2$ 1.26, "sand" 1.30, loss on ignition 6 04, and $SO_3$ 0 40% Russia has a very light marble cement called La Glyptolithe A Swiss white marble cement has the following compn ignition loss 5, lime 39, $SiO_2$ 18, $Al_2O_3$ and $Fe_2O_3$ 28, $SO_3$ 7, alkalies 1.2, MgO 0 6, and barite 0 2% Of the white special cements, one is made from rock chalk, infusorial earth (kieselguhr) and soda soln, and the other from calcined lime (white lime) and ground colorless silicic acid which are mixed in the slaking drum. G. G.

Action of magnesium sulfate on cement. P KREMSER *Ind cemento* 26, 8 (1929); *Ceram Abstracts* 9, 258—K. describes the occurrence of $MgSO_4$ and its chem relation to cement CaO is subject to the disintegrating action of $MgSO_4$ according to the equation $Ca(OH)_2 + MgSO_4 \longrightarrow CaSO_4 + Mg(OH)_2$; the hydrate of magnesia being a white, gelatinous mass. The detrimental compd sulfatoaluminate of Ca is then formed according to the equation $3CaSO_4 + (3CaO\ Al_2O_3\ 12H_2O) + 18H_2O \longrightarrow 3CaO.Al_2O_3\ 3CaSO_4\ 30H_2O$. This action effects change of vol and disintegration of the cement K also describes results obtained by satg. the specimens with "Sika," a cement paint for reducing disintegration by $MgSO_4$ G. G

Material balance in the rotary-kiln cement plant. D STEINER *Tonind-Ztg*

55, 479–80(1931).—A 100-kg. charge yields 64.5 kg. of clinker and 5 kg. of flue dust. This latter is composed of 1 kg. unburnt charge, 2 kg. calcined, 1.3 kg. ash and 0.7 kg. coke. With 330 g. of coal per kg. of clinker and 15% excess air, 3.35 kg. of air per kg. of clinker is required. A flow sheet and analytical data are given. D. A. Soule

Specifications for the grading of sand, gravel and crushed aggregates. Anon. *Zement* 20, 37–8(1931).—A report is given of the 3rd Conference of the Comm. for the Standardization of Particle Sizes. H. F. K.

Chemical studies of rock used in the construction of old monuments in the city of Salamanca, of the patina of the same, and its artificial reproduction. I. Ribas and Petra de Prada. *Anales soc. españ. fis. quím.* 29, 211–20(1931).—The golden yellow color of the patina on the old stones in Salamanca is due to Fe hydroxide. Patination is caused by dehydration of the hydroxide on the surface. Suitable treatment of the stone with pptd. $Fe(OH)_3$ reproduces the patina. E. M. Symmes

Pulverized iron for waterproofing and hardening floors and walls. Charles Kew. *Creamery and Milk Plant Monthly* 20, No. 5, 90–1(1931).—Pulverized iron suspended in water is applied to concrete, brick or masonry and permanently waterproofs these materials. The water, soaking the walls, carries fine particles of iron with it which oxidize and swell up and thus seal the pores. A. H. Johnson

Colonial wood from Spanish Guiana. II. T. Bataecas. *Anales soc. españ. fis. quím.* 29, 184–8(1931); cf. *C. A.* 25, 189.—Detns. of water, ash, B. t. u., apparent d., and ultimate analysis were made on *Dyospiros ervila* (ebony), *Pterocarpus sovansii* (palo rojo or padouk), *Lovoa klaineana* (envero), *Isolana klaineana* (ogoa or n'fé), ebanan or m bebame (a species of *Chrysophylum*), and adeba or ondondú. E. M. Symmes

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Acid resisting materials for chemical and building industries (Grigor'ev, Silvestrovich) 13. Kinetics of transformation of the various forms and stages of hydration of Ca sulfate (Teitknecht) 2. Cleaning [rotary cement kiln gases] electrically (Ger. pat. 522,389) 4

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Walz, Kurt. Die heutigen Erkenntnisse über die Wasserdurchlässigkeit des Mörtels und des Betons. Berlin: Ernst. 92 pp. M. 9.

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Cement. G. Polysius A.-G. Ger. 522,022, Dec. 4, 1925. A method of dewatering crude cement sludge in a horizontal centrifuge is described.

Cement. Bruno Bruhn. Fr. 697,673, June 19, 1930. The relative content of $SiO_2$ in normal portland cement is reduced by increasing the content of sesquioxides and the mass is fused. In the fusion of a mixt. of slag and lime the relative content of $SiO_2$ is reduced by increasing the content of sesquioxides. Other fluxes such as $CaCl_2$ or compds. of HF may also be added.

Cement. Caspard Winkler. Fr. 698,422, July 5, 1930. Cements of various kinds are protected against the action of corrosive waters by replacing a part of the sand by clinker of portland cement or other cements, the size of grain being between 0.15 and 2 mm. The clinker is preferably treated before use with solns. of alkali or alk. earth compds. or F compds. or solns. of oxalic acid or its salts.

Cement. Trefileries et laminoirs du Havre (Anciens établissements Lazare Weiller) and Soc. coöpérative de Rugles et la canalisation électrique réunis. Fr. 698,515, May 24, 1930. In making porous cements by decompn. of part of the mixing water under the action of Al powder, the formation of a protecting layer of $Al_2O_3$ on the Al is prevented by the addn. of certain chlorides such as $MgCl_2$ or HCl and calcined MgO. A soln. of $KMnO_4$ may also be used to prevent oxidation.

Cement. Arthur F. Fabre. Fr. 698,520, May 6, 1930. A special portland cement is made by substituting pozzolana for $CaSO_4$ in com. portland cement.

Fused cement. Stefan Kohut. Ger. 516,859, Nov. 23, 1928. See Fr. 685,027 (*C. A.* 24, 5456).

Porous cement. Soc. anon. Trépileries et laminoirs du Havre (Anciens établissements Lazare Weiller) and Soc. coöperativé de Rugles et lac analisation electrique réunis. Fr. 698,320, July 3, 1930. Porous cements are made by the action of a metal such as Al and a soln. of $KMnO_4$ or $MgCl_2$ or $MnCl_4$, CaO being added in suitable proportion to increase the action of the metal.

Dry mixing of cement-forming materials. Mikael Vogel-Jorgensen (to F. L. Smidth & Co.). U. S. 1,798,423, March 31. Various details of procedure and app. are described for obtaining a uniform mixt.

Waterproofing material for cement. Manziro Nakahara and Tokyo Industrial

LABORATORY Japan. 89,610, Dec. 10, 1930 A mixt. of resin and pitch is emulsified with aq soln of glue, and $H_2SiF_6$ and a substance contg sol silicic acid are added.

Concrete. BETONIT GES M B H and N V. HOLLANDSCHE BETONIT MAATSCHAPPIJ Fr 698,636, July 8, 1930 Articles such as pipes molded in concrete are placed in a closed space, which is then filled with liquid bitumen, asphalt or tar and submitted to pressure

Preparing and placing concrete. KARL P BILLNER (to Aerocrete Corp of America) U S 1,798,924, March 31 An intimate mixt is formed of cement, water and a gas-producing agent such as Al powder, and a counteracting pressure is applied to the mixt to prevent expansion of gas bubbles and to permit a pressure to develop within the mass while the chem reaction is in its incipient stages, the mass is then transported to the place of use, the counteracting pressure is relieved and it is deposited where desired App is described

Slate as a concrete aggregate. P N SHABLUIKIN and M I KOIFMAN Russ 19,510, Feb 28, 1931 Crushed slate, obtained as a waste product in slate production, is heated at 1100–1200° before being incorporated into concrete

Coating concrete vats. STANDFASSWERKE ROSTOCK & BAERLOCHER and GEORG WALTER Fr 698,562, June 25, 1930 Fermentation vats and reservoirs are coated internally by aq emulsions of bitumens, resins or lignite waxes to which oils and fats may be added Mortar may be added to increase the adherence

Road-making compositions. ROMAN GRENGG and ANNEMARIE SCHMÖLZER Austrian 121,773, Oct. 15, 1930 The binding of compns comprising rubble or the like and water glass, is improved by addn of powd sintered magnesite, or of powd wood charcoal that has been stored in $CO_2$ The sintered ferruginous waste obtained in working up magnesite may also be used

Road tar. THERMAL INDUSTRIAL & CHEMICAL (T I. C.) RESEARCH CO., LTD Fr. 697,824, June 23, 1930 A tar suitable for roads is made by adding a small proportion of acid, preferably $H_2SO_4$, to a crude tar free from wax, agitating the mixt at 55–83°, neutralizing the mixt and dehydrating it, and if necessary heating it to volatilize the light oils and obtain the desired consistency

Asphaltic and bituminous compositions. GENERAL TECHNICAL CO., LTD Fr 698,680, Oct. 7, 1929 Compns. of relatively high m p suitable for roads are made by heating residues from the distn of natural petroleum or coal tars to a temp of 360–430° at atm pressure, and eliminating the resulting liquid products from this partial dissocn as they are formed

Expansion joint for concrete pavements. ALBERT C. FISCHER (to Philip Carey Mfg Co.). U. S 1,800,193, April 7. Various details are described of the use of fibrous material and bituminous material together. U S 1,800,194 relates to products such as satd. paper or felt having an adhesive surface such as oil or asphaltic compn protected by a water-sol covering such as Na silicate. *Cf C A 24, 4008*

Building block. FRANCIS J STRAUB U S 1,798,505, March 31. The smaller particles and fines are sepd from an original mass of cellular coal-cinder aggregate and while dry these are mixed with a suitable binder such as portland cement. The remainder, composed of the larger pieces, is soaked in water and the materials are then mixed together for molding into blocks. An arrangement of app is described

Shaft furnace for burning gypsum. I. F FLORETZOV Russ 19,520, Feb 28, 1931. Structural details.

Artificial stones, etc. SOC ANON POUR L'IND DE LA MAGNÉSITE (SUCCURSALE DE HONGRIE). Fr 697,898, June 25, 1930 Very refractory stones resistant to rapid changes of temp are made by grinding magnesite (fritted or concreted) or overburnt MgO, removing the very fine particles—not more than 50%—and replacing them by an equal amt of finely ground substances rich in $Al_2O_3$. The mixt is used as mortar, fireclay lining or molded in the form of stones and baked.

Fireproof composition suitable for use in building construction. CARL MARCZINCZEK. U. S. 1,800,024, April 7 Volcanic cinders 45, cement 20, gypsum 5, hydrated lime 5 and finely ground pumice 25 parts are mixed with sufficient water to cause the mixt. to set.

Apparatus for making asbestos-cement tubes. RUDOLF HAYDEN Austrian 121,643, Oct 15, 1930.

Surface coloring of flat articles such as asbestos-cement shingles. CLEMENTS BATCHELLER (to Bemis Industries, Inc.) U. S 1,798,906, March 31. Flat objects having an alk. reaction are treated with a soln of a metallic salt such as Cu and Fe salts which will react with the alk substance to form an insol. compd and treated surfaces are juxtaposed to retard evapn. of the soln.

Surface coloring of articles such as asbestos-cement shingles. CLEMENTS BATCHELLER (to Bemis Industries, Inc.) U. S 1,798,097, March 31. In treating an article having an alk. reaction and having inorg coloring matter mechanically incorporated in its surface, to bind the coloring matter in the surface, the surface is treated with a soln of a metallic salt U. S 1,798,998 describes the similar surface coloration of shingles comprising cement and fibrous material U S 1,798,999 relates to coloring porous bodies such as asbestos-cement shingles by applying a soln of a metal salt such as $FeSO_4$ or $CoSO_4$ which is capable of oxidation and then applying a reacting substance such as a peroxide to form insol coloring material in the surface portion of the material. Various details and examples are given.

Plaster mixture. GEORGE H. A RUBY. U. S 1,799,324, April 7. A material capable of holding nails firmly without splitting or spalling is formed of cotton fibers with a plaster-of-Paris binder solidified through crystn after addn of water. U. S 1,799,325 also relates to similar material

Plaster-board. THEODORE E KNOWLTON (to Certain-Teed Products Corp) U S 1 798,609, March 31 Mech features

Drying wood, etc. AKTIEBOLAGET BANKFIRMAN ALFRED BERG Ger. 522,141, Sept. 24, 1929. The materials are treated in a closed container with warm air or other gas under pressure and the pressure is then reduced to zero as rapidly as possible. The treatment may be repeated App is described

Artificially drying wood. FRIEDRICH MOLL. Ger 516,064, Mar. 20, 1930 The drying chamber has an opening from which observations and samples can be taken during the process

Preserving wood. GRUBENHOLZIMPRAGNIERUNG G M B H Fr 698,624, July 7, 1930 Wood is preserved by a mixt of equal parts of $K_2CrO_7$ and NaF.

## 21—FUELS, GAS, TAR AND COKE

A C FIELDNER AND ALDEN H EMERY

Investigation of the aluminum apparatus for the testing of spontaneous combustion of anthracite coal and other materials. D J W KREULEN. *Brennstoff-Chem* 12, 107–11(1931); cf *C A* 25, 394.—By use of app previously described (*C A*. 25, 394) the influence of heating and $O_2$ flow rates, sample and particle size upon the results obtained has been detd The best results are obtained when $CO_2$ is passed through the coal at 5 l /hr until the app has reached 120° When the coal has reached 116°, $O_2$ is started through at 10 l /hr and the temp of the app raised to the kindling point of the coal Depending upon the shape of the plotted temp curves of the app and coal at the kindling temp , rates of 1° or 2° or 3°/min are used For each detn 5 cc of briquetted coal sized between 10 and 20 mesh/cm is used Anthracite, brown coal and wood charcoal have been used in showing graphically the effects of the variations F. W J.

New method for practical fuel examination and calculation. M. DOLCH. *Brennstoff und Wärmewirt* 12, 253–67(1930).—Review of the author's previous work (cf *C. A* 24, 221, 5969) A. HIRSCH

Ignition and combustion of fuels of low heating value. MARCARD *Die Wärme* 54, 208–13(1931).—Crit data concerning the ignition characteristics of fuels are tabulated and discussed The influence of the construction of the boiler on the ignition and combustion processes, and the importance of catalysis on ignition of fuels are discussed ALLEN S SMITH

Determination of the heating value by a simplified calorimeter. A. P SHAKHNO AND M D ZHUKOVSKII. *Investiya Teplotekh Inst.* (*Trans Thermo-Tech Inst.*) 1931, No 1, 34–42.—The heating values of various coals and wood were detd. in different calorimeters The Parr calorimeter is recommended provided that the $Na_2O$ contains not less than 92% of active $O_2$ and the proper amts of $Na_2O$ and tartaric acid are used, without the addn of $K_2S_2O_8$. Corrections for radiation must be made, and max deviations of 1 16% were observed in various detns A A BOEHTLINGK

Wood as a fuel for internal-combustion engines. G DUPONT. *Bull inst pin* 1931, 5–8, 31–6, 65–71.—An address describing the work carried out recently by D and co-workers at the Institut du Pin (cf *C A* 23, 2551, 24, 1490, 4914) A PAPINEAU COUTURE

Conversion tables for recalculating to various laboratory conditions results of fuel analysis and ash determinations V. ALEKSANDROVSKII *Izvestiya Teplotekh. Inst* (*Trans Thermo-Tech Inst*) 1931, No 1, 56–60.—Tables are given for recalcg the results of lab analysis to the as-received basis and to the dry basis. A. A. BOEHTLINGK

Determination of the ash content of coke and coal. H A J Pieters. *Het Gas* 51, 77–9(1931).—From comparative ash detns on coke and coal ground in a hammer mill, rolled on a steel plate or pulverized in a mortar it is shown that Fe particles can cause variations in ash content up to 0.4% (highest error for rolled coke). A particularly hard material needs to be used for the construction of grinders. A temp of 900° is advocated for ash detns., higher temps cause losses. Cooling of the samples for moisture or ash detns in air is equally as good as in a desiccator, as long as it does not take more than 10 min. Tables of check analyses are given. B J C. v d H.

Fuel technology and the classification of coal. Clarence A Seyler. *Proc. S. Wales Inst. Eng.* 47, 6–9(1931).—The properties of coal are divided into 2 categories: the concn. characteristics and the mobility or reactivity characteristics. The concn. characteristics are those which depend on the concn. of the combustible elements or the energy in the coal or its products of combustion. They include the compn. of the coal, its calorific value, vol. of air required for combustion, vol. and compn. of flue gases, flame temp. of gases and combustion efficiency. The relation between the vol. of flue gases or air and the net calorific value of the coal is a special case of a general relation which can be deduced from Dulong's law. The plotted lines of isocals therefore represent all other concn. characteristics. The mobility or reactivity characteristics depend on the freedom with which the colloidal particles or those of mol. dimensions can move and undergo rearrangement or enter into combination with external reagents. Coking properties belong in this category. Softening points detd. by the Charpy and Durand method show great regularity when plotted and lines of equal softening points may be drawn. The lowest line surrounds the best coking coals, the higher the line the poorer the coking properties. Alden H Emery

Petrography and coal classification. Clarence A Seyler. *Proc. S. Wales Inst. Eng.* 47, 4–6(1931).—S. briefly reviews 3 systems for the classification of coal: lithological (vitrain, clarain, durain and fusain), botanical (anthraxylon and attritus), and micropetrographical (humic material, resins, resistant plant remains and fusain). The latter are in the main proximate chem. components. Alden H Emery

The caking power according to Meurice as a basis for classification of coal. D Stavorinus. *Het Gas* 51, 79–82(1931), cf. M., *C. A.* 8, 1496.—The Meurice method of detg. caking power is reviewed. The "limiting agglutination index" is detd. by the no. of g. of sand which 1 g. of coal can bind without giving more than 1 g. loose powder. The sand passing a no. 40, and retained on a no. 50, sieve is heated with coal ground to pass a no. 80 sieve in a 25-cc. covered Meissner porcelain crucible, between 900 and 950° in a muffle until the flame between crucible and cover has disappeared. The loose powder remaining is weighed. A second significant figure, the "cokefaction index," is detd. from the compressive strength $K$ of the cake of 17 g. sand + 1 g. coal. If $D$ is the wt. of the loose powder after caking, the index is $17K/D$. The usual (European) classification of coal corresponds to limiting indexes as follows: flame coal (volatile matter more than 35%) 0 to 8, fat gas coal (volatile > 28%) at least 10, coking coal (volatile 18 to 32%) above 14, various fat coals (volatile 11 to 22%) from >10 to >2, lean coal (volatile 9 to 11%) 2, anthracite (volatile up to 8%) index 0. For 15 samples of Ruhr and Durham gas coals the cokefaction index is given. It varies for Ruhr coal from 40 to 425, $K$ between 3.5 and 14, $D$ from 0.30 to 1.5, for Durham coal the index is 196 to 1135, $K$ from 5 to 10, $D$ 0.30 to 0.52. For the detn. of compressive strength the Lechine app. was used. B J C. van der Horven

A note on the mineralogy of coal as suggested by x-ray examination. Henry Briggs. *Colliery Guardian* 138, 638–40(1929).—Mineral impurities in coal are classified under four heads: (1) those existing in the coal substance, and so finely disseminated through it that they cannot be extd. by any known phys. process, (2) those forming layers, streaks or flakes lying in the bedding planes, (3) those forming streaks, flats flakes or plates, usually at angles approaching the right angle, and (4) particles, crystals or irregular masses, large or small, scattered, apparently promiscuously through the coal. The first is discernible only in the radiograph of a coal band as a uniform and a featureless cloudiness of the clearest portions, while the other 3 varieties are sharply silhouetted in an x-ray photograph, and their manner of occurrence is still more clearly presented by the stereoscopic method of Kemp and Thomson. A review is made of characteristics of the mineral impurities, and the low ash content (compared to that estimated from the plant source of the coal) is explained. X-rays provide refined methods of qual. analysis not previously available and at the same time enable the manner of distribution of these foreign substances to be studied without destroying the sample. W. H. Boynton

Coal properties and their applications. T. Kidokoro and G. Shirane. *J. Fuel*

*Sci. Journ.* 0, 43–6 (1930).—A method is described for the identification of the geological rock of coals, lignites, etc., by their treatment with oxidizing agents followed by ppts. of the humic acids with NaOH. Expts. on the oxidation and spectroscopic examination of coals, with special reference to their rank, as detd. above, are also discussed. B. C. A.

The preparation of coal dust for and its analysis by projected microscope images. Erich Stach. *Fortschr. Geol. u. Pal.* 12, 147–80 (1931). cf. *C. A.* 23, 3029.—The procedure and apps. are described in detail for the examn. of coal particles, reduced to 0.25–0.88 mm. size. For mounting, a material prepd. from 3 parts dammar, 2 parts shellac and 1 part Venetian turpentine or other mastic or carnauba wax also is used. To 8 parts by vol. of this medium, 6 parts of the coal is added. The mixt. is then pressed into a 2 × 2 × 1 cm. mold. After the setting and removal, progressively finer grinding and wet polishing with the final use of alumina to produce relief, a surface of the block is prepd. for microscopic examn. at 150–200 diams. magnification. F. W. Jessup

Notes on occurrence of spontaneous heating [in coal mines]. E. H. Vallis. *Colliery Guardian* 141, 1971–2 (1930).—For the Seven Feet Barbery seam at the Barbeswood Colliery it appears that the $CO_2$ absorbed ratio of 1% is a critical figure. Having reached this point, it may recede, or after the ratio has remained stationary for several days, heating may develop with startling rapidity. It was found that the $CO_2$ absorbed ratio may increase from 1.1 to 2.9% in less than 10 hrs. and to a stage when the 1st change in smell is apparent in 5 hrs. V. emphasizes the importance of analyses every 24 hrs. in addn. to the frequent examn. of the working districts of such mines for any change in the smell of the return air. Such analyses should include air in the working places and the airways near the face to discover the development of heating in its early stages. H. C. Parish

Process of combustion of pulverized coal. A. Gaydt. *Compt. rend.* 192, 567–9 (1931).—Pulverized and dry (1% $H_2O$) coals (lignite or anthracite) ignite at characteristic temps. between 700° and 900°, temps. which correspond to the max. disengagement of $H_2$ during dry fractional distn. This leads to the conception that ignition of coal starts with inflammation of the $H_2$ disengaged, the carbonization continues along with the progressive and concomitant oxidation by air, first of the $H_2$, then of the transformed coals, and then of CO. The formed mass of incoherent coke reacts with the $H_2O$ present and the resultant $CO + H_2$ burns. This conception differs from the intermediate formation of the water-gas theory of d'Arsonval (Brennstoff und Verbrennung, Berlin, 1923), and is confirmed by recent analyses of Fick (Le Chauffage des Chaudières au Charbon Pulverisé, Paris, 1930, p. 57), the results of which are plotted to show that C is first oxidized to CO rather than to $CO_2$. Albert Thomas Fellows

Graphic examination of the combustion process. Alfons Nagel. *Die Wärme* 54, 201–3, 230–4 (1931).—A method of regulation, and estn. of combustion efficiency is described which eliminates the necessity of flue-gas analyses and reduces calcns., and which is simple and reliable. Ostwald flue-gas diagrams (*C. A.* 14, 257) are prepd. from equations representing complete and incomplete combustion of gaseous, liquid and solid fuels. From these diagrams the characteristics of the combustion may be detd. The influence of $CH_4$ and H on the accuracy of the diagrams is considered. Allen S. Smith

The specific heats of gases involved in combustion. A. Jaeschke. *Gasmasse* 59, 947 (1930). *J. Soc. Glass Tech.* 14, 144.—The sp. heats of individual gases, as well as those of typical mixts. of waste gases, are shown in tables and diagrams. The methods is given together with examples of the detns. of (1) the heat dissipated by gases while cooling and simultaneously decreasing in pressure, (2) the mean sp. heat of a gas between two specified temps., (3) the heat lost in the waste gases. G. G.

Saskatchewan Lignite. J. P. deWitt. *Can. Mining J.* 52, 420–3 (1931). cf. *C. A.* 25, 189.—Use is being materially extended within the province by adoption of suitable grates and stokers. W. H. Boynton

The gas plant at Ivry. Pouchelle. *J. usines gaz* 55, 69–74, 96–102 (1931).—Historical. Operation details are given with many drawings. B. J. C. v. d. H.

The modernization of the gas plant at Bressy. G. Dreux. *J. usines gaz* 55, 25–7 (1931).—A short description of the new installation of 7 vertical discontinuous chamber ovens, each of a capacity of 1500 kg. coal in 12 hrs. Steam is injected during the last 2 hrs. of carbonization. The plant has built-in-producers. B. J. C. v. d. H.

Gas production and its economics in Greece. Stergiades. *Gasverwertung Athen* 1, No. 1, 35–6 (1930).—An historical review of the gas production, its application for domestic and other purposes and the potential capacity of Greece oil fields are given. Statistical data on gasoline recovery from wet gases are tabulated. A. A. B.

Plant for preparation of coal and coke at the gas plant in Niederursel. J.

Andreeo *Schweiz Ver. Gas- u Wasserfach Monats Bull* 11, 78-82(1931).—A short description with drawings. B. J. C. van der Hoeven

Fundamental aspects of the natural-gas situation in Chicago. Samuel Insull, Jr. *J. Western Soc Eng* 36, 111-5(1931).—A brief résumé of the basic economics which shows that only those domestic consumers using large amts. of gas will benefit greatly by the use of natural gas. W. H. Boynton

*Heat loss of gas furnaces.* Fritz Schuster *Die Wärme* 54, 279-82(1931).—An essential part of the heat loss of all furnaces is contained in the sensible heat content of the waste gases. This may be estd. from the heat of combustion of the gases and a knowledge of the waste gases. The waste gas loss of the simple combustible gases, H, $CH_4$, ethylene, benzene, acetylene and CO, is computed for different conditions of temp., excess air and humidity. By means of these values the waste gas loss of com. gaseous fuels is obtained. Tables are given which show the heat content of the gases of combustion. An economical comparison is made of coal-, water-, and generator gas. Allen S. Smith

Metallic ions as catalysts for the removal of sulfur dioxide from boiler-furnace gases. H. F. Johnstone *Ind. Eng. Chem.* 23, 559-61(1931).—The catalytic effect of small concns. of $Fe^{+++}$ and Mn ions on the oxidation of dissolved $SO_2$ materially increases the capacity of water for absorbing $SO_2$ and thereby decreases the vol. required for washing flue gases. At a concn. of 300 p. p. m. Mn, 3500 cu. ft. of an air mixt. contg. 0.325% $SO_2$ was washed with 1 gal. of water at an av. efficiency of 95.5% removal of $SO_2$. The concn. of $H_2SO_4$ attained was 29.6%. $Fe^{+++}$ requires concns. about 100 times those of Mn. Cu ions act as a strong inhibitor to the catalysis by Mn but not by $Fe^{+++}$. Zn, Ni and Cr ions have no effect either as inhibitors or as catalysts. When lime water is used for washing, $CaSO_3$ rather than $Ca(HSO_3)_2$ is formed. Four thousand cu. ft. of flue gas contg. 5% $CO_2$ and 0.1% $SO_2$ was washed per gal. of water contg. 250 p. p. m. Mn. A rotary scrubber was used and the time of contact was approx. 1/20 sec. This is equiv. to 1¼ tons of water per ton of coal. The efficiency dropped from 40% at the beginning to 10% at the end when the acid concn. was 3.7% $H_2SO_4$. Further work on the application of catalysts to the scrubbing of flue gases is in progress. H. F. Johnstone

*Stoichiometry of the blow.* Lloyd Logan *Am. Gas J.* 134, 53-4(1931).—In the blow run of a water-gas set C is consumed by oxidation to CO or $CO_2$. There is a unique relation between CO, $CO_2$ and $N_2$ content of the blast gas, the compn. varying from 21% $CO_2$, 0% CO, 79% $N_2$ to 0% $CO_2$, 34.7% CO, 65.3% $N_2$. From the detn. of any one of the components the other 2 may be calcd., as well as the amt. of C consumed and the vol. of blast gas. Equations and charts are given for the calcn. of the unknown quantities from the analysis. Channing Wilson

Protection against fire hazards of gas appliances. F. G. Vandaveer *J. usines gaz* 55, 75-80(1931).—A review is given of results obtained in the Cleveland (O.) A. G. A. labs. B. J. C. van der Hoeven

Deformation of bells and lifts of gas holders under the influence of gas pressure. M. Petitpas *J. usines gaz* 55, 35-9(1931).—A review is given of the mechanics of water-gas holders. B. J. C. van der Hoeven

*The use of tar in the bell seals of gas holders.* W. J. A. Duynstee *Het Gas* 51, 73-7(1931).—From a no. of drawings and from a pressure chart of the gas trapped under the seal of the telescope ring of a 2 lift holder in bottom position it is shown that even if the ring seal is originally filled with tar to the top a water layer will replace it partly as soon as it has been down to the bottom once. Only by lowering the water level in the foundation basin can a sufficient tar seal be maintained in the ring permanently. B. J. C. van der Hoeven

The determination of sulfur in combustible liquids. I. F. Garelli and B. Saladini *Ann. chim. applicata* 21, 136-40(1931).—After reviewing the method of detg. S in illuminating oil by burning a weighed amt. and collecting the liberated $SO_2$ in alkali soln., a more general method is described suitable for crude as well as refined oils. This method is the common one using an $O_2$ bomb. A. W. Contieri

The plasticity of coal and the theory of coking. Clarence A. Seyler *Proc. S. Wales Inst. Eng.* 47, 9-14(1931).—When heated, coal deforms under const. pressure at a rate which diminishes as the contraction proceeds until it finally ceases, as a result, not of loss of the property of flow under pressure, but of the development of a resistance probably of the nature of a back pressure produced by the gases of decompn. The rate of deformation increases with pressure. With no pressure there is no flow. The phenomenon is one of plastic flow, not fusion. Plasticity involves 2 quantities, mobility (const. at a given temp.) and resistance (only conditionally const.). A plastometer

which permits calcn of the consts in c. g. s. units has been developed. In the coals investigated, when the rate of flow and temp. are not too high, coal follows the laws of plastic flow. Softening point is the temp. at which a min. rate of flow is produced at a given pressure, such that a very small further contraction causes the resistance to equal the external pressure. The plasticity temp. relation is hyperbolic with 2 asymptotes, 1 approaching the temp. axis and the other inclined to it. The plasticity of coal at the softening point is inversely proportional to the pressure. The plasticity does not increase indefinitely but reaches a max. detd. by the thermal stability of the coal. This max. decreases as the softening point of the coal increases and its thermal stability decreases. Preheating has a marked effect on plasticity. Coking is due to the plastic flow of the coal particles as a whole. The necessary pressure comes from the gases evolved. ALDEN H. EMERY

Results of compressive strength, tumbler and shatter tests of foundry coke. H. A. J. PIETERS. *Het Gas* 51, 84–5(1931).—The compressive strength was detd. on 10 cubical coke bodies sawed out and polished to 1 cc. For the tumbler tests 50 kg. coke was revolved for 4 min. in a drum, 1 m. long, 1 m. diam., 25 revolutions per min., then screened on 40 mm. round openings and the retained coke weighed. For the shatter test 25 kg. coke was dropped out of an Fe box with doubly hinged bottom halves on to a steel plate 1.80 m. lower. This test is repeated 4 times, the coke then screened on 80 mm. round holes and the retained coke weighed. From tabulated data of 52 expts. with 2 types of foundry coke it appears that the tumbler test gives the most consistent figures, the shatter test is more sensitive and less const., max. deviation for the former is about 3% of the average, for the latter around 10%. The compressive strength detn. has no practical significance for the valuation of the quality of the coke. B. J. C. v. d. H.

Heating inclined retorts with high B. t. u. gas. H. MÜLLER AND STIEF. *Gas u. Wasserfach* 73, 1177–80(1930).—Inclined retorts have been heated with mixts. of coke-oven gas with water gas, producer gas and flue gas, resp., as well as with coke-oven gas alone, which requires special burner provisions. The optional use of coke-oven gas increases the flexibility of gas manuf. and permits a higher coke gas ratio when this is desirable. The authors state that all coal-carbonizing equipment should be designed to operate with high or low B. t. u. gas. R. W. RYAN

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The geological history of coal (HICKLING) 8. Natural gas for metallurgical furnace (GORE) 9. The origin of coal (FUCHS, HORN) 8. *Excoecaria agallocha* as a source of power alcohol (SEN, *et al.*) 22. Refractory materials (GREEN) 19. Tower for effecting contact between gases and solid materials as in scrubbing fuel gas (U. S. pat. 1,798,307) 1. Working up oxidation products from paraffin, etc. (Ger. pat. 522,055) 22. Treating gas-washing oils (Ger. pat. 522,032) 22. Tower for liquid and gas contact operations such as washing fuel gases (U. S. pat. 1,798,563) 1.

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Fuel. MASCHINELLE DRUCKENTWASSERUNG M. B. H. Ger. 516,761, Apr. 19, 1929. Crude peat is dehydrated by pressing with fully dried peat dust. The mass is heated during pressing and cooled by water-cooled plates.

Liquid fuels. SOCIÉTÉ NEUTRAL MOTOR FUEL, INC. Fr. 697,439, June 14, 1930. Motor fuels are improved by bringing them in intimate contact with a mixt. of an oxidizing agent sol. in water such as $H_2O_2$ and a compd. contg. Cl sol. in water such as $AlCl_3$, in the presence of water. A suitable app. is described.

Motor fuel. I. G. FARBENIND. A.-G. Fr. 698,641, July 8, 1930. A valuable motor fuel is made by the thermal decompn. of mineral and tar oils in the state of vapor and preferably in the presence of catalysts at temps. above 600°. The decompn. takes place under conditions which cause the formation of large amts. of gaseous products, particularly unsatd. hydrocarbons, the appropriate fractions of which are sepd. from the non-gaseous products.

Composition for treating fuel. FRED L. MENNIE. U. S. 1,799,631, April 7. A compn. for treating fuel such as coal-dust briquets in order to improve its burning properties comprises $KMnO_4$ 6, $KClO_3$ 12, "table salt" 32, crushed rock salt 50 parts, mixed with water.

Utilizing carbon saturated with oxygen. MAX PLATSCH. Ger. 506,274, Nov. 13, 1927. C satd. with O may be used, *e. g.*, for the manuf. of CO relatively free from N as a motor fuel, for the direct internal heating of metallurgical, etc., furnaces, or for the

heating of closed pressure vessels used for cracking oils, etc. Few or no details of these applications are given

Destructive distillation of suspended fuel particles. Friedrich Bartling U S 1,798,995, March 31 Various details of app suitable for use in the destructive distn of powd bituminous material are described

Rotary kiln suitable for low-temperature coal distillation, etc. Edmund Roser (to C H Ellsworth) U S 1,799,500, March 31

Low-temperature carbonization apparatus. Frederick L Duffield Fr 698,606, July 4, 1930

Carbonizing retorts and furnaces. Woodall Duckham (1920), Ltd, and Arthur McD Duckham Fr 698,584, June 30, 1930

Hydrogenation reactions. I G Farbenind A-G Fr 697,539, June 17, 1930 In reactions using H at a high temp particularly in the hydrogenation of coal, tars, oils, etc., the reaction vessels are protected against the destructive action of the H by covering their surfaces with an alloy of Cu and Zn Other metals such as Mn, Ni, Fe, Co, Al or Ag may be incorporated to increase the mech resistance

Hydrogenating coal, etc. I G Farbenind A G Fr 698,425, July 5, 1930 The mixt of oily and solid substances obtained by the hydrogenation under pressure of coals, oils, etc, is heated to a temp higher than that used in the treatment until the solids are agglomerated into larger particles and sepd Cf C A 25, 2549

Hydrocarbons I G Farbenind A-G (Rudolf Wietzel and Bruno Engel, inventors) Ger 522,463, June 19, 1927 In the manuf of hydrocarbons, principally liquid, from coal, tars, mineral oils, etc., by destructive hydrogenation, cracking, or extn with org solvents under pressure, a small quantity of an org substance capable of lowering the surface tension of the products is present, *e g*, an emulsifying agent such as Na isopropylnaphthalene sulfonate Cf C A 25, 1068.

Hydrocarbons. I G Farbenind A G Fr 698,244, July 1, 1930 Valuable hydrocarbons are prepd. from coal, tars, mineral oils, etc., by treatment with H or gases contg it The finely divided starting material is allowed to fall freely through a vessel contg heating elements and filled with H under pressure

Recovery of phenols. F Raschig G m b H Fr 698,390, July 4, 1930. Residual waters from coking plants, fuel-distn app, etc, are obtained free from phenols by washing the distn gases with solvents for the phenols at a temp above the dew pt of the mixt of gases.

Acetylene cylinder filled with plastic material. Bruce Miller (to Air Reduction Co). U. S 1,799,803, April 7. Structural features.

Gas. The Power Gas Corp, Ltd and Nebls E. Rambush. Fr. 697,788, June 23, 1930 An app is described for making a mixt. of water gas and producer gas.

Fuel gas. Julius Pintsch A-G Ger. 522,493, Mar. 27, 1929. The gaseous by-products (consisting mainly of CO) from the synthesis of $NH_3$ from water gas are mixed with water gas and waste gas, *e g*, flue gas, in such amts. that a mixt. of the approx compn of generator gas is obtained

Fuel gas for automobiles. Jegor I. Bronn and Concordia-Bergbau A-G Ger. 516,850, July 28, 1926. The gas consists of $CH_4$ mixed with gaseous hydrocarbons from the low-temp distn of coal or lignite, or from the cracking of raw oils, etc.

Producer gas. Louis Chavanne. U S. 1,799,885 April 7 In utilizing solid fuels in a slagging gas producer, the lower portion of the fuel bed is blasted with a gaseous mixt. of a free O content regulated for melting the fuel ashes in a fusion zone extending above the blasting level and maintained to a thickness not exceeding one-fourth of the total height of the fuel column, and for maintaining above this an extended zone of low-temp distn. An aq fluid is added near the top of the fusion zone, gases and entrained by-products are withdrawn, and molten products are removed from the base of the column U. S. 1,799,886 relates to a generally similar process in which fuel dust is introduced in the zone of fusion and fuel in lump form at the top of the fuel column App is described.

Water gas. Wm J Edmonds (to Commercial Solvents Corp). U. S 1,799,359, April 7. In a cyclic process for the production of substantially S-free water gas, fuel is subjected to alternate air and steam blows, the water gas resulting from the steam blows is desulfurized by contact with solid desulfurizing material such as iron or Fe oxide and the desulfurizing material is revivified at intervals, during air blows, by contact with gases comprising, at least in part, the gaseous products of the air blows. App. is described

Water gas. Oesterreichisch Amerikanische Magnesit A.-G. Fr. 697,489,

June 16, 1930 Water gas poor, in or free from, CO is made by the action of steam on a mixt of carbonaceous material and the oxide, hydroxide or carbonate of Mg at a temp above the dissoen temp of $MgCO_3$ but not appreciably passing 750°. CO may be eliminated from a gas contg it by passing the gas over the above mixt. at a temp not appreciably above 500°.

Oil gas. Edward A. Dieterle U S 1,798,372, March 31 Hot combustion gases are supplied upwardly to and through vertically spaced banks of heating tubes stacked in a chamber, and oil is simultaneously sprayed on the outside surfaces of the heating tubes for generation of oil gas, and the oil gas thus formed is withdrawn from the bottom of the chamber App is described

Desulfurizing gases István Hunyady and Karl Koller Fr 698,327, July 3, 1930 Industrial gases are desulfurized with recovery of S, by bringing the gases to be purified into intimate contact with an aq soln of finely ground $MnO_2$ The mixt. of S and sulfide formed is sepd by filtration and the sulfide is transformed in known manner to hydrate and thence by the action of dry air to $MnO_2$ The mass is dried and the S dissolved out Cf *C A* 25, 2550

Removing hydrogen sulfide from gases. Wintershall A.-G Ger 516,851, Sept. 17, 1927. The gases are passed into a suspension of basic ferric salt in a ferric salt soln., prepd by oxidizing the corresponding ferrous salt with $HNO_3$. Thus, a soln of $FeCl_3$ in neutral or weakly acid soln is oxidized by $HNO_3$ Part of the $FeCl_3$ is pptd. as $FeCl_3.6Fe(OH)_3$, the rest forming $FeCl_3$ which remains in soln. This liquid absorbs the $H_2S$ in gases with disposition of S, which can be recovered by filtration and centrifuge

Treating slurry from gas-purification products. Frederick W. Sperr, Jr. (to Koppers Co.) U S 1,798,912, March 31. Slurry produced in the purification liquid is submitted to a flotation operation and S is removed as a froth concentrate, and metallic compds are removed as tailings. An arrangement of app is described. Cf. *C A*. 24, 4922

Oil-gas generator. Enoch Rector (to Rector Gasifier Co.). U S 1,799,247, April 7 Various structural details are described

Gas producers. Charles Whitfield Fr 698,590, July 2, 1930 Means for regulating the combustion of the fuel is described

Vertical gas-producer. John U McDonald U S. 1,798 617, March 31.

Distillation column for gas producers. Carl Bleyer. Fr 698,042, June 13, 1930

Means for recovering heat from flue gases Harry Fahrbach Fr 697,846, June 24, 1930

Purifying tar acid-bearing oils. Solomon Caplan (to Combustion Utilities Corp.). U S 1,799,780, April 7 In removing color producing substances from tar acid bearing oils, the oil is distd., with refluxing and condensation, and, during one of the steps prior to condensation, is brought into contact with a non acid ferric compd. such as ferric stearate

Coke ovens. August Koppers Fr. 697,625, June 18, 1930 The drawing mechanism and control are described

Coke ovens. Firma Carl Still. Fr 697,618, June 18, 1930. The loading mechanism is described

Regenerative coke ovens. Heinrich Koppers A.-G Fr. 697,472, June 16, 1930 Constructional details are given.

Horizontal regenerative coke oven, with vertical heating flues. Koksofenbau und Gasverwertung A.-G Ger 504,113, Aug 7, 1926

Coke ovens with vertical chambers. N. V. Silica en Ovenbouw Mij Fr. 697,680, June 19, 1930

Coke-oven battery. The Koppers Co Ger 522,388, Oct. 16, 1928.

Coking-retort oven. Joseph Becker (to Koppers Co.) U. S 1,799 670, April 7.

Coke-oven smoke-discharge system. Joseph Becker (to Koppers Co.). U. S 1,798,517, March 31 Structural features.

Fastening device for coke-oven door. James H Gleason (to Gas Machinery Co.) U S 1,798,599, March 31

Plant for cooling glowing coke Gebrüder Sulzer A.-G Ger. 516,870, May 22, 1928 Details are given.

# 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Methods of utilizing for power purposes the various petroleum residuals and by-products. A. E. DUNSTAN *J. Inst. Petroleum Tech.* 16, 701–22(1930).—The practices of the petroleum industry in burning its acid sludge, coke, asphalt and refinery gases are reviewed. EMMA E. CRANDAL

Refrigerating requirements for oil refining. HARRIS PRUIT *Refrigerating Eng.* 21, 311–3(1931).—The application of refrigeration to the removal of wax from paraffin-base lubricating oils is described. A. H. JOHNSON

Refrigeration in oil refining. J. M. WADSWORTH *Refrigerating Eng.* 21, 95–100 (1931).—The operation of an oil refinery using paraffin base crude oil is described. Wax is removed by gravity by filtration or by centrifuging. A. H. JOHNSON

The action of ferric oxide and ferric chloride as catalysts in the cracking and hydrogenation of oil from Ragusa. L. SALMOIRAGHI *Ann. chim. applicata* 21, 27–37 (1931).—Samples of oil from Ragusa contg. about 2.85% S and having a sp. gr. of 0.9667 were submitted to simple cracking by heating to 490° and also to cracking with hydrogenation *in the presence of* $Fe_2O_3$ *and* $FeCl_3$. *The amts. of the chloride were varied from* 5.07 to 11.07%. No gas is formed by simple cracking. With $Fe_2O_3$ 17.3% was formed (mainly $CH_4$, $C_2H_4$ with 80% $H_2$), while with $FeCl_3$, 7.4 to 13.6% of gas was made. In the simple cracking, only 4.5% of the product distd. under 250°, and 41% of residue was obtained. With $Fe_2O_3$ 37% distd. under 150°, 40% up to 250°, and the residue was 3.6%. With $FeCl_3$, 22% distd. below 150°, 53% below 250°, and there was no residue. With $Fe_2O_3$ the S was about evenly divided between the distillates and the residue, whereas with increasing amts. of $FeCl_3$, up to 75.5% of it was retained in the residue. A. W. C.

Crude oil emulsions. A. TZATUR'YAN *Groznenskii Neftyanik* 1, No. 2–3, 39–43 (1930–31).—The following methods for breaking up crude oil emulsions are described: (1) heating in open containers, (2) heating in closed containers, (3) elec. method (*with a potential of 1000 v.*), (4) *the Tret O-Lite method*, (5) *centrifuging method*, (6) combined methods, *i. e.*, a combination of two of the methods mentioned above. A. A. BOEHTLINGK

Fractional distillation of crude oil. E. O. SLATER. *Oil Bull.* 17, 272–4(1931).—The 4 point distn. method for evaluating crude oils is described in detail. It consists in a preliminary distn. (topping to a vapor temp. of 500°) under specified conditions of a weighed sample of the crude oil. Above 250° F. the distn. rate is not to exceed 10 ml. per min. A 300 ml. sample of the tops (contg. the gasoline and kerosene) from this distn. is rerun in the app. described in A. S. T. M. specification D-285–30-T, the condenser tube being packed in cracked ice and a dry graduate cylinder covered by blotting paper and immersed in water at 60° F. being the receiver. The distn. rate is 2–3 ml. per *min. for the 1st 5 ml. distd. and 4–5 ml. thereafter. The vols. of distillate in ml. are* detd. when the vapor temp. reaches the following points 221°F., 284°F., 392°F. and 437°F. From these vols. the percentage of gasoline recovered at each of these temps. and the percentage of gasoline in the crude oil are calcd. as follows. The percentage of gasoline recovered at each distn. point is the vol. recovered divided by the vol. of tops distd. times 100, this is the percentage of tops. The percentage of tops is multiplied by the percentage of net tops calcd. from the crude distn. (from the net vol. of crude oil and the net tops or total tops minus water), and the resulting figure is multiplied by a different factor for each temp. 5, 2, 1.11 and 1, resp., for the 4 distn. points to give the percentage of gasoline in the crude oil. D. F. BROWN

The detonation in internal-combustion engines. K. SCHNAUFFER. *Z. Ver. deut. Ing.* 75, 455–6(1931).—S. *uses a single cylinder engine in which the firing spark plug* is located at one end of the cylinder head. Three other spark plugs are located along the direction of flame travel. These are connected to a source of high frequency current and to an oscillograph. The passage of the flame front ionizes the gases between the electrodes, thus allowing the passage of the current and giving a record on the oscillograph. The firing is also recorded, as well as the pressure-time curve, and the oscillations of a timing fork. In the absence of detonation, the flame travels at an increasing speed, covering the 13 cm. of travel in 0.005 to 0.01 sec. When the engine is made to detonate, the flame reaches the last 2 indicators practically simultaneously. This shows the detonation consists in the spontaneous ignition of the whole mass of unburned gas compressed in front of the flame. G. CALINGAERT

*Detonation characteristics of some aliphatic olefin hydrocarbons.* WHEELER G.

LOVELL, JOHN M CAMPBELL AND T. A BOYD *Ind Eng Chem* 23, 855–8(1931) — The relative knock ratings of 25 aliphatic olefin hydrocarbons in admixt with gasoline have been detd With the $C_6H_{14}NH_2$ equiv as a basis of comparison, the straight-chain olefins showed that (1) in homologous series there is increased knock tendency with increased length of chain; (2) there is a progressive decrease in knock tendency in isomeric series, with centralization of the double bond and (3) tendency to knock is roughly detd by length of the longest satd C chain In branched-chain olefins the tendency to knock decreases upon the introduction of a double bond, both the position of the bond and the branched structure of the mol are important Cf. *C. A* 25, 1367. J L Issex

The behavior of antiknocks. A EGERTON AND L M PIDGEON *Nature* 127, 591(1931) —$PbEt_4$ is introduced into an evacuated vessel which is then heated to 295°. A charge of $C_6H_{14}$ and air is then introduced and exploded The $PbEt_4$ does not slow down the explosion and may even accelerate it. If the expt is repeated in the presence of a small quantity of air, the well-known retarding effect of Pb is observed, showing that Pb must be oxidized before it becomes an effective inhibitor G CALINGAERT

A study of the knock in internal-combustion engines. L AUER *Forsch Geb Ingenieurw*, Ausgabe B 2, *Forschungheft* 340, 18 pp (1931) —After a review of the literature, A describes his own expts The engine used is a single-cylinder, 4-cycle, water-cooled, valve in-head Baumann-Muenchen engine, 6 h p, 165 mm bore, 180 mm stroke and 320 r p m The compression ratio is varied from 3 6 to 10 1 by varying the length of the connecting rod Two types of knock indicator are used The 1st is derived from that described by Polster (*Forsch Arb Geb Ingenieurw* 172(1915)). This instrument, which is bolted to the underside of the piston, functions through the acceleration imparted to the piston by the knock. It comprises an "accelerometer," which is held in position by a spring, and an adjustable electromagnet By varying the exciting current of the magnet, it is possible to balance the force so that the mass is just deflected from its normal position by each detonation This slight deflection is detected by the breaking of an elec. contact The actual intensity of the knock, expressed in kg /sq cm, is calcd from the mass of the piston and the accelerometer and the force of the spring and the magnet The time of its occurrence is detd by recording the time of breaking of the contact The 2nd knock indicator has a small piston, the head of which is brought flush with the wall of the combustion chamber The piston is held in position by a strong spring The tension on the spring is adjusted to balance the pressure of the knock, thereby preventing a deflection of the piston The pressure is calcd from the known balancing pressure which holds the piston in position The fuel used is "Dapolin" gasoline of d. 0 711 The curves of "intensity of knock" and of "time of occurrence of knock" versus air-fuel ratio pass through a max and a min, resp, around the point corresponding to the theoretical air-fuel ratio With a compression ratio of 6 1, 10° spark advance and 310 r p m., the following typical data give successively the air-fuel ratio (by wt.), the intensity of knock (kg /sq cm), the time of knock (degrees of revolution after the top dead center) 10.8, 2 66, 33 5, 14 4, 7 46, 19 9, 15 7, 2 63, 46 0 At 6 1 compression and 310 r p m, advancing the spark from 0 to 20° increases the intensity of the knock from 0 75 to 6 74 kg /sq cm, while the time of the knock advances from 69 8 to 17.3° after the top dead center. At 6 1 compression and 10° spark advance, varying the speed from 205 to 336 r p m. decreases the knock from 8 61 to 2 86, while the time of knock is retarded from 21 6 to 34 6° after the top dead center Recalcd in sec. instead of r p m, the latter data show a practically const lapse of 0 022 sec. between ignition and detonation, irrespective of the speed The greatest effect on detonation is shown by the variation of the compression ratio At 296 r p m. and 15° advance, ratios of 5, 6 and 7 to 1 give intensities of 5 12, 7 19 and 24 08, resp, with corresponding times of 34.3, 21 2 and 14.2° after the top dead center At 6 1 compression, 10° advance, 310 r p m, air intake temps of 23, 49 and 74° give intensities of knock of 1 69, 2 56 and 6 50, resp, with corresponding timings of 45 9, 26 3 and 24 6° after the top dead center Finally, the knock was found to be unaffected in intensity and timing by variations in intake manifold pressure from 44 to 58 cm of water A comparison of these results with published data on the rate of flame propagation in explosive mixts led A to believe that detonation is caused either by an explosion wave or by the spontaneous explosion of the unburned gases compressed adiabatically by the flame front G. CALINGAERT

Improved bearing lubrication. HENRI BRILLIÉ *Bull soc encour. ind nat.* 130, 95–108(1931) —Lubrication of bearings by oil under pressure results in decreased power consumption and metal wear L. W. T. CUMMINGS

Extracts obtained in the manufacture of ethereal oils from conifers. P. A BOBROV. *Trudui Vyatskii Nauch Issledovatelskii Inst Kraevedeniya* 4, 76–86(1928) —The mixt.

under investigation is a by-product in the manuf of fir-tree oil obtained by treatment of conifers with steam It is sol in water and has marked tanning qualities After hydrolysis continued for 80 hrs ether extd from this soln. phenols, catechol and a solid of sweet taste The rest of the aq soln gave reactions of aldehydes, reacted with phenylhydrazine, reduced Ag and Cu salts, was optically active and was sweet in taste. It is regarded as a carbohydrate. From results of detns of carbohydrates with Fehling soln it was concluded that its liberation from a higher complex is due to hydrolysis Another product of hydrolysis was a ppt from which ether extd. phenols (catechol and resorcinol), acids (protocatechuic and gallic) and a neutral substance The tanning qualities of the exts were tested by reactions with lead acetate, gelatin and glue and powd hide As the results showed tanning qualities of the catechol group, actual tanning of pieces of hide was undertaken by shaking them with 0 2–4% solns of the tanning substances, treatments with hot water and 5% AcOH showed successful tanning J G TOLPIN

Recovery of organic nitrogen by dry distillation of agricultural waste. V. DIEGO. *Afinidad* 10, 97–101(1930) —$NH_3$ was obtained in 2 7% yield, together with tar, charcoal, AcOH and MeOH B C A

Excoecaria agallocha as a source of power alcohol. HIRENDRA KUMAR SEN, SINDHU BHUSAN GHOSH AND PATIT PABAN PAL *Proc 15th Indian Sci Cong.* 1928, 163 —*The sawdust from Excoecaria agallocha, which grows abundantly in Sundarban* tracts and is now being used plentifully for the match industry and for making cheap packing cases, was investigated While with most species previously examd 22 24% of reducing sugar was the max production after hydrolysis by Simonsen's process, namely, digestion with very dil $H_2SO_4$ under 9 atm pressure, the yield of sugar was about 40% of the wt of dry sawdust with *Excoecaria agallocha* Of this about 70% was readily fermentable, giving approx 30 gal of abs alc , a figure practically double that which was obtained in the past. With appropriate figures of cost, a gal of abs alcohol from *Excoecaria agallocha* would work out at 6 05 annas Given a continued supply of this wood, there is thus an excellent prospect of a power alc industry in the province of Bengal. E J C.

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The utilization of waste wood (SCHMID) 23. "Liquid rosin" and its possible uses (SCHMID) 23. Rayon oils (MULLIN, CALDWELL) 23. New compounds of Ti (GARDNER, BIELOUSS) 10. The use of Al for oil-lease tanks (SCHMIDT, *et al*) 9. Hydrocarbons (Ger. pat. 522,463 and Fr. pat 698,244) 21. Motor fuel (Fr. pat 698,641) 21. Fuel gas for automobiles (Ger. pat 516,850) 21. Hydrogenating coal, etc. (Fr pat 698,425) 21. Oxidizing paraffins, etc. (Ger. pat 522,361) 10. Oil filters (Fr. pat. 697,919) 1. Hydrogenation reactions (Fr pat 698,539) 21. Uninflammable solvent containing hydrocarbons (Fr pat 697,500) 13. Tetraalkyl Pb (U S pat 1,798,593) 10.

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Groznenskii Neftyanik (Grozny Petroleum Worker) (*New journal*). Published monthly by Chechenskii Oblastnoi Soyuz Gornorabochikh i Trest Grozneft, Prospekt Revolyutzii 24, Komnata 33, *Grozny*, U S S R *Vol 1, No 1* appeared in Nov , 1930 Price 3 rubles

TAPP, HARRY F Handbook of Oil Burning. New York Am Oil Burner Assoc. 629 pp

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Tank and breather to prevent loss of vapors from volatile liquids such as petroleum fractions during storage. HAROLD V ATWELL (*to Standard Oil Co of Ind*) U. S. 1,800,043, April 7

"Tube bundle" heat-exchange apparatus for use in refining petroleum oils. CHARLES H LEACH U S 1,709,471, April 7 Structural features

Treating petroleum residues. PIERCE M TRAVIS (to Travis Process Corp) U. S 1,798,341, March 31 For removing solid and semi solid materials from petroleum residues, the residual oil is heated to about 50–55° and centrifuged at this temp and the thus-sepd solid material is conveyed axially in one direction in the sepg zone while the liquid moves in the opposite direction, and the materials are continuously discharged Various details of app and operation are described Cf *C A* 24, 234

Composition for increasing the conductivity of hydrocarbons. WOLF KRITCHEVSKY and ELLIOTT MORRILL Can 309,080, Mar 31, 1931 A compn for increasing the cond. of light petroleum distillate consists of a partially or completely substituted ammonium salt of an aliphatic acid, *e g*, triethanolamine oleate and a solvent. The solvent is not necessarily a petroleum hydrocarbon, it may be propyl alc , ethyl acetate, acetone, etc.

Catalytic cracking of petroleum oils. Ernest B Miller (to Silica Gel Corp). U. S. 1,799,858, April 7. Oil to be cracked is vaporized and there is fed into a stream of the vapor a pulverized catalyst consisting of silica gel and an active material such as one contg Fe and the vapor with the catalyst in suspension is passed through a zone of suitable temp and the catalyst is then sepd. for further use App is described. A similar procedure may be used in catalyzing various other reactions.

Cracking hydrocarbon oil. Carbon P. Dubbs (to Universal Oil Products Co) U. S 1,799,218, April 7. Fresh untreated oil is introduced to one end of a series of externally unheated zones, and is caused to pass successively through this series of unheated zones Progressively higher pressure is maintained on the succeeding zones of the series, and unvaporized oil is taken off from the last zone of the series, and the oil is subjected to cracking conditions of heat and pressure and the heat for this purpose is supplied exteriorly of the zones mentioned After removal of heavier constituents, the heated conversion products are introduced into the zone of the series from which the unvaporized oil is taken off and vapors released from the oil are caused to move through the series of zones countercurrent to the movement of the oil, and a phys commingling of the vapors and oil in each of the zones is effected and vapors which have escaped condensation are removed from the zones of the series into which the fresh oil is introduced and are subjected to a final condensation, and the resulting distillate is collected as the ultimate product of the process App is described Cf *C A*. 25, 587.

Cracking hydrocarbon oils. Gasoline Products Co., Inc. Fr 697,397, May 30, 1930 In cracking hydrocarbons a cold hydrocarbon is injected into the final and hot test portion of the cracking worm to prevent supercracking and an excessive deposition of C, while the injected oil is cracked to a certain degree The injected oil may be of the same characteristic as the oil to be cracked A suitable app is described

Cracking oils. Robert T Pollock (to Universal Oil Products Co). U S 1,799 530, April 7 Oil is passed through a heating zone such as a pipe coil and thence to an expansion chamber vapors are taken from the expansion chamber to a reflux dephlegmator in which they are cooled by a regulatable supply of cool liquid such as water and the remaining vapors are led to a condenser Raw oil is supplied to the condenser to condense the vapors and preheat the raw oil and the preheated raw oil is mixed with the reflux condensate from the dephlegmator and the mixt., free from unvaporized residue, is led under pump pressure to the heating zone (the latter being maintained under substantial superatm. pressure and the expansion zone being under less pressure, as are also the dephlegmator and condenser) Cf *C A* 25, 2279

Cracking oils. Petroleum Conversion Corp. Fr 697,817, June 23, 1930. Petroleum oils are transformed into oils suitable for motor fuel by heating a gaseous vehicle to a temp at least equal to the temp of transformation, passing it into a reaction zone, submitting the petroleum oil to such conditions that it vaporizes without any appreciable cracking and mixing the gas and vapor in the reaction zone to provoke cracking of the vapor An app is described Cf *C A* 25, 2844

Oil-cracking apparatus. Lyman C Huff (to Universal Oil Products Co) U. S. 1,799,234, April 7 Metal walls of oil-cracking app are provided with a metal lining which is made in a plurality of sections, each anchored to the wall at a central point of the section, so that the sections expand from their centrally anchored points Expansion folds formed from a different metal are interposed between and at all sides of the sections

Plant for cracking hydrocarbon oils. Edward E Stewart U S. 1,798,338, March 31 Numerous structural features are described

Hydrocarbon oil purification and refining. Jacque C Morrell (to Universal Oil Products Co) U S 1,799,431, April 7 Oils such as S-contg "cracked distillates" are heated with added metal such as Zn and with glacial HOAc, simultaneously, to convert refractory S compds in the oil

Tube-bundle heat-exchange apparatus suitable for heating hydrocarbon oils. Kenneth B Rus (to Griscom Russell Co) U S 1,798 354, March 31 Structural features

Treating hydrocarbon oils to effect distillation. Jacob B. Heid (to Universal Oil Products Co) U S 1,799,231, April 7. Oil is fed into the portion of an enlarged chamber where vapor sepn takes place, and the unvaporized portion of the oil is caused to have a back and forth cascading descent in the chamber by which the oil is broken up and vapors are evolved Unvaporized portions of the oil are collected as a body in the lower portion of the chamber, and the ascent of released vapors is accelerated by causing them to ascend through passages of successively increased cross-sectional area App is described.

**Use of mercury in distilling hydrocarbon oils.** ARTHUR E PEW, JR. (to Sun Oil Co) U S 1,709,640, April 7. A stream of Hg vapor and a stream of relatively cold liquid oil are flowed into a confined path where they intimately mix and the mixt is passed into a relatively less confined space, the temp of the Hg vapor being sufficiently higher than that of the oil that, by heat exchange and condensation of Hg vapor, a portion of the oil will be vaporized, and the condensed Hg is sepd from the unvaporized oil App is described

**Distillation of hydrocarbon oil.** JOHN S WALLIS (to Foster Wheeler Corp) Can 310,658, Apr 21, 1931 Hydrocarbon oil having a high b p is blended with oil having a lower b p and the mixt heated to a temp to vaporize the lower boiling constituent the partial pressure effect of the vapor so formed is utilized to cause vaporization of the higher boiling constituent, and the vapors are introduced into a fractionating tower and the fractions sepd

**Distilling heavy hydrocarbons.** SOC DES ÉTABLISSEMENTS BARBET Fr. 698,744, Oct 14, 1929 An app is described for distg or cracking very heavy hydrocarbons by bubbling them through molten Pb

**Device for measuring and sampling fluids such as oils in oil fields.** HOLMES H. DYER. U S 1,798,788, March 31 Structural features.

**Oil-shale distillation retort.** CLAYTON O WHITE U S 1,799,268, April 7 Various structural details are described of a retort formed with sections having inclined bottoms over which powd oil shale will pass by gravity

**Converting oils into products of lower boiling point.** CARBON P DUBBS (to Universal Oil Products Co) U S 1,799,413, April 7 An app is described comprising a heating zone such as a pipe system through which the oil is passed and which is connected with inclined vaporizing tubes which in turn are connected to collecting tanks adapted to permit settling of the cracked oil, and connections are provided for drawing off the residual product and for returning the lighter ends to the heating zone for retreatment, and for controlling the relative temps of the heating and vaporizing zones

**Fractionating mineral oils.** ALFRED R EARL and THOMAS W REEVES. U S 1,799,414, April 7 A series of interconnected units such as stills is maintained under progressively varying pressures (some above atm pressure), and an intermediate unit of the series is at atm pressures and some other units are below atm pressure Oils are introduced into the system by means of the sub-atm pressures in one portion of the series of units and superheated steam under pressure is permitted to flow through the first mentioned series of units and to expand in the units under sub-atm pressure, and the pressures of the steam in the different units are utilized to maintain levels of oil at varient altitudes in the unit system, certain fractions are removed from the unit of greatest vacuum Numerous details of app and operation are described

**Colored mineral oils.** PATENT FUELS & COLOR CORP. Fr 698,152, June 27, 1930 Mineral oil (gasoline) or other petroleum distillates are colored in a stable manner by dyes and a stabilizing agent of a colloidal nature which may be a metal compd of a higher fatty acid, *e g*, Al palmitate, Mg oleate, Zn stearate The dyes may be arylated rosanilines, basic triphenylmethanes, indulines, indazines, rhodamines, etc If the dye has a strongly basic nature, an org acid such as stearic acid or benzoic is added if necessary

**Recovery of volatile substances such as gasoline from gases.** HENRY J NICHOLS, JR and ERIC W LUSTER (to Standard Oil Development Co) U S 1,799,619, April 7 A low-pressure still gas or the like is compressed by the expansion of a high pressure gas such as a pressure-still gas and the compressed gas is cooled The gases are mixed at an intermediate pressure, and volatile substances are recovered from the mixed gases App is described

**"Sweetening" gasoline.** HUGH H CANNON (to Cannon-Pritzman Treating Processes, Ltd) U S 1,798,784, March 31 Sulfurous petroleum products are "sweetened" by use of a dry powd reagent comprising PbO, an alk earth metal hydroxide, an alkali metal hydroxide and a porous earth such as diatomaceous earth Cf *C A* 25, 1067

**Working up oxidation products from paraffin, etc.** I G FARBENIND A G (Christoph Beck and Franz Kremp, inventors) Ger 522,055, May 27, 1928 To isolate the acids from the oxidation products of solid hydrocarbons such as paraffin and montan wax, the products are treated with $NH_3$ at atm or raised pressure and with or without simultaneous or subsequent addn of water The acids are thus converted, according to the conditions, into amides or $NH_4$ salts The amides may be freed from unchanged products by extg the latter with petroleum ether The $NH_4$ salts sep out during the

reaction The amides or $NH_4$ salts are converted into acids in known manner Examples are given Cf *C A* 24, 4792

**Treating gas-washing oils.** FRITZ SEIDENSCHNUR. Ger 522,032, June 30, 1925. To sep benzine from heavy oil that has been used to wash the distn. gases of lignite, the heavy oil contg benzine is run on to the surface of a body of benzine free heavy oil heated to 150–200° in a gas heated vessel fitted with a dephlegmator Benzine-free heavy oil is continuously withdrawn from the vessel

**Oil filter.** CHARLES W McKINLEY (to A C Spark Plug Co.) U. S. 1,798,947, March 31.

**"Self-washing" oil filter.** JOE W MORRISON (to General Motors Corp.). U S. 1,798,950, March 31.

**Lubricating oils.** MARTIAL BEGUIER. Fr 698,737, Oct. 14, 1929 Lubricating oils are regenerated during use by adding a small quantity of a homogeneous mixt. of a fixed oil, a fatty acid and a mineral oil

**Lubricating oils.** F HAUSZ. Hung 102,189, May 14, 1930 Addn. to Hung 99,915. Previously neutralized S or S-contg material is added to vegetable or mineral oils by chem or mechanical methods.

**Hydrocarbons of high boiling point range suitable for use as lubricating oils.** RUDOLF WIETZEL, WALTER SPEER and HANS KAEHLER (to I G Farbenind A.-G.) U S 1,798,288, March 31 A mixt of oxides of C and H is subjected to a treatment with a catalyst contg in addn to a metal of group 8 of the periodic system such as Fe and Co, a quantity of an alkali metal compd such as Na having an alky not substantially greater than that of $Na_2CO_3$ and comprising less than 0.5 part (calcd as alkali metal) per 100 parts of the group 8 metal the treatment is effected at temps. of 270–350° and the resulting hydrocarbons of low b. p range are subjected to a treatment under pressure at temps. below 250° in the presence of an inorg anhyd halide having a condensing action such as $AlCl_3$ which when treated with water causes strong evolution of heat

**Purifying mineral insulating and lubricating oil.** FRANK M CLARK and ARTHUR T HARDING (to General Elec. Co.) U S 1,798,968, March 31 Oil contg dissolved impurities such as that used in elec transformers is extd with tricresyl phosphate to remove the impurities Cf *C A* 24, 5477

**Lubricating greases.** JOSÉ DOBÓN Fr 697,770, June 21, 1930. Olive oil residues from olives, etc., are neutralized by means of a virgin rosin and a carbonate or lime.

**Hydrogenating oils.** STANDARD OIL DEVELOPMENT CO Fr 697,524, June 16, 1930 Lubricating oils are prepd by submitting a heavy hydrocarbon oil to a treatment with H under a pressure above 25 kg and at a temp above 371°, the formation of oil boiling below 204° being limited to below 20% of the amt of oil charged, so that the impurities of the oil are eliminated or rendered inoffensive. An app is described Cf *C A* 25, 808

**Hydrogenating oils.** STANDARD OIL DEVELOPMENT CO Fr 697,724, June 20, 1930 Lubricating and other oils are prepd by submitting heavy hydrocarbon oil to the action of a gas rich in free H, at a high temp (371–454°) and under high pressure A part of the oil in the liquid state is withdrawn and the pressure of the withdrawn part reduced so that a large proportion is vaporized The vapor is separately condensed An app is described

**Condensation products.** I G FARBENIND A.-G Fr 697,700, June 20, 1930. Condensation products, which are either *lubricating oils* or *resins* are made by condensing satd or unsatd fatty oils or waxes contg OH groups with colophony or other resin acids.

**Bitumen.** SIEGFRIED HAMBURGER. Fr 698,081, June 26, 1930 Bitumen is produced from the acid and resinous by-products obtained in the refining of crude oil and oil residues by heating them to 80–100° and allowing them to stand until 3 layers are formed, the lower being $H_2SO_4$ the next bitumen and the top oil

**Emulsion of tar or asphalt.** HUGO NOVÁK. Fr 698,554, June 30, 1930 In emulsifying tar or asphalt, org compds contg one or more atoms of Cl in the mol such as $CCl_4$, $C_6HCl_5$, chloronaphthalene or Cl derivs of oils are used as emulsifying agents in addn to the usual stabilizing and emulsifying agents such as glue, casein, resin and naphthenic acids.

**Deodorizing and decolorizing wood-distillation oils.** DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM ROESSLER (Wilhelm Querfurth inventor) Ger 522,254, Mar 4, 1927 The oils are vaporized and passed with H, at a temp. above

conclusion drawn by Bréguet from the study of fractional pptn. of such solns (Thesis, Lyon, 1924, p 93) Other investigators who studied the fractionation of cellulose esters by ultrafiltration do not mention the $H_2SO_4$ contents of the products with which they worked Specifications of max limits for total sulfate and ash are entirely inadequate to insure proper quality of cellulose acetate, it is essential to specify a min. decompn. point (*C A* 19, 171), which should preferably be not below 195°. When the decompn point is specified, total and neutralized sulfate are of secondary importance, as the decompn point depends directly on these 2 values. The max total $H_2SO_4$ content of 0.6% in cellulose acetate specified by the Fr aeronautical service is practically meaningless, as cellulose acetate with this $H_2SO_4$ content can be highly unstable, and moreover cellulose acetates are being produced commercially which contain as little as 0.05% $H_2SO_4$ and 0.2% ash The normal water content of cellulose acetate at 15° at a relative humidity of 50% is about 6% In the detn of Ac by sapon with excess alkali and back titration with acid, the error introduced by the presence of $H_2SO_4$ is negligible in finished acetates, in the investigation of the mfg and aging processes, in which total combined $H_2SO_4$ frequently reaches 2–3% and even more, the error is quite large and would lead to the conclusion that the Ac content decreases, contrary to C 's results (*C. A* 19, 171) Previous results have shown that nitrocellulose and cellulose acetate are easily washed free from acid, and the apparent difficulty reported by various authors is due to slow hydrolysis of the sulfocellulose esters in the presence of water, with liberation of free $H_2SO_4$. A sample of com. nitrocellulose taken immediately after nitration was divided into 2 portions, one was stabilized by washing 8 days in hard water (Rouen city water) (*C A* 18, 3715) and contained 1.113% $H_2SO_4$, the other was stabilized by prolonged boiling in $H_2O$ contg a trace of HCl and contained 0.17% $H_2SO_4$ They were subjected to the same fractional pptn. treatment, 400 cc. of a 5% $Me_2CO$ soln was used with the following results

| | Nitro contg 1.113% $H_2SO_4$ | | Nitro contg 0.17% $H_2SO_4$ |
|---|---|---|---|
| | Wt. of ppt | $H_2SO_4$% | Wt. of ppt. |
| Addn of 140 cc. of 50% $Me_2CO$ | 4.8 g | 0.503 | 14.0 g |
| Addn of 30 cc. distd $H_2O$ | 7.4 | | 5.4 |
| Addn. of 20 cc distd. $H_2O$ | 2.7 | 1.114 | 0 |
| Addn of 50 cc. distd $H_2O$ | 0 | | 0 |
| Residue on evapn | 5.1 | 1.536 | 0.6 |

These results show conclusively that, if the combined $H_2SO_4$ is not the controlling factor in the fractional pptn of nitrocellulose, it plays a very important part. Though these results are the reverse of those obtained by Bréguet (Thesis) they do not necessarily contradict them, as B used $C_6H_6$ to ppt. $Me_2CO$ solns of celluloid. A P C

Cellulose acetate and its production in Russia. Carl Peters. *Kunststoffe* 21, 85–9(1931).—Although the production of cellulose acetate elsewhere amounts to thousands of tons annually, the Russian industry is still in the early exptl. stages J. W. Perry

Effect of neutral salts on the rate of hydrolysis of cellulose acetate in acetic acid solutions. J. T. Fuess and C. J. Staud *J. Am Chem Soc* 53, 1934–41(1931).—The Na and K nitrates, sulfates and chlorides appear to exert a retarding influence on the rate of sapon of cellulose acetate dispersed in AcOH A greater effect was observed when nitrates and sulfates were used than when chlorides were employed Addn of neutral salts after the reaction had proceeded for 42 hrs showed an effect similar to that noted when they were present at the beginning of the sapon C. J. West

Cellulose furoate. Kenneth A. Kobe and Ralph E. Montonna. *J. Am Chem Soc* 53, 1889–91(1931).—Cellulose di and tri furoates have been prepd by treating standard cellulose with furoyl chloride in the presence of $C_5H_5N$ The esters were fibrous, dark colored and insol in the usual solvents for cellulose esters A considerable degradation of cellulose takes place during the reaction with the production of furoylated degradation products of cellulose which are black amorphous substances. The analysis of cellulose trifuroate by sapon. shows very clearly the fundamental difference of 2 of the alc. HO groups in the hexose residue from the third or primary HO and thus confirms the present accepted structure of the hexose residue. C. J. West

Note on the cellulose amyloid. Justin Mueller *Bull soc. chim.* 47, 1400–4(1930).—When cellulose is treated with $H_2SO_4$ (sp gr 1.58) and the resulting soln. dild., an amyloid seps in finely divided form. This amyloid gives a blue color with I, is sol in alkali, coagulates on drying, and does not reduce Fehling's soln. When dry it is less reactive than when wet On these grounds it must be differentiated from hydro-cellulose and starch R. H. Doughty

**The highest degree of nitration of cellulose.** G DE BRUIN *Z. ges Schiess-Sprengstoffw* 26, 81(1931), cf *C A* 25, 1671 By means of a process which he is not yet willing to describe, de B has prepd nitrocellulose of any desired degree of nitration from 2 to 14% N He believes the highest nitration product to be a homogeneous product It is not decompd by boiling water nor by very dil acid or alk solns Its soly in $Et_2O$ + EtOH is less than 2% C G STORM

**The structure of nitrated cellulose. I. The swelling and disintegration of ramie cellulose in nitrating acids.** FRANK D MILES AND MAURICE MURPHY *J. Phys Chem* 34, 2588-2600(1930) Ramie fibers were nitrated to N contents ranging from 2 to 12% with various mixts of $H_2SO_4$ and $HNO_3$, the latter at various dilns Phys changes occurred at a N content of 7.5% which were probably assocd with some structural change of the nitrated cellulose The phys changes appear to depend on N content rather than the acid compn II **The x-ray examination of nitroramie.** FRANK D MILES AND JAMES CRAIK *Ibid* 2607-20 The x-ray diagrams of nitroramie contg up to 7.5% N were identical with that of cellulose, which is possibly due to intermicellar nitration A N content of 7.5 to 10.4% resulted in phys disintegration of the fibers and indefinite diffraction but the parallel arrangement of the chains in the nitrated structure was thought to persist since the regenerated cellulose was of an ordered form At 10.3% N the stage of internal disorganization is passed at 12.7 or 12.8% N there is a discontinuity and after this the comparatively definite trinitrate is reached I A S

**The structure of nitrocelluloses.** DESMAROUX AND MATHIEU *Compt rend* 192, 231-6(1931) X-ray diagrams of cotton cellulose nitrates contg 11.35-13.9% N all showed distinct circles of diams indicating reticular distances of 6.6 to 7.5 A U, the increase being regular The trinitrate showed 2 intense circles corresponding to reticular distances of 4.5 and 4.0 A U resp The product with less than 13.0% N showed 2 larger circles of lesser intensity, the one contg 12.10% N having 2 concentric uniform regions which met An examn of the products by means of the polarizing microscope showed that the coloration of the fiber surfaces was that of a trinitrate whereas the interior was characteristic of a lower nitrate, indicating heterogeneity *Ibid* 354-5 —When Müller diagrams of long chain paraffins, indicating that the different reticular planes admit of considerable variation in arrangement in respect to variation in temp, were compared with those of D and M, evidence of an anisotropic structure of nitrocellulose was observed The interior circle of the Debye Scherrer diagram of nitrocotton of 13.0% N corresponds to the intense equatorial spots near the center of nitroramie, such spots caused by reticular planes not coinciding with the periodicity in the fiber It is such a family of planes whose distribution remains periodic when the % of N is varied and which suddenly disappears when the nitrocellulose passes to the amorphous state. P. A SIMMONDS

**New lever-acting presses for working celluloid** A HAHLS. *Kunststoffe* 21, 73-5 (1931), cf *C. A.* 24, 6000 J. W. PERRY

**New investigations on viscose.** HANNS SCHMIDT. *Kunststoffe* 21, 80-81(1931), cf. *C A* 24, 3042 J W PERRY

**Production of viscose rayon with high tensile strength.** HANNS SCHMIDT *Chem-Ztg.* 55, 265-7, 280-8(1931) —A review FOSTER DEE SNELL

**The production of viscose artificial silk.** D L PELLATT. *Textile Manufacturer* 55, 275-6, 312-3, 314-7, 307-9, 443-5(1929), 56, 31-3, 52-3, 103, 110, 137-8, 177, 188, 214-7, 257-9(1930) —Many details of the methods of mfg viscose rayon are discussed CHAS. E. MULLIN

**Some factors in the prospects for staple fiber rayon.** D. L. PELLATT. *Textile Manufacturer* 55, 435(1929) —An address CHAS E. MULLIN

**The hollow rayons and synthetic yarns.** CHAS E MULLIN AND FLORENCE H CADWELL *Textile Colorist* 52, 317-9(1930), cf *C A* 23, 5316, 24, 4150 —A review of the patents covering the manuf of the hollow yarns CHAS E. MULLIN

**Rayon oils. II.** CHAS E MULLIN AND FLORENCE H CADWELL *Textile Colorist* 52, 375-8, 414(1930), cf *C A* 23, 1500 —A description of the oils for, and their application to, the synthetic yarns, with a review of the literature and patents C E M.

**Effect of mild heat treatments on the chemical composition of wood.** L. F HAWLEY AND JAN WIERTELAK *Ind Eng Chem* 23, 181-6(1931) The chem characteristics of samples of white ash and Sitka spruce wood were detd before and after heating in closed tubes at 138° for 2, 4 and 8 days Losses of pentosans and AcOH occurred in the ash wood whereas in the Sitka spruce the losses were hexosans and stable cellulose The methoxyl content of both woods was practically unchanged Indications of a change of carbohydrates to a lignin like substance were observed P. A. SIMMONDS

**The utilization of waste wood.** W SCHMID *Papier-Fabr.* 29, Tech.-Wiss. Teil

84–5(1931).—The combination of chem. softening and mech. disintegration, for making coarse pulps, is considered. R. H. Doughty

Purified wood fiber. I. Physical and chemical properties. Geo. A. Richter *Ind. Eng. Chem.* 23, 131–9(1931).—Various tests used to characterize paper pulps are described and interpreted. Certain chem. constants of 51 samples representing 11 kinds of pulp are reported. II. Paper-making characteristics of wood fiber high in α-cellulose. *Ibid* 206–72.—The nature of the hydrate gel formed when cellulosic material is mechanically processed in the presence of water depends on the chem. characteristics of the unprocessed material. A wood pulp of high α-cellulose content hydrates slower than ordinary sulfite pulp and yields a paper of higher resistance to tearing and folding. The strength of a sheet is ascribed to an interfelting of the fibers plus the cementing effect of the hydrate gel. Hydrated wood pulp of high α-cellulose content produces paper of quality about equal to paper made from the better grades of rag stock. F. A. Simmonds

A contribution to the technic of fiber measurement. Bruno Schiller *Paper Fabr.* 29, Tech.-Wiss. Teil 4–5(1931).—A simple projection microscope and a method of sampling for making slides are described. The prepd. fibers are collected on an 80-mesh or finer wire cloth, and a small portion is transferred to the slide with a needle. Lifting fibers directly from dil. suspension with a needle results in loss of fines, while if a pipet is used the sample is unduly enriched in short fibers. R. H. Doughty

Chemistry of Australian timbers. W. E. Cohen and H. E. Dadswell. *J. Council Sci. Ind. Research* 4, No. 1, 45–8(1931).—A research project is outlined. For eucalypt Australian woods, the usual methods of wood analysis had to be modified because of their resistance to the action of Cl used in sepg. cellulose. These woods need a much longer treatment than usual and the cellulose appears to be greatly disintegrated. The repeated chlorinations cause the cellulose to become gelatinized by the subsequent alkali treatment and it cannot be filtered. The α-cellulose detn. is of value in detg. the suitability of the cellulose for the manuf. of rayon and cellulose lacquers. Chem. analysis is the only means of positively differentiating jarrah and karri. The former shows 38.8–52% cellulose while the latter yields 55.7–63.7%. It is hoped similarly to differentiate hoop pine and bunyah pine. Lignin results are often high because the $C_6H_6$-alc. mixt. which is used for extn. leaves behind some of the extraneous materials frequently present in woods. These substances contaminate the lignin and vitiate the results. C. R. Fellers

The penetration of water vapor into wood. L. M. Pidgeon and O. Maass. *Research Notes* 3, 47–50(1930); *Pulp Paper Mag. Can.* 31, 530–3(1931).—See *C. A.* 24, 4155. A. Papineau-Couture

Wood-pulp evaluation for soda pulp manufacture. II. W. Morgan. *Paper Trade J.* 92, No. 15, 51–2(1931).—*The importance of careful control of the quality of soda pulpwood and the present methods of grading are briefly discussed. The technic of the 1% alkali soly. test has been modified to give more uniform heating (resulting in slightly higher temp.), which gives more reproducible, though somewhat higher, results. From the results of evaluation of aspen wood by phys. and chem. methods, the relation of the yield to the 1% alkali sol. material was expressed graphically. It is estd. that an increase of 1% in alkali sol. material is accompanied by a decrease of 3% by wt. in the pulp yield.* The effects of decay on the compn. of wood are discussed and the relation of these effects to the pulp yield is pointed out. A. Papineau Couture

The growth of molds on sulfite pulp, the consequent fiber degradation and cellulose decomposition. Walter Drechsel. *Papier-Fabr.* 28, Tech.-Wiss. Teil 709–13, 739–46, 848–54(1930); 29, 5–9(1931).—The method generally used in studying this problem is to follow the wt. changes on decompn., which fails to show the mechanism of fungus attack. The presence of nutrient media may also lead to incorrect conclusions. D. followed the decompn. microscopically, and later by the rate of evolution of $CO_2$. The behavior of 15 molds toward sterile bleached and unbleached sulfite pulp was studied, at 650 magnification, special technic being used. The results, which are copiously illustrated, showed that all the molds tried attacked both pulps, but in different ways. In certain cases, and at certain stages of decompn., the fibers appeared as if swelled in peptizing media, the end result in all cases was a structureless mass. Lignin and other impurities in unbleached pulps seemed to serve as nutrients. Humin substances were formed, especially from the more lignified pulps. It was found that the molds are not anaerobic, and cannot exist solely on the O content of the cellulose. It was possible to control conditions in the lab. so that the lignin decompn. was greater than the cellulose decompn., but the results hold no promise of a successful process for *isolating pure and strong fibers* by biological decompn. of lignocellulose. While most

pulp in storage may be attacked by molds if special care is not taken to prevent infection, the attack will be localized since in the absence of special nutrient media the molds cannot propagate greatly Though the weight loss is small, the strength loss may be large, because of the nature of the attack on the fibers A bibliography of 60 items is appended R. H Doughty

**Description and historical development of the manufacture of sulfite spirit from waste pulp liquors in Germany during the war period 1914-18.** Walter Sembritzki. *Papier-Fabr* 29, Tech -Wiss Teil 69–74, 85–92(1931).—Methods, operation and costs are reviewed R. H. Doughty

***Review of patents on the use of waste liquors and gases of the pulp industry, for the period 1925-30.*** W Schmid *Papier-Fabr* 28, Tech -Wiss. Teil 573–5, 587–90, 620–3, 636–9 671–2, 727–9, 744–6, 875–7(1930), 29, Tech -Wiss Teil 10–4(1931) R. H Doughty

**The galvanic behavior of a chromium-nickel-iron alloy in sulfite liquors.** W Andrew Wesley and F L LaQue *Paper Trade J* 92, No 16, 56–61(1931) —Cr-Ni Fe alloy can function as cathode in galvanic couples in neutral and in acid solns without destruction of the surface film which renders it passive in these electrolytes Mech and other disturbances of the surface of this alloy rendered it active, at least temporarily in which condition it behaved more nearly like Fe than like a noble metal Fe coupled with Cr Ni Fe in $Na_2SO_4$ soln suffered just the same amt of galvanic corrosion as it did when coupled with Pt In sulfite liquors, freshly surfaced Cr-Ni Fe behaved erratically for a time, but always tended to become passive, to behave like a noble metal and to remain in that condition until its surface was again abraded The behavior of couples in which a valve bronze was connected with the alloy or with Pt *indicated that the corrosion process was different in tower acid from that in reclaimed* acid The test conditions were somewhat different from plant conditions in that these solns were satd with $SO_2$ at 50° and atm pressure In reclaimed acid the corrosion of valve bronze was accelerated to the same degree when it was coupled with Cr Ni-Fe as with Pt, indicating that the corrosion process involved to a predominating extent the reaction of some depolarizing agent active in this soln In tower acid the corrosion of valve bronze was accelerated much less by coupling it with Fe alloy than by coupling it with Pt A similar result was obtained in pure dil $H_2SO_4$ soln The discrepancy is thought to be the result of a difference between the H overvoltages of the 2 cathode surfaces A Papineau Couture

**"Liquid rosin" and its possible uses.** W. Schmid. *Papier-Fabr.* 29, Tech -Wiss Teil 1–4(1931) —Quality and compn of the liquid rosin that separates from alk pulp waste liquors varies with the process and the wood used An av yield is 30 kg. per ton of pulp made Purification and uses of this material are described The phytosterol, present up to about 2%, is of increasing importance R H Doughty

***Process water in the pulp and paper industry.*** A. Splittgerber *Papier-Fabr.* 29, Tech -Wiss Teil 81–4(1931) —The impurities of water and their removal from boiler feed, washing and cooling water are described R H Doughty

**White water in paper and pulp mills and its utilization.** R. J. Marx *Trans Inst Chem Eng*, Advance copy, Dec., 1930, 24–9 —White water is the effluent from the passage of the aq suspension of fiber over a close meshed wire in a paper machine. Settling methods for fiber removal were used first, but these are mostly of low efficiency An early power driven machine employed an endless belt traveling over a wire-covered drum The Dorr save-all consists of a vertical tank with horizontal trays connected close to the vertical shaft, which carries one scraper in each chamber The Oliver save-all is a horizontal revolving cylinder with a wire screen in which the deposited fiber forms a filtering medium It has oscillating rakes and works under suction M prefers a gravity settler, in which the water is allowed to fall as drops on to a distributing surface The impacts cause the sepn of entrained air from the fiber, which thereafter settles readily in a large conical tank with bottom discharge for solids B C A

***History of paper-products manufacture.*** H Raff. *Kunststoffe 20*, 272–5(1930) E J. C.

**Chemistry and paper making.** M. Brot. *Chimie & industrie* 25, 480–7(1931).—A general discussion of the importance of chemistry in the various pulp- and paper-making processes A Papineau Couture

**Copper-pipe advantages in the paper industry.** Charles A. Hill and Leland T. Summers *Paper Trade J* 95, No 16, 61–2(1931) —A brief discussion is given of the advantages of Cu over other metals for piping in pulp and paper mills Its use has been rendered quite practical and economical by the development of stream line hard Cu

pipe and fittings which is made threadless and designed to make a conveniently soldered connection to thin wall Cu pipe A. PAPINEAU COUTURE

**Preparation of paper-making materials. I. Rags, esparto, wood pulp.** J. P. BARBOUR. *World's Paper Trade Rev* 95, 1115, 1120, 1129(1931).—A brief discussion, based on 60 yrs.' practical experience, of the prepn of rags, esparto, straw and wood pulp, more particularly as regards boiling A. PAPINEAU-COUTURE

**Methods of determining acidity in paper.** P. F. WEIMER, *et al.* *Paper Trade J.* 92, No. 16, 63–4(1931).—Report of the Technical Assoc. of the Pulp and Paper Ind. subcommittee on paper testing chem. methods. Thirteen labs. have agreed to coöperate in an investigation carried out on 6 different grades of paper by 5 different methods (which are described) including 2 $p_H$ methods (electrometric and colorimetric) A. P.-C.

**The use of liquid chlorine in the preparation of bleach liquors.** H. R. J. FEENY *World's Paper Trade Rev* 95, *1092–6, 1154, 1156(1931).*—*After a brief outline of the* advantages of liquid Cl its use for the chlorination of bleaching powder and of milk of lime in paper mills is briefly outlined. A. PAPINEAU-COUTURE

**The volumetric composition of paper. I. Permeability of paper to air.** T. TREVOR POTTS. *World's Paper Trade Rev* 96, 1257–60, 1330(1931).—After a brief discussion of the primary requisites for permeability measurements, the effect of changing conditions of testing on the rate of flow of air through paper was studied. The rate of flow is proportional to the area of the sample, provided that it is not so great that, in papers of low permeability, it will be slightly modified at the pressure required to obtain flow of air through the paper. For all practical purposes, the flow is practically proportional to the pressure difference between the 2 sides of the sample. No change in rate of flow occurs with time. The rate of flow is proportional to some power of the thickness, the numerical value of the power varying according to the sample of paper tested. This is taken as exptl. proof that the inter fiber spaces of paper are not simple capillaries, and that the thickness of the sample should not enter into the expression of permeability until more is known about its meaning. A. PAPINEAU COUTURE

**Can the bursting pressure for a [paper] test area of any size be calculated if it is known for one area?** G. BIERETT AND BRUNO SCHEELER. *Wochbl. Papierfabr.* 61, 1652–5(1930). *Papier Fabr.* 29, Tech.-Wiss. Teil 231–5(1931).—The relation $p/P = (f/F)^{1/x}$ was found to hold, the value of $x$ lying between 1.6 and 1.8, with the value 1.7 giving satisfactory approx. results in all cases. In the formula, $p$ and $P$ are the bursting pressures for the areas $f$ and $F$. In a perfect homogeneous material, $x$ should equal 2. The formula fails for very weak papers because of the exptl. error in detg. small pressures. R. H. DOUGHTY

**Grease resistance of paper.** ROGER C. GRIFFIN. *Paper Trade J.* 92, No. 15, 44–51(1931).—Results of a collaborative study of the turpentine penetration test and the red oil penetration test, applied to greaseproof paper and vegetable parchment, are reported. It is recommended that paper be first tested in a preliminary way by the turpentine penetration method using 4 sep. pieces, and that, if the av. result of this test is less than 5 min., the paper be tested by the red oil penetration method. Adoption of both methods (the technic of which is described in detail) as tentative standard methods by the Technical Assoc. of the Pulp and Paper Industry is recommended. A method proposed by Ernest Scheller, which is based on the no. of transudations per unit there are in a definite period of time and the technic of which is described, will be studied. A. PAPINEAU COUTURE

**Newsprint: control and tests.** RAYMOND FOURNIER. *Papeterie* 53, 350–61 (1931).—A discussion is given of the advantages to be derived by newsprint users, particularly large dailies, from the control of the paper purchased with an outline of the principal tests and the instruments required. A. PAPINEAU COUTURE

***Manufacture of insulating board from cornstalks.*** O. R. SWEENEY AND W. E. EMLEY. *U. S. Bur. Standards, Miscellaneous Pub.* No. 112, 27 pp. (1930).—A description is given of the exptl. work at Iowa State College on the manuf. of cornstalk insulating boards, including lab. scale and semicom. expts. Both chem. and mech. methods were used. The boards produced appeared to have the same properties as boards from other sources. A statistical survey of the quantity, distribution, value, etc., of cornstalks is given and cost data are presented in pointing out the possibilities of cornstalks in board production. M. HEINIG

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X ray study of the gelatinization of nitrocellulose (DESMAROUX, MATHIEU) 2. Plastic materials (Fr. pat. 698,321) 18.

Hess, Walter F.: Die Praxis der Papier-verarbeitung. Berlin: M. Krayn. 256 pp

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**Cellulose.** Aktieselskapet Raoul Pictet & F. Tharaldsen. Fr. 698,338, July 3, 1930 Cellulose is obtained by treating wood, etc., with a lye contg a much larger amt of free $SO_2$ than in the usual "bisulfite" process, less lye being used than is necessary to recover entirely the primary material treated

**Cellulose derivatives.** I G Farbenind. A.-G. (Max Hagedorn and Eugen Gühring, inventors). Ger 516,882, Apr. 18, 1929 The derivs are recovered from their solns by pptn with steam or vapor Thus, a soln of cellulose laurate, in PhCl, pyridine and pyridine-HCl is treated with steam at 120° The cellulose laurate is pptd as a fine powder and can be sepd by centrifuge or filtration A soln of cellulose nitrate in MeOH is treated with $C_6H_6$ vapor to ppt the cellulose nitrate Further examples are given

**Alkylcellulose masses.** I G Farbenind A.-G (Gerhard Balle and Kurt Sponsel, inventors) Ger 516,751, Aug 14, 1925 Masses or objects are prepd partly or wholly of aq sol alkylcellulose by pressing layers or plates of this substance on one another with simultaneous treatment with water, moisture or aq solns

**Benzylcellulose.** I G Farbenind A.-G (Eduard Dörr, inventor). Ger. 522,170, Aug 18, 1925 See U. S. 1,771,529 (*C. A.* 24, 4631)

**Cellulose acetates.** I G Farbenind A.-G. Fr 698,392, July 4, 1930 Primary acetates of cellulose sol in acetone are prepd by acetylating monohydroxyalkyl ethers of cellulose with $Ac_2O$, AcOH and a catalyst at a temp below that at which hydrolysis takes place

**Cellulose esters.** Kodak Pathé Fr 698,689, Oct. 7, 1929 In making cellulosic esters the diluting reaction acid is replaced wholly or in part by a solvent for primary esters of cellulose, particularly $CH_2Cl_2$ A reflux app is used

**Treatment of cellulose esters.** Camille Dreyfus and Clifford I Haney (to Camille Dreyfus) Can 309,756, Mar 24, 1931 Cellulose acetate that has been prepd by the reaction of cellulose with $Ac_2O$ in the presence of $H_2SO_4$ is purified by sepg it from the primary soln. in which it is formed, dissolving in AcOH and then adding $Ba(OAc)_2$

**Cellulose ethers.** I. G Farbenind A.-G (Gerhard Balle and Karl Ost, inventors) Ger. 522,054 Feb 11, 1928 Cellulose ethers insensitive to water are prepd by treating metal compds of cellulose with an excess of an alkylating agent contg up to 2 mols of an aralkyl halide for each 10–30 mols of alkylating agent The reaction is effected under such conditions of temp and pressure that sapon of the excess of alkylating agent is avoided Thus, an alkali cellulose prepd from 1 mol of cellulose ($C_6H_{10}O_5$) may be heated with EtCl 14 and $PhCH_2Cl$ 1 mol to 110–120° in a pressure vessel Cf *C. A.* 25, 1379

**Carbohydrate ethers.** I G Farbenind A.-G (Otto Leuchs and Eduard Dörr, inventors). Ger. 522,171, Nov. 7, 1923. See Fr 684,330 (*C. A.* 24, 5496)

**Nitrocellulose.** Fredrich Olsen. U. S 1,798,270, March 31. Cellulose is nitrated, pulped and then alternately boiled and washed in water, in order to effect purification.

**Dissolving and dispersing nitrocellulose.** William B. Pratt and Ralph T. Halstead (to Dispersions Process Inc) Can 311,079, May 5, 1931 Cellulose is dissolved in wood creosote and a hydrophilic colloid incorporated therein and water is gradually added until a change of phase takes place and the nitrocellulose soln disperses as minute particles in the aq medium

**Use of cellulose compounds such as celluloid solutions for sealing joints between watch crystals and bezels.** Warren F. Bleecker. U. S 1,799,146, April 7.

**Films.** Kodak-Pathé Fr 698,727, Oct. 12, 1929 In making films from cellulose derivs the sheet of collodion is submitted, during the formation of the film, and particularly before solidification, to a drawing in the direction of its breadth to avoid the formation of wrinkles or creases The drawing may be by bands of fabric on the edges of the sheet which they accompany into the bath guiding it to the roller

**Artificial silk.** Hölkenseide G m b H Ger 522,469, Nov. 17, 1928 See Fr 684,658 (*C. A.* 24, 5497).

**Artificial silk.** Henry Dreyfus. Fr. 697,427, June 14, 1930. Artificial threads or filaments are made by extruding a spinning soln of cellulose acetate or other cellulose deriv. into an evaporative medium in which an external skin-like layer is formed on the threads The threads are passed into an atm of solvent vapor in which the external

layer is softened, and then drawn The drawing is limited to the part of the filaments which have been submitted to the softening An app is described

Artificial silk. HENRY DREYFUS Fr 697,725, June 20 1930. A soln of cellulose or its deriv is extruded and the threads are wound or twisted in a centrifugal box of relatively small diam and at a very high speed, *e g*, 12 000 to 20 000 r p m

Artificial silk. CAMILLE DREYFUS. Fr 697,814, June 23 1930 A soln of an org or inorg deriv of cellulose such as cellulose acetate in a solvent is extruded through orifices at the outlet of which the soln is received into a coagulating bath, the nature of the solvent being such or the coagulation being carried out in such a way that a certain amt of the solvent remains The threads are then heated and are obtained in a transparent brilliant state Thus, threads made from a soln of cellulose acetate in ethylene dichloride, MeOH and triacetin are passed into a coagulating bath contg water and then over a heated roller Other examples are given

Artificial silk. CARL HAMEL A -G and EDMUND HAMEL. Fr. 697,717, June 20, 1930 App for regulating the course of the guide thread is described

Artificial silk. JACQUES DELPECH and CONSTANTIN HEINRICH Fr 698,423, July 5, 1930 An artificial silk of very fine strand is made by partially dehydrating the nitrocellulose by means of 70° MeOH, dissolving the partially dehydrated nitrocellulose in MeOH, and spinning this collodion into 10–40° MeOH at a temp not below 25°.

Artificial silk. COMPTOIR DES TEXTILES ARTIFICIELS (SOC. ANON) Fr 697,853, June 24, 1930 In making artificial silk, the thread after passing through the coagulating bath is passed through a narrow tube traversed by a liquid The liquid is caused to flow in the opposite direction to the movement of the thread to increase the tension or with the thread for the reverse effect. The liquid may be the same as that in the bath or may be a washing liquid

Artificial silk. COMPTOIR DES TEXTILES ARTIFICIELS (SOC. ANON) Fr 698,660, July 8 1930 A brilliant pearly artificial silk is made by transforming a cellulose rich in α-cellulose into a viscose rich in cellulose, preferably more than 7 5%, and, after a short ripening spinning the viscose in a bath of $H_2SO_4$ and $Na_2SO_4$, the content of $Na_2SO_4$ being more than double that of $H_2SO_4$ and the latter being 100–150 g per l

Artificial silk. I G FARBENIND A G Fr 697,329, June 13, 1930 Hollow threads of artificial silk are made by dissolving cellulose derivs such as cellulose acetate in one or more solvents adding one or more non solvents, the b p of which is higher than that of the solvents, heating the spinning soln and spinning into a gaseous medium, the temp of which is lower than the b p of the non solvents Examples are given in which cellulose acetate is used in a mixt of acetone and toluene or $C_6H_6$.

Artificial silk from viscose. I G FARBENIND A -G Fr. 697,997, Mar. 24, 1930 Uniform solns of viscose are prepd, the use of compressed air or other gas being completely avoided The filtration, elimination of air and the final mixing of the distinct contents of the dissolving reservoirs are effected without any interruption The crude soln to be spun coming from the reservoirs is driven back by a common pump to the filter presses connected to a common distributing pipe, then the filtrates from all the filter presses working simultaneously are collected in a common conduit

Artificial silk and films. I G FARBENIND A -G Fr 698,100, June 26, 1930 The reaction mixt of cellulose esters obtained in liquid $SO_2$ by Fr 664,459 (*C A* 24, 961) is used, without isolation of the dissolved cellulose esters, for making threads or films by dry spinning or flowing the liquid into a pptg liquid

Artificial silk, films, etc. WOLFF ET CO KOMMANDIT GES. AUF AKTIEN, EMIL CZAPEK and RICHARD WEINGAND Fr 698,307, July 2, 1930 In the manuf of threads sheets etc, from aq solns of cellulose and a coagulating bath, the mutual soln. of cellulose is heated to about 50°

Artificial silk, films, etc., of reduced luster. HENRY DREYFUS Fr. 698,093, June 26, 1930 $TiO_2$, preferably in a finely divided form, is incorporated in the solns of org derivs of cellulose used for making silk, films, etc The size of the particles of $TiO_2$ is preferably 0 0001–0 00035 mm and dispersing agents for the particles may be used

Artificial silk, plastic materials, etc. OSCAR KOHORN & CO and HELLMUTH SCHUPP Fr 697,471, June 16, 1930 Solns, lacquers, films, artificial silk, etc., are prepd by treating cellulose acetobutyrate with mixts of liquids which have not marked solvent properties for this substance, *e g*, mixts of alcs with hydrocarbons or with their derivs Examples are given using mixts of EtOH and $C_6H_6$ in equal amts

Artificial silk threads, etc. CAMILLE DREYFUS Fr 697,573, June 17, 1930 In dry spinning artificial threads, etc, in an upward direction, the operation is started by surrounding the nozzles with a coagulating liquid such as water, $C_6H_6$, MeOH, EtOH or $CCl_4$, which is run off once the threads have begun to form.

Artificial fibers. I G Farbenind A.-G (Adolf Kämpf, inventor). Ger 522,308, May 1, 1929 A method of stretching dry-spun artificial fibers is described. The fibers are treated, in the course of the process, with swelling agents.

Preparing artificial silk fiber for spinning. Meinrad F Thoma U. S 1,799,399, April 7 The fiber is treated at a moderately warm temp in a bath of water contg an oil soap with a trace of $H_2SO_4$, glycerol, NaOH and pinol

Spinning and stretching artificial silk. Fr. Küttner A.-G. Ger. 516,789, May 27, 1928.

Spinning apparatus for artificial silk. Martin Hölken G m b H Ger. 516,788, July 31, 1929 Details of supplying the soln. to be spun to the spinning heads are given.

Nozzle for spinning artificial silk in acid spinning baths. Erste Österreichische Glanzstoff Fabrik A G Austrian 121 970, Nov 15, 1930

Cellulose acetate yarn. William Whitehead and Camille Dreyfus (to Camille Dreyfus) Can 310,732, Apr 21, 1931 An acetone-sol cellulose acetate having an acetyl value of 52.5–56% is dried until it contains less than 1% of water, dissolved in substantially pure acetone, filtered and dry spun at a temp of 50–55°, whereby yarns are formed that are highly resistant to the delustering action of boiling water, and which have a strength that is 15–25% greater than that of yarn produced from a cellulose acetate soln in 95% acetone

Cooking fibrous material. Thomas L. Dunbar. U S. 1,798,525, March 31. In a process such as digestion with acid liquor, gases and vapors from a digester are discharged through a conduit into an enlarged mixing chamber, and cold acid liquor is constantly fed into the chamber and the gases and vapors are thus utilized to preheat and pre-condition the liquor, thus operation is conducted and the liquor is withdrawn from the chamber under substantially atm. pressure and the liquor is then forced into an accumulator maintained at superatm pressure An arrangement of app is described.

Sulfite liquor. Thomas L. Dunbar (to Chemipulp Process, Inc.). Can. 309,887, Mar 31, 1931 A process and an app are disclosed for absorbing $SO_2$ gas in aq solns. to obtain a sulfite liquor Hot, strong $H_2SO_3$ soln is mixed with cooler, dil. $H_2SO_3$ soln. in the presence of solid lime-contg material. The resulting soln is cooled, $SO_2$ gas is absorbed therein, in the presence of solid lime-contg material, and unabsorbed $SO_2$ is passed from the last-mentioned absorption into contact with water in the presence of solid lime-contg material to prepare a dil. soln to be mixed with further quantities of hot strong $H_2SO_3$.

Washing sulfite pulp. Syosiy Okuda. Japan. 90,207, Feb. 9, 1931. Stuff from the pulp separator in the manuf. of ordinary sulfite pulp sometimes contains acid, which lowers the quality of the pulp. In this process the stuff is mixed with milk of lime in a flow-box; by this means the acid in the stuff is neutralized and the quality of the pulp is improved

Cellulose pulp. George A Richter (to The Brown Co.). Can. 309,868, Mar. 31, 1931. Wood pulp, previously liberated by the action of an alk. liquor, is digested in an acid sulfite liquor to remove components other than α-cellulose, including ligneous matter and pentosans; then the pulp is digested in an alk. liquor to remove more non-cellulose components, and finally bleached.

Chemical wood pulp. George A. Richter (to The Brown Co.). Can. 309,867, Mar. 31, 1931. Raw cellulosic material is cooked in ammoniated water to dissolve a portion of its cementitious content and then cooked in a liquor contg. both NaOH and $Na_2S$ to effect fiber liberation.

Pulp for paper making. John D. Rue (to Champion Fibre Co.). U. S. 1,798,987, March 31. An unbleached and impure chem wood pulp is partially bleached and washed, thickened, admixed with an alk. treating soln. such as caustic alkali and digested. Treating pulp is sepd., a portion of the sepd. soln. is coned., and the remainder of the sepd. soln is combined with a portion of the so-coned. soln. The resulting alk. soln. is reused with addnl caustic alkali as alk. treating soln., and the remainder of the so-coned. soln. is used in alk. digestion of wood.

Bleaching paper pulp. John Neumann. U. S. 1,799,601, April 7. The pulp is bleached in a bath contg salt and oxalic acid and is then washed.

Paper. Charles J. Barnes. U. S. 1,799,350, April 7. Mech. features.

Paper containing rubber. General Rubber Co Fr. 697,683, June 19, 1930. A protective colloid such as starch esters known as "feculoid" or "feculose" or a protein is mixed with paper pulp. The mixt. is rendered alk. and a dispersion of rubber added. The pulp obtained is then treated in the usual manner for making paper. Cf. C. A. 24, 5159

**Paper-making apparatus.** HERMAN L KUTTER (to Black Clawson Co) U S 1,798,887, March 31 Structural features

**Fourdrinier paper-making apparatus.** SAMUEL MILNE U S 1,798,801, March 31 Structural features

**Paper-making apparatus having a raising felt.** EUGENE M VEYRON (to Papeteries Navarre) U S 1,798,821, March 31 Structural features

**Suction roll for paper-making apparatus.** *EARL F BERRY (to Beloit Iron Works).* U S 1,799,775, April 7 Structural features

**Suction box for paper-making, etc., machines.** ERNST KRAMER Austrian 121,848, Nov 15, 1930

**Drying continuous paper sheets or other moist materials with air currents.** JOHN P BROWN U S 1,798,718, March 31 App and various details of operation are described

**Apparatus for dewatering paper pulp, etc.** RICHARD KASTNER and HERBERT SCHMOLKA Austrian 121,799, Nov 15, 1930 Addn to 115,901 (*C A* 24, 2295) and 120,690 (*C A*, 25, 1996)

**Apparatus for dewatering cardboard, etc, by compression.** CARL WEISHAN Austrian 121,801, Nov 15, 1930

***Sizing paper.*** JUDSON A DECEW (to Process Engineers, Inc). U S 1,799,216, April 7 A stream of sizing soln is mixed with a stream of alum and the mixed materials are then mixed with a stream of pulp stock U S 1,799,217 describes incorporating emulsified rubber particles into cellulose paper stock by mixing the rubber emulsion with the paper stock after the stock has been discharged from the beater, and adding and mixing a coagulant such as $Al_2(SO_4)_3$ to fix the rubber on the cellulose fibers, then forming the latter into paper Cf *C A* 24, 2604

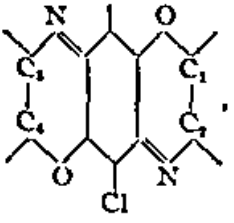
**Safety paper.** RAYMOND E BOITER (to Todd Co, Inc) U. S 1,799,499, April 7. A plurality of max valuation legends are printed in a concealed manner on documents such as bank checks, by use of substances such as colorless inks" which are altered by chemical reagents such as ink eradicators" so as to render the legends visible

**Packing, etc., paper.** FELIX THUNERT. Ger 519,867, Aug 20, 1925 Addn to 518,099 (*C A* 25, 2568) In the method of Ger 518,099, ornamental effects are obtained by spraying colored or uncolored adhesives on to the cellulose wadding

**Wallboard and pressboard, etc.** FERNANDO S VIVAS. U S 1,800,121, April 7 In producing a sheet of felted cellulosic fibers, the pulp used is beaten with a soln of dextrin

**Carbon paper.** FIRMA GÜNTHER WAGNER Ger 516,975, Mar 8, 1928 Carbon paper is prepd by giving the paper a layer of natural or artificial rubber, gutta percha, *balata, dye and optionally a softening agent such as tricresyl phosphate, oil, fat, fatty* acid etc, and drying Vulcanizing agents may also be added Examples are given Cf *C A* 24, 3903

**Paper colored with sulfonic acid compounds of dyes obtainable from higher molecular diarylaminobenzoquinones.** GEORG KRÄNZLEIN, HEINRICH GREUNE, MAX THIELE AND KARL HAGER (to General Aniline Works) U S 1,798,544, March 31 Dyeings of good fastness to water and to light are effected by coloring paper with a salt of a sulfonic acid of a compd of the probable general formula



wherein $C_1$ and $C_2$, on the one hand, and $C_3$ and $C_4$, on the other hand, represent C atoms belonging *to a naphthalene or carbazole nucleus*, or to a benzene nucleus which is substituted by at least one substituent of the group consisting of PhO, PhNH, BzNH, alkylamino, alkyl and halogen Examples with details of procedure are given, involving the use of the Na sulfonate salts of the dyes produced from (1) 2,5-di(*N*-ethylcarbazolyl-3' amino) 3,6 dichloro-1,4 benzoquinone, (2) di (*β* naphthylamino)dichlorobenzoquinone, (3) 2,5-di (*o* aminodiphenoxy)-3,6-dichloro-1,4 benzoquinone, and, (4) 2,5-di (*p* aminodiphenylamino) 3,6 dichloro-1,4 benzoquinone *Blue, violet, red and bluish* gray tints may be obtained

# 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E MUNROE AND C G STORM

**Recovery of ammonium nitrate from amatol. Explosion at ammonium nitrate plant of Ammonite Company.** R NORRIS SHREVE *Ind Eng Chem* 23, 566–73(1931).—S. describes in detail the process and equipment used in the Ammonite Co's plant for recovery of $NH_4NO_3$ from water soln obtained from amatol (TNT $NH_4NO_3$ mixt) salvaged from loaded shell. He also discusses the effects and probable causes of an explosion which destroyed the plant and killed 16 persons on March 1, 1924.

C G STORM

**Effect of impurities on the freezing point of nitroglycerin.** A SAPOZHNIKOV AND K SNITKO *Zhur Prikladnoĭ Khim* 3, 1077–85(1930).—F. ps of the 2 isomers of nitroglycerin are 12.2° 12.3° and 13.15°, resp. The use of $NaNO_3$ yields the high f. p., and the use of $KNO_3$ the low f. p. isomer. Addn of dinitroglycol for lowering the f. p. is practical while addn of dinitrochlorohydrin or tetranitrodiglycerin has only a small effect. F. ps of these mixts contg. 60–100% nitroglycerin are given. V. K.

**Apparatus for determination of flame propagation.** J. IZART *J. usines gaz* 55, 57–8(1931).—The principle of the app. described is variation of height of combustion cone in a calibrated Bunsen burner. Curves and numerical examples of detns. are given.

B. J. C. VAN DER HOEVEN

**Flame speeds in the "inflammation" and "detonation" of moist carbon monoxide-oxygen mixtures.** WILLIAM A. BONE AND REGINALD P. FRASER *Proc. Roy. Soc.* (London) A130, 542–51(1931).—The "detonation range" of moist satd. CO–O mixts. at about 18° and atm. pressure lies between about 40 and 80% CO contents, as compared with about 15.4 and 94.0% for their "inflammation range." Within the said range the observed rates of detonation in a tube 1.3 cm. in internal diam. all lie between 1700 and 1800 m. per sec. There was a well marked max. rate of detonation at the $75CO/25O_2$ mixt. compn.

H. C. PARISH

**Application of the antioxygenic effect to the problem of extinguishing fires. Negative catalysis of the ignition of carbon.** CHARLES DUFRAISSE AND RAYMOND HORCLOIS. *Compt. rend.* 192, 564–6(1931).—Ignition, like oxidation at low temps., may be hindered by neg. catalysts, and there is thus no theoretical reason why fires may not be extinguished by applying this principle. $CCl_4$, added to air so as to form 5% by vol., exerts this antioxygenic catalytic effect, extinguishing a wood charcoal fire in an exptl. stove very quickly. That the extinguishing is not due to the massive action of the $CCl_4$ or to rarefaction of $O_2$ by dilu. is shown by similar expts. in which the diluent is $N_2$ (scarcely any extinguishing effect) or where the air and $CCl_4$ are enriched with up to 31% $O_2$ (marked extinguishing effect). For $CCl_4$, the threshold of activity is at $^1/_{10}$ of satn. or $^1/_{100}$ of vol. $CO_2$ behaves similarly but not so markedly. Other substances acting like $CCl_4$ are $CHCl_3$, $C_2H_4Cl_2$, $C_2H_2Cl_2$, $C_2HCl_3$, EtBr, ethyl chloroformate, sulfur chloride, thionyl chloride, sulfuryl chloride, $PCl_3$, $PBr_3$, As chloride, $SiCl_4$, $TiCl_4$, $SnCl_4$, $BCl_3$, $Et_3NH$, $SO_2$, etc. $POCl_3$ is very active, its threshold being $^1/_{20}$ of satn. or $^1/_{2000}$ of vol.

ALBERT THOMAS FELLOWS

**Prevention of mine explosions by means of water sprays.** WM. KOHLSCHEIN. *Z. ges. Schiess Sprengstoffw.* 26, 77–81(1931).—A method is described for extinguishing an explosion flame by means of an atomized spray of water, automatically released by means of compressed air from 45 l. of water in a cylinder placed in the mine gallery about 20 ft. from the shot. The release is effected electrically by the current which fires the shot. Tests in a steel gallery at Freiberg, Saxony, in which 200-g. charges of dynamite were fired from a mortar, showed a length of flame of 25–30 m. without the water spray, and only 0.5–1.5 m. when the spray was used. To be effective, the spray must be released 2.5–3 sec. before the shot is fired, the delay of the shot being obtained by "delay detonators."

C G STORM

**Prevention of explosions in mirror-silvering materials.** MAX ERMES *Diamant* 51, 62–3(1929), *Ceram. Abstracts* 9, 24.—In the prepn. of a silvering mixt. there is a possibility of the formation of CNOAg on the addn. of alc. to a concd. soln. of $Ag_2O$ in $NH_3$. Two kinds of silver fulminate, Howard's and Berthelot's, are formed and they are both more explosive than the best gunpowders. Precautions to be taken to prevent accidental explosions while prepg. and working with silvering solns. in mirror manuf. are discussed.

G. G.

**Danger of explosion in silvering solutions.** MAX ERMES *Diamant* 51, 587 (1929), *Ceram. Abstracts* 9, 725.—The statements of E. Lohmann (cf. following ab-

stract) in regard [redacted] ty from danger of explosions in the Rochelle salt process are confirmed by l[redacted] ns of mirrors prepd by this process that are still sound though they were prepd 20 yrs. ago Experience with a soln that had been stored for a year confirmed the fact that the Brashear process is also safe if the solutions are properly dild G G

**Source of danger of explosion in chemical silvering of glass.** Eduard Loidmann. *Diamant* 51, 526–30(1929), *Ceram. Abstracts* 9, 725.—The danger of explosion is said to lie in the prepn. of the ammoniacal soln of Ag for the Brashear process, when soln "A" is made alk with KOH or NaOH In certain concns the compd $Ag(NH_2)_2OH$ is formed, which breaks down to give $AgNH_2$ and $Ag_2N$. This does not happen in dil solns contg less than 0.35 g.-atoms of Ag per l The mixt. of $AgNH_2$ and $Ag_2N$, the "Knallsilber" of Berthelot, detonates violently on the slightest disturbance of the soln In the Rochelle-salt process, where addns of KOH are unnecessary, there is very little danger of the formation of this explosive compd., and the danger in the Brashear process can be minimized to a large extent by avoiding too concd solns of Ag, by using dil caustic alkali and by mixing the soln only just before use It is also good practice to keep the flasks which contain such solns away from direct exposure to sunlight. G G

**Explosions in production of mirror coatings.** Werner Mylius. *Diamant* 51, 42–4(1929), *Ceram Abstracts* 9, 24.—The chemistry of prepg silvering solns for mirror silvering is discussed, and it is pointed out that there is a possibility of formation of such explosive compds as $AgNH_2$ by the combination of Ag and part of the $NH_4$, or in case other ingredients are used in prepg the solns, other explosive compds. may be formed G G

**Explosion studies of ammonia-air and ammonia-oxygen mixtures (with regard to high pressures).** H Heinrich Franck and Gerhard Döring *Z. angew Chem* 44, 273–7(1931).—An investigation of the lower explosion limits of mixts. of $NH_3$ with air and O was carried out in a 50-l bomb at an initial pressure of 1–20 atm., with various means of ignition Independent of the nature of the means of ignition, there is a sharply defined explosive limit above which explosion is propagated without interruption in all directions With less efficient ignition (elec sparks or small quantities of combustible mixts.), complete reaction results only with increased concn of $NH_3$ in the gas mixt With more efficient ignition (*e. g.*, 0.5–1 g $KClO_3$ C mixt.), the explosion limits were, for 1 atm., 15.5% $NH_3$ with air, and 13.5% $NH_3$ with O, for 20 atm., the limit fell to 10% $NH_3$ with O C. G. Storm

**Explosions in mixtures of acetylene and electrolytic gas.** W. A. Bone, R. P. Fraser and F Lake *Proc Roy Soc* (London) A131, 1–17(1931), cf *C. A.* 21, 2064.—Explosions of mixts of $x(C_2H_2) + (100-x)(O_2 + 2H_2)$ were studied by the open tube and the closed tube methods The flame speeds, $S$, were measured and the flames photographed Initial $S$ is reduced on addn of 1% $C_2H_2$, further addns. up to 11.8% $C_2H_2$ greatly increase $S$ which reaches a max at $C_2H_2 + 5O_2 + 10H_2$ when the $O_2$ is sufficient to burn $C_2H_2$ to $CO_2 + H_2O$, increasing the $C_2H_2$ content above 11.8% causes a rapid decrease in initial and general $S$ until a 40 $C_2H_2$/60($O_2 + H_2$) mixt is reached No C is deposited in mixts contg 25% or less $C_2H_2$, *i. e.*, in mixts. with $C_2H_2$ less than $C_2H_2 + O_2 + 2H_2$, the combustion is given by $C_2H_2 + O_2 + 2H_2 = 2CO + 3H_2$ Diln with A has no effect, while diln with $N_2$ causes C sepn and steam formation In no expts with explosions of $x(C_2H_2) + (100-x)(O_2 + 2H_2)$ or $x(C_2H_2) + (100-x)(O_2 + 2CO)$ was there any sepn of C or survival of $C_2H_2$ until $x$ was greater than 25 With low $C_2H_2$ content the "water-gas" equil was not attained during cooling behind the flame front. S Lenher

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Smokes and smoke gases (Smoluchyk) 13. The effect of an electric field on flames and their propagation (Lewis) 2.

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**Ballistic powders.** E I du Pont de Nemours & Co Fr 698,308, July 2, 1930 A ballistic powder which may be dried contains nitrocellulose in combination with a polynitrotoluene and an ester of an org acid, each of which has in the liquid state a marked solvent action on nitrocellulose and each of which is non-volatile, non hygroscopic and insol in water, *e. g.*, nitrocellulose 85, dinitrotoluene 10, dibutyl phthalate 7 and diphenylamine 1 part.

# 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Recent developments in dyes and dyeing.** CHAS E. MULLIN AND ALFRED R. MACORMAC *Textile Colorist* 52, 739–43, 815–8, 849(1930).—A review of the present trends in dyeing and latest color cards, with a discussion of the properties of the recently announced dyestuffs CHAS. E MULLIN

**Action of light on some vat colors.** W F A ERMEN AND E. H. GOODYEAR. *Textile Manufacturer* 55, 437–8(1929).—Some abnormal effects in the fading of vat colors by light. CHAS. E. MULLIN

**Dyeing and finishing costume cloths.** H. JENNISON *Textile Manufacturer* 57, 69(1931).—A general address on the dyeing and finishing of wool materials C E M.

**Notes on the dyeing of union fabrics containing acetate rayon.** ENCO *Russa* 6, 489, 491(1931).—Brief practical notes are given on the production of various effects on such fabrics A PAPINEAU-COUTURE

**Effect of valences of electrolytes in mordant dyeing.** P P VIKTOROV AND A. A LEBEDEV *Zhur Prikladnoi Khim* 3, 1175–88(1930). cf *C A* 25, 1386.—For coagulating Benzo pure blue the effectiveness of electrolytes is as follows $NH_4 < Na < K < Mg < Ni < Mn < Zn < Cd < Al$ V KALICHEVSKY

**The resistance of coloring substances to ultra-violet light.** III. GIUSEPPE A BRAVO. *Boll ufficiale staz sper ind pelli mat conciantì* 8, 292–8(1930). cf *C A* 24, 2888, 25, 2295.—Earlier investigations were continued The dyes examd in this study belonged to the following classes azo, pyrazolone, diphenylmethane, triphenylmethane, xanthene, acridine, quinoline, azine, oxazine and thiazine dyes. G S

**Chemical control in the textile industry.** W. F A ERMEN AND S. H. JENKINS. *Textile Manufacturer* 55, 279–81, 316–7, 352–3, 402–3, 439–40(1929), 56, 28–9, 71–2, 225–6, 261–2, 377(1930), 57, 70–1(1931).—A discussion of lab layout, the testing of coal and lubricants, the identification of synthetic yarns and starches, and the chem analysis of flue gas, water, fabrics, sizing, finishing and weighting materials. CHAS. E MULLIN

**Use of the microscope in the textile industry.** J M. PRESTON. *Textile Manufacturer* 55, 293, 335–6, 379–80(1929), 56, 12–3, 130–1, 244–6, 284–6, 358–9, 395–6 (1930); 57, 6–7(1931).—Many excellent details of technic are given. C E M

**Some chemical differences between abaca and Canton fibers.** HARTLEY E SHERMAN. *Philippine J. Agr.* 1, 123–34(1930).—Color of the ash is of no value in differentiating abaca from Canton. Since both fibers are colored by $K_2CrO_4$ soln this test is of no value in classifying Canton and abaca Canton fibers were lighter in wt., showed lower tensile strength, lower elasticity, higher natural acidity, 2–3 times greater fat content and higher ash than abaca fibers of similar stripping The "Mercerization Curl" produced by hanging the fiber in a tall tube of 20% NaOH gave tighter, kinkier curls and greater contraction with Canton than with abaca fiber of similar stripping Loss in wt due to boiling the fiber for 1 hr. in 1% KOH soln was 6% higher for Canton than for abaca fiber, indicating a larger amt. of saponifiable matter and pectocelluloses in the Canton JOHN O HARDESTY

**Relation between reeling process of the cocoon and physicochemical properties of the aqueous colloidal solution of sericin.** H. KANEKO AND M MIYASAKA. *Bull Sericulture and Silk Ind* (Japan) 3, 2–3(1930).—The sericin of silk cocoons has been examd as to its soly. in hot water and the stability, viscosity, surface tension, osmotic pressure, sp elec cond and degree of turbidity of its colloidal solns. Increased ease of reeling appears to be correlated with lower soly in hot water, higher stability of colloidal solns, lower surface tension, greater cond., greater osmotic pressure and greater turbidity B C A

**Acetate silk developments.** CHAS. E MULLIN. *Textile World* 78, 1519, 1578 (1930).—A general review of the developments in the use, dyeing, printing and processing of the acetate silks. CHAS E MULLIN

**Recent developments in the delustering of rayon materials.** A J HALL. *Textile Exporter* 6, No 49, 14–5(1931).—A review of the recent patents CHAS. E MULLIN

**What are the future trends in the American synthetic yarn industry?** CHARLES E MULLIN. *Chem Markets* 28, 363–7, 492–6(1931). E H

**Immunized cotton.** GIOVANNI TAGLIANI. *Bull soc. ind Rouen* 58, 418–26 (1930).—An address on the Zimmerman process of rendering cotton immune to the action of substantive dyes by treatment with toluenesulfonyl chlorides (cf. Ger Pat. 396,926 (1922)) The chem and phys factors affecting the process are discussed

in general terms Among the properties of cotton so treated are the following larger, stiffer, and more transparent fibers, maintenance of immunization against the action of dil acids, alkalies and bleaching liquors, also to the mercerization process if carried out rapidly, resistance to drying storage and molds The product is immune to most substantive dyes It can be dyed with properly chosen S and vat dyes in which case certain phenolic materials and colloids are desirable addns to the bath It also absorbs basic dyes, some azo dyes and several other classes A list of patents on this type of process is given I H Odell

Woolen and worsted cloth finishing. B H *Textile Manufacturer* 55, 314-5, 350-1, 442-3(1929).—Carbonizing piece goods by the $MgCl_2$, $AlCl_3$, $H_2SO_4$ and HCl processes, filling and weighting are considered Chas E Mullin

Sizing of worsted and woolen yarns. B R D Sharp *Textile Manufacturer* 56, 240-1(1930).—General. Chas E Mullin

Treatment and disposal of wool-washing effluent. Basil A Smith *Textile Manufacturer* 56, 452, 458(1930) *Trans Inst Chem Eng*, Advance copy, Dec 1930, 16-23.—The acid-cracking solvent extn, and centrifugal processes of grease recovery, the recovery of scouring liquors by purification and the disposal of the final liquors are discussed Chas E Mullin

Treatment of suint liquors from wool-scouring A T King *Textile Manufacturer* 56, 458-60(1930). *Trans Inst Chem Eng*, Advance copy, Dec 1930, 9-15.—The Duhamel and other systems are discussed Chas F Mullin

The Marwa washing process. M Dittmer. *Seifensieder Ztg* 58, 235-7(1931).—The Marwa process saponifies fatty acids with $Na_2CO_3$ in the washing machine in the presence of the wash goods. The evolution of $CO_2$ may aid cleansing but the odor of the fatty acids, the usual presence of neutral fat and traces of metals in the fatty acids are decided disadvantages and do not avoid the formation of Ca and Mg soaps as a result of water hardness F Eschen

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Dyeing of furs (Dohogne) 29 Examination of textile oils (Treuler) 27. Combinations among certain dyestuff radicals (Reber) 10. Triphenylmethane dyes derived from quinoline, tetrahydroquinoline, diphenylamine and carbazole (Sen Sen) 10. Dyes derived from oxalyldibenzyl ketone (Salfford, Chakravarti) 10 Naphthalene series III Action of bisulfite on *p* nitrobenzeneazo-*β* naphthol (Vorozhtzov, Bielov) 10. Compositions of silicates with other compounds [dyes] (Fr pat 698,543) 17. Unnflammable solvent containing hydrocarbons [for cleaning] (Fr pat 697,500) 13. Polymerizing oils and fats [for textile industry] (Fr pat. 697,785) 27.

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Krãnzlin, G, and Marcus, A Baumwolle. Leipzig Deutscher Auslandsverlag 169 pp Linen, M 6

Schultz, Gustav Farbstofftabellen. 7th ed. Band I. Lfg 16-17. Leipzig Akad Verlagsges. Pp 673-764 M 16 Cf *C A* 25, 2855

Tobler, Friedrich Sisal und andere Agavefasern. Leipzig Deutscher Auslandsverlag 104 pp Linen, M 5

Walland, Heinrich Einführung in die quantitativen textilchemischen Untersuchungen. Vienna Holder Pichler Tempsky A -G 206 pp

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Dyes. Ostro Research Laboratories, Inc. Fr 698,076, June 24, 1930 4 (*p*-Alkoxyphenyl)azo-*m* phenylenediamines in which 1, 2 or 3 alkyl groups may be substituted in each benzene ring are prepd by diazotizing an alkoxyaniline and coupling with a diaminobenzene Thus *p*-phenetidine is diazotized and coupled with *m* phenylenediamine The products may be used as direct dyes for silk and wool and for cotton mordanted with tannin They may also be used for *coloring bacteria* and for *preserving foods from fermentation*

Azo dyes. I G Farbenind A -G (Winfrid Hentrich and Rudolf Knoche, inventors) Ger 522,201 May 15 1928 The diazo compd from 4 nitraniline-2 sulfonic acid is coupled with 2 alkylaminonaphthalenesulfonic acids in which the alkyl residue contains more than 2 C atoms An example is given Cf *C A* 25, 2299

Azo dyes. I G Farbenind A G (Leopold Laska and Arthur Zitscher, inventors) Ger 522,295, July 26, 1928 Diazo tetrazo or diazoazo compds not contg the COOH or $SO_3H$ group, are coupled with a 2,3 hydroxynaphthoyl-4-amino-1 alkoxytoluene The dyes are insol in water, and are useful as pigments as well as for dyeing or printing vegetable fibers Numerous examples are given Cf *C A* 25, 2855

Azo dyes. I G Farbenind A G Fr 698,219, June 30, 1930 Diazotized

aromatic amines are coupled with ω haloacylaminonaphtholsulfonic acid and their derivs Thus, a dye which dyes wool red shades is obtained by coupling diazobenzene with ω-chloroacetyl 1 amino-8 naphthol-3 6 disulfonic acid Other examples are given

**Azo dyes.** I G Farbenind A G Fr 697,540, June 17, 1930 Dialkyl ethers of aminohydroquinone or their derivs are diazotized and coupled with 1-benzoylamino-8-naphthol-4 6 disulfonic acid or its derivs substituted in the $C_6H_4$ ring Examples are given

**Azo dyes.** I G Farbenind A G Fr 698,007, July 5, 1930 Azo dyes are prepd in substance or on the fiber by coupling diazo compds of esters of aminoterephthalic acid with arylamides of 2 hydroxynaphthalene-3 carboxylic acid Thus the dimethyl ester of aminoterephthalic acid is diazotized and coupled with the 2'-methoxy 1' anilide of 2 hydroxynaphthalene-3-carboxylic acid Other examples are given

**Azo dyes.** Soc anon pour l'ind chim à Bâle Fr 697,742, June 21, 1930 Aminodiarylsulfones of the general formula $R'R''N(H_2N)C_6H_3SO_2R$, in which the amino groups are *p* to each other and R' represents H, alkyl, aralkyl or aryl, R'' is alkyl, aralkyl or aryl, and R is aryl, or ring substituents thereof, are treated with $HNO_2$ and coupled with arylides of β hydroxynaphthoic acid in which the $C_{10}H_6$ nucleus may contain substituents such as halogen or OH and in which the aryl group may also be substituted

**Chromium compounds of azo dyes** I G Farbenind A G Fr 698,526, June 4, 1930 Azo dyes prepd by coupling diazotized aromatic amines contg neither a OH nor COOH group *o* to the amino group with 1 phenyl 3 methyl 5-pyrazolones contg in the phenyl group a OH and COOH *o* to one another are treated with Cr compds *Thus, the dye obtained by diazotizing m aminobenzoic acid and coupling* with (2 hydroxy 3'-carboxy 5 sulfo) 1 phenyl 3 methyl 5-pyrazolone is treated with a paste contg $Cr_2O_3$ and HCOOH Other examples are given

**Vat dyes.** Felice Bensa Fr 697,640, June 18, 1930 Perylenediketones dissolved *in an appropriate solvent are electrolyzed An example is given of the electrolytic* treatment of dibenzoylperylene dissolved in concd $H_2SO_4$ The product dyes cotton in a blue shade which turns purple on exposure to the air

**Vat dyes.** I G Farbenind A G Fr 697,875, June 25, 1930 Vat dyes of the *N* dihydro-1,2,2',1' *anthraquinoneazine* series are prepd *by* treating *the* dyes prepd by the process of Fr 693,919 (*C A* 25, 2004) with halogens or substances yielding halogens Several examples are given

**Vat dyes.** I G Farbenind A-G Fr 698,345, July 3, 1930 The $H_2SO_4$ ester obtained by treating the leuco compd of 4,6 dichloro 6' methoxy bisthionaphthene-indigo (by condensing a 2 anil of 2,3 diketodihydro-6 methoxy thionaphthene with 4 6 dichloro-3 hydroxy thionaphthene) in the presence of a tertiary base with $SO_3$ or substances liberating it gives fast scarlet red shades on animal or vegetable fiber when used for dyeing or printing

**Vat dyes.** I G Farbenind A G Fr 698,407, July 4, 1930 Two active derivs of 4 alkyl 5,7 dihalo 2,3 diketodihydrothionaphthenequinones are condensed with hydroxy thionaphthenes with the exception of 4 methyl 5,7 dichloro-3-hydroxy thionaphthenequinone Thus, 4 methyl 5,7 dichloro-2,3 diketodihydrothionaphthenequinone 2 (*p*-dimethylamino)anil is condensed with 4 methyl-6-chloro-3 hydroxythionaphthene in glacial AcOH to give a product which dyes cotton in fast rose shades Other examples are given

**Vat dyes.** I G Farbenind A G Fr 698,638, July 8, 1930 Vat dyes of the *N* dihydro-1,2 2',1' anthraquinoneazine series are prepd by treating the products obtained by Fr 346,398, with halogens or agents liberating halogens Examples are given

**Blue vat dyes.** I G Farbenind A G (Karl Thiess, Theodor Meissner and Werner Zerweck, inventors) Ger 522,206, Aug 28, 1928 Reactive α compds of 4 methyl 5 halo-7-alkoxyisatins are condensed with 4 halo-1 naphthols The reaction may be effected by warming the reagents together in PhCl soln Examples are given Cf *C A* 25, 2301

**Dye preparation.** Mary B Parrish Can 310,316, April 14, 1931 A dye compn consists of commercial aniline dyes, panercatin, pancreas, acetic acid, citric acid, acetone, gelatin, tinctures of camomile flowers, hyssop, ground cedar wood, and myrrh and dextrin

**Sulfuretted dyes.** Chemische Fabrik. vorm Sandoz Fr 698,583, June 30, 1930 See Brit 335,297 (*C A* 25, 1394)

**Dibenzanthrone dyes.** Scottish Dyes, Ltd Ger 522,406, Aug 27, 1927 See Brit 286,323 (*C A* 23, 285)

**Xanthene dyes.** Imperial Chemical Industries, Ltd Ger 516,785, Mar 3, 1929 See Brit 314,825 (*C A* 24, 1518).

**Acid dyes of the anthraquinone series.** Fabrique de produits chim ci devant Sandoz Fr 698,306, July 2, 1930 Anthraquinone derivs having at least one replaceable group are condensed with halogenated aromatic amines, contg at least one halogen *m*- with respect to the amino group, and their substitution derivs and sulfonating the products thus obtained Thus, 1-amino-2 methyl-4 bromoanthraquinone is heated to 160° with *m*-chloroaniline and a small quantity of AcOK and crystd $CuSO_4$ The product is sulfonated Other examples are given Wool is dyed violet red, violet and violet blue shades.

**Acid wool dyes.** I G Farbenind A.-G (Walter Mieg and Kurt Bamberger, inventors) Ger 522 082, June 8, 1929 Amino- or alkylamino-1,1'-dianthraquinonyl amines are sulfonated with oleum in the presence of $H_3BO_3$ and Hg or its oxides or salts at 120–50° Examples are given Cf *C. A.* 25, 2574

**Alkylolamine salts of aliphatic acids and sulfonated fatty acids (dye assistants).** Jean G Kern and Charles J Sala (to E I du Pont de Nemours & Co) U S 1,799,821, April 7. Dyeing is facilitated by mixing the dye with a product resulting from saponifying a higher fatty acid and glyceride with an alkylolamine such as mono-, di- or tri ethanolamine, U S 1,799,822 relates particularly to the use of the product derived from oleic acid and an alkylolamine such as mixed ethanolamines U S 1,799 823 relates to the similar use of similarly formed derivs from stearic acid U. S 1,799,824 relates to products formed from an alkylolamine such as ethanolamines and sulfonicinoleic acid or the product of sulfonation of castor oil U S 1,799,825 relates to the use in dyeing of these products U. S 1,799,826 relates to printing pastes contg a lake of a basic color and an alkylolamine salt of a higher fatty acid

**1-Amino-2-chloro-4-hydroxyanthraquinone.** Ivan Gubelmann, Henry J. Weiland and Otto Stallmann (to Newport Chemical Corp) U S 1,798,156, March 31 This compd., a *dye intermediate*, forming dark red shining needles when recrystd from glacial HOAc, may be made by further heating a reaction mass resulting from the heating of 3' amino-4',6' dichloro-*o*-benzoylbenzoic acid with concd $H_2SO_4$ and contg 1 amino-2 4 dichloroanthraquinone to a temp of 140–200° and maintaining the mass within that temp range until evolution of HCl has practically ceased

**Condensation products.** I. G. Farbenind A.-G Fr. 698,525, June 3, 1930 Org polycyclic N compds having at least 4 rings, particularly $NO_2$ or $NH_2$ derivs., are treated with org compds having an open chain of at least 3 C atoms, in the presence of dehydrating agents, preferably in the presence of oxidizing substances favoring the reaction and finally substituting or condensing or both the reaction products thus obtained Thus, 6-aminobenzanthrone is condensed with glycerol in $H_2SO_4$ The product, 6 (*N*), 5 pyridinobenzanthrone, m 270°, dyes acetate silk in green yellow shades, and by alkali fusion gives a product which dyes vegetable fiber a violet blue from the vat Many examples are given, including the prepn of pyridino-*allo meso* naphthodianthrone, m 350–352°, a pyridinopyranthrone, m above 300°, pyridino-3,4 8,9 dibenzopyrene 5,10 quinone, 4,3-pyridino-*Bz*-dichloroanthraquinone 2,1-benzacridone and their derivs and condensation products The *products have application in dyeing, printing and pharmacy*

**Aniline black dyeing.** Hikozo Sato Japan 89,540, Dec. 12, 1930 Fibers are treated first with a dil soln of persimmon tannin, dried and then dyed with one of the following mixts (1) aniline salt 140, $K_2Cr_2O_7$ 150 and HCl 30 parts, (2) aniline salt 200, $KClO_3$ 40, $CuSO_4$ 80 parts, (3) white paste 1000, aniline salt 80, $KClO_3$ 40 and CuS 80 parts

**Dyeing textiles.** Camille Dreyfus. Fr 698,269, July 1, 1930. Textiles of or contg cellulose esters or ethers are dyed with vat dyes by applying the leuco compds by means of a medium of relatively low alky., *e. g.*, 2–8 parts of alkali for 5 of dye Examples are given

**Dyeing piece goods.** August Römer, Färberei, Bleicherei und Appreturanstalt (Alfred Linke and Walther Schramek, inventors) Ger 516 983, Feb 10, 1927 A method of producing white or colored effects on piece goods during the slop-padded aniline black process is described Wool yarn is soaked with an ammoniacal or other alk casein soln to which oxidation retarding agents have been added, and is optionally after treated with $CH_2O$ or acid Finally it is dried in moderate heat Thus, wool yarn is soaked in an aq soln of casein and $NH_4OH$ and squeezed out It is then immersed in a bath of 1% AcOH, dried and woven It remains unchanged in oxidation processes A further example is given

**Dyeing acetate silk.** Soc anon. pour l'ind chim à Bâle Fr 697,541, June 17, 1930 Fast shades are obtained on cellulose esters and ethers by means of 1 alkyl-

amino-4 anilinoanthraquinones Thus, the Me compd gives a light greenish blue shade on acetate silk

**Dyeing and waterproofing of cloth and fibers.** YONETARO WASINO Japan 89,546, Dec. 13, 1930 The dyeing and waterproofing are effected by one treatment with a mixt. of emulsified wax, paraffin, fatty acid, rubber or like substances in the presence of protective colloid, dyestuff and hydroxides of metals or their double salts.

**Dyeing animal fibers.** SOC. ANON. POUR L'IND CHIM A BÂLE Ger. 516,878, Dec 28, 1929 The fastness of chromed azo dyes on animal fiber is improved by adding tannin and an aromatic hydroxycarboxylic acid to the dye bath, or by after-treatment with these substances In the example, wool dyed with a chromed *o*-hydroxyazo dye is made fast to acid dressing and fulling by addn of tannin and salicylic acid

**Dyeing furs with "ursols."** GOSUDARSTVENNAYA SUIREINO KRASILNAYA FABRIKA GOSUDARSTVENNAGO TRESTA LENINGRADSKOI SHVEINOI PROMYSHLENNOSTI "LENINGRADODEZHDA" Russ appl 37,262, Dec 19, 1928 Furs after being dyed with "ursols" by usual methods are first treated at ordinary temp with dil solns. of $Ca(ClO_3)_2$ followed by a dil sol of $H_2O_2$ before their final finishing, whereby they are rendered harmless

**Coloring textiles.** HENRY DREYFUS. Fr 697,523, June 16, 1930. Textiles are colored by aq suspensions or dispersions of free leuco compds of dyes Several examples are given Cf *C A* 25, 2007

**Machine for dyeing cloth.** MASCHINENFABRIK BENNINGER A.-G. Fr. 698,177, June 28, 1930

**Machine for dyeing cloth.** MASCHINENFABRIK BENNINGER A.-G. Fr. 698,416, July 5, 1930

**Controlling means for dyeing machines.** SIEMENS-SCHUCKERTWERKE A.-G Fr 698,252, July 1, 1930

**Beam-dyeing apparatus.** WM P HORNBUCKLE and ROBERT F CRAIG U S 1,709,421, April 7 Structural features

**Apparatus for oxidizing mordanted cloth.** TEINTURERIE CLÉMENT MAROT. Fr. 697,955, Sept 30, 1929

**Textiles.** HENRY DREYFUS. Fr 698,418, July 5, 1930 Cotton or other cellulosic fiber is eliminated from mixed fibers contg animal fibers and (or) cellulose acetate or other esters or ethers of cellulose by heating the fibers in a soln of a mineral acid or a salt having an acid reaction such as $FeCl_3$ and washing, etc.

**Textile materials of organic cellulose derivatives.** CAMILLE DREYFUS and HERBERT PLATT (to Celanese Corp. of Am.) U S 1,798,536, March 31. Org. cellulose derivs such as cellulose acetate are prepd contg a substance such as a Sn compd which acts as a weighting and swelling agent and gives increased resistance to heat

**Metallized fabrics.** OSCAR TREBITSCH Austrian 121,965, Nov. 15, 1930. Fabrics are treated with a metal salt soln and then with a reagent capable of reducing the salt to the metal. After washing and drying, the metallic appearance is developed by mech. treatment with steel rolls or brushes in a lustering or beetling machine or the like. Cf *C A* 25, 1392

**Treating cloth.** HENRY DREYFUS Fr 698,181, June 28, 1930 Metallic radicals are incorporated in textile materials for mordanting, charging or dyeing by treating the materials with a current of particles of metal or oxide moving at a high speed, and oxidizing if necessary

**Vegetable fibers.** HEBERLEIN & CO., A.-G Ger 516,877, Nov 29, 1927. In working up vegetable fibers by CuO-$NH_3$ soln and NaOH, the fiber is treated first with CuO-$NH_3$ soln and then directly with NaOH soln. The excess of the first soln may be removed mechanically, *e. g.*, by pressing, before the application of the second soln The fiber is washed, dried, stretched, etc. The NaOH bath imparts a mercerized finish

**Threads for spinning.** GIOVANNI MOSSO Fr 697,629, June 18, 1930 Fibers which may be spun are obtained by softening crude vegetable in water, treating them in an autoclave at above 130° in a bath contg $Na_2CO_3$ 1, NaOH 2–3 and olein or soap 0.5% The fibers are afterward submitted to an energetic washing with water under pressure and afterward in a bath contg soap and olein or Na sulforicinate and dried

**Apparatus for sizing textile threads.** JOSEPH ANNICQ Fr 698,547, June 11, 1930

**Weavers' shuttles.** I G FARBENIND A.-G Fr 697,496, June 16, 1930 Weavers' shuttles are made of wood impregnated with org Cl compds such as chlorinated $C_{10}H_8$ or wax

**Scouring silk.** I G FARBENIND A.-G. (Anne Nies-Harteneck and Roland Rüsch, inventors) Ger 520,092, Mar 6, 1928 Addn to 513,373 (*C A* 25, 2578)

The method of Ger 513,373 is applied to undegummed crude silk in mixed fabrics or to hardened or colored but still undegummed silk. Examples are given.

Regeneration of natural silk. Gen'itu Kita, Genzo Yamanouti, Syuzo Masuda and Institute of Physical and Chemical Research Japan 89,557, Dec. 15, 1930 $Ca(NO_3)_2$ soln of natural silk is coagulated by passing through 70% $Na_2S_2O_3 \cdot 5H_2O$ soln The regenerated fiber is further treated with AcONa soln or AcOH (1:2)

Preparing spinnable solutions from natural silk. I G Farbenind A.-G (Wilhelm Irion, inventor) Ger 522,086, Nov. 2, 1929 Degummed silk is dissolved in a concd strong mineral acid, *e. g.*, 89% $H_3PO_4$ at a low temp., preferably below 0°, and the soln is treated with a salt soln., *e. g.*, NaCl or HCOONa soln. The fibroin is thus pptd in a form readily sol at atm temp in solns of suitable alkali or alk earth metal salts, *e. g.*, in 50% NaSCN soln., giving solns suitable for the manuf of fibers by spinning into baths of coagulating salts

Preparing spinnable solutions from natural silk. I G Farbenind A.-G (Heinrich Fink and Ernst Rossner, inventors) Ger 522,408, Sept 1, 1929 Addn to 510,489 (*C. A.* 25, 1103). In the method of Ger 510,489, about 0.02–0.1% of an ethereal oil is added to the acid spinning soln The tendency of the spun fibers to stick together is thus reduced

Twisting effect in cottonized fiber. A V Talanov Russ 19,498, Feb 28, 1931. Fiber after having been cottonized by usual methods and after plucking and mellowing, is steamed in chambers with vapors of $H_2SO_4$ soln (8–10° Be.) or HCl (12–15° Be.) and then dried

Preparing cotton goods for roughening. Eduard Tschörner and Heinrich Ries. Ger 516,876, Sept 10, 1929 The cotton fabric to be roughened is treated with an alk soap soln or with a sulfonated oil in alk soln to which an oxidizing agent has been added An example of the latter agent is Turkey red oil and $H_2O_2$

Dulling cellulose esters and ethers. I G Farbenind A G (August Baumert and Richard Fischer, inventors) Ger 519,983, Nov 12, 1929 Addn to 512,390 (*C. A.* 25, 1393) Cellulose ester or ether yarns or fabrics are uniformly dulled by impregnating with an aq soln of urea, and then steaming The action of the urea soln may be enhanced by addn thereto of water-sol., aliphatic, hydroxy carboxylic acids, *e. g.*, glycolic or lactic acid, or their salts A dye may also be added to the urea soln Examples are given

Size-impregnated yarn package for use in knitting machines. Joseph A. Harron, James J Diamond and Gustav Bley. U. S 1,799,230, April 7 Yarn packages are formed with convolutions of yarn of a type having an inherent tendency to snarl or loop in untensioned state, with the convolutions adhering to each other by the action of the size employed so as to resist being too readily unwound from the package

Apparatus for the wet treatment of hank yarns. Maschinenfabrik Tillm Gerber Söhne & Gebr Wansleben Ger 522,382, Feb 5, 1930

Paste for textiles. Hikuzo Kato Japan 90,201, Feb 9, 1931 The paste is prepd by treating cherry-tree gum with NH$_4$OH, $Na_2CO_3$ or $K_2CO_3$ for 24 hrs and then mixing with boric acid

Apparatus for continuous steaming of material carried by looping bars. Stanley H Franklin (to Textile Finishing Machinery Co.) U. S 1,799,978, April 7. Structural features

Washing liquid for fibers. Hans Schwarzkopf Fr 698,101, June 26, 1930 A powd prepn suitable for making a washing or sprinkling liquid for treating wool or silk is made by mixing citric or tartaric acid with a non hygroscopic acid not acting on the citric or tartaric acid, such as boric acid or salicylic acid

Waterproofing fibers. Dunlop Rubber Co., Ltd., and The Anode Rubber Co., Ltd Fr 697,730, June 20, 1930 Fibrous or cellulosic materials are waterproofed by the application of rubber or vegetable resins in the form of an emulsion or aq dispersion with the addn of a wax or mixt of waxes

Waterproofing cloth. Edmond Decoclois. Fr 698,691, Oct. 7, 1929 A coating of latex which may contain appropriate ingredients to give designs is used.

Treating textile fabrics with substances for waterproofing, mothproofing, etc. Hilton I Jones. U S 1,799,047, March 31 Textile materials such as canvas are wetted with an emulsion contg petrolatum kept in suspension by the joint action of bentonite and an auxiliary emulsifying agent such as soap, casein and carrageen and the material is subsequently treated with a soln of a rare earth chloride such as Ce chloride so that a salt of the rare earth chloride is pptd in the material

Apparatus for bleaching, washing or other wet treatments of fibers. Emil Grimmer U S 1,799,685, April 7. Various details are described of an app comprising

a treating drum of "frustroconical" form, having an inclined axis, with its lower side substantially horizontal, fibers and water, Cl soln., oil, acid, benzene or other treating liquid being delivered to the larger end of the drum and withdrawn from its smaller end

Apparatus for treating fiber packages under pressure with fluids such as bleaching, dyeing or washing liquids. OTTO J OBERMAIER U S 1,708,623, March 31. Structural features

Drying apparatus for continuous strip material such as rubber-coated fabric. ROBERT R JONES (to Firestone Tire and Rubber Co.) U S 1,709,375, April 7. Leakage of vapors at the inlet or outlet passageways is prevented by maintaining a body of inert gas about the passageway at a pressure greater than that within the app. and greater than atm. pressure. Various details of app. are described.

## 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Irregular results of accelerated [paint] tests. P. NETTMANN. *Farben-Chem.* 1, 103–4(1930). cf. *C. A.* 25, 2009.—The composite nature of paint films is indicated, and an attempt is made to illustrate this by means of an equation. Surface forces and thickness of coat, and the effects of temp. on these, are further influences acting against the possibility of obtaining uniform results from accelerated tests, even if such factors as vol., shape, wettability and degree of grinding of pigment could be standardized. B. C. A.

Protecting paints of aluminum. H. BUSCHLINGER. *Hauszeit. f. Anstrich u. Erfinderwerk. Z. Aluminium* 1, 237–43(1929). *J. Inst. Metals* 43, 517.—The properties are described of Al paints which consist of a mixt. of Al powder with a binding agent (linseed oil, varnish, cellulose lacquer, bituminous colors). Some examples of their application for rust prevention are given. G. G.

Protective coatings of aluminum paint. H. BUSCHLINGER. *Vortrage geh. Jahresversammlung 1929 zu Wien* (Suppl. to *Korrosion u. Metallschutz*) 1929, 49–53. *J. Inst. Metals* 43, 517.—The value of Al paint as a protection against corrosion is discussed, it is particularly resistant to the action of moisture and $SO_2$ and, if desired, may be colored by the addn. of pigments. The manuf., properties and uses of the paint are described. It reflects 70% of the incident light and heat waves, and its radiation power is only 30% of that of a perfect black body. One kg. of the paint will cover about 15–20 sq. m. of surface satisfactorily. G. G.

Chalking of paints. IV. Practical studies of the chalking of oil paints. RICHARD KEMPF. *Farben-Ztg.* 36, 1173–6, 1216–7, 1256–9(1931). cf. *C. A.* 25, 1104.—The chalking of paints made up with one or more of the pigments, (1) red seal lithopone, (2) bronze seal lithopone, (3) low oil-absorption lithopone, (4) carbonate white lead, (5) sublimed white lead, (6) Kronos A titanium pigment, (7) $TiO_2$, (8) ZnO, (9) lead chromate, in vehicles contg. one or more of the oils, tung, boiled linseed, linseed and tung standoils, was studied. The area under the time-degree of chalking curve was taken as the amt. of chalking. The type of vehicle proved to be unimportant. The chalking of the single pigment paints was 4 least, 1, 7 and 6 increasing in the order named. The chalking of paints contg. lithopone in combination with 9, 8, 4 or 5 was 9 least, followed by 8, 4 and 5. Cracking sometimes accompanied pronounced chalking, *e. g.*, lithopone paints, but slight chalking was not always accompanied by cracking, *e. g.*, white lead paints. G. G. SWARD

*Analysis of an oil color.* A. GARCÍA BANÚS. *Anales soc. espan. fis. quim.* 29, 182–3 (1931).—A violet oil paste defied sepn. because the dyestuff dissolved in all known org. solvents and was insol. in water. Sapon. of the oil gave hopeless emulsions. Since such dyestuffs have usually a base of triphenylmethane, HCl was passed in, pptg. the dyestuff completely. The oil was dolphin or whale oil. E. M. SYMMES

Human factors in color judgment. W. O'D. PIERCE. *J. Oil & Colour Chem. Assoc.* 14, 90–109(1931).—A review of the psycho-phys. aspect of color matching indicates that individuals vary widely in the 3 fundamental attributes of color. Normality in one respect does not guarantee normality in all others. Results on pigments do not necessarily parallel those on lights. There are probably as many supernormals as subnormals. It is further emphasized that color judgment depends upon the human factor and that color has no existence apart from the presence of the observer. It is shown that experience is a large factor in matching color. G. G. SWARD

A simple device for measuring gloss. G. G. SWARD AND S. A. LEVY. *Am. Paint*

*& Varnish Mfrs'. Assoc.*, Circ. No 380, 162-4(1931).—A low cost device for viewing the reflection of an illuminated slit 1 × 20 mm at an angle of incidence and reflection of 45 is described and illustrated. Illumination is by an ordinary flashlight. The reflection from a sample is merely compared with that from standards of known gloss. The range of gloss from that of polished plate glass (= 100%) to 0% is divided into 5 steps: above 90, excellent, from 50 to 90, good, from 25 to 50, fair, from 10 to 25, fair, below 10, none. G. G. SWARD

Gloss and its quantitative measurement. L. D. RIES AND C. B. GILBERT. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 911-23(1930).—An app. is described for measuring gloss by photometric detn. of the intensity of specularly reflected light. The reflected light goes through a sharp max. when the angle of incidence of the rotating panel board equals the angle of reflection. Flat surfaces show no max. The amt. of specularly reflected light increases with the angle of reflection and approaches 60% for some polished panels. Gloss changes markedly with the angle of incidence except in very glossy panels. Diffuse reflection from darkly pigmented lacquered surfaces has been shown to be of the same order of magnitude as that from light ones. H. M. S.

Application of microchemical methods to investigation of the pigments in paintings. H. HETTERICH. *Mikrochem., Emich Festschr.* 1930, 152-62.—Particles of pigments may easily be removed from oil paintings by means of a fine needle moistened with glycerol, without causing any visible injury; details are given of microanalytical methods suitable for the examn. of the pigments. B. C. A.

Report of coöperative work on the determination of hiding power of paints and pigments and the tinting strength of pigments. ANON. *Proc. Am. Soc. Testing Materials* 30, Pt. I, 748-52(1930).—A series of pigment samples and pigment-in-oil mixts. was sent out by Am. Soc. Testing Materials, subcommittee VIII on Methods of Analysis of Paint Materials, to coöperating institutions who were requested to make tinting strength and cryptometer tests. The results led to the conclusions: (1) that the former Tentative Method D282-28T for tinting strength did not give consistent results, (2) that tinting strength should be studied further by the committee; and (3) that hiding power can be measured satisfactorily by the cryptometer, reproducible results being obtained by the several laboratories reporting on the pigment-oil mixtures. H. M. STARK

A discussion of hiding power and its measurement. G. P. A. STUTZ, JR., AND G. S. HASLAM. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 884-90(1930).—Indirect measurement of hiding power by measuring related properties such as tinting strength is not satisfactory. The paint-out test for hiding power is correct in principle but is time-consuming in application. Improvements necessary in the test before it will meet the definition of Subcommittee VIII on Methods of Analysis of Paint Materials include more uniform application, possibility of increasing the film thickness by an amount less than a normal coat, etc. The Pfund cryptometer measures hiding power simply and accurately but is applicable only to wet paints and to paints of over 70% brightness. The Pfund black-and-white cryptometer gives an accurate measure of the wet hiding power of a paint of any brightness. The Haslam spinning-film method measures hiding power accurately but requires expensive app. The modified paint-out test of Gardner is less accurate but simple and inexpensive. H. M. STARK

Hiding power and tinting strength of white pigments. R. L. HALLETT. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 895-910(1930).—This paper describes a method for detg. hiding power and tinting strength for white pigments. The hiding power test consists of a brush out of several coats on a white board with a black stripe down the center. Tinting strength was detd. by detn. of the amount of carbon black necessary to dil. the white color of the unknown to that of a standard white contg. a fixed amount of black. It is important in measurement of tinting strength that the pastes all have the same consistency and the same brightness. Hiding power and tinting-strength values for 20 white pigments obtained by the methods described showed a straight line relationship to each other. The hiding power in sq. ft. per lb. was equal to its tinting strength (carbonate white lead = 100%) multiplied by 0.10 + 3. H. M. STARK

Manufacture of titanium white. HANS J. BRAUN. *Metallbörse* 21, 507-8(1931).—Ilmenite is treated with 90% $H_2SO_4$ at about 80° or with 80% acid at 180-250°. $Ti(SO_4)_2$ and $FeSO_4 + Fe_2(SO_4)_3$ are leached from the brown mass resulting from the attack. Ti is pptd. as $Ti(OH)_4$ by hydrolysis of the soln. Hydrolysis is influenced by concn., temp., H ion concn., manner of agitation and the presence of foreign substances, both org. and inorg. The product of hydrolysis is amorphous and contains some $SO_4$ not removed by washing. The $H_2SO_4$ is neutralized by $BaCO_3$ or $CaCO_3$. Calcination

produces $TiO_2$ of microcrystalline form Other white pigments are mixed with $TiO_2$ to give the product special properties. $TiO_2$ pigments are superior in tinting strength and covering power and are chemically inert. H M. STARK

The inexhaustible red lead problem. HANS HENRIKLING *Farben-Ztg* 36, 1129-30(1931) —The value of red lead as a pigment is undoubtedly due to its ability to form so-called metallic glyceride systems, a property not possessed by iron oxides. Basicity or ability to form metallic soaps is not related to the durability of films. G G S.

Reaction of litharge with linseed oil at room temperature. K. CHARISIUS AND E. KINDSCHER *Farben-Ztg* 36, 1297-1300(1931) —A mixt of raw linseed oil 500 g and litharge 750 g was placed in a completely filled, closed flask and shaken daily for 7 weeks. At the end of that time there was obtained, (1) 316 g of a clear acetone sol oil contg 2.6% Pb The residue yielded an ether ext., (2) an org compd contg 46% Pb The residue from 2 was extd with a mixt 9 1 of benzene and alc. and yielded 47 g of a solid dark brown compd contg 30 4% Pb The residue from 3 contained no org material The principal change accompanying the reaction was a slight increase in the acid no. of the clear oil (1) from 5 6 to 7 1, and the oxidation (by the litharge) of the org portion of (2) The compn of the lead compd. in (1) is unknown but upon standing a white compd., apparently a neutral Pb soap of satd fatty acids, is deposited. G G SWARD

Lithopone. MASAO UCHINO AND K. KAMITANI *Repts Osaka Imp Ind. Research Lab Japan* 11, No 3(1931) —A general review is given on the methods of prepn., properties and the methods of analysis. F. I. NAKAMURA

The preparation of ultramarine blue and health. G ISSOGLIO *Industria chimica* 6, 27-30(1931) —The manuf of ultramarine blue, because it uses as raw materials silica, kaolin and S, developed a great deal of dust, which is found to induce pulmonary diseases. This industry is, therefore, classed as hazardous, and it is recommended that the dust be kept under control A. W CONTIERI

The preparation of an antimony yellow. JAROSLAV MILBAUER. *Chem.-Ztg.* 55, 222(1931) —A bright yellow product is obtained by grinding together $Sb_2S_3$ and 25% NaOH (1 6) in a ball mill for 3 hrs. The product is a solid soln of $Sb_2S_3$ and Sb oxides. This pigment is stable to 200°, has good covering power, but may not be mixed with colors that react with sulfides. W GORDON ROSE

Manufacture and evaluation of Schweinfurtgreen. A TIETZMER. *Farben-Chem* 1, 114-6(1930) —The prepn and properties of Schweinfurtgreen (Cu arsenoacetate) are described The characteristics of this pigment depend on purity and regularity of particle size, and details of its evaluation by chem analysis and by sieving and settling tests are given. B C. A.

Precipitating agents used in color-lake manufacture. A. W C. HARRISON *Farben-Chem.* 1, 105-8(1930) —An account is given of insol agents and mordants functioning by occlusion, *e. g.*, green earth, artificial Fe silicate, $Al_2O_3$, of sol. metal salts (true precipitants), *e. g.*, $Ca(OAc)_2$, $Pb(NO_3)_2$, $BaCl_2$, and of special synthetic agents, *e. g.*, Tamol NN and Katanol G. G.

Wood stains. A C. HEINEMANN *Farben-Ztg.* 36, 1259-60(1931).—Acid dyes have but little affinity for cellulose and when used for dyeing wood their effectiveness is due to the presence of lignin This fact was demonstrated by being able to dye newsprint paper slightly but filter paper not at all with Orange G Basic dyes are more suitable for wood The staining of wood with particular emphasis on wax emulsion stains is briefly discussed G G SWARD

Requirements of pigments for the linoleum industry. H. G. BODENBINDER. *Farben-Chem* 2, 58-61(1930) —The desirable qualities of linoleum pigments are fastness to light, resistance to cleaning agents, heat and acid; freedom from oxidation catalysts and from sol Fe salts. Each of these is discussed, and a general description of linoleum manuf is given B. C. A.

Notes on the oxidation of metallic keels and the means of protecting them from rust. H MASSEILLE *Peintures pigments vernis* 7, 1372-5(1930), 8, 1401-4, 1430-3(1931).—Devices for grinding and mixing paints are discussed. J W PERRY

Manganese soaps. II. HANS WAGNER AND G HOFFMANN. *Farben-Ztg.* 36, 1214-6(1931), cf. *C. A.* 25, 1695 —The degree of swelling of linseed oil films in water is proportional to the amt of Mn soaps present. Films contg Mn hydroxide, umbers, Mars yellow and Mars yellow plus 5 and 10% Mn soaps were prepd. Only the film contg pure Mars yellow was satisfactory from the standpoint of swelling in water. G. G. SWARD

Cooling produced by evaporation. HERBERT DABISCH. *Farben-Ztg.* 36, 1300 (1931) —A Lambrecht psychrometer was used to obtain the lowering of temp. pro-

duced by the evapn of some 21 solvents used in the print industry The wet bulb was unventilated and the detns were made at 27° and 10°, with relative humidities of 63% and 93%, resp With hygroscopic liquids, instead of a lowering, a rise in temp took place This was due to the heat of soln exceeding the heat of evapn G G S

**The formation of films of drying oils. A problem in organic colloidal chemistry.** C P A Kappelmeier *Chem Weekblad* 28, 174-83(1931).—A lecture, reviewing the various theories which have attempted to explain the mechanism of the drying of oils Stress is laid upon the fact that the problem must be considered not simply as one in org chemistry, but rather as one in org colloid chemistry G. Calingaert

**Ursolic acid and other plant products (in lacquer and varnish).** H A Gardner, G G Sward and A W Van Heuckeroth *Am Paint & Varnish Mfrs' Assoc*, Circ No 379, 154-60(1931).—The drying times of varnish or nitrocellulose lacquers in which ursolic or oleanolic acids have been added are greatly extended The acids dissolved in warm varnish are pptd when the varnish is cooled and act as flatting agents The tensile strength and elongation of lacquers are slightly reduced but the gloss is greatly increased by the presence of the acids The possibilities of derivs, such as esters and salts as plasticizers are suggested G G Sward

**Mirror-surface lacquers.** Max Ermes. *Diamant* 51, 286-8(1929), *Ceram Abstracts* 9, 208.—The properties of some of the varnishes or lacquers used in the mirror industry are discussed Varnishes contg alc are not used for silver mirrors as the residual alc causes them to be hygroscopic to some extent, while benzene varnishes are not good in cold weather, since the resin is decomposed and drying is held up No alternative solvents are suggested G G

**Thinners for cellulose lacquers.** P S Symons. *Brit Plastics* 2, No 23, *Synthetic and Applied Finishes* 2, 5-7, 12(1931).—The methodical blending of thinners for nitrocellulose lacquers are outlined with particular respect to such points as "flow," blushing pinholing and winkling' of the lacquer films Tables are given showing the diln ratio for nitrocellulose in various solvents using benzene, xylene, solvent naphtha and kerosine, resp as diluents and the evaporative rates for a no of solvents, also formulas for a general high flash point thinner, a general low flash point thinner and a cheap thinner S warns against the use of 'universal thinners" D Thuesen

**Butyl and amyl lactates as solvents for cellulose lacquers.** Otto Gerhardt *Chem Ztg* 55, 222(1931).—A brief discussion of the properties that characterize butyl and amyl lactates as desirable cellulose solvents W Gordon Rose

**Plasticizers for nitrocellulose lacquers.** P S Symons *Brit Plastics* 2, No 22, *Synthetic and Applied Finishes* 1, 169-71(1931).—The proper choice of plasticizers is discussed with consideration of the various purposes for which the lacquers are to be used The main characteristics of the following principal plasticizers are described diamyl phthalate, dibutyl phthalate, methylcyclohexanol oxalate, tricresyl phosphate, triphenyl phosphate *Sipalin ADM* (methylhexalin ester of adipic acid), *Sipalin MOM* (methylhexalin ester of methyladipic acid), camphor Bu stearate, castor oil, linseed oil tung oil and rapeseed oil D Thuesen

**New resins for the cellulose-lacquer industry.** F Harriss Cotton *Brit. Plastics* 2, No 21 No 22, *Synthetic and Applied Finishes* 1, 157-8 165-8(1931), cf *C A* 24, 525.—The manuf of nitrocellulose lacquers and enamels is broadly described Marked improvements in the properties of these have been obtained with the use of gutta percha and balata resins D Thuesen

**Resin studies. I. Preparation and autoxidation of precipitated lead rosinate.** W A La Lande Jr *J Am Chem Soc* 53, 1858-68(1931).—An app is described in which all the steps of the prepn of Pb rosinate (I) may be carried out in an inert atm. 2% solns of $Pb(OAc)_2$ and Na rosinate were found most practical for the pptn, the compn of the ppt was also found to vary with the rate of addn. of the $Pb(OAc)_2$ to the Na rosinate and with the time and rate of agitation of the reaction mixt Details are given of the prepn and a method is proposed for the analysis of the metal content of rosinates The rate and degree of O absorption by I depend, for a given pressure, on the temp The amt of O absorbed at equil corresponds to 3 atoms of O, the reaction product at this point is probably a combination of reaction products, rather than a definite compd. of 3 atoms of O with 1 mol of Pb abietate The mixt slowly liberates I from aq KI quickly from acidified iodide The product obtained at 60 atm pressure also liberated I from aq and acidified iodide. The dissocn of the end (or equil) product in the autoxidation of I evidently proceeds progressively as the temp is raised, there is an indication that this dissocn is never complete, and that a max dissocn is reached when 1 at equiv of O remains fixed by the rosinate The amt. of O absorbed in each case is thus an index of the stability (and the concn) of the end product at a

given temp for a const pressure The results are discussed from the viewpoint of the theory suggested by Dupont and Lévy (*C A* 24, 855, 1386, 1629, 2945, 5240) for the autoxidation of abietic acid C J West

**Resin studies. VIII. The Donath resin test.** Erich Stock. *Farben-Ztg* 36, 1176-7(1931). cf *C A* 25, 222.—The Donath test (*C A* 24, 5515) was carried out on a no of natural and synthetic resins and varnishes with and without rosin One g *of powder (in the case of resins)* was *cooked* with 5 cc $HNO_3$ (sp gr 1.32-3), cooled, diluted with an equal amt of water and finally neutralized with a large excess of $NH_4$ In many cases the test is useful, but it does not definitely identify rosin G G S

**Gum resin production and dry distillation.** P Bonnov *Trudui Vyatskii Nauch Issledovatelskn Inst Krasvedeniya* 5, 74-80(1929).—A number of processes resulting in change of products take place in gum resin production *The construction of app* permitting the primary products to escape before further decompn is of great importance B does not agree with the theory of Clason that the primary products are volatile in high vacuum The retort used for gum resin production in the Viatka region has always an exit for non volatile but fusible products before they are decompd by heat These are not obtainable in ordinary dry distn of wood and B therefore differentiates the latter from thermal decompn of wood, which is the process used by him A number of expts with cellulose lignin, sawdust, combustible slate, and peat were carried out in which the material was heated to 215-75° Lignin gave mostly products non volatile in a high vacuum half of them are sol in $H_2O$, the rest insol in the usual org solvents sol in NaOH less sol in soda As to the ether sol products it is known only that they are a mixt of weak acids and phenols Cellulose gave water sol products *(except charcoal) of sweet-caustic taste, 42-15% of the cellulose products were non* volatile They reduced an ammoniacal soln of silver oxide, gave a cuprous ppt with Fehling soln and showed reaction for carbohydrates with alkalies and with phenyl hydrazine First they could not be fermented but after treatment with dil acids they did The volatile matter contained considerable quantities of furfural and hydroxy *methylfurfural Wood and peat gave similar products The process is not changed* by application of steam and vacuum but the yields are increased Extn would probably give also solid infusible products, but for technical reasons this was not tried J G Tolpin

**The artificial synthetic resins.** René Chesneau *Bull soc ind Rouen* 58, 392 (1930).—A review is given of the methods of production, properties, and uses of synthetic resins, classified as phenol formaldehyde, urea formaldehyde, glycero-phthalic (glyptal) and coumarone I H Opfell

**Phenol- and cresol-formaldehyde resins.** Hans Stäger. *Helv Chim Acta* 14, 285-304(1931).—Resins were prepd by condensation of HCHO and PhOH (I) or $MeC_6H_4OH$ (II) and mixts of the 2 The II used contained varying quantities of *p* and *m* isomers The properties of these resins were compared The sp cond and *loss in dielectric rise while the dielectric const falls with increase in I content To a* smaller extent, the reverse is true for the II resins with rise in the *m* compd These facts show that polymerization takes place to a higher degree with II. A fall in the dielectric const, etc, is obtained by heating the resins The solubilities in alc and NaOH also drop with increase in duration of heating The force of cohesion (cementing force) *drops to a min upon heating and then rises steadily as the heating is continued, with* increase in I the min is lower and a longer time is required to attain it I M L

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The electrolytic preparation of white lead (Sachse) 4. Some unusual properties of colloidal dispersions (Williamson) 2. Hydroxide systems in Fe oxide colors (Wagner) 2. New compounds of Ti (Gardner, Bieloussa) 10. Polymerizing oils and fats [for linoleum industry and for addition to varnishes] (Fr pat 697,785) 27. Ornamenting artificial oil cloth, etc (Austrian pat 121,989) 29. *Condensation products [resins]* (Fr. pat 697,700) 22. Azo dyes [for use as pigments] (Ger pat 522,295) 25. Plastic materials (Fr pat 697,471) 23.

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*Paint mill.* Elmer Peters (*to Kent Machine Works, Inc*) *U S* 1,798,627, March 31.

**Titanium white.** Alexandre Follift and Nicolas Saindfrichin. Fr 698,516, May 26, 1930 Titanium white is prepd by sepn of the metal from its ores, *e g*,

ilmenite by concomitant reduction and oxidizing volatilization under the action of an air blast heated from 750° to 850° acting on a thin layer of a mixt of powd ore and reducing fuel moving forward under the action of air jets

Zinc oxide. Manufactures de produits chimiques de Jouy-en-Josas (Anciens Établissements Louis Descamps) Fr 697,760, June 21, 1930 ZnO free from impurities is made by transforming the Zn starting materials into $Zn(AcO)_2$ either by soln in AcOH or by double decompn., eliminating the impurities and submitting the solns or crystals of $Zn(AcO)_2$ to pressure and temp to allow the dissocn of acetate with recovery of AcOH

Destructively distilled castor-oil condensation product suitable for use in paints, varnishes and lacquers. Edward C. Holton (to Sherwin Williams Co) U S 1,799,420, April 7 Castor oil is subjected to destructive distn until the residue is 60–80% the wt of the original oil, and the residue is heated with 0.5–3.0 times its wt. of glycerol until the esterifiable constituents are substantially esterified, and the product thus obtained is then heated with 0.75–5.0 times the wt., of the residue, of phthalic anhydride until condensation is effected and a clear homogeneous product is obtained

Printing inks. Johannes Scheiber Ger. 522,277, Nov 6, 1928. For the prepn of odorless printing inks, a vehicle is used consisting of, or comprising, the viscous residues from the vacuum distn of castor-oil acids

Printing inks. Johannes Scheiber Ger 522,480, Nov. 6, 1928. For the prepn of odorless printing inks, a vehicle is used consisting of, or containing, an ester of a polyhydric alc with 9,11-octadekadiene-1-carboxylic acid This acid is prepd by the vacuum distn of castor-oil acids The esters may be boiled to a suitable consistency before use Cf preceding abstr.

Printing ink. I G Farbenind A.-G Fr. 698,639, July 8, 1930 Varnishes, which have a basis of cellulose derivs obtained by using only hydrophobe constituents, are used in flat printing machines Examples are given of the use of a varnish made by mixing nitrocellulose of low viscosity with castor oil, phthalic acid ester, benzoic acid ester, dammar resin or an esterified resin and lamp black or ZnO

Printing ink. Goro Nakao. Japan. 90,225, Feb 10, 1931. The ink contains KI or $NH_4I$ and starch.

Coating composition. Edward F Arnold (to Canadian Industries, Ltd.). Can 310,845, Apr 28, 1931 A striping enamel comprises nitrocellulose of low viscosity, a pigment and a polyhydric alcohol polybasic acid resin modified by more than 50% of drying-oil component Cf *C. A.* 25, 834

Nitrocellulose solvent and coating composition. David Carnegie, Jr. (to The Atlas Powder Co) Can 309,861, Mar 31, 1931 A coating compn. comprises 20 oz of cellulose nitrate per gallon of soln The solvent comprises by vol 30 parts of AcOEt, 35 parts of EtOH and 35 parts of a non toxic hydrocarbon oil fraction corresponding to a naphtha having an initial b. p of about 20°, with 50% passing over at about 90° to 95°, and 90% at about 105° with a dry point at about 115°.

Synthetic-resin coating composition. Horace H. Hopkins (to The Canadian Industries, Ltd) Can 310,124, Apr 7, 1931. A coating compn for a *linoleum base* contains an ester of glycerol, a polybasic acid, acids formed by the hydrolysis of linseed oil and acids formed by the hydrolysis of China wood oil, and a pigment.

Pyroxylin solutions. Hammermill Paper Co. Fr 697,780, June 23, 1930. See U. S. 1,768,253 (*C. A.* 24, 4391)

Varnish. "Cirine-Werke" Josef Lorenz & Co Austrian 121,984, Nov 15, 1930 Varnishes comprising wax, fatty oils, a Co siccative and benzine or turpentine are prepd by emulsifying a part of the wax, after preliminary comminution, with the fatty oil in the cold, and adding to the emulsion a cooled soln of the siccative in the fatty oil and a soln of the rest of the wax in benzine or turpentine. The wax may be paraffin, ceresin or beeswax, and the fatty oil may be wood oil, linseed oil or thickened linseed oil (stand oil) An example is given Cf *C. A.* 25, 2311.

Varnishes. Bakelite Corp Fr 698,091, June 26, 1930 A resin soln. contains a non hardening resin having a basis of thiourea, an anhyd hardening agent contg $CH_2$ in amt sufficient to harden the resin and a solvent for the resin and hardening agent. The soln is used as a varnish Cf *C. A.* 25, 2866.

Varnishes. Maurice Percot. Fr 698,712, Oct. 9, 1929 AcOH is added to cellulosic varnishes to increase the stability of the colors obtained by incorporating artificial dyes therewith

Crystallizing varnish. William O Stauffer (to Canadian Industries, Ltd.) Can 310,846, Apr 28, 1931 A crystg varnish contains 19 parts by wt of a resin made from glycerol phthalic anhydride and China wood-oil acids, 38 parts of blown

China wood oil, 5 5 parts of Co drier soln , 9 5 parts of solvent naphtha and 28 parts of high boiling gasoline

Plant for making varnish from wood oil. Wilhelm Schmidding Ger. 422,407, Feb. 14, 1925.

Recovery of values from fumes in varnish making. Robert S. Perry. U. S 1,799,177, April 7 The fumes are passed through a treatment conduit having an open end, and an alk. liquid is sprayed within the conduit and toward its open end, condensates formed are collected with the alk liquid, and after sepn the alk. liquid is further used for spraying App is described.

Lacquers, etc. I G Farbenind A.-G. Fr. 697,348, June 13, 1930. Lacquers and plastic materials having a nitrocellulose basis are colored an intense greenish blue, fast to light by the dyes obtained by condensing the hydrochloride of a dialkyl nitrosoaniline with a dialkyl *m* aminocresol or a monoalkyl *m* aminophenol. Thus, 2 dimethylamino-2'-diethylamino-3' methyloxazine may be used Other examples are given Cf *C A* 25, 2866

Pigmented lacquer base. Henry J Hemingway and Wm A Weidlich. U S 1,798,840, March 31 A non aq mixt of nitrocellulose and unground pigment such as "titanox" is subjected (without grinding or rolling pressure) solely to the kneading action of a mixing machine in the presence of a relatively small quantity of a liquid volatile solvent such as alc , EtOAc and $C_6H_6$ to initiate the dissolving of the nitrocellulose simultaneously with the pulverization of the pigment and its dispersion throughout the batch (the amount of the solvent being insufficient to dissolve all the nitrocellulose but sufficient to produce a high viscosity during the kneading), and addnl solvent is added after the pigment is broken down and dispersed

Fire-resisting lacquer. Fernando S. Vivas (to International Fireproof Products Corp ) U S 1,800,120, April 7 Gum dammar, "soluble cotton," oil such as castor oil, $CaCl_2$, $H_3BO_3$, alc., BuOAc, EtOAc, toluene and perchloromethane are used together

Condensation products of phenols and aldehydes. Wilfred S. Rothera, Stanley Blythen and H R Gillespie (Alphous Ostersetzer and Franz Riesenfeld, inventors) Ger 516,677, Mar 13, 1928 To produce the condensation product as a powdery ppt., a basic condensing agent contg less than 10% of a dispersing agent or protecting colloid, and which causes a 25% increase of volume, is added Neutral salts may be present Thus, a mixt of *m*-cresol and $CH_2O$ is added to distd water and gum arabic and heated A yellowish sand like resin powder results Further examples are given Cf. *C. A* 23, 1189

Phenol-aldehyde condensation products. Bakelite G m b. H. (Fritz Seebach, inventor) Ger 516,766, July 18, 1928 Pure resin like $PhOH$-$CH_2O$ condensation products are prepd by dissolving the crude condensation products in aq solns. of readily sol salts of $PhNH_2$ or toluidine with acids such as HCl, HBr, $HNO_3$ or $CH_2ClCOOH$, and distg the soln The distn may take place *in vacuo* or with addn of superheated steam In an example, aniline-HCl, water and cresol-$CH_2O$ condensation products are distd Further examples are given Cf *C A* 24, 3662

Moldable mixtures. Bakelite Corp. Fr. 698,183, June 28, 1930. A moldable mixt. contains a resin of the hexamethylenetetramine, triphenol type, an org retarder such as colophony and a filler such as mica or a hardened and divided resinoid Cf *C A* 25, 2823

Resinic acid derivatives. Chemische Fabriken Kurt Albert G m b. H Fr 697,470, June 16, 1930 Derivs of natural or artificial resinic acids are prepd. by heating resinic acids with acid derivs b above 200°, the acid of which when liberated may be easily eliminated by phys or chem means. Examples are given of the heating of colophony and of various copals with dibutyl phthalate, benzyl acetate, triglycerostearin or acetamide

Resins. John M Weiss. Fr 698,623, July 7, 1930. See Brit. 338,845 (*C. A* 25, 2581).

Fractionating rosin into resene and abietic acid. Fredrick W. Kressman Can 310,774, Apr 28, 1931 Rosin is distd at a pressure not greater than 10 mm of Hg Between 205° and 240° the vapors contain principally resene. Between 240° and 260° abietic acid chiefly distils over

Synthetic resins. Georg Walter. Austrian 121,999, Nov 15, 1930 Resinous products are prepd by warming with bases monomethylolurea or monomethylolthiourea, or reagents yielding them, or the products obtained from them by splitting off water, in the absence of any substantial amt of solvent Thus, monomethylolurea may be mixed with 1–7% of NaOH, added either as a solid or in concd soln , and the mixt heated to 100 130° The base may be neutralized at the end of the reaction The

products can be hardened by heat, with or without pressure, and may be used as molding powders or lacquer ingredients. Examples are given.

Synthetic resins. I. G. Farbenind. A.-G. (Leo Rosenthal, inventor). Ger. 520,858, Apr. 18, 1929. Addn. to 517,477 (*C. A.* 25, 2313). Compds. of $BF_3$ with aliphatic hydroxy acids, or with unsatd. aliphatic acids are used in the process of Ger. 517,477.

Synthetic resins. Bakelite Corp. Fr. 697,525, June 16, 1930. A moldable material is made by treating fusible resinous products from the condensation of PhOH, with substances, such as $Ca(OH)_2$, which transform the PhOH into phenolate. The cooled or solidified product is mixed with a compd. contg. active $CH_2$ groups to transform the fusible resin into an insol. infusible resin. Appropriate filling materials may be added. Cf. *C. A.* 25, 2867.

Synthetic resins. Bakelite Corp. Fr. 697,753, June 21, 1930. The hardening of a phenol furfurol resin is accelerated by the addn. of a basic substance such as lime and a compd. contg. $CH_2$ such as $(CH_2)_6N_4$.

Synthetic resins. Lucien Sellet. Fr. 697,908, Oct. 1, 1929. The OH groups of compds. such as glycerol are satd. with natural resins of acid function (colophony, copal, etc.) and a dibasic acid (adipic). Thus, glycerol 95, colophony 150 and adipic acid 146 g. are heated together.

Synthetic resins. Ellis-Foster Co. Fr. 698,598, July 3, 1930. Resins which may be dissolved or dispersed in water are made by treating the condensation products of a polyhydric alc. with a polybasic acid, with or without monobasic acids, by a base such as an oxide or hydrate of Ca, Ba, Mg or Zn or $NH_4$ or an org. base such as $(CH_2)_6N_4$. Cf. *C. A.* 25, 2312.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. Schierbel

**Problems of the research laboratory for the chemistry and biochemistry of fats in the Central Food Institute.** S. Ivanov. *Chem. Umschau Fette, Oele, Wachse u. Harze* 38, 96–100(1931).—A general review of the various problems concerning the compn. of fatty acids, the formation of oils within the plant from glucose via fatty acids and glycerol, the dependence of compn. upon climatic and geographic location and the possibility of control of this compn., all with reference to the development of agriculture and the oil and fat industry in the U. S. S. R. P. Escher.

**The so-called rancidity reactions of fats.** I. D. Holde, W. Bleyberg, G. Brilles. *Allgem. Öl Fett-Ig.* 28, 3–7, 25–9(1931).—When fats contg. mono- and di-glycerides are irradiated with ultra violet light in the presence of air, the free alc. groups are oxidized to aldehyde groups. Tristearin contg. mono- and di-glycerides when irradiated in the presence of atm. O gave a neg. Kreis test, a pos. Ag reaction (reduction of ammoniacal $AgNO_3$) and a neg. peroxide test. Synthetically prepd. tristearin, free of mono- and di-glycerides, after irradiation gave neg. reactions to all 3 tests. Irradiated olive oil and also triolein gave pos. reactions to all 3 tests. Irradiated tributyrin gave a neg. Kreis test, but pos. reactions to both the Ag and peroxide tests. Before irradiation all samples gave neg. reactions to the 3 tests. Tricaprin and 2 dicaprins were synthetically prepd., the latter from 1,2- and 1,3-dibromohydrin and were irradiated both in air and in an atm. of N. They were then subjected to modified Kreis tests and the Ag test. The Kreis test was modified by using only 0.05 g. of substance dissolved in 5 cc. benzine and in one test a 1% soln. of phloroglucinol and in the other a 1% soln. of resorcinol was used. The phloroglucinol reactions were as follows: all samples whether irradiated in air or N gave neg. results after 15 min. irradiation. The dicaprins after 4 hrs. gave a pale green and after 24 hrs. a dark green coloration. A 1:1 mixt. of tricaprin and dicaprin (prepd. from 1,2-dibromohydrin) gave a pale green coloration after 24 hrs. The same dicaprin irradiated in N gave neg. results after 72 hrs. The reactions in the resorcinol test were essentially the same as in the phloroglucinol, except that the color produced was red. The reactions in the Ag test were as follows: All samples gave neg. tests before irradiation. The dicaprins as well as the 1:1 mixt. of tricaprin and dicaprin gave pos. tests after 5 min. irradiation, while the tricaprin irradiated in air, and the dicaprin (from 1,2-dibromohydrin) irradiated in N gave neg. tests after 4 hrs. Before irradiation the tricaprin had a pleasant taste, after irradiation, an ozone like taste. The dicaprins, although they do not melt in the mouth after 8 hrs.' irradiation produced a slight to distinct "scratchy" sensation. The

1 1 mixt of tricaprin and dicaprin, which did melt in the mouth, also produced a "scratchy" sensation after irradiation W. F Hollens

**Yellowing of the fat in Australian frozen rabbits. Its nature and cause.** J. R. Vickery *J Council Sci Ind Research* 4, No 1, 1-5(1931) —The yellowing of the fat, especially about the kidneys, is due to long-continued action of O on the unsatd fat acids, specifically linoleic glycerides The yellow fraction of the fat was purified and resembled an oxidized acid contg 18 C atoms, the pigment existing *in situ* as an unsatd ketonic compd of undetd compn The yellowing occurs at cold-storage temps as low as —10°, though sharp freezing greatly retards the development and the accompanying rancidity When the fatty tissues of the rabbit were cold stored in an atm of pure N, no yellowing of the fat occurred The yellow color appeared soon after the reintroduction of O Various impermeable coatings were tried without success Blood and hemoglobin are effective catalysts for the production of the yellow color; hence the complete removal of blood is advised Some relief is obtained by packing the rabbits so that the muscular wall of the intestine covers the abdominal fat Cold-storage temps of below —14° are recommended C. R Fellers

**The detection of less than one-half per cent of oil of sesame in fats.** R. Lucentini *Ann chim applicata* 21, 82 3(1931) —See *C A* 25, 2316 A W. Contieri

**Determination of iodine number of liquid fats with mixtures of ether and water.** V I Tsafova *Zhur Prikladnoi Khimii* 3, 1207 21(1930) —The method of Margosches (*C A* 18, 2436) is satisfactory for liquid fats but in the presence of unsatd hydroxy acids the results are high If not enough $I_2$ is added HI unites with fats V K

**The aniline point as a constant of fats and oils.** C G Katrakis and J G Megaloikonomos *Praktika Akad Athenon* 5, 267 9(1930) —To det the aniline point of fats and oils, a certain quantity of the oil or fat is filtered, neutralized with NaOH (15% at 60°) and mixed with the same vol of normal benzine (Kahlbaum) Five cc of this mixt is placed in the app and 5 cc of aniline added to det the aniline point This method is useful in detg whether or not a particular oil or fat has been adulterated by the addn of other oils or fats with the same refractive index N v P

**A further study of the reactions occurring when oils and fatty acids are heated in the presence of active nickel on a support.** H I Waterman and M J van Tussenbroek *Chem Weekblad* 27, 146 7(1930) cf *C A* 24, 742 —The hexabromide value for soy-bean oil as detd by the method of Carriere is not altered by the usual technical method of deodorizing The hexabromide value is lowered by heating in a vacuum to 225°, the presence of infusorial earth and especially active Ni increasing the change The acid value increases on heating in a vacuum, and the change is largest in the presence of active Ni Elaidic acid is relatively stable toward active Ni on a support and in this respect resembles oleic acid F d Leeuw

**Fatty-acid components of the oil from the Malayan gavial, Tomistoma schlegeli and some properties of the oil from Pecten (patinopecren) yossensis Jay.** Seiichi Ueno and Nobuo Kuzei *J Soc Chem Ind Japan* 34, Suppl binding 92-3(1931) — Consts of the oil from the Malayan gavial, *Tomistoma schlegeli*, are $d_4^{15}$ 0 9166, $n_D^{40}$ 1 4623, I no 77 4, sapon no 197 6, acid no 19 4, R M no 0 54, acetyl no 22 4, unsaponifiable 0 44% The liquid fatty acids amounted to 64 3% and consisted mostly of oleic acid with small quantities of linoleic and linolenic acids The I no was 92 8 and the neutralization no 201 The satd acids consist of palmitic and a small quantity of stearic acid Oil from *Pecten yossensis* Jay had the following consts $d_4^{100}$ 0 9894, $n_D^{40}$ 1 4781, I no 204, sapon no 187 7, R M no 1 2, acid no 9 5 The mixed acids + unsapon gave $n_D^{40}$ 1 4705, I no 199 8, m p 30 9°, neutralization no 187 7, Br content 70 34%, ether insol bromides 50 46% E Schierubel

**A plant for continuous oleic acid distillation.** O Krebs *Teer u Bitumen* 29, 71-5(1931) —Crude oleic acid, the filtrate from the hydraulic fatty acid press, is heated by combustion gases to 340° in a special tubular heater the vapors are passed through a vertical purifying column, from which any nonvaporized liquid portion flows off at the bottom to a soft pitch reservoir, while the pure distd oleic acid is condensed and gives off its heat to preheaters P Escher

**Preparation and purification of linoleic acid.** H I Waterman and J A van Dijk *Verfkroniek* 4, No 2, 15-9(1931) —The fatty acids of sesame oil were brominated and the tetrabromostearic acid obtained was debrominated to linoleic acid This product $n_D^{20}$ = 1 4681 was fractioned in a cathode vacuum A further purification was obtained by dissolving 1 vol of linoleic acid in 2 vol of acetone (b 56 0-56 1°), cooling to —15° to sep out oleic acid and satd fatty acid, and then cooling to —30° to sep.

out linoleic acid, followed by refractionation in vacuum. The final product obtained had a $d_4^{20}$ 0.9031 and $n_C^{20}$ = 1.46643, $n_D^{20}$ = 1.46944, $n_F^{20}$ = 1.47642, $n_\infty$ = 1.48228, mol refraction $M_D$ = 86.49. F. J. G. DE LEEUW

**Hydrogenation of fatty oils by the so-called wet process. I. Hydrogenation in presence of nickel acetate under atmospheric pressure.** SEI ICHI UENO AND TAKAO YUKIMORI. *J. Soc. Chem. Ind. Japan* 34, Suppl. binding 109–11(1931).—Catalysts were prepd. as follows: A soln. of $NiSO_4$ was pptd. with $Na_2CO_3$ and the $Ni(CO_3)_2$ was dissolved in acetic acid and evapd., ground and screened. (2) Ni acetate was dissolved in water and kieselguhr, equal to 4 times the wt. of Ni in the acetate, was added, this was then dried and screened. (3) Kahlbaum Ni acetate was crushed and screened in the same manner. (4) Kahlbaum Ni acetate and kieselguhr were mixed as above. (5) Kahlbaum Ni acetate and pumice were mixed as in (2). (6) $Ni(CO_3)_2$ was mixed with kieselguhr equal to 4 times the wt. of Ni in the carbonate. The oil used had an I no. 188.3 and acid value of 0.5. Catalysts from 0.2 to 0.0% were added to 40 g. of oil and the temp. was raised and held 5 min. at 280° and then lowered to 180° and hydrogenation carried out for 1 hr. Catalyst No. 6 was first reduced in H. It was very difficult to control the expts. by this method and app. The rate of decrease of I nos. was not proportional to the amt. of catalyst used, and the catalytic power was far inferior to that of catalyst no. 6. E. SCHERUBEL.

**Absorption of oxygen by unsaturated oils. I. Influence of solvent on the rate of absorption.** SEI ICHI UENO, ZENSAKU OKAMURA AND TEI-JI SAIDA. *J. Soc. Chem. Ind. Japan* 34, Suppl. binding 106–8(1931).—The accelerating effects of various solvents on the oxidation of unsatd. oils was studied. A shaking app. was used. Co linoleate drier was added to linseed and sardine oil. The rate of oxidation was estd. from the vol. of absorbed O. A comparison of the effects of various solvents on the rate of oxidation shows in decreasing order for linseed oil as follows: glacial AcOH, decalin, EtOAc, turpentine, $CHCl_3$, acetone. With sardine oil: glacial AcOH, decalin, turpentine, acetone, $CHCl_3$, petr. ether. E. SCHERUBEL.

**Hydrogenation of oils at high temperatures and under high pressures. I. Hydrogenation with nickel under constant high pressures.** SEI ICHI UENO, TAKAO YUKIMORI, HEIJIRO TSUCHIKAWA AND SEIGORO UEDA. *J. Soc. Chem. Ind. Japan* 34, Suppl., binding 111–5(1931).—Three hundred g. of sardine oil of I no. 171.0, sapon. no. 190.7 and acid no. 1.05 was used with 3 g. catalyst consisting of 22.5% Ni and 77.5% kieselguhr in a steel tube of 2 l. capacity. The expts. were carried out with 50, 40, 30, 20 and 10 atms. for 1 hr. at temps. of 150°, 180°, 200° and 230°. The tube was shaken by a Shita's shaking mechanism. The following detns. were made upon the hardened product: m. p., I no., sapon. no., thiocyanogen no. The mixed and solid fatty acids were analyzed for m. p., I no. and neutralization value. The reaction was most rapid at temps. of 180° and 200°. Results are tabulated. E. SCHERUBEL.

**Solidifying point of vegetable oils.** J. MÓTYUSZ. *Kisérlet Közlemények* 31, 321–31 (1931).—Good results were obtained by a modified Mohr method with 6–7 g. of oil instead of 30–35 g. Solidifying points do not increase proportionally with addn. of solid triglycerides. Solidifying point curves bear a relation to the consistency of solid fats. The solidified fat is cryst. if the temp. increases upon solidification. Solidification curves of some glycerides change upon adding other fats to them, while some retain their original characteristics. S. S. DE FINÁLY.

**The cottonseed-oil industry.** E. L. CARPENTER AND LEO HOLDREDGE. *Mech. Eng.* 53, 353–9(1931).—Its history, economics, processes and problems. E. H.

**Preliminary study on peanut varieties at the Lamao Experiment Station, Lamao, Bataan.** PEDRO L. PAULINO. *Philippine J. Agr.* 1, 273–86(1930).—The oil contents of 13 varieties of peanuts are given. Varieties proving rich in oil, as per sample submitted, were Japanese, 56.90%, Tennessee Red, 56.40%; North Carolina Runner, 54.37% and the San Jose No. 1, 54.13%. Other varieties had 44.99–54.10% oil content. By analysis on the dry basis Tennessee Red contained 60.07% of oil, Japanese, 58.80%, San Jose No. 1, 58.08%, and San Jose No. 2, 58.01%; while other varieties contained 49.08–56.94%. JOHN O. HARDESTY.

**Greek tobacco-seed oil.** J. D. KANDILIS AND N. S. KARNIS. *Praktika (Akad. Athenon)* 4, 475–81(1929).—The (drying) oil (36.85%) had: I value 117.8–137.9, $d_{15}$ 0.9253–0.9440, $n^{25}$ 1.4735–1.4828, acid value 2.25–16.93, sapon. value 186.8–201.6, Hehner value 95.21–96.34, Reichert Meissl value 0.32–2.03, Polenske value 0.15–0.30. B. C. A.

**Factors of quality in copra.** F. C. COOKE. *Malayan Agr. J.* 19, 128–36(1931).—About 6% represents the water content of the av. stable condition for kiln-dried

copra stored in bulk Higher moisture produces deterioration with development of heat, acidity, rancidity and internal darkening and formation of white, brown, green and black molds As deterioration progresses the oil % increases because of the disappearance of tissue in the form of gas and water vapor. It has been found that bad Malaya copra with a high degree of rancidity, if stored under free ventilation, will diminish in acidity, while the copra, as a whole, will become dry and clean and the mold will fall away as dust. Drying arrests acid formation from the neutral oil, while the existing fatty acids are converted into water vapor and gas and thus reduce the free acid Rubbery copra does not press below 7% oil content; it results from young nuts Copra can be compressed to advantage for shipment at a pressure of 1 ½ cwt. per sq in without loss of oil E. Schierbel

**Examination of textile oils.** I. Ralf B Truesler. *Oil and Fat Ind.* 8, 51–7, 77 (1931).—The app that was designed to measure the susceptibility of an oil to oxidation consists of 3 parts, a reaction bulb, a gas-measuring device and a shaker. The bulb is made of pyrex glass and is 138 mm long and 40 mm in diam and holds 130 cc., which accommodates 25 g oil and 100 ml of O An inlet for O is provided by a capillary tube with a stopcock The oil sample is admitted through a sep. capillary tube near the bottom of the bulb The gas measuring device consists of a leveling flask of 300 ml capacity contg sufficient Hg to fill the tubing and to maintain a column in the stem of the manometer and to fill the gas buret. The flask is adjustable by means of a ring clamp The balancing manometer serves as a means for attaining a standard pressure in the buret when a vol of O is to be detd It is made from a 100 ml. pipet. The shaking device provides the means for oxidizing oils under conditions that can be controlled and duplicated It consists of a rocker arm 14 mm long from the axis of the shaft to the center of the bulb The upper part of the rocker arm from the axis of the shaft to the pivot of the rocker beam is 7.5 cm The rocker beam is given a transverse motion by a rotating wheel about which it travels in a circle of 36 mm diam at its point of attachment II. *Ibid* 103–6, 109.—A measure of the oxidizability of oils to predetermine their desirability for textile purposes can be ascertained by treating 25 g of oil with a definite amt of O in a reaction bulb at a definite temp in an oil bath and shaking at the rate of 140 shakes per min for 1 hr in a shaker It was found that fatty oils appear to pass through 3 stages of oxidation At ordinary temps. peroxide combinations are produced which are assocd with the subsequent occurrence of rancidity Increased temp during oxidation causes stable oxygenated compds. to be formed At higher temps oxidation resembles combustion in that $CO_2$ is evolved This reaction is most common with unsatd acids The accuracy of the method is approx 0.2% Dry oils should be used The new method permits numerous applications to problems dealing with the behavior of oils toward oxidation *E. g.*, the presence of unsatd free acids in a glyceride was found to render an oil more sensitive to oxidation The accuracy of this test permitted a study of textile oils regarding their stability toward O and also gave a means for evaluating antioxidants and for measuring their effect upon oxidizable oils E. Schierbel

Toilet-soap manufacture. W H. Simmons *Mfg Chemist* 2, 95–9, 107(1931).—A review. E. H.

**Unsaponifiable matter and so-called iso-oleic acids contained in toilet soaps on the market.** *Sei-ichi Ueno, Gentaro Inagaki and Heijiro Tsuchikawa. J. Soc. Chem Ind Japan* 34, Suppl binding 90–2(1931).—The unsaponifiable matter of 12 samples of soap was detd by Spitz and Hönig's method The insol mixed acids were subjected to the Pb salt alc method for sepn into solid and liquid acids The iso-oleic acids were calcd by A S Richardson's formula and varied from 2.2 to 5.5% It has been shown by the authors that 36–43% of the total acids are converted to iso-oleic acids during hydrogenation and by calcn about 5 to 10% of hardened oil was used in the raw material for these soaps, some of which were toilet soaps E. S

**Influence of the component glycerides of the soap base in the production of a white (milled) toilet soap when dried in a Proctor dryer.** G F. Caley. *Chem Eng Min Rev* 22, 472–3(1930).—*The transparent appearance, characteristic of milled soaps* made from soap that has been prepd by sudden chilling in a cooler and dryer, can be avoided by careful control of the proportions of solid and liquid acids in the soap stock B C. A

**Soap solutions. IX. Surface tension of aqueous solutions of binary mixtures of soaps having extremely different molecular weights.** J Mikumo *J. Soc. Chem. Ind* (Japan) 34, Suppl binding 115–6(1931), cf *C A* 25, 427.—Na salts of fatty acids whose mol wts are very small or very large are inefficient as detergents Surface tension at 40° was measured by Traube's stalagmometer for aq solns of binary mixts

of the lowest Na soaps of satd acids $C_6$ to $C_{10}$ and $C_{12}$ and also Na erucate, $C_{22}$. In these systems this soap is the primary adsorbate and dominant in quantity at the surface, even in the presence of more capillary active laurate, $C_{12}$. Soaps of $C_{14}$–$C_{22}$ are not able to improve the surface activities of their solns. by the addn. of soaps below $C_{16}$. Sometimes soaps below $C_8$ have a coagulating tendency upon the $C_{16}$–$C_{22}$ soaps because they are common electrolytes in dil. solns. E. Schreuber

**Migration of sodium chloride in soap cakes.** J. Mikumo. *J. Soc. Chem. Ind.* (Japan) 34, Suppl. binding 116(1931).—The fact of salt migration was verified for all aged cakes of boiled and settled and even milled soaps. The direction of migration is detd. by the difference in vapor tension between the outside and inside of the cake. M. believes that NaCl and other sol. impurities diffuse through the interfibrillar water of the cake mass. Sepd. curd soaps vary their structure during cooling, maturing and storage, becoming more and more fibrous, liberating a part of the hydration $H_2O$ as free (syneresis). Tenacity of the soap base seems to be closely related to the nature and content of soaps of higher liquid acids (oleate, ricinoleate, linolate) which form the basal structure by cementation of total mass and also give finer fibers to soaps of higher solid acids which otherwise would be very hard and brittle. F. S.

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Rayon oils (Mullin, Caldwell) 23. The Corail pea or *Adenanthera pavonina* (Pierarts *et al.*) 11D. Oil filters (Fr. pat. 697,949) 1. Oxidizing paraffins, etc. (Ger. pat. 522,361) 10.

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**Fats and waxes.** John G. Stephens. Fr. 697,572, June 17, 1930. Fats and waxes are atomized and coated with a harmless powder such as flour to prevent agglomeration and keep them in an easily used form, *e. g.*, as ingredients for cakes, confectionery, etc.

**Saponifying fats and oils.** Clemens Bergell. U. S. 1,799,496, April 7. In soap manuf. comprising a first and main saponification of oils and fats succeeded by a second and final saponification, the first sapon. is effected by boiling with an alkali lye, a small quantity of an electrolyte and water (the mixt. being boiled contg. about 56% of combined and uncombined fatty acids and 1.0–1.5% of the electrolyte) so that the product after boiling can be rendered viscous by addn. of a small proportion of water, and the second sapon. is effected by boiling after adding sufficient water that the mixt. contains about 50% of combined and uncombined fatty acids.

**Soft fat or oil from solid fats.** Yositora Iwamoto. Japan. 90,175, Feb. 6, 1931. Soft fat or liquid oil is manufd. from solid fats by the action of silent discharge against the fats *in vacuo* or in $N_2$ or $H_2$.

**Rotary drum apparatus suitable for extracting animal or vegetable oils or fats with solvents or for other extraction operations.** Walter E. Sanger and Oscar H. Wurster (Sanger's executor to Wurster). U. S. 1,799,481, April 7. Structural features.

**Polymerizing oils and fats.** I. G. Farbenind. A.-G. Fr. 697,785, June 23, 1930. Products particularly for use in the textile, linoleum and rubber industries or as addns. to varnishes, etc., are made by polymerizing vegetable oils or fats or their derivs. in the form of emulsions, small quantities of O or S or compds. liberating them being used as accelerators.

**Apparatus for extracting oily substances from grain, etc.** Philipp L. Fauth G. m. b. H. Fr. 697,296, June 12, 1930.

**Apparatus for removing oil from soy-beans and for semi-baking the beans.** Teiichi Satow. U. S. 1,799,256, April 7. Various details are described of a rotatable drum app. which may be supplied with solvent.

**Extracting oily substances from citrus fruit peel.** Wilbur A. Pipkin. U. S. 1,798,555, March 31. App. and mech. details of operation are described.

**Wax compositions.** I. G. Farbenind. A.-G. Fr. 698,643, July 8, 1930. Wax compns. contain wax and org. derivs. of $NH_3$ contg. at least one alkoxy or cycloalkoxy radical or both, or salts or derivs. of these compds., *e. g.*, mono-, di- or triethanolamine. Cf. *C. A.* 24, 1535.

**Cleansing agent.** Maurice Sado. Fr. 697,751, June 21, 1930. A cleansing agent is composed of black soap, powd. $CaCO_3$, boric acid, $Na_2CO_3$ and water.

**"Washing compound."** Joseph A. Seibert. U. S. 1,799,930, April 7. Coloring matter, perfume and alc. are successively added to a mixt. of $Na_3PO_4$, powd. soap and borax, with thorough mixing.

**Soap.** Saccharin Fabrik A.-G. vorm. Fahlberg List & Co. Ger. 522,367, Apr. 22, 1928. In the manuf. of soap contg. salts of aromatic chlorosulfonamides, decompn. of the salts in the presence of the soap is avoided by preliminarily treating the

soap or the fat from which it is prepd, with hypochlorites or Cl in an amt exceeding that necessary for bleaching

Soaps, etc. Soc. Parfy & Cie Fr. 649,716, Oct. 11, 1929 Soaps of all kinds, creams, etc, are improved by incorporating therewith org matter as from the secretions of glands of the digestive organs of an male, particularly the intestines

Soap powder. Adolf Wolter. Ger. 516,993, Nov. 1, 1928 See Brit. 322,760 (C. A. 25, 430)

## 28—SUGAR, STARCH AND GUMS

J. E. DALP

The sugar plant of the future. Eduard Gutwirt *Listy Cukrovar.* 49, 265–8 (1931).—A discussion of allied industries which may become subordinated to sugar plants as artificial leather, silk, gums, adhesives etc Frank Marpsh

A review of Czechoslovakian patents pertaining to sugar technology. Jiří Vondrák *Listy Cukrovar* 49, 229–32 (1931).—All patents are listed and described briefly Frank Marpsh

A contemporary comparison of the sugar-cane and sugar-beet industries. O Fallada *Chem. Listy* 25, 111–4 (1931) Frank Marpsh

The revaluation of raw sugar types used by the Prague exchange for goods and valuable papers K. Šandera *Listy Cukrovar* 49, 267–71 (1931).—On account of the effect of sunlight etc upon raw sugars the standards have to be rechecked every 2 yrs The color of the specimens is detd relative to one of the standards of a medium color After a search for mineral standards powd glass resembling sugar in color and in grain size was chosen as a standard Complete matching was not possible, for sucrose is cryst optically anisotropic and colored only on the surfaces glass has lustrous cleavage, is optically isotropic and is colored throughout its thickness All standard types of raw sugar showed an increase of 0.08 g in wt during the 2 yr period as a result of an increased humidity In 31 of the standards, the change in absorption did not exceed 1.5%, 6 standards showed an increase greater than 3% 2 were altered to visual inspection and discarded Since all standards are kept in the dark at 20° Š thinks that changes in humidity lead to a spontaneous refining of the raw sugar The small changes permit the same standards to be used for another (3rd) year Frequent (monthly) retesting is of no value Frank Marpsh

Adsorption from sucrose solutions. IV. Sucrose according to the stratum method. J. Vašátko and J. Vácha *Listy Cukrovar* 49, 215–9 (1931), cf. *C. A.* 24, 6053.—Sucrose solns lower the decolorizing effect of activated charcoal Sucrose solns (*d* 1.0904, *p*H 7.3) at 20° were passed through 10 g dry charcoal spread out in layers 7–8 mm thick The vol of sucrose passing through the charcoal layers increases linearly with time The time required for the flow of 50 cc of the above sucrose soln varied with different charcoals standard norite 27 sec, supranorite (5+) 41 sec, polycarbon 49 sec, supranorite (3+) 53 sec, carboraffin 56 sec, supracarboraffin 66 sec, and radite 93 sec. The same values were obtained with water, in dil solns, sucrose has little effect upon the rate of flow through charcoals The dry charcoal adsorbs more water than sucrose during early filtration Plotting the adsorbed sucrose against vol of soln filtered showed a typical isotherm with an asymptotic approach at a vol of 50 cc of filtered soln Colored sucrose solns deviated greatly from water curves, during the start of filtration water is adsorbed more rapidly than sucrose so that even a *neg.* absorption of sucrose may occur The max sucrose adsorbed by this layer method is the same as the max sucrose adsorbed by charcoal in suspension, providing the same ratio of soln to charcoal exists Leaching expts show a complete reversibility of the adsorption of sucrose upon charcoal Frank Marpsh

*p*H and acidity determinations of cane juices expressed by a fourteen-roller milling plant. Francisco S Gomez *Philippine Agr.* 19, 609–34 (1931).—Detns of total acidity by titration, *p*H by quinhydrone electrode and Brix solids were made of the juices coming from each mill of a sugar central The total acidity of the first mill juice is greater than that of crusher juice This is not due to bacterial action but to expression of acids from the rind of the cane Large amts of sucrose are lost when juice is allowed to stand more than 24 hrs When the mills are thoroughly washed once every shift, bagasse is periodically removed and the juices are handled promptly, the increase in acidity due to bacteria is negligible The use of chemicals in cleaning the mills is not advisable A. L. Mehring

**The results of eugenic experiments with sugar beets.** F. Chmelař and Jar Šimon *Listy Cukrovar* 49, 265-70(1931).—Four domestic varieties of sugar beets, 4 German and 1 Polish were grown on 12 plots. The order of total yield of sugar was Dobrovická, Zapotilova, Selecta Praha, Wohanka, Schoblert, Schreiber SS, Kleinwanzlehen N. Mette and Buszczynski P. Dobrovická, Zapotilova and Selecta Praha were characterized by a high yield and good sugar content and excelled all foreign varieties in total sugar yield. Wohanka had the highest sugar content but only an av. yield. Frank Marsh

**The increased sugar-beet yield by early planting and late harvesting.** Koch *Zuckerrubenbau* 12, 73(1930); *Listy Cukrovar.* 48, No. 12, Rozhledy 41.—Late harvesting is recommended. Frank Marsh

**The time for beet thinning.** Kamlah *Zuckerrubenbau* 12, 78(1930); *Listy Cukrovar* 49, No. 4, Rozhledy 1. Frank Marsh

**The prediction of the quality of a seasonal run of beets on the basis of beet analysis.** Jiří Vondrák. *Listy Cukrovar.* 49, 384-7(1931).—The quality of the alky. of beet liquors was predicted correctly in 10 out of 12 cases from the amide N content of the beet. V. considers the amide N an index of what the alky. of the juices will be from the same beets unless the alky. is not decreased by the inversion of sucrose. The frequency of rainfall is the most reliable criterion for making the above prediction. F. M.

**Parasites and diseases of beets for 1930 (Czechoslovakia).** F. Rambousek. *Listy Cukrovar.* 49, 387-97(1931).—A detailed annual report is given for all forms of parasites including the extent, no., type of destruction and effective means of eradication. Beet pathology is discussed in the same manner. Frank Marsh

**A negative correlation observed between the nitrate nitrogen in the juice of beet leaves and the weight of the leaves.** Donald D. Fran *J. Agr. Research* 42, 53-6(1931).—In order to reduce the possibility of serious sampling error it is necessary to choose leaves that are approx. the same size. W. H. Ross

**The yield of sugar from dried slices.** J. Hanous *Listy Cukrovar* 49, 352-3(1931).—A computation is given showing the cost of manuf. of sugar from dried beets. Frank Marsh

**The increase of polarization of sugar-beet mash by grinding, mixing and drying.** O. Kopecký. *Listy Cukrovar* 49, 275-83(1931). *cf. C. A.* 24, 312.—Samples ranging from 100 to 1790 g. were ground, mixed and weighed. The following facts were observed: (1) Beets lose weight during weighing. (2) Beet mash loses weight during mixing and weighing. (3) The loss in wt. is due to an evapn. of water, it is responsible for higher polarization values for mash than for beets. (4) The loss in wt. and increase in the polarization vary directly with the time of grinding, time and rate of mixing, time of analysis, temp. and humidity of the atm. and surface area of the exposed mash. (5) The smallest loss in wt. occurs during the weighing, the largest during grinding. (6) The increase in polarization always exceeds 0.1%, and may exceed 0.2%. F. M.

**Experiments on decolorizing greens from refined loaf sugar with norite.** I. F. Zelikman and A. I. Sichkarenko. *Nauk. Zapiski Tzukrovoi Prom.* 10, 403-17(1930).—Greens of 65° Brix mixed with 0.75% of standard norite were heated for 15 min. at 60°, 75° and 90°. The increase of the temp. from 60° to 75° gave a decrease in color of about 7% and with a further increase of the temp. to 90°, the color decreased about 5% more. To prevent an increase of reducing sugars at the high temp. all further expts. were made at 75°. Decrease of the d. from 70° to 50° Brix gave about 20% more decolorizing effect. An increase of the time of contact of norite with greens from 15 to 45 min. gave a very slight increase in decolorization. An increase of standard norite from 0.5 to 1.0% gave a noticeable decrease in color. A further increase of norite to 1.25% did not show any further benefit. Expts. at the refinery gave better results than in the lab., probably because of the thickness of the norite cakes in the filter presses. The quality of the sugar from greens treated with norite was lower than that of refined sugar of middle quality. Norite was regenerated by the following scheme. Discharged from filter presses it was mixed with water to about 20° Bé. and boiled with HCl for 1 hr., filter pressed and washed to a slight acid reaction. It was then heated in retorts. Norite used for lower grades of refined sugar was first boiled with NaOH for 2 hrs., then treated as above. Regenerated norite gave very poor results in decolorizing greens. The decolorizing power of norite depends on the initial color of the liquors. Hence decolorizing of refinery greens with bone black is more advisable as the decolorizing results are better and manuf. costs are lower. *V. E. Baikow*

**The Teatini method of clearing liquors.** K. Smoleński and M. Werkenthinówna. *Gazeta Cukrownicza* 68, 145-8(1930); *Listy Cukrovar* 49, No. 26, Rozhledy 24.—The process of using 1.01% CaO in the Hougaerde factory decreased the time of

filtration, and extn. of slices with a high CaO recovery. The [illegible] throughout the process are given. FRANK MARESH

The course of the first saturation. V. Saturation with oxalic acid in solutions of lime and sucrose. J. DĚDEK AND D. IVANČENKO *Listy Cukrovar.* 47, 271–3 (1931); cf. C. A. 25, 1700–1.—Studies in the course of satn. of a CaO sucrose [illegible] showed that the origin and quantity of sediments are not proportional to the quantity of $CO_2$, and that with a delayed or sudden formation of sed. ment, CaO and sucrose are removed from soln. Further satn. with $CO_2$ allows both CaO and sucrose to reenter the soln. from the sediment. The release of CaO exceeds the rate of satn. with $CO_2$ and leads to a temporary increase in alky. Solns. contg. 15% sucrose and 1% CaO were treated with increasing quantities of $(COOH)_2$. The course of the first satn. with $(COOH)_2$ gave the same picture of changes in alky. as $CO_2$, the withdrawal of CaO from soln. by the sediment occurs only at full satn. or at elevated temp. The addn. of $CaC_2O_4$ to CaO-sucrose-solns. causes an immediate withdrawal of CaO from soln. with the sediment. The alky. of the solns. after equil. is reached corresponds to a satd. CaO soln. CaO from a freshly or undersatd. soln. cannot be adsorbed by sediment. Sucrose is only adsorbed with adsorbed CaO. A max. of 2.5 equivs. of CaO is ppd. by $CaC_2O_4$. FRANK MARESH

Glycerophosphoric acid during filtration and saturation. BLAHOSLAV DUDOUŇ *Listy Cukrovar.* 49, 371–4(1931).—Sucrose solns. (15%) contg. 0.2 or 2.0% CaO were treated with Ca glycerophosphate (0.3 g. per 100 cc.) and digested 12–60 hrs. at 20° and 100°. The amt. of Ca glycerophosphate hydrolyzed ranged from 2.6 to 4.8%; and independent of temp. and time. During the satn. of a 15% sucrose soln. contg. 2% CaO at 80°, the hydrolyzed Ca glycerophosphate did not exceed 6.3% and 83.8% of the phosphate was carried down with the sediment in an insol. form. The ratio of inorg. phosphate to org. phosphate was 1:13. In com. preps., the reverse ratio holds because of the presence of inorg. phosphate in the root of the beet. During the 2nd satn., only traces (0.06%) of the Ca glycerophosphate hydrolyzed and 6.2% was ppd. with the sediment in an insol. form. The total Ca glycerophosphate recovered in analysis was 96.4%. Solns. contg. 15% sucrose, and 1.2491 g. Ca glycerophosphate per 500 cc. were made slightly acid with HCl and treated with 3.5 g. $CaHPO_4$. The ratio of org. P to inorg. P was 1.5. After heating the solns. were made alk. with milk of lime, cooled, made up to 1 l. vol. and filtered. The Ca phosphate ppt. carried with it 85.1% of the added glycerophosphate. The addn. of 1.4 g. $CaHPO_4$ to the preceding clear filtrate and a repetition of the treatment carried down 8.2% more of the org. P. The Ca glycerophosphate is hydrolyzed very little to glycerol + Ca phosphate during filtration, and satn.; it is deposited without decompn. in the sediment. This pptn. is due to the adsorption of the org. P upon the ready formed Ca phosphate ppts. Further studies with glycerophosphates from lecithin are promised. FRANK MARESH

The porosity of sediments. J. DĚDEK AND L. DOSTÁL. *Listy Cukrovar.* 49, 375–82(1931).—A series of runs with Krogg, Sweetland and Kelly presses contg. satn. sediments is described in detail. Increasing addns. of CaO up to satn. decrease the porosity; in a semi-com. plant when the CaO was increased from 1.2 to 4% the porosity decreased from 62.4 to 43.8. This is a reversal of the experience in com. operation. D. ascribes the discrepancy to an increased sp. gr. of the sediment with a decreased vol. of porosity. FRANK MARESH

Antiseptic medium "Lystonol." J. ZALESKI. *Gazeta Cukrownicza* 66, 653–5 (1930). *Listy Cukrovar.* 49, No. 4, Rozhledy 4.—During the foaming of liquors in the diffusion process, 20–40 g. Lystonol is added per ton of beets to prevent infection. Analysis shows $H_2O$ 72.43, HCHO 0.79, $ZnCl_2$ 8.03, NaCl 17.07, $CaSO_4$ 0.46, $FeCl_2$ 0.27, and $NH_4Cl$ 0.56%. The active disinfectants are $ZnCl_2$ and HCHO. F. M.

Volumeter of modified construction and its manipulation. V. YAVORSKII. *Nauk. Zapiski Tsukrovoi Prom.* 10, 423–9(1930).—The vol. of a lump of sugar is detd. by the difference in the vols. of kerosene in a volumeter (*C. A.* 23, 297; 24, 257). Instead of kerosene Hg can be used and has the advantage that the same sample of sugar can be used for crushing and soly. tests. The methods for the detn. of the constant of the app. and limits of the error are described. V. E. BAIKOW

Isolation of choline from beet molasses. V. STANĚK. *Z. Zuckerind. Czechoslov.* 55, 103–5(1931).—See *C. A.* 25, 1406. G. G.

Slow-boiling massecuites. S. A. WICKEY. *Intern. Sugar J.* 32, 594–5(1930).—See *C. A.* 25, 1114. E. J. C.

Seeding low-grade massecuites. G. F. MURRAY. *Intern. Sugar J.* 32, 595–6 (1930).—See *C. A.* 25, 1114. E. H.

Determination of total solids in massecuites, drainage liquors and molasses.

SAILLARD AND DARTOIS *Suppl circ hebd comité central fabr sucre* 42, No 2168 (Oct., 1930), *Chimie & industrie* 25, 440(1931).—As the usual method requires 5–6 hrs., Morizot has proposed a quicker method consisting in absorbing 10 cc of a 20% soln of massecuite in absorbent cotton contained in a glass tube 6-cm long and 3 cm in diam and passing heated air through the tube, one end of which is open and the other connected to a suction pump. The tube is placed in a double wall oven, heated by oil to 130°. At this temp and with a vacuum of 43 cm., drying is complete in 2.5 hrs., it can be shortened by increasing the temp and the vacuum. A. PARINEAU COUTURE

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The effect of N fertilizers on the yield and quality of sugar beets (MIKHALOVSKII) 15. Heart rot of sugar beets (GALMANN) 15. Cellulose amyloid (JUSTIN MUELLER) 23. Soil and cane composition in relation to Lahaina failure at Waipio Substation (HANSSON) 15. The measurement of cuprous oxide with permanganate solution (BRUHNS) 7. Recent investigations on the constitution of pectins [sugar beet] (BRIDEL) 10. Adsorption of sugars by animal charcoal and vegetable decolorizing carbons (TAKETOMI) 2. The effect of mineral fertilizers and manure upon the quality of sugar beets (STRACHENKO) 15. The constancy of vegetable composition according to Liebig and the sugar beet bred by selections (SAILLARD) 11D. Sugar cane α-cellulose (DE LA ROZA) 23. Fertilizer from sugar factory residues (U. S. pat. 1,709,176) 15. Drier for beets (Russ. pat. 19,535) 1.

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**Sugar purification.** MANUFACTURE DE PRODUITS CHIMIQUES DE JOUY-EN-JOSAS (ANCIENS ÉTABLISSEMENTS LOUIS DESCAMPS). Fr. 697,820, June 23, 1930. A colloidal suspension of a basic Zn hyposulfite, aldehydic or not, or like hyposulfites is prepd. by adding to the hyposulfite the desired amt. of an earth or alk. earth base corresponding or not to the metal of the hyposulfite. The products are used in sugar or pectin manuf. as flocculating agents for colloidal impurities.

**Purifying sugar solutions.** HOLZHYDROLYSE A.-G. Ger. 522,300, Aug. 6, 1929. In the electroosmotic purification of sugar solns. obtained by hydrolyzing cellulose, starch, etc., with acids, a three-cell app. is used in which the anode and cathode compartments contain a sugar soln. of approx. the same concn. as the soln. to be purified, the latter being contained in the middle compartment.

**Diffusion apparatus for extracting sugar, etc.** AUGUSTE EUGÈNE VASSEUX. Fr. 698,191, June 28, 1930.

**Apparatus and method for disintegrating and extracting juice from sugar-cane stalks.** WM. H. MORGAN, SR. (to Morgan Hurryeane Co.). U. S. reissue 18,022, March 31. Reissue of original pat. No. 1,646,762 (*C. A.*, 22, 329). The stalks are reduced to a loose fibrous mass by longitudinal splitting.

**Depurating a mixture of beets and water.** ARNALDO GUADAGNINI. U. S. 1,798,792, March 31. A mixt. of beets and water for the production of a saccharine liquid is heated in a sealed vessel to effect cooking under a pressure of about a half atm., and vapor in the upper part of the vessel is superheated by a steam coil for quickly blowing out the vaporized impurities from the vessel, the mixt. is subjected to a further cooking operation under pressure, and the vapor in the upper part of the vessel is again superheated for blowing off the impurities which are vaporized. App. is described.

**Apparatus for making an improved caramel.** EUGÈNE BASSIÈRES. Fr. 697,908, Mar. 25, 1930.

**Apparatus for liming molasses, etc.** CARL STEFFEN, JR. Ger. 522,359, Dec. 19, 1925.

**Washing apparatus for separating starch from starch-containing materials.** OTTO RIEMANN. U. S. 1,798,811, March 31. Structural features.

**Adhesive gum.** MARIO VISTARINI. Fr. 698,074, June 26, 1930. An adhesive gum in powder form is obtained by adding powd. gum tragacanth to a mixt. of salicylic acid and boric acid.

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## 29—LEATHER AND GLUE

ALLEN ROGERS

**Various vegetable tanning materials from Eritrea.** G. A. BRAVO. *Ann. chim. applicata* 21, 141–6(1931).—Several plants have been found in Italian Eritrea which contain high percentages of tanning materials. Among these *Osyris abissinica* (Eritrea sumach) and *Acacia nilotica* both have considerable tannins, 18.4 and 35%, resp., the first is widely diffused, but is readily affected by parasites while the latter is compara

tively rare However, *Caesalpinia tinctoria*, having tannin contents up to 51%, has been cultivated, and promises to become a source of tannins, and also to become a good substitute for sumach A W Contieri

**Analysis of miscellaneous tannery materials. Committee report.** V. J. Mel'nik. *J Am Leather Chem Assoc* 26, 249–57(1931) — Provisional procedures (based on familiar methods) are submitted for the routine analysis of sodium sulfide, lime, Epsom salt, soda ash, $NaHCO_3$, NaOH, $H_2SO_4$ and $NaHSO_3$ H B Merrill

**Determination of moisture in tanning extracts. Committee report. 1930-31.** Gene W Stanberry, *et al* *J Am Leather Chem Assoc* 26, 214–6(1931), cf *C A* 23, 3368 — Samples of quebracho and chestnut exts were analyzed for $H_2O$ by the direct and by the indirect methods Quebracho showed no difference outside the permissible range of expt'l error chestnut gave lower results by the direct method Lowest total solids resulted from 6–16 hrs' drying in the direct, and 16 hrs' in the indirect method Variations in humidity are without effect when the prescribed dryer is used The electric oven at 99–103° gave results for $H_2O$ that are very slightly higher than those obtained with the "evaporator dryer" H B Merrill

**Quantitative method for determining tannin colorimetrically and the value of the method of P. Menaul.** A B Shakhkeldian *Zhur Prikladnoi Khim* 3, 1117–24 (1931) — The unknown soln should contain 0.5–2.0 g tannin per l Add to 100 cc of it 0.315 g chem pure tannin dried at 100° and to 10 cc of the resulting soln add 10 cc of a 2% $(NH_4)_6Mo_7O_{24}$ soln and dil to 100 cc To 10 cc of the unknown soln add also 10 cc of a 2% $(NH_4)_6Mo_7O_{24}$ soln (neutral salt can be used) and dil to 100 cc After 15 min standing compare both solns in a Duboscq colorimeter and calc the results, assuming that 0.315 g chem pure tannin of Kahlbaum contains 0.015 g impurities This method is only 1/10 as sensitive as the method of Menaul (*C A* 18, 1005) but is simple, rapid and the color produced is more stable V Kalichevsky

**Some notes on microscopic technic with special reference to microtannology.** Fred O'Flaherty *J Am Leather Chem Assoc* 26, 257–64(1931) H B M

**Tanning and dyeing of furs.** A Dohogne *Bull officiale staz sper ind pelli mat concianti* 8, 168–71(1930) — Directions are given G Schwoch

**Application of colloidal mills to the leather industry.** Alan A Claflin *Leather Manuf* 42, 59–60(1931) — It is suggested that better emulsions with less emulsifying agent can be made for fat liquoring by the use of the colloid mill H B Merrill

**Skin color tests. Committee report, 1931.** C A Blair, *et al* *J. Am Leather Chem Assoc* 26, 223–34(1931), cf *C A* 25, 2325 — Pickled calf skin and sheep skivers were depickled with borax, adjusted to $p_H$ 4.8 with acetate buffers, and preserved with borophenol soln Tanning tests were made with cutch, quebracho and chestnut exts under a variety of conditions Collaborators' comments indicate that the method is generally satisfactory, divergent opinions are expressed regarding working details H B. Merrill

**Collagen and gelatin.** G C Hering and H R. Kruyt *Chem. Weekblad* 28, 142–50(1931) — A review F de Leeuw

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Extracts obtained in the manufacture of ethereal oils from conifers (Bobrov) 22. Röntgen diagram of collagen (Herzog, Jancke) 2.

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Synthetic tanning agent. J R Geigy A.-G Ger 515,664, Aug 17, 1926 A tanning agent free from mineral acid is prepd by treating neutral salts of the tanning material from aromatic hydroxysulfonic acids and $CH_2O$ (the soly of which in water depends on the presence of the $HSO_3$ group) with salts of $H_2SiF_6$ Thus, the tanning agent from cresolsulfonic acids and $CH_2O$ is neutralized with $Na_2CO_3$ and dried $Na_2SiF_6$ is then added A further example is given

Tanning green hides. Joseph M Brown. U S 1,800,131, April 7 The dehaired hides are treated with an aq soln of gum catechu ext, further subjected to the action of the soln with addn of fluid ext of wild haw and alum, then washed and dried

Drying apparatus for hides and furs. A A Popryadukhin Russ 19,534, Feb 28, 1931 Constructional details

Leather. Paul Raksanyi Austrian 121,093, Nov 15, 1930 Non-slipping chrome leather capable of being nailed is manufd by steeping the prepd hides successively in 3 baths contg (1) water glass 25 and linseed oil 2%, (2) $CaCl_2$ 10 and $KMnO_4$ 1%, and (3) chrome alum 20 and $FeSO_4$ 2% The proportions stated may be varied, and $CaCl_2$ in the second bath may be replaced by equiv salts

Greasing leather. Hanseatische Mühlenwerke A.-G and Bruno Rewald. Ger 522,041, Dec 6, 1927 Addn to 516,187 (*C A* 25, 2019) As an emulsifying

agent for prepg the compn described in Ger. 516,187, use is made of residues from the extn *of soy-bean phosphatides, e g, of dregs from soy* bean oil

Impregnating leather. LE CUIR LISSÉ FRANÇAIS. Fr. 698,720, Oct. 11, 1929 Leather is impregnated with a neutral mixt. of paraffin, petrolatum and boiled or crude *linseed oil in an non inflammable solvent,* particularly $CCl_4$

Ornamenting artificial leather, oil cloth, wood, etc. ADOLF ESSLER. Austrian 121,989, Nov. 15, 1930. Addn. to 114,418 (*C. A.* 24, 987). The materials are treated as described in Austrian 114,418

Degradation products of albumins. CHEM. FAB GRÜNAU LANDSHOFF & MEYER A.-G. (Erich During, inventor) Ger. 522,061, June 30, 1928 Leather waste, *e g*, chrome leather shavings, is heated with an aq soln of an alk earth hydroxide, and the mixt. is then treated with an alkali carbonate in an amt. insufficient to react with all the alk. earth hydroxide. Heating is continued, and the soln is then filtered, treated with $Na_2CO_3$ to ppt. $CaCO_3$, and filtered again

Demineralizing bones. GELATINES HASSELT & VILVORDE. Fr 697,634, June 18, 1930. See Belg 371,121 (*C. A.* 25, 1704).

## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Evaluating gas blacks by the D. P. G [diphenylguanidine] adsorption method. I. DROGIN. *India Rubber World* 83, No 6, 57–9, 62(1931) —Not all gas blacks adsorb a given accelerator to the same extent, and therefore the rate of vulcanization of a rubber mixt. contg the accelerator varies with the gas black used The analytical method described is claimed to be reliable in evaluating the effect of gas blacks on the rate of vulcanization and on the phys properties of the vulcanizate, with diphenylguanidine as accelerator *Procedure*—Agitate 2 g of gas black with 100 cc. of MeOH solns of diphenylguanidine of 6 different normalities (0.0025–0.20 *N*), centrifuge and titrate *10 cc. of the supernatant liquid with MeOH solns of HCl of the corresponding nor*malities (bromophenol as indicator) All calcns. are expressed volumetrically in terms of a single normality of HCl. The quantity of diphenylguanidine adsorbed as a function of the quantity remaining in soln. (both in terms of HCl), when expressed in graphical form (ordinate and abscissa, resp.) gives a curve which, converted to a logarithmic basis, becomes a straight line. The distance between the abscissa axis and the point of intersection of this straight line with the ordinate axis represents the logarithm of a const. The antilogarithm of this const. represents the value of the gas black. Exptl. data show the application of this method to 4 different gas blacks C. C. DAVIS

Behavior of various clays with crude and reclaimed rubber. H. A. WINKELMANN AND E. G. CROAKMAN *Ind. Eng. Chem.* 22, 865–9(1930) —Often the influence of 2 different clays on the properties of a rubber mixt. is greater in the uncured than in the cured mixt. The present paper shows the variations in raw rubber and in reclaimed rubber produced by various com. clays, as judged by plasticity, retentivity, phys tests, artificial aging and chem. analysis A microscopic examn. also shows the relation between particle size and phys properties of the raw and reclaimed rubbers The results are described in detail and shown graphically, and lead to certain general conclusions: (1) Chem analysis of a clay gives little or no useful information about its behavior in raw or reclaimed rubber On the other hand, its acidity or alky has an influence on the rate of vulcanization and should be detd. The color of a clay does not indicate its purity or behavior (2) There are wide differences in the effects of different clays on the plasticity, retentivity and softness of raw and reclaimed rubbers. (3) In cured new and reclaimed rubbers, clays vary greatly in their effect on the phys properties, the same relative effects being obtained in the new and reclaimed rubber mixts. There is not, however, so much variation in tensile strength in reclaimed rubber vulcanizates as in new rubber vulcanizates (4) Artificial aging in compressed O *serves better to distinguish clays and is an important test in judging their merits.* (5) By microscopic examn. it is possible to judge the relative effects of clays in new and reclaimed rubber, both uncured and cured. C. C. DAVIS

Rosin and rosin oil in rubber and reclaimed rubber. H. A. WINKELMANN AND E. B. BUSENBURG *Proc. Am. Soc. Testing Materials* 30, Pt. II, 807–27(1930) —Rosin and rosin oil can be satisfactorily used as softeners for rubber, with due regard to proper compounding conditions. Different types and grades of rosin and rosin oil are described, and the phys. properties of both gum and wood rosins are given in tables.

"Synthetic" rosin oils of low rosin content, retort pine tar and kiln pine tar, having acid nos. of 65–90, can be used interchangeably as softeners, but rosin oils contg much rosin, rosin itself or neutral rosin oil must each be handled differently. Besides acting as a softener during the mfg process, rosin also activates the accelerators, but because of its relatively greater effect as a softener the cure is slower with rosin than with fatty acids To prevent rosin from lowering the modulus and tensile strength of rubber, greater proportions of accelerator must be used Three different grades of rosin appeared to affect modulus, tensile strength and aging equally. If wood rosin is substituted for the pine tar in an ordinary tread stock formula, the rate of vulcanization and tensile strength are slightly lowered, and if substituted for the stearic acid there is considerable softening and the rate of vulcanization is lowered A no of expts are described, in which various grades of gum and wood rosin, pine tar and "synthetic" rosin oil are incorporated as softeners in a rubber compn and their effect on plasticity, "nerve," elongation and tensile strength, aging and softness ascertained Rosin is also useful in imparting tackiness to rubber, and as a devulcanizing agent Also in *India Rubber World* 83, No 6, 63–5, 67(1931), 84, No 1, 56–8(1931) H K. Salzberg

**Some recent engineering applications of rubber.** J R. Hoover and F. L. Haushalter *Ind Eng Chem* 23, 402–9(1931).—The discussion includes rubber bearings, electrodeposited rubber products, absorption of vibration and noise, heat resisting and oil resisting rubber products, rubber products resistant to chemicals, rubber as a preventive of aviation ice hazard and various other applications. C. C. Davis

**Toxic substances in the rubber industry. XX. Sulfur monochloride.** P. A. Davis. *Rubber Age* (N Y.) 29, 77–8(1931). cf *C. A.* 25, 2329.—A review and discussion of the physiol properties of $S_2Cl_2$ and preventive and remedial measures to be taken C. C. Davis

**Accelerated discoloration tests for white rubber products and methods of measuring the extent of the discoloration.** Harlan A Depew. *Rubber Age* (N Y.) 29, 27–30(1931).—The discoloration (yellowing) of vulcanized rubber upon exposure to sunlight is a function of (1) the character of the light (the shorter the wave length the more rapid the discoloration), (2) the temp (the higher the temp the greater the discoloration) and probably (3) moisture (the yellow color is leached away by water) Light from a Hg arc may be used as the basis of an artificial discoloration test, and the changes in color may be measured by a "K and E." color analyzer. In this way it was shown that the higher the lithopone content of vulcanized rubber the less did the latter discolor, and that ZnO inhibited the yellowing of vulcanizates contg lithopone C. C. Davis

**The effect of grit upon the stress and strain properties of a carbon-black stock.** L. P. W. Kearsley and C. R Park *Rubber Age* (N Y.) 29, 79–80(1931).—From a practical point of view, a small proportion of grit in C black does not impair the resistance to abrasion of a vulcanizate contg it, as shown by Twiss (cf. *C. A.* 20, 3838), and it is only the ultimate elongation and tensile strength which may be seriously affected. The present paper describes expts on this latter effect, a field of investigation not well covered in the literature To the base mixt : rubber 100, S 3.5, diphenylguanidine 1.25, ZnO 5, were added samples of a C black to which had been added increasing proportions of C-black grit from elsewhere The mixts were cured 20, 60 and 90 min. at 140° and tested for tensile strength and modulus. Up to 3% the grit had no measurable effect on the tensile strength or on the modulus. Above this proportion, the values began to decrease progressively When poor results are obtained with gas black, factors other than grit are responsible, notably poor dispersion of the pigment (cf Endres, *C. A.* 19, 1208) *Agglomerates in the unwet state disintegrate upon stretching and form points of weakness* The present day tendency to minimize times of mixing results in incomplete dispersion, and it is probable that premature tread wear and cracking are a result of this rather than of gritty pigments C. C. Davis

**A contribution to the problem of the impregnability of cord threads with rubber.** F A Hauser and M Hünemörder *Metallgesellschaft Periodic Rev.* No. 5, 13 S (1931).—There is almost no literature on the impregnability of fabrics by latex and by rubber in org solvents except the investigations of Dietrich (*C. A.* 24, 1543) and Grenquist (*C. A.* 22, 4875), and the methods used by both give untrustworthy results because of the changes which may take place during the rigorous treatment. For this reason a new microscopic method was developed which should be free of these shortcomings and with which were examd fabric or cord (1) covered with visibly thick rubber, *e. g.*, coated on both sides with or without previous impregnation, and (2) protected by a rubber coating of no significant thickness, *e. g.*, impregnated with latex or rubber in an org. solvent. In case (1) the sample is set in hard paraffin, dissected and

frozen with $CO_2$ to a depth of 200$\mu$, a microsection 20–30$\mu$ thick is cut on a sliding microtome, immersed in warm water, dried on a microscope slide, immersed in concd $H_2SO_4$ for 1–2 hrs., washed clean with $H_2SO_4$ and examd. directly or preserved in Canada balsam. In case (2) the sample is immersed in 7% gelatin soln. and solidified by cooling, and the same procedure used as before. The samples thus examd. were: (1) thread soaked in 5% benzine rubber soln., (2) sample (1) after treatment with $H_2SO_4$, (3) thread soaked in 33% latex (ammoniated), (4) sample (3) after treatment with $H_2SO_4$, (5) dry cord threads frictioned with rubber, (6) sample (5) after treatment with $H_2SO_4$, (7) cord fabric soaked in rubber in $C_6H_6$, then skimcoated on both sides and finally treated with $H_2SO_4$, (8) latex cord fabric coated on both sides and treated with $H_2SO_4$, (9) cord fabric coated on both sides and after vulcanization treated with $H_2SO_4$, (10) latex cord fabric coated on both sides and after vulcanization treated with $H_2SO_4$; and (11) dry cord fabric in sheets treated with $H_2SO_4$ after vulcanization. Microscopic examn. of these different samples made possible, in conjunction with earlier expts. on phenomena taking place during vulcanization (cf. *C. A.* 22, 4870, 23, 3597), the drawing of certain general conclusions. A fabric previously soaked in a $C_6H_6$ soln. of rubber is already completely impregnated with rubber before vulcanization, whereas a fabric soaked in latex is only covered with an external coating of rubber, even after vulcanization. When threads which have not been treated are embedded in rubber sheets, or when rubber mixts. are frictioned on dry fabrics, there is no impregnation previous to vulcanization, but impregnation takes place to a high degree during vulcanization as a result of the flow of the rubber. The extent to which weftless cords can be impregnated in a vulcanized state depends not upon whether the fabric has been previously treated but upon the phys. condition of the rubber. The reason that the rubber in latex is merely deposited on the surface is that the rubber hydrocarbon is present as particles whose av. diam. is 1–2$\mu$, and the capillary interstices of the fibers are smaller than these particles. The question whether cord fabrics and weftless cords prepd. with $C_6H_6$ solns. of rubber or those with latex are superior in strength, elasticity and durability is not settled by the present investigation. C. C. Davis

**Graphical tensile-testing machine for rubber threads.** S. H. Hahn and E. O. Dieterich. *Ind. Eng. Chem., Anal. Ed.* 3, 218–21(1931).—The new machine, the construction and operation of which are described in detail, allows the testing of thread having breaking strengths of approx. 400–2000 g. and elongations up to 1000%, with great precision at 200–700% elongation. Curves show the stress-strain curves of typical threads by this method and a comparison in 1 case with the stress-strain curve of the same vulcanizate by the ordinary method. C. C. Davis

**Experiments on some technical mixtures with reference to their electrical properties.** I. Jacobs. *Kautschuk* 7, 4–7(1931).—The object of the expts. was to ascertain to what extent the compn. and the color of rubber matting influence the elec. insulating power. In expts. already described (cf. *C. A.* 24, 4058) it was found that certain coloring agents like ocher and C black have unfavorable effects on the resistance to elec. puncture. In places where the sheets were united during vulcanization, and at the junctions of 2 colors in mottled samples, the resistance to breakdown was no lower than in the corresponding homogeneous sections. The higher the voltage the shorter the time before breakdown. A systematic study of the influence of various fillers on the dielec. resistance of matting was carried out by using a base mixt. contg. 45% natural whiting and comparing the behavior of this with corresponding mixts. contg. kaolin, kieselguhr, slate powd., marble and pptd. $CaCO_3$ instead of whiting. With kaolin and with pptd. $CaCO_3$ the resistance to elec. breakdown was less than with the other fillers. Kieselguhr and powd. marble gave the highest resistances, followed by slate and natural whiting, which were greatly inferior to kieselguhr and powd. marble. In every case the green *matting samples contg.* $Cr_2O_3$ *were inferior to the gray ones.* The quant. results of the elec. measurements are given in tables. C. C. Davis

**Accelerators of vulcanization.** I. Jacobs. *Caoutchouc & gutta-percha* 28, 15438–45 (1931), cf. *C. A.* 25, 2330.—The manuf., phys. and chem. properties and behavior from an accelerating point of view of com. thiuram derivs. are described, with quant. data. *Ibid.* 15485–91.—The properties and behavior of tetramethylthiuram disulfide under various conditions and in various types of rubber products are described, with quant. data. C. C. Davis

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An outline of the manufacture of carbon black (Cranor, Venuto) 18. Polymerizing oils and fats [for rubber industry] (Fr. pat. 697,785) 27.

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**Rubber compositions.** Paul Hoyer and Hans Hoyer. Ger. 522,091, Aug. 25,

1920 A fusible rubber compn that resumes its original condition on cooling is prepd by heating rubber or gutta percha with about 20–25% of paraffin, adding S to the melt in the proportion required for vulcanization and further heating until a liquid of watery consistency is obtained, to which fillers addnl rubber and S, etc., may be added The mixt should be stirred throughout the process The product may be cast, or applied to containers as a protective lining It contains only a little paraffin, the greater part evapg during the process An example is given

**Sponge rubber.** Gummi und Balata Werke "Matador" A G Austrian 122,000 Nov 15 1930 Variegated sponge rubber showing marbled or veined effects is prepd by combining a no of differently colored rubber masses to each of which suitable softening and gas forming reagents have been added The masses may be drawn out into thin sheets and superposed then rolled up together twisted and rolled out into strips which are laid side by side in a mold and vulcanized

**Preventing the deterioration of rubber.** The Naugatuck Chemical Co Fr. 697,630 June 18 1930 Rubber and other vulcanizable materials are treated with products obtained by the reaction in the presence of a dehydrating agent of a secondary aromatic amine having the general formula R NH R′ with an acid of the general formula RCOOH in which R is an org radical or H and R and R′ are mono or polycyclic residues in each of which the C atom α to the N atom is joined to a H atom Methylacridine obtained by the reaction of $Ph_2NH$ on AcOH naphthbenzacridines from phenylnaphthylamine or diacridylethane may be used

**Inhibiting cracking of rubber when exposed to sunlight** Sidney M Cadwell and Ludwig Meisel (to Naugatuck Chemical Co) U S 1,798,133 March 31 Sulfoxides (suitably 1–5% the quantity of the rubber) are used such as diphenyl sulfoxide, di *p*-tolyl sulfoxide, dibenzyl sulfoxide, dibutyl sulfoxide or dibenzyl disulfoxide

**Antioxidant for treatment of rubber.** Sidney M Cadwell and Sherman I Strickhouser (to The Dominion Rubber Co Ltd) Can 310,115, Apr 7, 1931 *Deterioration and surface cracking of rubber are retarded by treating vulcanizable rubber stock* with the material obtained by mixing a polyethylenepolyamine b above 130° and a monohydroxynaphthalene, and then vulcanizing the stock

***Antioxidant for treatment of rubber.*** Clyde Coleman (*to* The Dominion Rubber Co, Ltd) Can 310,141, Apr 27 1931 The deterioration of rubber is retarded by treating rubber in the presence of an accelerator and a vulcanizing agent with 4,4′-diaminodiphenylmethane, and subsequently vulcanizing the rubber

**Regenerated rubber.** American Glue Co Fr. 698,452, July 7, 1930 Rubber is recovered from waste rubber by submitting the waste to the action of the cleavage products from the dissocn of tanned leather during the process of devulcanization

**Plastic materials.** Jean Barr Fr. 697,641, June 18, 1930 A plastic-elastic material is made by dissolving in $CS_2$ the polymerization products of halogenated hydrocarbons of the group $C_nH_{2n+2}$ with polysulfides and by mixing this soln with natural rubber latex *Cf C A 24, 528*

**Masses resembling hard rubber.** I G Farbenind A.-G. Fr 698,208, July 2, 1930 Mixts of natural rubber and artificial masses resembling rubber are treated in the same way as *hardened rubber is usually treated* Besides S vulcanization accelerators and fillers may be added

**Temperature-regulating system for rubber extrusion apparatus.** Ralph B Day (*to Goodyear Tire & Rubber Co*) U S 1,800,180, April 7

**Rubber coatings.** Dunlop Rubber Co, Ltd, and The Anode Rubber Co, Ltd Fr 697,762, June 21, 1930 Cellulosic or fibrous vessels are coated with rubber or similar vegetable resins applied in the form of solns or aq emulsions or dispersions, which may also contain a wax or mixt of waxes

**Hose of rubber and fibrous material.** Charles W Leguillon (to B F Goodrich Co) U. S 1,798,798, March 31 Various details of mech assembly and vulcanization are described

**Compounding soap-forming materials with other substances.** Willis A Gibbons (to American Rubber Co) U S 1,798,253, March 31. In forming products suitable for compounding with rubber latex, a water-sol volatile base soap of a higher aliphatic acid such as $NH_4$ stearate is first mixed with a filler such as C black, in finely divided fluid form, which is nonreactive with the acid, the material is mixed with a rubber latex, *and the soap is then reconverted into the original material* (suitably by removing $NH_3$ in a drying operation)

**Synthetic rubber.** I. G. Farbenind A.-G. Ger. 522,090, July 13, 1928 Butadiene hydrocarbons are polymerized by treatment *with NaH at atm* or raised temp. An example is given.

Synthetic rubber. I G FARBENIND A.-G Fr. 697,679, June 19, 1930 In the polymerization of 1,3 butadiene or its homologs or analogs by the aid of alkali metals, the metal is placed in a vessel with one or more walls and is in communication through openings of at least 2 mm diam with the hydrocarbon. The vessel used may be filled up with the hydrocarbon which is allowed to polymerize and then added to the main mass of hydrocarbon

Rubber-vulcanization accelerator. RALPH V. HEUSER (to American Cyanamid Co.) U S 1,798,159, March 31. Dibenzylguanidine is used as an accelerator and general mention is made of the use of some similar compds

Rubber-vulcanization accelerators THE NAUGATUCK CHEMICAL CO. Fr 698,259, July 1, 1930 The aliphatic bases produced by the reaction of dihalides of ethylene or its homologs with $NH_3$ are used as accelerators

Triazine derivatives containing sulfur. SOC ANON. POUR L'IND CHIM À BÂLE. Fr 697,599, June 18, 1930 Triazine derivs contg at least one atom of exchangeable halogen are condensed with at least one mol of a S deriv. contg an SH group and a group easily removed. Such derivs of S are thiosulfates, thiocyanates, xanthogenates, di or poly sulfides The products are transformed by sapon and reduction to mercaptotriazines Examples are given including the prepn of dimercaptophenylaminotriazine (m 248°), mercaptoaminophenylaminotriazine (m 240°), dimercaptonaphthylaminotriazine (m 260–262°) and mercaptoamino-α-naphthylaminotriazine (m. 257–258°) The products are used in the *vulcanization of rubber*.

Apparatus for vulcanizing tire and other rubber articles. PAUL WIECHARDT (to Fr Krupp Grusonwerk A G.) U S 1,798,826, March 31 Mech. features

Vulcanizing rubber. I G FARBENIND A G Fr 697,568 June 17, 1930 Mixts. of rubbers obtained in different ways from natural and synthetic rubbers are vulcanized in the presence of finely divided C (lampblack) *Cf. C. A.* 25, 1412

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